

SIP005 - GUIDANCE ON MOORING





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SIP005

GUIDANCE ON MOORING

INTRODUCTION

The Health and Safety Executive provided support to Port Skills and Safety in producing this guidance, which is aimed at improvements within the Ports industry. This guidance may go further than the minimum you need to do to comply with the law with regard to health and safety.

It is for companies operating in the UK ports industry with responsibility for the safe design, construction, operation, management and maintenance of ports and terminal facilities and activities. It will also be useful to employees and their representatives.

Following the guidance is not compulsory and you are free to take other action. If you follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance. If the guidance goes beyond compliance, then this will be clearly identified.

For the purpose of this guidance, bollards and mooring equipment includes but is not limited to bollards, mooring hooks, quick-release mooring hooks, capstans, mooring buoys, heaving lines, fenders, wires or ropes, tension mooring systems and mooring dolphins.

Automated docking systems using hydraulics, vacuum or other methods to maintain a ship's position alongside when in port fall outside the scope of this guidance, as this is specialised equipment.

Regulations in this document are referred to by title but not year, because they are amended from time to time and the reader should always seek the current version. Acts are given a year as they tend to change less frequently. The list of references at the end of this document however does include a year that was correct at the time of publication.

Guidance within these shaded areas of this document denotes that the contents go beyond statutory compliance and are industry recommended best practice. These guidelines are not mandatory, though the legislation referenced below is. Individual organisations have a duty of care to those who might be affected by their operations and are responsible for devising arrangements that meet their obligations.



1. REGULATORY FRAMEWORK AND GUIDANCE

- 1.1. The two principal relevant pieces of law are the Health and Safety at Work etc. Act (HSWA) 1974, and the Management of Health and Safety at Work Regulations (MHSWR), which set out the basic requirements to ensure, so far as is reasonably practicable, the health, safety and welfare of all involved.
- 1.2. Port specific, Merchant Shipping and other legislation applies and should be referred to.
- 1.3. Approved Code of Practice (ACOP) L148 'Safety in Docks' was introduced on 6 April 2014: www.hse.gov.uk/pubns/books/l148
- 1.4. The PSS/HSE Safety in Ports guidance suite, available from the PSS website at: www.portskillsandsafety.co.uk/resources is an important supplement to Safety in Docks ACOP L148.
- 1.5. The Provision and use of Equipment Regulations, (PUWER), place duties on people and companies who own, operate or have control over work equipment. PUWER also places responsibilities on businesses and organisations whose employees use work equipment, whether owned by them or not.
- 1.6. Bollards and mooring equipment are considered to be Work Equipment under PUWER. If your business or organisation uses bollards and/or mooring equipment or is involved in providing work equipment for others to use (e.g. for hire), you must manage the risks from that equipment.
- 1.7. PUWER requires that equipment provided for use at work is:
 - 1.7.1. suitable for the intended use
 - 1.7.2. safe for use, maintained and inspected to ensure they remains fit for purposes
 - 1.7.3. used only by people who have received adequate information, instruction and training
 - 1.7.4. accompanied by suitable health and safety measures, such as protective devices and controls
- 1.8. The guidance is aimed at routine operations and does not cover some of the specialised and high-risk activities associated with handling dangerous goods and hazardous cargoes, or major hazards sites which are subject to the Control of Major Accident Hazards Regulations for which specialist advice may be required.
- 1.9. Reference can also be made to the International Labour Organisation's (ILO) Code of Practice on Safety and Health in Ports (ILO 152): www.ilo.org/sector/activities/sectoral-meetings/WCMS_546257/lang--en



