



Mooring, Towing or Hauling Equipment on all Vessels: Safe Installation and Safe Operation

Notice to all Shipbuilders, ship repairers, shipowners, ship operators harbour authorities, Masters, skippers, officers and crew of merchant ships, yachts, (motor and sail) and fishing vessels

This note replaces MGN 308 (M+F)

Summary

This note provides updated advice on the safe installation, inspection, maintenance and use of mooring, towing and hauling equipment.

It emphasises the importance of seeking expert advice on the repair and maintenance of equipment.

It also advises that risk assessments which cover the use of mooring equipment and operations should take full account of the potential dangers of unusual or non-standard mooring arrangements, bights in mooring warps and snap back zones.

Dangerously weighted heaving lines must not be used.

1. Introduction

1.1 Operations such as mooring, towing and hauling, including trawling operations, impose great loads on ropes, warps, gear and equipment. The circumstances of some accidents show that greater emphasis should be given to considering the safety aspects of mooring and towing systems as a whole rather than the individual safety aspects of component parts. These systems should incorporate the safety of windlasses, winches, bollards and fairleads, including their construction and their attachment to a vessel's structure.

2. Design and Installation of Mooring Equipment

2.1 Winches or Windlasses

2.1.1 Should be constructed to give warning of undue strains by stalling at well below the designed maximum safe working load of the weakest element in the system (e.g.



bollard, fairlead, shackle, holding down bolt, etc.) and to afford further protection by walking back at about the design load (e.g. breaking strength of the mooring rope, tow line, or hawser whichever is applicable) *For example: A winch or windlass capable of a 10 tonne pull should be fitted with a rope having a breaking strain of 20 tonnes or more.*

- 2.1.2 The layout of the installations should be such as to avoid the need for anyone to be stationed or work in the bight or warp of rope formed by the lead from the winch or windlass round and through the fairleads and over-side. The consequences of failure in any part of the system should be carefully considered and effective precautions taken.

2.2 Pedestal roller fairleads, lead bollards, and mooring bitts should be:

- 2.2.1 properly designed to meet all foreseeable operational loads and conditions;
- 2.2.2 correctly sited to minimise the need for complex mooring line configurations; as far as reasonably practicable, a dedicated fairlead should be provided for each mooring line;
- 2.2.3 effectively secured to a part of the ship's structure which is suitably strengthened; and
- 2.2.4 effectively maintained.

2.3 The advice in paragraph 2.2. reflects the outcome of Marine Accident Investigation Branch accident investigations which found the following failures of equipment:

- 2.3.1 fracture of a roller pin due to corrosion fatigue. The place at which the fracture occurred was located at a sharp change of section machined at the lower end. Because this was located just below the housing surface it was inaccessible for inspection and maintenance;
- 2.3.2 failure of the welding between a fairlead pedestal and the deck due to inadequate preparation and poor welding; and
- 2.3.3 failure of a bollard which together with its supporting pad piece was pulled out of the deck as a result of poor material selection and weld procedures during repairs and an inadequate supporting structure to cope with the service loads.

3. Repair and maintenance

- 3.1 Owners, operators, masters and skippers should ensure that all mooring, towing and hauling equipment, including ropes and warps are covered by a regular maintenance programme. Equipment should be regularly inspected for wear, damage, deflection and corrosion. A programme of maintenance and inspection may help to prevent such failures or alternatively identify potential failure at an early stage such that repair is a relatively simple matter rather than a major task.
- 3.2 All ropes, wires, and stoppers that are used for hauling, towing or mooring operations should be in good condition. Ropes should be frequently inspected for both external wear and tear between strands. Wires should be regularly treated with suitable lubricants and inspected for deterioration internally and broken strands externally. Splices in both ropes and wires should be inspected regularly to check they are intact.



3.3 Particular care should be taken when repairing deck areas, especially those fitted with bollards or equipment requiring a strong substantial base. Classed ships must carry out such repairs with the knowledge of, and under the supervision of Class, as this falls under Safety, Construction and Classification rules. Ships under certification by a Certifying Authority should undertake such repairs in a similar way. The MCA should be consulted regarding ships certificated by the MCA. Owners of ships not falling under survey and certification by one of the above, which do not have internal expertise should seek external expert advice and undertake repairs taking this into account.

4. Safe Use of Equipment: Precautions to be taken before and during mooring, towing and hauling operations

4.1 Careful thought should be given to mooring, towing and hauling arrangements, so that the leads used are those most suited and will not create sharp angles. Ropes and wires should not be fed through the same leads or bollards. Fairleads which have previously been used for wires should be checked to ensure that they have no sharp metallic areas on tension surfaces prior to being used for ropes. All such operations should be pre-planned, and a risk assessment of the operation should be completed, especially in cases where it is necessary for the vessel to use an unusual or non-standard mooring arrangement.

4.2 To ensure personal safety when mooring equipment is under load, personnel essential to the operation should as far as reasonably practicable be able to stand in a protected position. Immediate action should be taken to reduce the load if signs of excessive strain appear in any part of the system. Wherever practical the person in charge should avoid getting involved with the physical operations, so that they can retain an effective oversight. Good communication must be maintained between all members of the mooring team. Other persons who have no involvement with mooring, towing or hauling operations, including passengers waiting to embark or disembark, should always be kept well clear of the area.

