
MOORING, TOWING OR HAULING EQUIPMENT ON ALL VESSELS - SAFE INSTALLATION AND SAFE OPERATION

Notice to all Builders, Repairers, Owners, Operators, Masters, Skippers, Officers and Crew of Merchant Ships, Yachts (Motor and Sail) and Fishing Vessels.

This notice supersedes Merchant Shipping Notice M.718

Summary

This Guidance Note provides updated advice on the safe installation, 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 should in particular take full account of the potential dangers of bights in mooring warps and of "Snap-Back" Zones.

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 recent 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.** Hence the system should include the safety of windlasses, winches, bollards and fairleads, their construction and their attachment to a vessel's structure.

2. Design and Installation of Mooring Equipment

- 2.1 **Winches or windlasses** should be constructed to give warning of undue strains by stalling at well below half 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 half the design load (e.g. breaking strength of the mooring rope, tow line or hawser which ever 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.*

- 2.2 The layout of the installations should be such as to avoid the need for anyone to be stationed or to work in the bight of warp or 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.
- 2.3 **Pedestal roller fairleads, lead bollards and mooring bitts** should be:
- (a) Properly designed to meet all foreseeable operational loads and conditions;
 - (b) Correctly sited, wherever practicable this should enable only one line to need to be used on each item;
 - (c) Effectively secured to a part of the ship's structure which has been suitably strengthened; and
 - (d) Effectively maintained.
- 2.4 The advice in paragraph 2.3 reflects the outcome of Marine Accident Investigation Branch accident investigations which have found the following failures of equipment:-
- (a) 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;
 - (b) failure of the welding between a fairlead pedestal and the deck due to inadequate preparation and poor welding; and
 - (c) 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 **Ropes, wires and stoppers** that are to be used in mooring operations should be in good condition. Ropes should be **frequently inspected** for both external wear and wear 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. Expert advice should be sought externally on an appropriate method of repair, including material selection and welding procedures, of the affected area, where such expertise is not available within the owner's or operator's organisation. Details of the proposal for carrying out the repair should then be submitted to the appropriate Marine Office of the Maritime and Coastguard Agency for acceptance and updating of the vessel's records. Owners and operators should ensure that the person(s) carrying out the repair is/are appropriately qualified and experienced. Classification Societies should, where appropriate, be consulted.

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 they have no sharp metallic areas on the tension surfaces prior to being used for ropes. Pre-planning of such operations is recommended 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 **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.
- 4.4 Ropes and wires which 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.
- 4.5 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:
- a) Breast-lines provide the bulk of athwartships restraint;
 - b) Back-springs provide the largest proportion of the longitudinal restraint; and,
 - c) 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.
- 4.6 **Where moorings are to be heaved on a drum end**, one person should be stationed at the drum end. For heavy 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.
- 4.7 When **stoppering off moorings**:
- (a) Natural fibre rope should be stoppered with a natural fibre stopper.
 - (b) Man made fibre rope should be stoppered with a man made fibre stopper (but not polyamide).

- (c) The 'West Country' method (double and reverse stoppering) is preferable for fibre ropes.
- (d) 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 up the lay of the wire.

4.8 Working with Tugs

- (a) 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.
- (b) Ensure the bitts upon which the towing eye is to be placed are clear of rope or wire.
- (c) When conducting towing operations it is important that those involved consider the safety of persons on both vessels.
- (d) All equipment used in towing operations including messengers should be regularly inspected and replaced as necessary.
- (e) 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.** Operation of winches should preferably be undertaken by competent personnel to ensure that excessive loads do not arise on mooring, towing and hauling lines.
- 5.2 **When mooring, towing and hauling lines are under strain all personnel in the vicinity should remain in positions of safety, i.e. avoiding all 'Snap-Back' Zones.** A bird's eye view of the mooring deck arrangement is recommended (an aerial view from a high point of the vessel can be utilised) to more readily identify danger areas. 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. 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.
- 5.3 **Annex 1 – "Snap-Back" Zones.** This Annex contains diagrams of simple and complex mooring systems, as well as an example of an actual mooring deck arrangement, illustrating the associated "Snap-Back" Zones.
- 5.4 Further information on "Snap-Back" Zones can be found in the Oil Companies International Marine Forum (OCIMF) publication "Mooring Equipment Guidelines", and in Chapter 25 of the Code of Safe Working Practices for Merchant Seamen.

6. Health and Safety

- 6.1 Further guidance can be found in the Code of Safe Working Practices for Merchant Seamen; MGN 20 (M+F) – Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997; Fishermen and Safety – A Guide to Safe Working Practices for Fishermen; and the IMO/FAO/ILO Fishing Vessel Safety Code and Voluntary Guidelines, Part A and Part B. Apart from the safety responsibilities of employers and operators, all workers on board ship have a duty to take reasonable care for their own health and safety and that of others on board who may be affected by their acts or omissions.