2. HEALTH

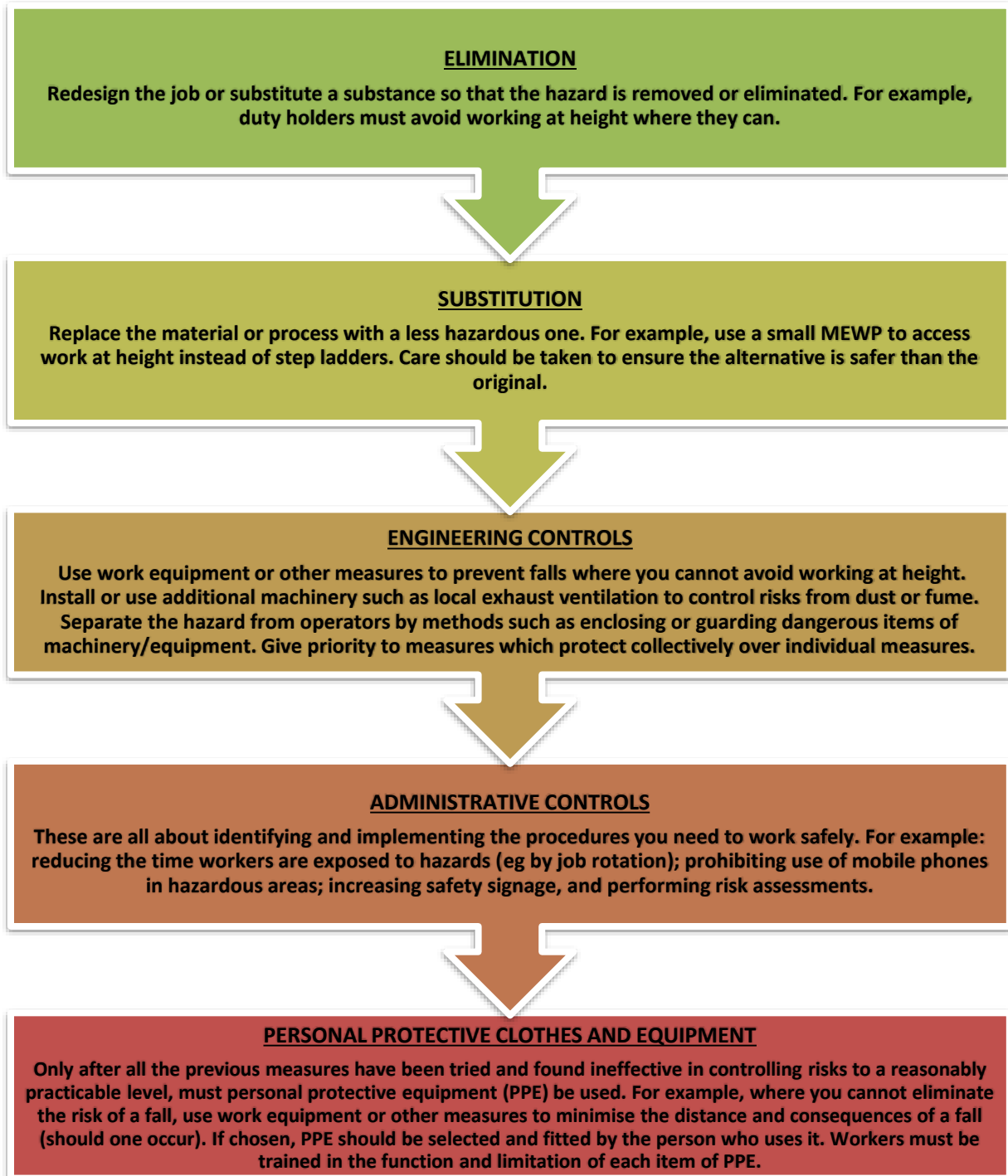
- 2.1. The wide range of activities in ports can give rise to possible health risks such as exposure to dusty cargoes; back injuries, sprains and strains from lifting and handling, pushing and pulling; noise and vibration. There is specific legislation including the Control of Substances Hazardous to Health Regulations, the Control of Noise at Work Regulations, the Manual Handling Operations Regulations and Personal Protective Equipment at Work Regulations.
- 2.2. While there is reference to some specific health risks in these guidance documents, it is not possible to cover all the issues. Further information and guidance on the identification, assessment and reduction or avoidance of such risks can be found on the HSE website at:
 - Ports web pages: www.hse.gov.uk/ports
 - Control of Substances Hazardous to Health: www.hse.gov.uk/coshh
 - HSE Whole Body Vibration in Ports Information Paper www.hse.gov.uk/vibration/wbv/ports.pdf
 - Musculoskeletal disorders (MSDs): www.hse.gov.uk/msd
 - Noise at Work: www.hse.gov.uk/noise
 - Personal Protective Equipment: www.hse.gov.uk/toolbox/ppe
 - Vibration at Work: www.hse.gov.uk/vibration

3. RISK ASSESSMENT

- 3.1. Risk Assessments must be undertaken in accordance with the Management of Health and Safety at Work Regulations. The risk assessment must consider the risks to everyone involved or affected by the activity. This includes but is not limited to non-permanent employees (NPE's), ship's crew, passengers and visitors. The appropriate control measures must be introduced and should consider collective measures before personal or individual measures.
- 3.2. Risks should be reduced to as low as is reasonably practicable by taking preventative measures in order of priority below. The diagram below sets out an ideal order to follow when planning to reduce risk.
- 3.3. Risk assessments must be reviewed:
 - regularly
 - immediately after any incident
 - when there are significant changes to the operation



HIERACHY OF CONTROLS



Reference: HSE Leadership and Worker Involvement Toolkit. Available at www.hse.gov.uk/construction/lwit/assets/downloads/hierarchy-risk-controls



- 3.4. Most accidents and near misses can be avoided if the risks from the work are suitably and sufficiently assessed and appropriate control measures adopted.
- 3.5. A risk assessment should record the significant hazards and risks of an operation together with the relevant control measures. In port operations risk assessments should consider changes such as tidal changes, weather, trim, list, load/cargo and vessel dynamics.
- 3.6. Planning and work execution are discussed in HS(G) 177, Managing Health and Safety in Dockwork: www.hse.gov.uk/pubns/books/hsg177
- 3.7. The Health and Safety at Work Act 1974 applies on board a ship when shore-based workers are engaged in cargo handling or other tasks on board. Cargo handling may include, but is not limited to:
 - 3.7.1. loading, unloading, stowing, unstowing, pouring, trimming, classifying, sizing, stacking, unstacking
 - 3.7.2. composing and decomposing unit loads
 - 3.7.3. services in relation to cargo or goods such as tallying, weighing, measuring, cubing, checking, receiving, guarding, delivering, sampling and sealing, lashing and unlashng.
- 3.8. The Health and Safety at Work Act 1974 applies to the Master and ship's crew when working with shore-based personnel on board ship.
- 3.9. A signed agreement or an agreed and recorded system of work with the master of each vessel is recommended. This is not a legal requirement but may help to ensure effective co-ordination with other parties.
- 3.10. Regulations made under the Health and Safety at Work Act 1974; such as:
 - 3.10.1. The Management of Health and Safety at Work Regulations
 - 3.10.2. The Lifting Operations and Lifting Equipment Regulations
 - 3.10.3. The Provision and Use of Work Equipment Regulations

do not apply to a master or crew of a ship, or any persons employing them, in relation to:

 - 3.10.4. safe access, plant and equipment which remain on board the ship
 - 3.10.5. any undertakings or work which are carried out on board ship solely by the master and the crew.

Instead, the Merchant Shipping Act 1894 and related Merchant Shipping Regulations impose similar duties on board ship in UK territorial waters.
- 3.11. A ship's Master has duties under the Health and Safety at Work Act 1974 in relation to the ship's crew who are put ashore to perform their own tasks. For example, self-mooring, loading ship's stores or carrying out maintenance work on their ship. Those duties extend



to plant and equipment (for example a forklift truck) under the Master's control being used ashore by ship's crew, or when used by shore-based workers ashore or on-board ship.

4. *CONSULTATION, COOPERATION AND COORDINATION*

- 4.1. **Consultation:** Employers have a duty to consult with their employees, or their representatives, on health and safety matters. By gaining worker involvement on health and safety through two-way communication, concerns can be raised and solved together and views and information can be sought and exchanged in a timely manner.

