26 ANCHORING, MOORING AND TOWING OPERATIONS

26.1 Introduction

26.1.1 All seafarers involved in anchoring, mooring and towing operations should be given additional instruction on the specific equipment and mooring configurations used on the vessel. This should include (but may not be limited to):

- the types of winches and windlass and their operation;

- the location of emergency stop buttons;
- the types of ropes and/or wires used; and
- the location and use of rollers, dollies and leads.

Records of instruction should be maintained.

26.1.2 Based on the risk assessment, appropriate control measures should be put in place. It is particularly important that the risk assessment considers the consequences of failure of any equipment. This chapter identifies some areas that require attention when anchoring, mooring or conducting towing operations. The risk assessment and control measures should be reviewed for each new mooring operation, taking account of the expected mooring configuration, with particular attention to potential risk of snap-back.

26.1.3 When anchoring, mooring or towing operations are taking place, all seafarers should be adequately briefed on the mooring configurations and correctly dressed in appropriate personal protective equipment.

26.2 Anchoring and weighing anchor

26.2.1 Before using an anchor, a competent seafarer must check that the brake is securely on and then clear all securing devices. A responsible person must be put in charge of the anchoring party, with a suitable means of communication with the vessel's bridge. The anchoring party should wear protective clothing, including safety helmet, safety shoes, gloves and goggles, to protect from injury by rust particles and debris that may be thrown off the cable during the operation. Where the noise levels generated may be harmful, hearing protection may be considered; however, the time exposure and the greater risk from impaired communication should be taken into account. During anchoring, the anchoring party should stand aft of, or at a safe distance from, the windlass/capstan and be mindful of the potential risk of snap-back.

26.2.2 Where the means of communication between bridge and anchoring party is by portable radio, the identification of the ship should be clear to prevent confusion caused by other users on the same frequency.

26.2.3 Before the anchor is let go, a check must be made that there are no small craft or other obstacles under the bow. As a safety precaution, it is recommended that the anchor is 'walked out' clear of the pipe before letting go. For very large ships with heavy anchors and

cables, the anchor should be either walked out at intervals or all the way to avoid excessive strain on the brakes (and on the bitter end, if the brakes fail to stop the anchor and cable).

26.2.4 When the anchor is let go from the stowed position, if, on release of the brake, the anchor does not run, seafarers should **not** attempt to shake the cable. The brake should be re-applied, the windlass placed in gear and the anchor walked out clear prior to release.

26.2.5 Cable should stow automatically. If, for any reason, it is necessary for seafarers to enter the cable locker, they must first take proper precautions for entering an enclosed space. They should stand in a protected position and be in communication with the windlass/capstan operator.

26.2.6 Anchors that are housed and not required should be properly secured to prevent accidental release.

26.3 Making fast and casting off

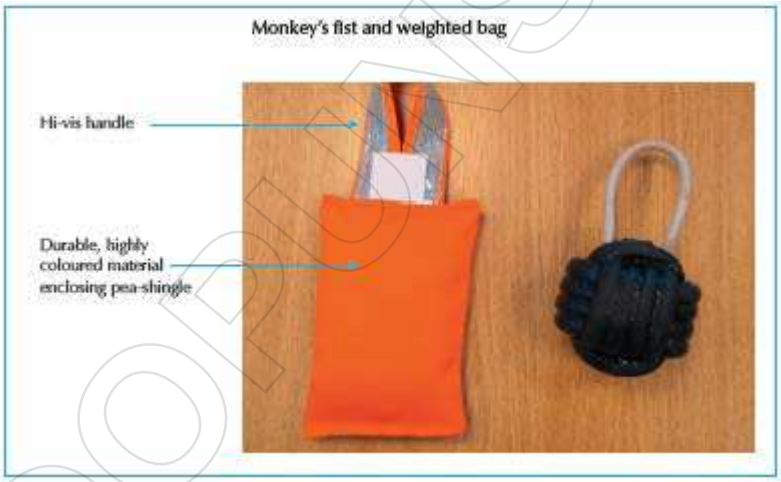
26.3.1 During mooring and unmooring operations, a sufficient number of seafarers should always be available both forward and aft of the vessel to ensure a safe operation. A responsible person should be in charge of each of the mooring parties, and a suitable means of communication between the responsible persons and the vessel's bridge team must be established. If this involves the use of portable radios, then the ship should be clearly identified by name to prevent confusion with other users. All seafarers involved in such operations must wear protective clothing, including safety helmet, safety shoes and gloves, and be fully briefed on the berthing plan.

