CONTENTS

SAFE MOORINGS

References OCIMF Effective Mooring
Code of Safe Working Practice

1. RISK

Mooring operations are considered high risk due to the large forces exerted on the mooring lines by the mooring winches and by the ship's movement. In addition to this synthetic mooring lines have a high degree of elasticity and can snap back with violent force if parted under tension.

Some of the hazards associated with mooring operations are as follows:

- Snap Back — a common incident that can prove fatal to anyone standing in the mooring line's dangerous snap-back zone.
- Standing in the bight — can be fatal or cause serious injury. The highest risk is when handling tug's lines.
- Jammed / crushed — Hands or fingers can become jammed and severely crushed if they get trapped under a mooring line that is under tension. Most commonly occurs when handling mooring lines on the winch warping drum.
- Struck By — Heaving lines being thrown on board by mooring gang or flying debris when letting go an anchor.
- Break Away — Vessel breaks loose from its moorings or moves sufficiently to cause disruption to the cargo operation.[1]

Pre-planning of mooring operation and a risk assessment of the operation should be completed prior to commencement of mooring operation. Based on the risk assessment, appropriate control measures should be put in place.[2]

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.[3]

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[2] W 09 / 2021
[3] W 09 / 2021

2. SAFETY PRECAUTIONS

The Personal Safety precautions while handling moorings contained in the OCIMF publication Effective Mooring, Chapter 7, and the 'Safety Reminders' contained throughout the publication must be observed. Reference should be made to the Safety Precautions contained in CSWP, Chapter - Anchoring, Mooring and Towing Operations

Deck Officers should familiarize themselves with the following points:

- Type of mooring lines, construction, size, MBL, length, general condition (age, spliced etc).
- Type of winches and their operation.
- Heaving power of the mooring winches.
- Type of brake mechanism.
- Operation of brake, correct brake setting, brake rendering capacity of the mooring winch.
- Lay out of the mooring equipment (winches, warping drum, bitts, bollard, fair leads etc).
- Limitations and capabilities of mooring equipment.

Officer in charge at mooring station will conduct the toolbox talk with the mooring team before the mooring operation starts comprising on the topics - mooring configuration, hazards and associated control measures identified in Risk Assessment, keeping clear of the snap-back areas and ropes under tension, donning of appropriate PPE, handling of the tugs etc Report to bridge upon completion of the toolbox talk.[4]

Personnel not directly involved in mooring operations are not permitted within the mooring operation area. Any un-authorized personnel that happen to enter the mooring area during mooring operations must be immediately instructed to leave the area.[5]

3. SUPERVISION OF MOORINGS

3.1. A certificated Deck Officer must supervise mooring operations during berthing or un-berthing and moorings in port.[6] .

3.2. Tending moorings while the vessel is moored alongside should be supervised by the Bosun or a fully qualified Able-Bodied Seaman.

3.3. A person should be assigned to tend each winch control that is in use. A person with suitable training and experience should tend ropes being heaved or rendered on the winch drum or warping drum

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[6] W 09 / 2021

4. TRAINING[7]

4.1. To ensure a safe and efficient mooring operation, all involved personnel should be well trained. New personnel on board should familiarize themselves with mooring equipment and their operation before attending the first mooring station. Personnel entrusted with the responsibility of maintenance, operation, care and testing of mooring equipment should refer to the manufacturer's guidelines and should follow the job instructions in the ship's PMS for the maintenance.

Office conducts campaigns on mooring safety and shares the lessons learnt from near misses and accidents in the fleet. Training on various aspects of the mooring is imparted using Training Video and CBT modules.

4.2. TRAINEES

Trainees are seafarers with limited knowledge or experience of mooring operations e.g. Cadets, Oilers, Stewards etc. who are new to mooring operations. Before participating in mooring operations Trainees must be provided with familiarization training on board and made aware of the hazards involved and precautions to be taken. A seafarer experienced in mooring operations should be nominated as a mentor and should keep a look-out for the Trainee.

5. MOORING ROLES AND RESPONSIBILITIES[8]

Master is the overall in-charge of the mooring operations. He will exchange information with the Pilot on mooring configuration and will ensure that the environmental factors at the berth are considered when discussing the mooring plan with Pilot and vessel is moored as per the agreed mooring plan. He will instruct the officer in-charge at each mooring station on the deployment of the mooring lines and tugs. The officer in-charge will follow his instructions and will ensure these instructions are complied with.