See HSE pages: Consulting and involving your workers – www.hse.gov.uk/involvement.

- 4.2. **Cooperation and Coordination:** Cooperation and coordination between shipside and landside employers is required. Employers must therefore carry out risk assessments and develop safe systems of work (in consultation with the workers involved) that all parties agree to, so that the respective employers can co-operate effectively with each other.

5. *RESPONSIBILITIES*

- 5.1. The Master of the vessel has the overall responsibility for the safe mooring of his ship, safety of his crew and a legal duty towards shore-side workers. Under the Merchant Shipping and Fishing Vessels Regulations, UK registered vessels (over 500 GT) must have risk assessments and prescribed safe methods of work for their activities, but this does not apply to foreign flagged vessels. However, under the International Safety Management Code (ISM), the Master of a vessel is to ensure safe shipboard operations, maintenance of the vessels equipment, and competence of the crew and to ensure the safety and co-operation with other shore side organisations which may be involved in the mooring process and other ship activities.
- 5.2. The employer or operator of the shore mooring team is responsible for assessing the risks to the mooring operatives, their competence, number and the risk assessments and safe systems of work under which they should work. Under the Health and Safety at Work Act this also includes a duty towards the Master and crew of the vessel and those engaged in other adjacent port operations. And for all to co-operate to ensure that health and safety requirements are met.
- 5.3. The owner of the shore fixtures, such as pontoons, quay ladders, capstans, buoys or other equipment used in mooring should ensure that they are:
- suitable for their intended use
 - of sufficient strength and well maintained
 - provide a safe berth for the vessel
 - ready for use prior to berthing



- 5.4. A work boat used in mooring operations must be fit for purpose, suitably equipped, maintained and operated in accordance with any requirements imposed by the MCA or Harbour Authorities and comply with any other safety requirement necessary for this operation.
- 5.5. The Port Marine Safety Code places a duty on Harbour Authorities and those designated under any harbour or port safety management system in compliance with the code to: provide a safe harbour and competent personnel to undertake marine duties. The National Occupational Standards for mooring operations are available from Port Skills & Safety. Harbour authorities may also determine the number of personnel within mooring teams for a given vessel. In all cases, it must be ensured an adequate number of trained competent personnel are allocated to mooring operations. This will ensure the safety of the vessel and all persons involved.
- 5.6. The berth operator must ensure, so far as reasonably practicable: that the intended berth is safe and, in all respects, suitable for the vessel to be moored there. This should include ensuring that the berth is of suitable size to accommodate the vessel. All hazards and obstructions should be cleared or moved to a safe position including: cranes, ship loaders or un-loaders, grabs and other equipment. There should be no concurrent activity taking place that could present a hazard to the vessel, such as hot work or other maintenance/repair work.
- 5.7. The berth must be clear of any other vessels and in plenty of time so as not to impede the approach of a vessel onto that berth.
- 5.8. Shore moorings should be in good condition and ready for use. A pre-use visual check should be undertaken by the mooring supervisor/team.
- 5.9. Lighting should be sufficient to ensure safe operations. At the same time, it should not impact on the night vision of the Master and/or Pilot as the vessel approaches the berth.
- 5.10. When staff of more than one employer are involved in mooring operations there must be clear and documented roles and responsibilities, relating to the different parties which must be communicated in good time to all concerned.

6. *ACCESS AND EGRESS FROM VESSELS DURING SELF MOORING*

- 6.1. It is the port's responsibility to ensure that the berth is suitable for the berthing and mooring operations. For more guidance and information on this please see ***SIP014 - Guidance on Safe Access and Egress***.
- 6.2. The ship owner / Master has a responsibility to ensure a safe means of access and egress as defined in Maritime and Coastguard Agency (MCA) Marine Guidance Notes (MGNs).



- 6.3. A safe means of access and egress can be broadly classified into two categories with regard to the time of vessel securing;
- 6.3.1. Access and egress after the vessel is safely secured alongside. For more guidance and information on this please see ***SIP014 - Guidance on Safe Access and Egress***.
 - 6.3.2. Access and egress before the vessel is secured (eg self mooring and dropping someone off, usually from a small craft).
- 6.4. Where vessels (including but not limited to smaller vessels such as tugs, workboats, line handling boats) need to make use of berths, a joint co-operative approach should be taken where reasonably practicable between the berth operator and the vessel operator to formally identify and evaluate the shared risks of vessels being moored on berths. Joint co-operation may include but is not limited to:
- 6.4.1. Holding regular meetings and engagement with vessel operators where safety topics can be discussed
 - 6.4.2. Where appropriate, carrying out joint site specific risk assessments, including identification of safe methods for mooring and access / egress between the berth and the vessel, with specific attention on any requirement for the need to 'Self-Moor'
 - 6.4.3. Agreed procedures and protocols between both parties. Self-mooring is a hazardous practice and, if it cannot be avoided entirely, then it should only be attempted following formal risk assessment by both the vessel and berth operator.
 - 6.4.4. A code of practice for the safe mooring of vessels
- 6.5. Further guidance regarding safe access and egress can be found in ***SIP014 - Guidance on Safe Access and Egress***.

7. ***MOORING OPERATION HAZARDS***

- 7.1. There are a number of hazards associated with mooring activities. These include but are not limited to:
- falls from height
 - slips, trips and falls
 - parting ropes or wires
 - stepping over, passing under or standing in the bight of ropes or wires
 - manual handling
 - being hit by flying objects such as inappropriately weighted heaving lines
 - entanglement, entrapment, or crush injuries
 - working from boats
 - use of capstans and winches for example riding turns



