MOORING OPERATIONS

SAFE WORKING PRACTICE

Hanza Marine Management, Training Centre
By Capt. Igors Sorokins
Mooring incidents: Statistic

Most ships do not have fully non-slip decks

Less than 50% carry out annual brake tests

22% ropes not made up to bitts correctly

Which do you let go first?

27% of vessels keep moorings on drum ends
Type of Injury From Mooring Incidents

Death = 14%
Legs = 23%
Back = 14%

Causes in detail

parted ['pɑːtɪd]
1) a) разделённый на части b) рассечённый до основания
2) 2) разлученный, разъединённый
We would like to remind about this:

Please watch Video on WEB page

Then return to this presentation and continue...
Most equipment used in the mooring of the UK P&I Club’s insured merchant vessels was in good condition while the procedures and practices involved in berthing and casting off were generally carried out satisfactorily, according to the Club’s ship inspectors.

However, some vessels did not have appropriate procedures in place or carry out adequate working operations. In some cases, crew were not properly trained or supervised; there was a dearth of non-slip mooring decks; mooring ropes were frequently stored on drum ends.

In the year to March 2010, the UK Club’s in-house inspectors looked at the mooring arrangements, equipment and procedures on 373 ships, noted shortcomings and analysed reported mooring incidents.

The mooring arrangements on 14% of vessels were “not satisfactory.” 7% of ISM mooring procedures were found unacceptable. A significant portion had some way to go to improve mooring procedures to an appropriate standard.

Within the last 24 months, only 4% of ships had reported a “near miss” relating to mooring operations. There was concern about insufficient skilled personnel being deployed to moor a vessel safely and effectively.
It was often difficult to grease the equipment on winches correctly.

Some vessels’ split drums were not set up correctly:
There should be only 4 or 5 turns on the smaller drum with the rest of the rope on the larger one.

Some 51% of vessels inspected carried out annual break tests, 26% did not, and for 23 per cent, this was not applicable.

Although these tests are mainly a tanker requirement, they would improve safety for other vessels during high-risk mooring operations.

Nearly a quarter of the vessels inspected kept moorings on the drum ends instead of making them fast. This is not good practice as ropes made fast on drum ends are more likely to jump and cause expensive damage to the drum end bearings.

Some 94% of vessels had painted the drum ends where a build up of paint could cause rope damage. Drum ends should be smooth and coated with a thin layer of boiled linseed oil or other approved synthetic liquid for protection.

All ropes, wires and Tonsberg links used for mooring should be certificated.

Spare mooring ropes, wires and links should not be overstowed with paint, chemicals or other shipboard or general cleaning items.

Such equipment should be stowed clear of the deck, preferably on a pallet and in a dry ventilated position. Mooring ropes and wires stowed on deck during sea passages should not be exposed to sunlight, sea spray or funnel soot. Canvas or heavy duty polyethylene covers would prolong rope and wire life.
Decks, bitts and ship

Some 32% of ships had fully non-slip decks while the same percentage had none at all. About one-quarter had non-slip decks around bitts and drum ends. Mixing sand or an approved non-slip aggregate into the paint can be very effective in helping to reduce mooring accidents. Only 6% of vessels had painted snap-back zones on deck.

Many accidents occur because someone is standing in the wrong place at the wrong time. Well marked zones should reduce such accidents.

The UK Club has seen a growing number of incidents when non-deck crew are employed during mooring operations!

It is often crew with insufficient training who are seriously hurt when things go wrong, particularly in bights or snapback zones.

This highlights the need for all crew to be trained and familiar with bights, snap-back zones and prospective hazards. Correct stoppers must be used with appropriate mooring ropes/wires. They should not be left around the mooring ropes once they have been made fast to the bitts.
Think: How these incidents could be avoided...

Please watch a Video on WEB page

At 12.34:20 the master communicated ‘in position’ to the deck crew via VHF. The ship was still sailing at around 0.7 knots at that time. As the master later explained, this order meant that the crew were to fasten the mooring line winch onto the strap brake. Almost immediately after the master had given his order, the mooring line broke. The ship's main engine was running at full astern at that time. The seaman, who had walked to the forecastle to grab hold of the heaving line, was standing in the mooring line snap-back zone. He was hit by the mooring line that had snapped back and, as later emerged, died instantly from his injuries. It was immediately clear to the crew on the forecastle and the boatswains on the quay that the seaman was severely injured.

They managed to quickly moor the ship. The lockmaster warned the emergency services and authorities. After the ship had moored, the pilot and engineer went to the forecastle to provide first aid assistance. The seaman, however, had already died by that time.
Here they are - the answers on questions:

How to avoid...
How to reduce...
How to be safe...

Lets read together:

CODE OF SAFE WORKING PRACTICES FOR MERCHANT SEAMEN!

Latest ELECTRONIC Consolidated Edition 2010
COSWP - it is not only ONE edition for your guidance for SAFE WORKING PRACTICES!

SAFE WORKING PRACTICES DURING MOORING AND UNMOORING

This circular seeks to promote awareness amongst Batterham's clients about best practices in the mooring and unmooring of vessels. These measures may be part of the routine of a shipping line, but they hold inherent danger for both seafarers and crew. To prevent physical damage and to prevent injuries to crew members (especially for crane masts, hoists or cranes while handling), we advise that these measures should be adhered to.

BEFORE THE MANEUVER ORGANIZATION AND SAFETY

- The crew should be briefed on the mooring plan and duties involved.
- The crew should wear appropriate personal protective clothing, including reflective vests, helmets, safety shoes, sailing gloves, and safety lines.
- The workplace should be carefully prepared for the maneuvering.
- The communication equipment ensuring the linkage and the warning system should be properly tested.
- The maneuver should only be carried out by authorized persons.
- The operations and functions of the vessel should be instructed to the responsible crew members.