It is the duty of the OOW that mooring team is given sufficient notice for preparing themselves for attending mooring station. Duty engineer is informed in timely manner for preparing mooring winches in readiness for operation (warming up in cold weather, running cooling water etc). Mooring team is alerted of the extreme weather conditions when mooring stations are announced. Any additional instructions from the Master are complied.

The officer in-charge will follow his instructions and will ensure these instructions are complied with.

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[8] W 09 / 2021

The Officer in-charge at each mooring station is responsible for:

- Conducting toolbox meeting prior operation
- Ensuring crew are equipped with appropriate PPE.
- Crew suitably clothed for the prevailing weather conditions.
- Testing the communications with bridge prior operation
- Readiness of the mooring lines and equipment for the deployment
- Ensuring stoppers, sufficient heaving lines, and any ancillary equipment is at hand and in good conditions. Ensure heaving lines are not weighted
- Safe handling of the tug line
- Discussing the mooring pattern with crew
- Supervising the safety of the mooring team
- Proper operation of the mooring winches.
- Hand signalling with tugs and shore mooring gang
- Having an overall view of the mooring operation
- Keeping an eye out for all members of the team. If they are in an unsafe position, alert them.

He will closely communicate with the master on following:

- Clearance from the berth as and when required.
- If the fenders at the berth are in poor condition
- Side alongside and mooring pattern (no of ropes)
- Passing first line and subsequent lines
- Making fast / letting go the tugs.
- Progress of the mooring operation
- Any unexpected strain on the mooring lines and winches
- Any difficulty is experienced.
- Any near miss is experienced.
- On the matters related to the mooring boat and shore mooring gang.

The officer in charge shall not operate the winches by himself. The ratings will operate the winches.

The ratings at the mooring stations will follow the instructions from the officer in-charge. The ratings shall clarify with the Officer in charge in case of any doubts.

Officer in-charge shall ensure following[9]:

- Winches are out of gear after the mooring operation
- Brakes are tightened to rendering mark (where marked)
- Split-drum winches not to have more than one layer of mooring line on the tension section of the drum with the minimum of five turns on the drum
- Mooring station area squared up after the mooring operation

Once vessel is secured alongside, Master is responsible for ensuring that vessel remains securely and safely moored alongside the berth. He will advise deck officers if any specific precautions about moorings are to be observed.

Duty officer is responsible for following:

- Vessel remains securely and safely moored alongside.
- Regular monitoring and tending of the moorings.
- Tightening and slackening of the lines as the freeboard reduces and increases due to cargo operation and/or rise and fall of the tide.
- Monitor the weather report,
- Alert Master, Chief Officer and Duty Engineer if adverse weather is forecasted.
- Monitor passing ships for surging movement.
- Readiness of mooring winches
- Closely monitor the other ships movement around the vessel

Master shall immediately inform Ship Manager whenever a mooring rope fails at berth or difficulties are being experienced in keeping the vessel alongside. It is more common at a berth which is open to sea. The sea and swell effect at berth may give rise to surge and sway movement in vessel. This movement imposes excessive strain and damages the ropes due to chafing resulting in failure of the ropes.

If two or more ropes start parting at the same time due to surging and sway movement, Master shall immediately suspend cargo operations and call for mooring stations. If Master finds it unsafe to remain at berth, he shall use his overriding authority and vacate the berth keeping the company and the charterers informed.

The Master shall also make an assessment and decide if it is safe to remain alongside and continue the cargo operations.

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A joint decision will be made by the Company, the Master and the Charterers and appropriate action will be taken for the vessel to remain safely alongside which may include one of the following:

- Providing additional ropes to vessel
- Increasing the number of mooring lines forward and aft
- Considering the use of tugs until cargo operations are completed.

In such cases master should not hesitate to issue a Note of Protest to the Port Authority and to the charterers.

The spare ropes should be kept in readiness for replacement at such berths and precautions are observed against damage by using the chafe protection devices around fairleads.

6. GENERAL MOORING ARRANGEMENTS

6.1. The Master must ensure that a safe and efficient mooring pattern is provided that is suitable for the berth and prevailing/predicted weather conditions, and suitable for safe and quick mooring, unmooring and line-tending operations.

6.2. Mooring lines must not be turned up and secured on the warping drum ends.

6.3. Breast lines should be oriented as perpendicular as possible to the longitudinal centre line of the ship and as far aft and forward as possible.

6.4. Spring lines should be oriented as parallel as possible to the longitudinal centre line of the ship.

6.5. The vertical angle of the mooring lines should be kept to a minimum.

6.6. Generally, moorings should not be mixed and should be of the same size, material and construction. If this is not possible, all lines used in the same service e.g. breast lines, spring lines, headlines, etc. should be of the same size and type. For example, all spring lines could be wire and all remaining lines synthetic.