- working on, near or over water, falling into the water, hypothermia, drowning
 - cuts and lacerations from damaged wires
 - water borne diseases
 - overloading fixed mooring equipment
- 7.2. As the ship approaches the berth, heaving lines will be either thrown from ship to quay or vice versa. These light lines, often with a weighted end or 'monkeys fist' will then be tied to a further messenger line, then to the mooring line. In some cases the heaving line may be attached directly onto the main mooring line.
- 7.3. Where mooring boats are used, the mooring ropes/wires will be lowered down to the boat to take ashore to the waiting mooring team, who will then make the rope/wire secure to the appropriate bollard or dolphin.
- 7.4. Once a mooring line is secured on a shore-side bollard the ship will then utilise its winches to heave on the ropes/wires to tension them and to pull and hold the ship alongside.
- 7.5. When sailing, the ship will slacken its ropes/wires, which can then be released from the bollard by the mooring team. The ship will recover the lines back on board and depart.
- 7.6. The practice of using vehicles for mooring tasks has become increasingly popular and in some cases specialist trucks have been developed. If vehicles are to be used then the risk assessment must cover this activity and staff need to be aware of the dangers involved and control measures in place. The mooring supervisor/ person in control of the operation must have radio contact with the vessel. A means of quick release of the ropes should be provided to help avoid the risk of a vehicle and occupants being dragged into the water, in the event of adverse vessel movement or if fouling of the capstan occurs.
- 7.7. All mooring operations should be properly planned. Where vessels call regularly, mooring configurations could be recorded as standard operating procedure. Such plans may also consider mooring configurations for different weather conditions, particularly at tidal or exposed berths where some moorings may need 'doubling up', for example in adverse conditions.
- 7.8. Having pre-written plans produced in co-ordination with the vessel ensures a uniform method of work and may reduce the risks in many circumstances.
- 7.9. In any event mooring teams will need to follow the requests of the Master as to how many moorings are needed. It is the Master's duty to determine this and it may vary depending on weather and tidal conditions or the condition of the ship.
- 7.10. As part of their pre-planning, port operators may also have to consider the position of quayside equipment when vessels are berthing. There have been instances when ships manoeuvring alongside a berth have made contact with quayside cranes and other structures. Such contact has caused fatal incidents and resulted in the destruction of cranes.



It may be appropriate to move cranes away from the area until the ship is alongside or clear, or ensure cranes are positioned in the ship's mid length area as the ship manoeuvres near to the quayside.

8. CONTROL MEASURES

8.1. Risks (as identified through risk assessments) should have associated control measures to be adopted to reduce the risk of injury to personnel engaged in mooring activities. Such control measures will include but may not be limited to:

- guarding and fencing arrangements
- information, instruction and training
- safe use of work boats safe use of bollards and mooring equipment
- co-ordination with other dock activities, including suitable control of quayside operations and vehicle movement in the vicinity
- lighting arrangements
- communications between ship and shore
- manual handling techniques including the use of mechanical aids
- provision of appropriate PPE, such as lifejackets, safety helmets, high visibility clothing and gloves

8.2. Access to some quays, jetties, berths and terminals may give rise to additional risk, for example working at height, water safety, restricted working areas including areas where cargo handling is being undertaken, unguarded edges and access via boat or vertical ladders. It is important that the risk assessments cover suitable and sufficient controls for these additional aspects. See also ***SIP014 Safe Access and Egress***.

8.3. More detailed information, guidance and advice on controlling these risks can be found in other documents in this guidance series e.g. ***SIP009 Guidance on Lighting***, and on the HSE website:

- Work at height: www.hse.gov.uk/work-at-height
- Manual handling/ pushing and pulling: www.hse.gov.uk/msd
- Personal Protective Equipment: www.hse.gov.uk/pubns/indg174.pdf

8.4. Training of staff for mooring activities is absolutely essential. Good handling techniques for ropes and wires are vital. Personnel must know where to stand as weight comes onto ropes and wires. It cannot be emphasised enough that when the weight of a manoeuvring ship is taken on a mooring rope, personnel must be positioned away from the snap back zones. Similarly, hazardous loads can be produced by the ship's mooring winches when heaving on ropes or wires. Training should be updated where procedures or circumstances change.



- 8.5. Specific berths, jetties, quays and terminals may require specific additional control measures. Examples of these include petrochemical facilities or other areas where hazardous materials and cargoes may be encountered.

9. *MOORING ASSISTED BY LINE HANDLING STAFF AND SELF MOORING*

- 9.1. It is the responsibility of each individual port facility to identify the criteria required for mooring or self-mooring operations. Considerations may include but are not limited to: vessel length overall, tidal flow, weather, vessel type and handling capability, facilities available on the quay (e.g. static lines). The criteria should be made available, by appropriate means.
- 9.2. It is the responsibility of the Master to conduct their own risk assessment of the mooring operation. The Master should take into account the port facility mooring criteria, when deciding whether or not it is safe to conduct self-mooring.
- 9.3. Self-Mooring
- 9.3.1. Self-mooring operations should only take place on berths that have been agreed and approved by the Harbour Authority or berth provider.
- 9.3.2. Self-mooring requires a person or persons to transfer between vessel and quay where the vessel is either moving or has the potential to move. Consequently, self-mooring gives rise to increased risk when compared with line-handling assisted mooring. This should be taken into account when completing the risk assessment.
- 9.3.3. Under the hierarchy of controls, if self-mooring is being used, the preference should be for the use of measures such as shore-based mooring lines, that remove the need for persons to transfer between the vessel and quay to make fast or let go.
- 9.3.4. Where the transfer of persons between vessel and quay has to take place (include dropping someone off) the vessel must ensure that a safe system of work is in place. Considerations should include but are not limited to:
- maintaining the vessel steady along side
 - communications between master and person(s) to transfer
 - safe point of access/egress to/from the quay, including but not limited to height difference and stepping up or down on quay means of access
 - means of ensuring that person(s) remain in a safe position until authorised by the Master to make the transfer

9.4. Line-handling assisted Mooring

9.4.1. Linehandlers should be at the quay in adequate time before the vessels arrival to ensure the area and equipment is checked. Such checks will include:

- wearing appropriate Personal Protective Equipment e.g. hard hat, safety footwear, high visibility garments, gloves and life jackets;
- means of communication, for example VHF radio and battery;
- quay conditions, for example housekeeping, obstructions, and access to the quay area
- quay ladders are in good condition and free from obstruction
- any quick release hooks are operational
- operation and safety features of any powered capstans or winches

9.4.2. The supervising line-handler should confirm the mooring plan with the berth operator and make contact with the vessel. This should be done via a suitable method, such as VHF, to:

- Test communication
- Enable the master/pilot to confirm the berthing arrangements and identify if any special arrangements are required
- The supervisor should also check the type of lines to be used to ensure there is a sufficient mooring team available.