Further Information

Further information on the contents of this Notice can be obtained from:

Seafarer Health & Safety Branch
Bay 2/09
Maritime and Coastguard Agency
Spring Place
105 Commercial Road
Southampton
SO15 1EG

Tel : +44 (0) 23 8032 9227
Fax : +44 (0) 23 8032 9251
e-mail: seafarerh&s@mcga.gov.uk

General Inquiries: 24 Hour Infoline
infoline@mcga.gov.uk
0870 600 6505

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Tel : +44 (0) 11 5901 3336
Fax : +44 (0) 11 5901 3334
e-mail: mca@promo-solution.com

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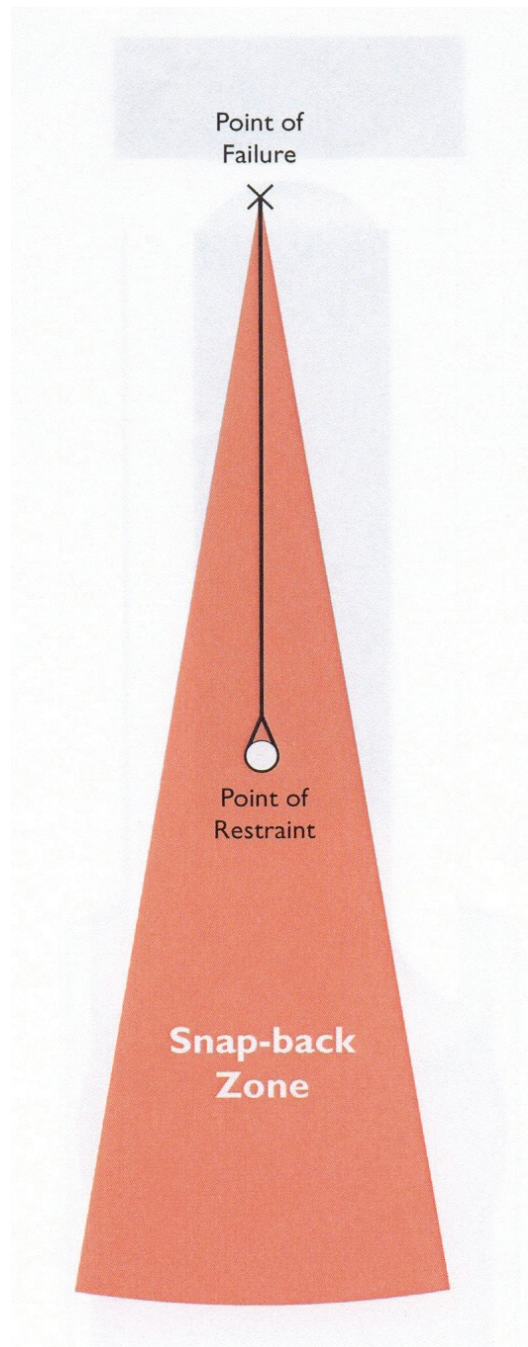