6.7. All mooring lines in the same service should be about the same length between the ship’s winch and the shore bollard. Line elasticity varies directly with line length and shorter lines will assume more load.

6.8. All vessels are to maintain a minimum of 2 new spare moorings on board.

7. DEPLOYMENT AND MONITORING OF MOORING LINES

7.1. The person responsible for supervising the mooring operation should ensure that sufficient crewmembers are available for the operation at hand.[10]

Personnel matrix for mooring[11]

Forecastle deck	Minimum 3 personnel • One certified deck officer • Bosun or AB • One rating
Aft mooring deck	Minimum 3 personnel • One certified deck officer • Two ratings

Note: The certified deck officer shall supervise the mooring operations forward and aft. The Master may use additional crew for mooring operations considering the rest hours of crew or if he believes they are necessary for safety. If non deck crew are used, training has to be provided to them prior mooring operations.[12]

7.2. Moorings should be inspected at regular intervals that are appropriate to the prevailing conditions and tended as necessary.

7.3. The specific conditions of the port should be considered e.g. tidal ranges, prevailing weather conditions, exposure of the berth to swell / surge conditions, current ranges, passing traffic, etc. Mooring patterns recommended by the port / terminal should be taken into account.

7.4. Predicted weather and tidal conditions should be monitored and the moorings tended as necessary.

7.5. Moorings are to be closely monitored during unpredicted changes in environmental conditions and traffic movements to avoid the vessel breaking out from its berth. Stop all cargo operations and consider laying out additional moorings should it be required.

7.6. In severe weather condition, call tugs for assistance in holding the vessel against the berth reduce strain on the moorings or vacate berth in advance of the adverse weather conditions.[13]

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[11] W 09 / 2024
[12] W 09 / 2024
[13] W 09 / 2021

7.7. Handling of Mooring Lines[14]

Surging of lines on winch warping drums is not recommended for conventional fibre lines. The nature of the fibres, in combination with the high loads, make it safer to provide slack by walking the winch back rather than surging the line.

When holding and tensioning the line on the warping drum, bitt, the line handler must not stand too close. If standing too close when the line surges, the line handler could be drawn into the drum or bitt before being able to safely take another hold or let go. The line handler should stand back and grasp the line at least one metre from the drum or bitt.
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. The recommended method of turning up a line on bitts is to take two full turns around the leading post before belaying figure of eights. The reason for this is to reduce the tendency to pull the two posts together.[15] 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).

8. MAINTENANCE OF MOORING WINCHES / WINDLASSES

Refer Mooring Equipment Management Plan (MEMP) / Part C - Inspection and Maintenance of Fixed Equipment and Fittings in the shared drive - 9.09.11 Mooring Equipment Management Plan (MEMP).[16]

9. MOORING EQUIPMENT[17] MANAGEMENT PLAN (MAINTENANCE, INSPECTION, WEAR ZONE MANAGEMENT, RETIREMENT AND RENEWAL OF MOORING LINES)[18]

Refer Mooring Equipment Management Plan (MEMP) / Part B – Mooring Line Management Plan in the shared drive – 9.09.11 Mooring Equipment Management Plan (MEMP)[19]

10. WORKING WITH TUGS

When tugs are used additional care is required and all necessary safety precautions should be taken. Making tugs fast is a frequent operation on board.

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[18] W 47 / 2022
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Care must be taken to avoid injury to personnel. 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.

Towage inside port limits may be by either head or stern rope (or both) or by towage alongside. In many cases, it will be necessary to follow the "custom of the port". All equipment used in towing operations including messengers should be regularly inspected and replaced as necessary. The heaving line, messenger and mooring line to be used for tug must be in good condition and must be inspected before use.

The condition of a tug line will be unknown and the personnel at the mooring stations will not normally be aware of when the tug is actually heaving or what load is being applied to the line.
It is therefore important that once the tug line is made fast all personnel stay well clear of the towline at all times.

If two mooring lines are required to be made fast, both lines must be of the same material.
Once the tow is connected, crew 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 snapback zone at all times.

Tugs should only be cast off after receiving instructions from the bridge, and never on the orders of the tug crew. Great care must be taken while letting go tugs to ensure that the tug line is cast off in a controlled manner.