10. HANDLING A MOORING LINE

10.1. Ships will in most cases use ropes or wires to moor safely alongside a jetty, pier or berth. Such ropes and or wires normally belong to the ship and remain on board the ship. In some cases, they can be very large diameter and have a high breaking point in order for them to withstand the loads they will encounter during a mooring operation.

10.2. In order to get the ship's ropes to shore, a smaller line is attached to the mooring ropes which is known as a heaving line. Heaving lines are thrown from the ship to shore or vice versa. The weighted end of the heaving lines, often referred to as a "monkey's fist" is a rope knot. It is the knot itself that provides the weight to the line, but other knots are also used as are small 'sand' bags. A Monkey's fist should never have added weights inside it. The weight of the monkey's fist should be sufficient to allow the line to be thrown into a wind but should not be heavy enough to cause serious injury should it inadvertently hit someone.



Fig 1: A Heaving line

Note: mooring gangs should be made aware of the danger that some ship's crew may try to increase the weight of heaving lines by attaching shackles, bolts, metal bars etc. If these are found, they should be reported to the Master to be rectified.

- 10.3. Linehandlers must keep clear of the jetty edge when handling lines. The weight of the line should always be taken by one person whilst another walks a slack line along the jetty. Lines under tension should not be walked along the jetty.
- 10.4. Always hold a line by the side of the eye or the standing part and throw the eye over the bollard or hook.
- 10.5. When handling mooring lines, the following precautions must be observed:
 - Never stand on or stand astride a tensioned line or attempt to step over it
 - Never stand between the mooring line and the quay edge
 - Never stand in the eye or bight of the mooring line
 - Never let a wire rope slip through your hands or run your hand along the wire as the wire may have deteriorated causing wire strands known as "spraggs" which can injure the hands even through gloves
 - Remove rings and other hand jewellery
 - Never stand behind a bollard once a line has been placed on it.
 - Be aware of the snap-back zone



Fig 2: Spraggs [WIRE ROPES IN THIS CONDITION SHOULD NOT BE USED]

- 10.6. The "snap back zone" is an area where a person could be injured if a mooring line of a vessel, parts under tension and comes flying back. When a mooring line parts, it releases a tremendous amount of stored energy and anyone who is in the "snap back zone" could be hit by the flying rope/wire resulting in serious or fatal injuries. Traumatic amputation of limbs and decapitations have been reported. Prior to each mooring operation the mooring supervisor should ensure that all personnel are aware of the hazards of snap back and the probable areas of the quay that are not safe when mooring lines are under load.



- 10.7. Personnel should not in any circumstances stand in the bight of a rope or wire. When mooring and hauling lines are under strain, all personnel in the vicinity should remain in positions of safety, i.e. avoiding all “snap-back” zones.
- 10.8. On no account should mooring lines be handled and, in particular, let go or cast off, without receiving an instruction to do so from the person in charge of the mooring station on board the ship even if the lines appear to have been slacked off ready to be handled. Vessel movement on the berth or problems with vessel winches may cause lines to become tensioned again very quickly, potentially placing handlers at risk
- 10.9. Ship’s lines should not be "let go" or "cast off" before the vessel is ready for this to take place as to do so might endanger the ship.
- 10.10. **Powered capstans** are used by some ports, terminal and berth operators where space is restricted for mooring teams to pull the heaving line ashore. The heaving line is attached to a motorised capstan to wind the rope ashore.
- 10.11. Incidents involving powered capstans at ports indicate that the following precautions must be considered as part of the risk assessment:
 - 10.11.1. **Capstan control foot pedals:** Are positioned to ensure that the rotating capstan is out of reach of the operator where possible and fixed in position. To prevent accidental operation or misuse the foot pedals should be shrouded.
 - 10.11.2. **Emergency Stops:** Sufficient emergency stops are available, can be safely operated and are readily accessible to the capstan operators/mooring team’s working position(s).
 - 10.11.3. **Bi Directional Controls:** To minimise the risk of rope cross over/riding turn, ideally capstans should be multi directional. If the capstan is single direction, procedures must be in place to ensure its rotation is in the correct direction in relation to the lines feeding it, to prevent crossing.
 - 10.11.4. **Pre-use checks:** Should be carried out to ensure all parts are operating/ functioning safely. They should include all controls, pedals and emergency stops.
 - 10.11.5. **Maintenance:** A documented maintenance system in accordance with the manufacturer’s instructions and taking account of the environmental conditions must be in place.
 - 10.11.6. **Training:** Operatives must be trained in the use of the powered capstan and all those who are working around a powered capstan should be aware of the dangers. Essential personnel only should be in the vicinity during mooring operations and they must be aware of both the danger zone of the rope and the powered capstan.

11. MOORING ARRANGEMENTS

- 11.1. Manmade fibre mooring ropes such as polypropylene will deteriorate in sunlight or as a result of contact with some hydrocarbons. If a ship's mooring equipment is found to be deteriorating it should be reported immediately to the ship and to the Harbourmaster or equivalent
- 11.2. In Figure 5. the image shows mooring lines on the same bollard with the eyes "dipped". Passing the eye of one rope up through the eye of the rope already on the bollard will enable either rope to be let go as required. This is known as dipping the eye. When letting go, even if the rope jams, it can be lifted over the standing rope and pulled clear by the ship's winch.
- 11.3. Ships will use differing numbers of mooring lines depending on the weather and tidal conditions. Mooring teams must work to the Master's instructions.