Figure 1 – A Simple Mooring System Illustrating the Potential “Snap-Back” Zone

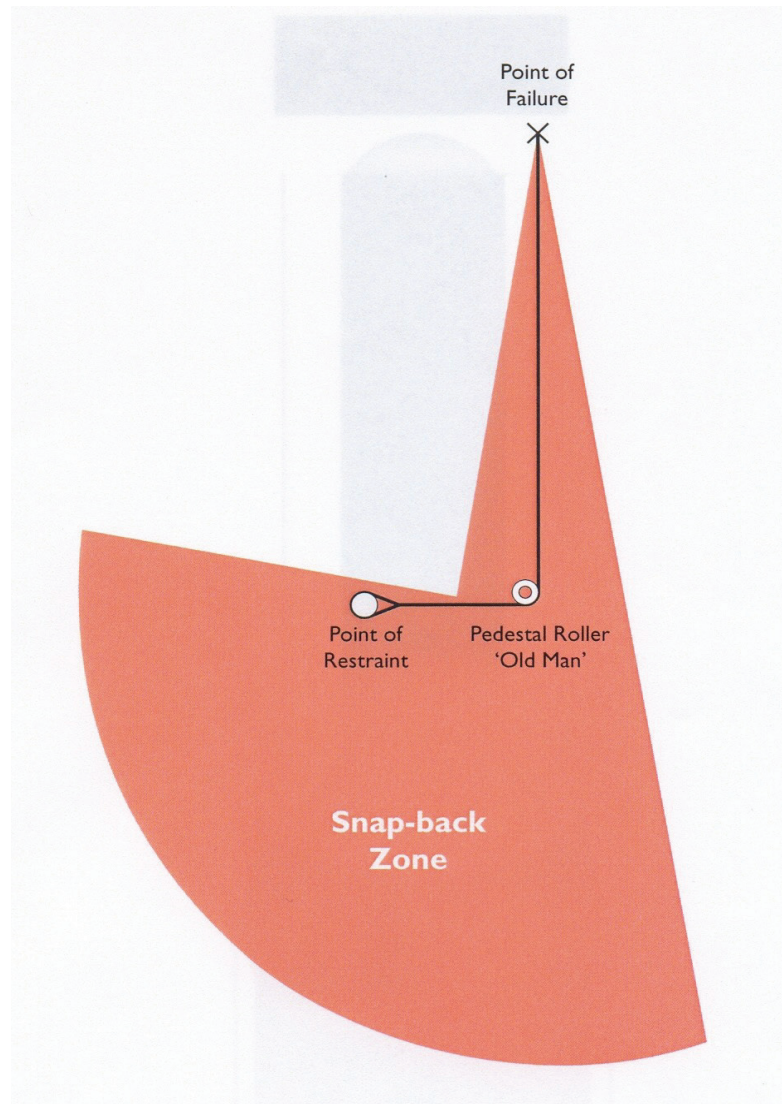


Figure 2 – A Complex Mooring System Illustrating the Potential “Snap-Back” Zone

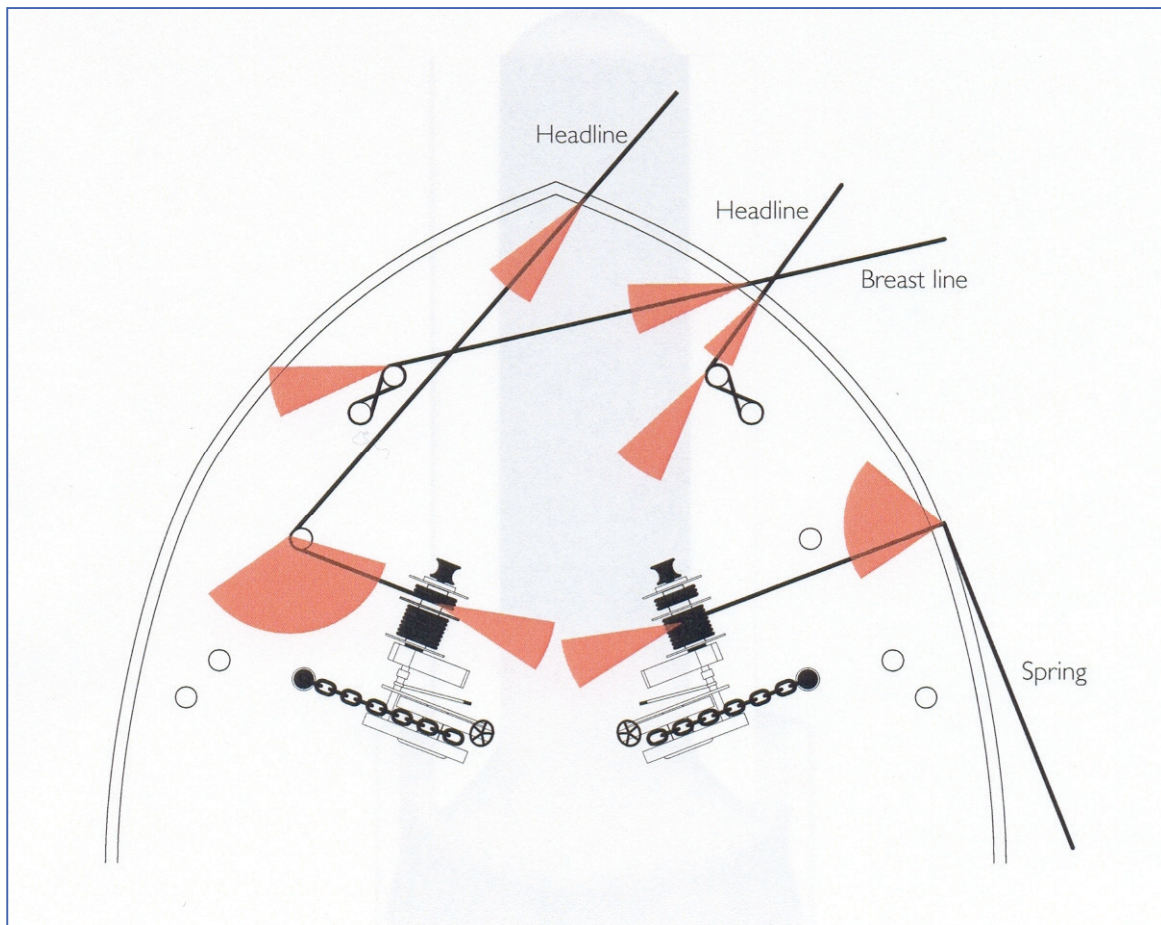


Figure 3 – An Actual Mooring Deck Arrangement Illustrating Potential “Snap-Back” Zones