26.3.2 Owing to the design of mooring decks, the entire area should be considered a potential snap-back zone. All crew working on a mooring deck should be made aware of this with clear visible signage.

26.3.3 The painting of snap-back zones on mooring decks should be avoided because they may give a false sense of security.

26.3.4 Working on enclosed mooring decks adds additional hazards and therefore extra caution should be exercised. Particular attention should be paid to ensure adequate lighting.

26.3.5 To prevent personal injury to those receiving heaving lines, the 'monkey's fist' should be made with rope only and must not contain added weighting material. Safe alternatives include a small high-visibility soft pouch, filled with fast-draining pea shingle or similar, with a weight of not more than 0.5 kg. Under no circumstances is a line to be weighted by items such as shackles, bolts or nuts, or twist locks.



26.3.6 Areas where mooring operations are to be undertaken should be kept tidy and clutter free. All mooring ropes should be properly stowed, heaving lines and stoppers coiled away and any oil and grease cleaned up immediately. Decks should have anti-slip surfaces provided by fixed treads or anti-slip paint coating, and the whole working area should be adequately lit for operations undertaken during periods of darkness.

26.3.7 Equipment used in mooring operations should be regularly inspected for defects. Defects found should be corrected. Particular attention should be paid to oil leaks from winches. The surfaces of fairleads, bollards, bitts and drum ends should be clean and in good condition, and drum ends should not be painted. Rollers and fairleads should turn smoothly and a visual check be made that corrosion has not weakened them. Pedestal roller fairleads, lead bollards, mooring bitts, etc. should be:

- properly designed for the task;
- able to meet all foreseeable operational loads and conditions;
- correctly sited; and
- fixed to a part of the ship's structure that is suitably strengthened.

26.3.8 Mooring ropes, wires and stoppers are to be in good condition. Ropes should be inspected frequently 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. Lubricants should be thoroughly applied so as to prevent internal corrosion as well as corrosion on the outside, and wires should never be allowed to dry out. Splices in both ropes and wires should be inspected regularly to check that they are intact. 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.

26.3.9 Ropes and wires that are stowed on reels should not be used directly from stowage, 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 over the amount required, then the complete reel should be run off.

26.3.10 Ship's equipment can be employed to best effect if the following general principles are remembered:

- Breast lines provide the bulk of athwartships restraint.
- Springs provide the largest proportion of the longitudinal restraint.
- Very short lengths of line should be avoided when possible because such lines will take a greater proportion of the total load, when movement of the ship occurs.
- Very short lengths may be compensated for by running the line on the bight.

26.3.11 Careful thought should be given to the layout of moorings, so that the leads are those most suited without creating sharp angles, and ropes and wires are not fed through the same leads or bollards. Pre-planning of such operations is essential and a risk assessment of the operation must be completed, especially in cases where unusual or non-standard mooring arrangements are used.

26.3.12 Personnel should not, in any circumstances, stand in a bight of rope or wire. Operation of winches should be undertaken by competent seafarers to ensure that excessive loads do not arise on moorings.

26.3.13 When moorings lines are under strain, all personnel in the vicinity should remain in positions of safety, i.e. avoid the snap-back zones. It is strongly recommended that a bird's eye view of the mooring deck arrangement is produced to identify danger areas. Regardless of designated snap-back zones, seafarers should always be aware of other areas of potential danger – the whole mooring deck may be considered a danger zone.

26.3.14 Immediate action is to be taken to reduce the load should any part of the system appear to be under excessive strain. Care is needed to ensure that ropes or wires will not jam when they come under strain, so they can be slackened off quickly if necessary.

26.3.15 Where a mooring line is led around a pedestal roller fairlead, the snap-back zone area will change and increase in area. Where possible, lines should **not** be led round pedestals, except during the operation to moor the ship. Thereafter, lines should be made up on bitts, clear of pedestals if at all possible.

26.3.16 When moorings are to be heaved on a drum end, the winch operator must have a full view of all activity. The 'fleet angle' or lead angle of the rope onto the drum should be no more than a few degrees. One person should be stationed at the drum end, backed up by a second person, who is standing at least a metre away, backing and coiling down the slack. In most circumstances, three turns on the drum end are sufficient to undertake a successful operation and avoid riding turns. A wire on a drum end should never be used as a check wire. A synthetic rope should never be surged on the drum end. After being hauled tight, a stopper is to be used to allow the rope to be removed from the warping drum and then placed on a bollard or bitts by using either single turns or figures of eight. For wire rope, at least the top three lays of the figure of eight must be secured by a fibre rope to prevent jumping. The stopper material should be like for like (i.e. natural for natural, and chain for wire ropes).