Fig 3: A conventional mooring bollard



Fig 4: Quick release hooks with capstan

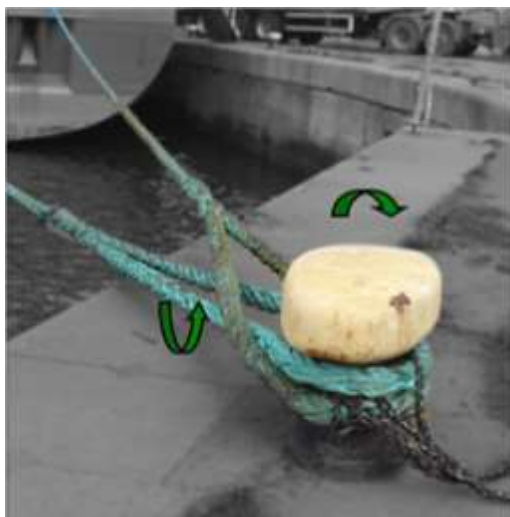


Fig 5: Mooring lines on the same bollard with eyes "dipped"

- 11.4. When the mooring lines of different ships are on the same bollard, care should be taken when releasing the lines of the first ship to sail, as the load on the mooring lines of the remaining ship can be a danger to mooring staff when letting go. Mooring staff should stand well clear, and keep away from the bollard and the remaining ships lines. Once the load is off the departing ship's lines they will go slack and the lines of the remaining ship will then settle. Only then should the lines of the departing vessel be released from the bollard.
- 11.5. Any poor practices or unsafe acts by the ship's crew should immediately be reported to the harbourmaster (or equivalent) and to the ship's Master.
- 11.6. Some quays, jetties, berths and terminals have mooring dolphins with access via a boat, up vertical ladders, or other means that can make access more difficult. Working areas on dolphins may be restricted and may have unguarded edges where the mooring lines lead from the bollards/hooks to the ship. They may also be at a considerable height above water level, which may vary at differing states of tide. It is important that the risk assessments required under the management of Health & Safety at Work Regulations take such factors into account.

12. COMMUNICATIONS

- 12.1. Safe mooring operations require the ship's crew and the shore or boat mooring teams to communicate effectively. In some cases this may be made difficult by language differences. Background noise and environmental conditions may create further difficulties. Two way radios may be useful and are a requirement for mooring teams in many ports. Hand signals can be a reliable means of communication which are recognised and understood by crews of ships of all nationalities. Use of these signals and waiting to carry out tasks until requested, will improve the safety of mooring operations and reduce accidents.



Fig 6: Vertical up and down movement of an outstretched hand means "slack away" or "slack off"



Fig 7: Arms crossed in front of the body or above the head means “make fast” or “is fast”



Fig 8: Rotation of a hand held up means “heave away”



Fig 9: Cupped movement of the hand upwards means “let go” or “cast off”



Fig 10: Hands held up together means “stop” or “hold on”



13. PERSONAL PROTECTIVE EQUIPMENT

13.1. The personal protective equipment (PPE) that is required should be determined by risk assessment. The PPE may include a lifejacket or buoyancy aid, safety helmet, safety footwear, high visibility clothing and gloves. PPE should be suitable for use with consideration to being waterproof, providing a good grip for handling wet ropes and compatible with the other required PPE. Some ports, terminals and berths may require other area specific PPE, such as eye protection in petrochemical facilities.

See also *SIP020 Water Safety and Use of Buoyancy Equipment in Ports*

14. SELECTION AND CONFORMITY OF BOLLARDS AND MOORING EQUIPMENT

14.1. Work equipment including bollards and mooring equipment must be suitable for the purpose for which it is used or provided and used only for operations for which it is suitable. In selecting work equipment, employers must take account of:

- 14.1.1. the working conditions and risk to health and safety from the premises it will be used in
- 14.1.2. who will use the equipment
- 14.1.3. the work equipment itself

14.2. New work equipment should conform to any essential requirements for safety applicable to it through product supply law.

14.3. You must select suitable work equipment and consider:

- 14.3.1. its initial integrity and conformity with legal requirements
- 14.3.2. where it will be used
- 14.3.3. the purpose for which it will be used

15. NEW BOLLARD INSTALLATION

15.1. When providing new work equipment for use at work, you must ensure it conforms with the essential requirements of the relevant law/regulations. You must check it:

- 15.1.1. is suitably marked, indicating conformity with any appropriate product health, safety, and environmental protection standards
- 15.1.2. comes with a declaration of conformity
- 15.1.3. is provided with instructions in English



15.1.4. is free from obvious defects – and that it remains so during its working life

15.2. Ensure adequate checks are taken during procurement and installation to confirm that the new bollards/mooring equipment meet the standards and certification requirements set out in the procurement specification.

15.2.1. Industry best practice is to request samples for testing prior to installation.

16. *BOLLARDS AND MOORING EQUIPMENT USED IN MOORING OPERATIONS*

16.1. Ports and /or terminals with responsibility for mooring equipment should keep a full inventory of all bollards and mooring equipment on site. This should include a means of identification for each unit, its location, the type of equipment, and a safe working load.

16.2. It is industry best practice that the manufacturer and date of installation is also recorded, where this is known.

16.3. **Safe Working Loads (SWL)** : all equipment should be used within its safe working load and in line with the manufacturer’s instructions where these are known.

16.4. Where the safe working loads for bollards and mooring equipment are not known, the risk assessment should determine a notional SWL for each item of operational equipment and how it is to be used. This can be done through a combination of good engineering and seafaring principles, mathematical calculation and inspection.

16.5. It is industry best practice that bollards should where practicable be appropriately marked so that they are conspicuous to both shore and vessel. Many ports use white or orange paint to highlight bollards.

17. *ASSESSMENT OF MOORING OPERATIONS*

17.1. Ports must undertake assessments of the mooring capabilities for each berth within their areas. Vessels should only be allowed to berth in areas where bollards and mooring equipment are capable of withstanding the expected loads imposed upon them.