Ensure chain stoppers are available for making fast tug's mooring wires. Care must be taken that the pull of the tugs used, and the length of the lines is commensurate with the attachment points onboard the vessel. Towlines and ropes should be protected against chafe and must not be led round sharp corners. No lines should be passed for towage purposes to any tug without an order or consent from the bridge.

When the officer stationed aft is about to send the tow rope away, he must inform the bridge of his intentions, taking care to give timely warning to stop the engine if necessary. 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. Ensure the bitts upon which the towing eye is to be placed are clear of rope or wire. When conducting towing operations, it is important that those involved consider the safety of persons on both vessels.

Master shall ensure that tug pushes vessel only at tug push points which are clearly marked. When the tug is being secured or let go, the person in charge of mooring should monitor the operation closely to ensure that no load comes onto the line before it is properly secured or while it is being let go.

The bollard pull of tugs & the SWL of the ships chocks, bollards & mooring fittings should be compatible for safe operation.[20]

[20] W 09 / 2021

Where stopper is required for the release of tugs lines, care should be taken that fibre rope should be stoppered with fibre rope stopper & wire rope should be stoppered with chain stopper.[21]

11. USE OF HEAVING LINES

Vessel's heaving lines should be constructed with a monkey's fist at one end. 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.[22]

The act of using dangerously weighted heaving lines is an UNSAFE ACT which can cause death or serious injury to mooring crew and is not in accordance with good seamanship.

Vessels using dangerously weighted heaving lines may be subject to prosecution in some ports.

Under no circumstances a heaving line shall be weighted by items such as cement, shackles, sand, bolts or nuts, or twist locks. Bosun's are to maintain and inspect the heaving lines. If any monkey fist on board is found to be accidentally weighted, same shall be deconstructed and disposed of with immediate effect.

Chief Officers are to instruct the crew and frequently remind them on this matter. Use of weights in heaving lines is a dismissible offence.

Prior each mooring operation, chief officer and duty officer shall personally check and ensure that there are no additional weights like cement, sand, shackles, bolts, nuts, twist locks etc on the monkey fists used on board.

Also prior to throwing a heaving line, the vessel's mooring party should alert the linesmen, mooring boat and/or tug crew and anyone else in the vicinity that a line is about to be thrown. The operation should only proceed if the area where the heaving line will land is clear of personnel.

While preparing risk assessments for mooring operations, hazards and control measures for use of heaving lines shall also be considered.

Reference to be made to COSWP (Mooring operations) regarding use of heaving lines and monkey fist.

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[22] W 47 / 2022

12. STOPPER[23]

Stoppers are to be in good condition and should be inspected prior to each use and frequently for both external wear & wear between the strands. Inspect the stopper securing point, a staple on the bitts or an eye pad on the deck close by prior each use and during routine inspection of the mooring fittings.

Stopper should be used in double line configuration where it is secured to eye on the bitts or eye pad close by and the two ends of the stopper are crossed over and under the line being stoppered off.

Rope stoppers should be stored in a dry location out of direct sunlight after use. Rope stoppers should be replaced at 24 months interval or upon deterioration whichever is earlier.

When stoppering off moorings, the following applies:

- Stoppers are used to transfer the weight of the mooring lines from the winch to the bitts or vice versa.
- Natural fibre rope should be stoppered with natural fibre.
- Man-made fibre rope should be stoppered with man-made fibre stopper (but not polyamide).
- Used on the double (criss-crossing the mooring line).
- 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.

Ideal stopper should be:

- Made of polyester.
- Flexible and made of stiff material.
- About two meters effective length from the securing point
- About half as strong as the mooring line

13. SNAP BACK ZONES

Mooring lines led around roller pedestals and fairleads have the potential to create complex snap-back zones. With the number of permutations involved for different mooring situations it is impractical to mark all snap back zones on the deck. Further crew members working in an incorrectly marked mooring area will have a false sense of safety. The entire area of the mooring deck should be considered a potential snap-back zone.[24]

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[24] W 47 / 2022

13.1. Individual snap back zone markings around bitts, fairleads and rollers are not to be painted. Demarcate the entire forward and aft mooring areas with a cordoning off danger line. A warning, “Danger Entering Snap Back Hazard Zone” should be stencilled on the deck when entering the poop deck or on the bulkhead of the forecastle break, clearly visible to a person entering the area.

13.2. Paint the entire mooring zone with non-skid paint.

13.3. Following illustration on snap back zone may be used to carry out a toolbox talk prior commencement of mooring.

- Annex 26.1 Complex Mooring System, Illustrating the Snap-Back Zone (from COSWP)