26.3.17 A wire should never be led across a fibre rope on a bollard. Wires and ropes should be kept in separate fairleads or bollards.

26.3.18 When stoppering off moorings, the following applies:

- Natural fibre rope should be stoppered with natural fibre.
- Man-made fibre rope should be stoppered with man-made fibre stopper (but not polyamide).
- The 'West Country' method (double and reverse stoppering) is preferable for ropes.
- 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.

26.4 Mooring to a buoy

26.4.1 Where mooring to a buoy is undertaken from a ship's launch or boat, seafarers engaged in the operation must wear a working lifejacket (personal flotation device). A lifebuoy with an attached lifeline should be available in the boat.

26.4.2 Means should be provided to recover a man overboard. If a boarding ladder with flexible sides is used, it should be weighted so that the lower rungs remain below the surface.

26.4.3 Where mooring to a buoy is undertaken from the ship, a lifebuoy with an attached line of sufficient length is to be available for immediate use.

26.4.4 When slip wires are used for mooring to buoys or dolphins, the eyes of the wires should never be put over the bitts, because at the time of unmooring it may not be possible to release the load sufficiently to lift the eye clear. To prevent accidental slippage of the wire eye(s) over the bitts or other obstruction, the eyes should be seized, partially closing the eye.

26.5 Towing

26.5.1 A number of accidents have occurred during the operation of making fast and releasing a tow. It is not uncommon for the gear to become taut without warning, causing the messenger to part and strike anyone in the snap-back zone, resulting in serious injury. Poorly controlled towing operations are also a significant hazard to tug crews.

26.5.2 Equipment used for towing should be adequately maintained and inspected before use because during towing operations, excessive loads may be applied to ropes, wires, fairleads, bitts and connections. If there are suspicions over the quality of the towline, it should be rejected and an alternative line used.

26.5.3 Prior to towing operations being undertaken, the master (and pilot) should establish a suitable means of communication, exchange relevant information (e.g. speed of vessel) and agree a plan for the tow with the tug master.

26.5.4 Seafarers involved must understand their duties and they should be adequately briefed on the operation and the safety precautions to be taken. They should be equipped with personal protective equipment including safety helmets, safety shoes and gloves. During hours of darkness, care should be taken to ensure that floodlighting will not dazzle and destroy the night vision of the tug master.

26.5.5 On instruction from the bridge, the heaving line should be thrown over to the tug from the shoulder (when taking a tow forward) of the vessel and not from the position of the Panama/Suez fairlead. The position in front of the vessel's (bulbous) bow is the most dangerous for the tug. The tug will then attach a messenger, which is placed on a winch and used to heave the tug's main towline on board. Only enough turns of the messenger should be used on the drum end to heave in the towline (see section 26.3.16). A stopper is then used while the eye is placed around the bollard. On tankers, the towline's eye should not be placed over the same bollard that the fire wire has made fast to. The fire wire should be taken off if there is no bollard available. The whole operation should be conducted efficiently to allow the tug to withdraw to a safe position without undue delay.

26.5.6 Once the tow is connected, seafarers should keep clear of the operational area. If anyone is required to remain in this area or to attend to towing gear during the towing operation, they should take extreme care to keep clear of bights of wire or rope and the snap-back zone at all times.

26.5.7 During operations, communications should be maintained between:

- the towing vessel and both the bridge team and the foredeck of the vessel under tow; and
- the tow party and the bridge team.

All parties should identify themselves clearly to avoid misunderstandings. The tug master should be kept informed of engine movements, proposed use of thrusters, etc. Seafarers in charge of the mooring party should monitor the towline to give warning to the crew if the towline should become taut, for whatever reason.

26.5.8 When letting go, no attempt should be made to heave in the messenger to release the tow before making positive communications with the tug. This should be done by the vessel's master or pilot and once the tug has indicated that it is ready to receive the tow back, the instruction to release must come from the vessel's master. The tug's messenger should be used to heave in the towline and then stopper it off before taking the eye off the bollard. Use turns of the messenger around the bollard to control the speed at which the towline goes out and is retrieved on board the tug. This is particularly important aft where the towline, if it goes into the water, may foul the tug's propulsors. If the towline is allowed to run out uncontrolled, it could whiplash and strike a crew member, causing severe injuries. No attempt must be made to handle towlines that have weight on them.