17.1.1. When conducting a risk assessment to establish a suitable mooring for a vessel, or conducting vessel assessments they should include, but are not limited to:
safe working loads

17.1.2. how the mooring equipment is to be used

17.1.3. number and types of moorings lines that may be used the same item of mooring equipment



- 17.1.4. angle and lead of moorings
 - 17.1.5. number of bollards and other items of mooring equipment in use at any time
 - 17.1.6. additional load effects such as if the equipment is used by vessels to assist in manoeuvring and therefore subject to additional loading
 - 17.1.7. other load factors on bollards and mooring equipment such as effects of tide, type of vessels and loadings of those vessels due to windage and size; cargo operations that might affect loading
 - 17.1.8. type and condition of fixings
 - 17.1.9. frequency of use of the equipment
- 17.2. The Duty Holder should ensure that the risk assessments described above are conducted by a competent person.
- 17.3. It is industry best practice that mooring assessments should wherever possible be jointly undertaken by people with suitable competence such as a Harbour Master or Dock Master and a competent Engineer. In making the assessment they should apply principles of good seamanship to the assessment in conjunction with good engineering practice.

18. *INSPECTION OF BOLLARDS AND MOORING EQUIPMENT*

- 18.1. The purpose of an inspection is to identify whether work equipment can be operated, adjusted and maintained safely.
- 18.2. PUWER Regulation 6 specifies the circumstances where inspection is required to ensure healthy and safe conditions are maintained:
- 18.2.1. where the safety of work equipment depends on the installation conditions, it should be inspected after installation and before first use
 - 18.2.2. at suitable intervals, determined by risk assessment
 - 18.2.3. each time exceptional circumstances (e.g. major modifications, known or suspected serious damage, substantial change in the nature of use) are liable to have jeopardised the safety of the work equipment
- 18.3. **Type and frequency of inspections of bollards and mooring equipment**
- 18.4. **Pre-Use Check:** A pre-use check is a documented confirmation that the equipment appears visually safe to use. This means that a visual examination of the equipment has been undertaken and no cracks, defects or signs of damage are apparent to the operator.
- 18.5. Any pre-use check requirement should be made clear to all persons involved in mooring operations.



- 18.6. Industry best practice is that a visual pre-use check should be undertaken prior to use, by those personnel carrying out the mooring operation. This should be recorded, and any defect reported. Documenting pre-use checks may be done on site by the person inspecting the equipment or confirmed by VHF radio to the Port/Marine Control Centre. But must be done pre-use.
- 18.7. Industry best practice is that where berthing and mooring activities are undertaken by contracted-in personnel, details of required actions should form part of contracts, licences or agreements. All affected persons should be informed of these requirements.
- 18.8. **Periodic Inspection:** is an inspection carried out by a competent person in accordance with the requirements under PUWER Regulation 6. This is different to a pre-use check by the operator.
- 18.9. Equipment can be inspected by anyone who has sufficient knowledge and experience of it to enable them to know what to look at, what to look for and what to do if they find a problem.
- 18.10. The necessary level of competence will vary for inspections, according to the type of equipment and how/where it is used. The nature of these inspections does not have to be determined by the same person who undertakes them, provided the person determining them is competent. This can often be done in-house by experienced staff, taking account of:
- 18.10.1. the manufacturer's recommendations
 - 18.10.2. industry advice
 - 18.10.3. their own experience of the equipment, its use, the particular factors of the workplace and the people using the work equipment
- 18.11. Industry best practice is that all bollards and mooring equipment shall be the subject of a documented periodic visual inspection based on risk assessment.
- 18.12. If a testing regime is used, it is the duty holder's responsibility to ensure that it is suitable, sufficient and reliable.
- 18.13. Records relating to inspection and test for each item should also be retained in such a manner as to be readily retrievable if required.

19. MAINTENANCE OF BOLLARDS AND MOORING EQUIPMENT

- 19.1. PUWER requires that: all work equipment be maintained in an efficient state, in efficient order and in good repair. Where any mooring equipment has a maintenance log, the log should be kept up to date.
- 19.2. The frequency and nature of maintenance should be determined through risk assessment, taking full account of:



- 19.2.1. the manufacturer's recommendations
 - 19.2.2. the intensity of use
 - 19.2.3. operating environment (including but not limited to the effect of temperature, corrosion and weathering)
- 19.3. Take appropriate measures to ensure maintenance operations on mooring equipment does not expose people undertaking maintenance operations to risks to their health and safety.
- 19.4. An appropriate management system should be in place to ensure that mooring equipment is only used in the manner for which it is designed. Loadings and the leads of mooring lines must be in accordance with the design parameters of the equipment and principles of good seamanship.
- 19.5. Where bollards and mooring equipment are out of use, they should be clearly marked (visible from ashore and afloat) and prevented from being used.
- 19.6. Where bollards and mooring equipment are permanently out of use, they may be excused from an inspection and maintenance regime. Providing the markings are permanent and clear and there is no possibility of the equipment being used.

20. *USE OF MOORING BOATS*

- 20.1. Mooring boats are widely used to assist in mooring operations. This generally takes the form of pulling lines ashore to other members of the mooring team, from the ship. This means that the lines are lowered down from the mooring stations on the ship (forward and aft ends) to the boat. The boat then pulls these mooring ropes, floating in the water to the shore. It is vital that there are good communications between the mooring boat and the ship's crew. Any excessive weight on one of the mooring lines can result in the mooring boat being overturned or dragged under water.
- 20.2. Mooring boats should be under the control of an experienced and suitably trained coxswain. During operations:
- boats should keep clear of ship's propellers, thrusters and anchors
 - the ship's master/pilot should know the mooring boat's location during manoeuvring to take ropes
 - when towing ropes there should be sufficient slack rope to prevent the boat taking too much weight and possibly over turning.
- 20.3. Additionally the use of mooring boats requires the boat to manoeuvre underneath the ship's bow and stern to receive the lowered down ropes. The Ship's Master and Pilot must be aware of the boat's position. Boats are vulnerable to any use of the ship's engines or bow thrusters which could easily result in a capsized.