4.3 Operation of winches should be undertaken by competent personnel to ensure that excessive loads do not arise on mooring, towing and hauling lines.

4.4 Where wire rope is joined to fibre rope, a thimble or other device should be inserted in the eye of the fibre rope. Both wire and fibre rope should have the same direction of lay.

4.5 Ropes and wires that are stowed on reels should not be used directly from stowage unless a split drum arrangement is available but should be run off and flaked out on deck in a clear and safe manner, ensuring sufficient slack to cover all contingencies. If there is doubt of the amount required, then the complete reel should be run off.

4.6 It is often difficult to achieve an ideal mooring layout, but ship's equipment can be employed to the best advantage if the following general principles are borne in mind:

4.6.1 breast-lines provide the bulk of athwartships restraint;

4.6.2 back-springs provide the largest proportion of the longitudinal restraint;

4.6.3 very short lengths of line should be avoided where possible, as such lines will take a greater proportion of the total load, when movement of the ship occurs; and

4.6.4 very short lengths may be compensated for by running the line on the bight.

4.7 Where moorings are to be heaved on a drum end one person should be stationed at the drum end. For heaving moorings and large vessel operations, they should be backed up by a second person backing and coiling down the slack. The line must be tended at all times.



In most circumstances up to three turns on the drum end are sufficient to undertake a successful operation, and an excessive number of turns should be avoided. A wire on a drum end should never be used as a check wire. A wire should never be led across a fibre rope on a bollard; wires and ropes should be kept in separate fairleads or bollards.

4.8 The following applies when stoppering off moorings:

- 4.8.1 Natural fibre rope should be stoppered with a natural fibre stopper.
- 4.8.2 Man-made fibre rope should be stoppered with a man-made fibre stopper, but not polyamide.
- 4.8.3 The “West Country” method (double and reverse stoppering) is preferable for fibre ropes.
- 4.8.4 Wire moorings should be stoppered with chain, using two half hitches in the form of a cow hitch, suitably spaced with the tail backed up against the lay of wire, to ensure that the chain neither jams nor opens the lay of the wire.

4.9 Use of weighted heaving lines

- 4.9.1 Where weighting of heaving lines is used to facilitate the transfer of larger, heavier lines to prevent personal injury to those receiving heaving lines, the “monkey’s fist” at the weighted end should be made with rope only and must not contain added weighting material.
- 4.9.2 Safe alternatives include a small high-visibility soft pouch, filled with fast-draining pea shingle or similar, with a weight of not more than 0.5kg.
- 4.9.3 Under no circumstances is a heaving line to be weighted by items such as shackles, bolts, nuts, or twist locks.
- 4.9.4 Prior to the operation, the person in charge at the mooring stations should check that lines are not dangerously weighted. If any dangerously weighted lines are found, these should be removed and replaced with appropriate heaving lines. (Code of Safe Working Practices for Merchant Seafarers, section 26.3.5).

4.10 Working with tugs

- 4.10.1 Good communication between the tug and vessel being aided are important to ensure that the status of tow lines is understood by both parties at all times and thus avoid unexpected loads being applied.
- 4.10.2 Ensure the bitts upon which the towing eye is to be placed are clear of rope or wire.
- 4.10.3 When conducting towing operations, it is important that those involved consider the safety of persons on both vessels.
- 4.10.4 All equipment used in towing operations including messengers should be regularly inspected and replaced as necessary.
- 4.10.5 Similar considerations need to be applied when working with any mooring operation where equipment out of direct control of the vessel is used.



5. Specific Risks: Bights of Rope and Snap-back Zones

- 5.1 Personnel should not in any circumstances stand in a bight of rope or wire.
- 5.2 When mooring, towing and hauling lines are under strain all personnel in the vicinity should remain in positions of safety, avoiding potential 'snap-back' zones. All seafarers should be reminded that the whole of the mooring deck may be considered a danger zone and understandable and visible signage should remind all crew working on a mooring deck of this. Viewing the mooring deck arrangement from a high point is recommended, so that potential snap-back zones can be identified.
- 5.3 Immediate action should be taken to reduce the load should any part of the system appear to be under excessive strain. Care is needed so that ropes or wires will not jam when they come under strain, so that if necessary they can quickly be slackened off.
- 5.4 Where a mooring line is led around a pedestal roller fairlead, the 'snap back' zone will change and increase in area. Where possible, lines should not be led round pedestals except during the operation of mooring the vessel, thereafter lines should be made up on bitts, clear of pedestals if at all possible.

6. Health and Safety Guidance

- 6.1 Further information on health and safety on mooring, towing and hauling can be found in:
- i. Oil Companies International Marine Forum (OCIMF) publication "Mooring Equipment Guidelines",
 - ii. The Code of Safe Working Practices for Merchant Seafarers;
 - iii. Fishermen's Safety Guide, A Guide to safe working practices and emergency procedures for fishermen; and
 - iv. IMO Code of Safety for Fishermen and Fishing Vessels 2005, Parts A and B;
 - v. Port Skills and Safety SIP005 – Guidance on Mooring:



More Information

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