26.5.9 Further recommendations on towing are contained in the relevant merchant shipping notices (MSNs).

MGN 308(M+F)

26.6 Safe mooring of domestic passenger craft and ships' launches to quays

26.6.1 The recognised and safe method for securing small vessels and launches alongside a quay or wharf in a good seafarer-like manner is by the use of all the following ropes:

- a fore spring;
- a back spring;
- a head rope; and
- a stern rope.

A risk assessment must be carried out for the full mooring arrangement and should include a diagram.

26.6.2 Annex 26.2 shows the full and safe mooring arrangement for small domestic passenger craft and ships' launches.

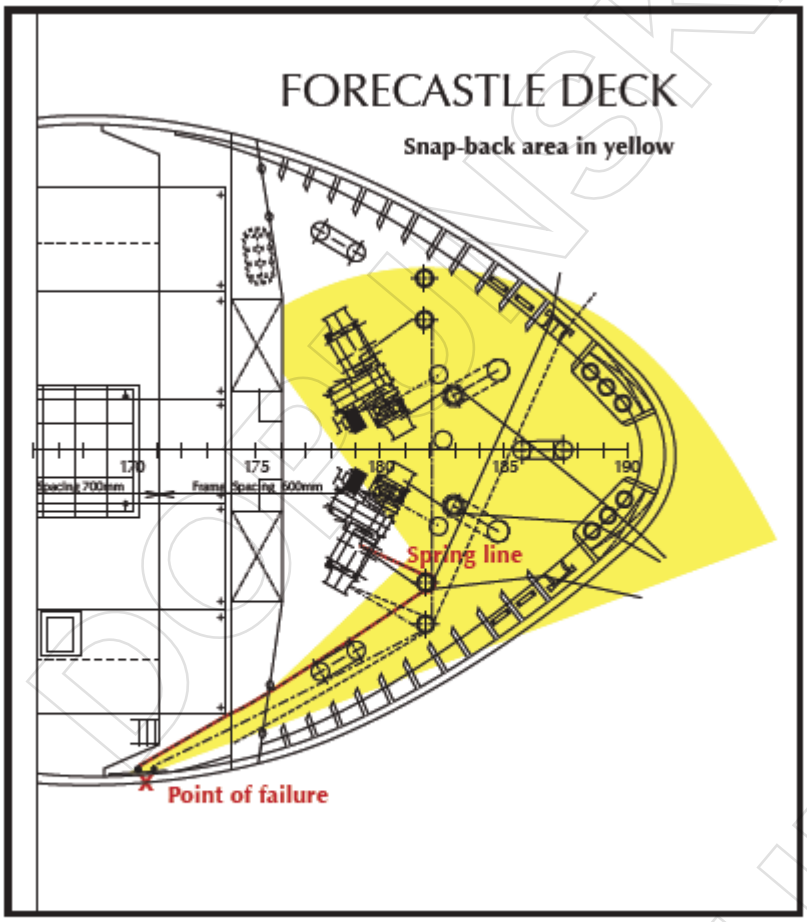
26.6.3 Reduced mooring arrangements may be used in exceptional circumstances. This may only be done after taking into account the weather and sea conditions, tidal state, tidal flow and respective snap-back zones. A risk assessment must be carried out for all arrangements that diverge from the full safe arrangement in section 26.6.1.

26.6.4 Passengers and seafarers should keep out of snap-back zones.

26.6.5 Where mid-ships mooring is the only means of making fast, breast lines may be run from mid-ships in addition to spring lines from the bow and stern.

26.6.6 Single-point mooring and steaming on a spring is not recommended and should be avoided.

ANNEX 26.1 COMPLEX MOORING SYSTEM, ILLUSTRATING THE SNAP-BACK ZONE



The diagram shows the potential area of danger (snap-back zone) when the spring line parts at the spring line fairlead. The snap-back zone would be increased if both pedestal fairleads were used. (Swedish Accident Investigation Authority Report S-95/11 Moerraborg)

ANNEX 26.2 THE FULL AND SAFE MOORING ARRANGEMENT FOR SMALL, DOMESTIC PASSENGER CRAFT AND LAUNCHES