- 20.4. Mooring boats must be fit for purpose and the type of use for which they are intended. The Maritime Coastguard Agency (MCA) may need to certify the boat for use. Such boats should comply with the MCA publication The Code of Practice for the Safety of Small Work boats and Pilot boats.
- 20.5. Boats and crew training requirements are classified by the area in which they are intended to work. It is important that operators of such boats ensure that boats and its crew meet these requirements.
- 20.6. Mooring boats are sometimes used to help smaller ships manoeuvre. This effectively means they are acting as tug boats. Mooring boats that may be engaged to carry this out should be fit for this type of use and the crew should be appropriately trained.

21. *INFORMATION, INSTRUCTION, TRAINING AND SUPERVISION*

- 21.1. All persons engaged in work must be trained and assessed as competent for the role that they are required to perform by a competent person. These persons must have their fitness for work assessed against the requirements for each task being performed and consideration should be given to the requirement for a drug and alcohol monitoring system to be in place.
- 21.2. All persons involved in operations must be provided with adequate information, instruction, training and supervision. This is particularly important where Non-permanent employees (NPEs) are utilised who may be generally competent but have limited experience of the particular operation.
- 21.3. All persons involved in mooring operations must know who is in control. This is particularly important where NPEs are working alongside permanent employees.
- 21.4. Supervisors should be trained, competent and experienced in the areas of work that they are supervising and/or have access to relevant competent advice and assistance.

22. *VESSEL ACCESS*

All ships must provide a safe means of access. Providing safe access to a ship is considered to be an integral part of ensuring a safe working environment on board, as required by the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations. MGN 532 (M) Amendment 1, safe movement on board ship and MGN 533 (M) Amendment 1, means of access refer.

See also *SIP014 Safe Access and Egress*

REFERENCES AND FURTHER READING

Relevant legislation and guidance includes the following. Please note that these are the correct versions at the time of publishing but the reader should always seek out the most current version.

- The current versions of other PSS Safety in Ports Guidance documents can be found at: www.portskillsandsafety.co.uk/resources
- Code of Safe Working Practices for Merchant Seafarers (COSWP): www.gov.uk/government/publications/code-of-safe-working-practices-for-merchant-seafarers
- Consulting and involving your workers: www.hse.gov.uk/involvement
- Confined Spaces Regulations 1997: www.hse.gov.uk/confinedspace
- Control of Major Accident Hazards Regulations (COMAH) 2015: www.hse.gov.uk/comah
- Control of Substances Hazardous to Health Regulations (COSHH) 2002: www.hse.gov.uk/coshh
- Control of Vibration at Work Regulations 2005: www.hse.gov.uk/vibration/wbv/regulations
- Dangerous Goods in Harbour Areas Regulations 2016: www.hse.gov.uk/pubns/books/l155
- Dangerous Substances and Explosive Atmospheres Regulations (DSEAR) 2002: www.hse.gov.uk/fireandexplosion/dsear
- Electricity at Work Regulations 1989 and guidance on electrical safety: www.hse.gov.uk/electricity
- Health and Safety at Work etc. Act (HSWA) 1974: www.hse.gov.uk/legislation/hswa
- Health and Safety (Safety Signs and Signals) Regulations 1996: www.hse.gov.uk/pubns/books/l64
- HSE Whole Body Vibration in Ports Information Paper: www.hse.gov.uk/vibration/wbv/ports.pdf
- International Labour Organisation's (ILO) Code of Practice on Safety and Health in Ports (ILO 152): www.ilo.org/sector/activities/sectoral-meetings/WCMS_546257/lang--en
- International Maritime Dangerous Goods Code (IMDG): www.imo.org/en/Publications/IMDGCode
- Lifting Equipment at Work: www.hse.gov.uk/pubns/indg290
- Lifting Operations and Lifting Equipment Regulations (LOLER) 1998: www.hse.gov.uk/work-equipment-machinery/loler

- Load Security HSE web page: www.hse.gov.uk/logistics/load-security
- Management of Health and Safety at Work Regulations 1999: www.hse.gov.uk/managing
- Managing Health and Safety in Dockwork HS(G) 177: www.hse.gov.uk/pubns/books/hsg177
- Merchant Shipping (Hatches and Lifting Plant) Regulations 1988: www.opsi.gov.uk/si/si1988/Uksi_19881639_en_1
- Merchant Shipping (Safety at Work) (non UK Ships) Regulations 1988: www.opsi.gov.uk/si/si1988/Uksi_19882274_en_1
- Merchant Shipping and Fishing Vessel (Lifting Operations and Lifting Equipment) Regulations (LOLER) 2006: www.opsi.gov.uk/si/si2006/20062184
- Merchant Shipping and Fishing Vessel (Provision and Use of Work Equipment) Regulations (PUWER) 2006: www.gov.uk/government/publications/guidance-applying-vessel-equipment-regulations-loler-and-puwer
- MGN 532 (M) Amendment 1, safe movement on board ship www.gov.uk/government/publications/mgn-532-m-amendment-1-safe-movement-on-board-ship
- MGN 533 (M) Amendment 1, means of access: www.gov.uk/government/publications/mgn-533-m-amendment-1-means-of-access
- Musculoskeletal disorders (MSDs): www.hse.gov.uk/msd
- Noise at Work: www.hse.gov.uk/noise
- Personal Protective Equipment: www.hse.gov.uk/toolbox/ppe
- Ports web pages: www.hse.gov.uk/ports
- Provision and Use of Work Equipment Regulations (PUWER) 1998: www.hse.gov.uk/work-equipment-machinery/puwer
- Managing Health and Safety in Dockwork HS(G) 177: www.hse.gov.uk/pubns/books/hsg177
- Manual handling/ pushing and pulling: www.hse.gov.uk/msd
- Risk Management HSE web page: www.hse.gov.uk/risk
- Safety in Docks ACOP L148: www.hse.gov.uk/pubns/books/l148
- Vibration at Work: www.hse.gov.uk/vibration
- Work at Height Regulations 2005: www.hse.gov.uk/work-at-height
- Vehicles at work HSE web page www.hse.gov.uk/workplacetransport



Raising Standards in UK Ports

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