A training package should have an illustration of the situation at all times.
- All personnel should be familiar with the nature of the equipment to be used and have a working knowledge of.

Mooring and unmooring

PPE to be used

Various factors in monitoring and unmooring

- The ship's safety should be maintained at all times.
- The ship should be in a safe condition and ready for the maneuvering.
- The operation should be carried out by competent personnel.
- The crew should be aware of the risks involved in the operation and handling equipment.

This manual is made for the purpose of maximizing the safe mooring and unmooring and to minimize possible harm to the people of...

Hanza Training Centre
Chapter 25: Anchoring, mooring and towing operations

25.1 Introduction
25.2 Anchoring and weighing anchor
25.3 Making fast and casting off
25.4 Mooring to buoys
25.5 Towing
25.6 Safe mooring of domestic passenger craft & ships launches to quays

Annex 25.1: Mooring systems
Annex 25.2: The full and safe Mooring Arrangements for small Domestic, Passenger Craft and Ships Launches illustrating potential ‘Snap-Back’ Zones

Chapter 26: Hatch covers and access lids
26.1 Introduction
26.2 General
26.3 Mechanical hatch covers
26.4 Non-mechanical hatch covers and beams
26.5 Steel-fringed inspection/access lids
26.6 Access to holds/cargo spaces

Let’s open Chapter 25:
Anchoring, mooring and towing operations
First of all – Risk Assessment to be done!

Risk assessments
A risk analysis helps you identify risks you may come across on board when mooring.

A pattern for your joint risk assessments:

Five steps!

25.1 Introduction

25.1.1 Based on the findings of the risk assessment, appropriate control measures should be put into place to protect those who may be affected. This chapter highlights some areas which may require attention in respect of anchoring, mooring and towing operations.

It is particularly important that the risk assessment considers the consequences of the failure of any element of the equipment.
Step 1 - Mapping

Identify the hazards. Call everyone in for a mapping session on deck at the mooring gear. Make an INITIAL RISK ASSESSMENT.

Then, think about each individual work process that you go through when mooring and decide whether there are any hazards.

Note down every hazard on a piece of paper - make a MAP!

What are the hazards when mooring?

Just to get your thoughts and imagination – go to next pages which show you what might happen.
Look at the drawing – how many risks can you identify?
The underlying factors

• Fatigue
• Poor supervision
• Recklessness
• Poor training
• Poor procedures
• Unspoken accept

These factors could cause the following risks – go to next page
1 Poor overview
Плохой обзор

2 Stopper breaks
Обрыв стопора

3 Oil leak from winch - slip/injury
Подтеки масла с лебедки

4 Too cold
Холод

5 Crossing line
Перескрещивание швартовов

6 Sea rising
Подъем уровня воды

7 Lines in mess on mooring boat
Путаница швартовов на боте

8 Wires/ropes tight and slack/or different material, elasticity and breaking strength
Швартовы разных типов (эластичность и прочность) и неравномерно нагружены

9 Line thrown without telling docker
Подача выброски без предупреждения
11 Moving to and from
Moving to and from
Рыскание судна у причала

12 Standing in a bight
Standing in a bight
Человек в петле швартова

13 Too many turns
Too many turns (on the drum)
Излишние шлаги на барабане

14 Sitting on a line
Sitting on a line
Человек сидит на швартове

15 Untidy lines
Untidy lines
Слабина швартовов

16 Wrong outfit
Wrong outfit
Работа без защитных средств

17 Mess on the quay
Mess on the quay
Беспорядок на причале

18 Line caught in fender
Line caught in fender
Швартов зацепился за кранец

19 Telling off/bad communication
Telling off/bad communication
Плохой обмен информации

20 Lines lying too long in sun & water
Lines lying too long in sun & water
Потеря прочности швартова от солнца и воды

13.03.14
21 Language confusion
Языковый барьер

22 Bad lighting
Плохая освещенность

23 Poor communication between pilot & captain & tug
Плохая связь между судном и буксиром

24 Line 'singing' before it parts
Швартовы трещат от напряжения перед разрывом

25 Wet paint
Свежая покраска

26 Unaware of risk, being in snap back zone
Незнание опасных зон

27 Standing on the line
Человек становится на швартовы

28 Draught changed
Изменение осадки

29 Line comes off bollard - steep angle
Швартов соскачивает с кнехта (крутой угол)

30 Line round propeller
Швартов попадает под винт

31 Several lines on same bollard
Несколько швартовов на одном кнехте
Step 2 - Assessment

Go back to the office and assess the hazards.

Assess each hazard according to danger and probability.

Then prioritize which RISKS you intend to do something about.
Step 3 – Action plan

Have a **meeting** where you can talk through possible solutions to reduce the risks.

**THREE COMMON REASONS FOR ACCIDENTS**

- Seamen standing in bights or snap back zones and when lines part, those involved are often injured.
- Insufficiently trained crew are used during mooring operations and they are often seriously injured if something goes wrong.
- The person supervising the mooring is also involved in the operation and is unable to carry out his role effectively.

**Attention!**

“**The person supervising the mooring is also involved in the operation and is unable to carry out his role effectively !!!!!**”
An officer should produce a document comprising what you have decided.

Afterwards it should be passed on to all the relevant people, who have helped identify the risks and those who take part in mooring operations.

Then use the document to remind you of what you have decided to do, and do just that.

The document could also be used to tell other crews what has been done and decided on since they were last on board.
Step 5 - Follow-up

The officer should regularly check whether what you have decided is actually being done.

Please watch a Video on WEB page 3
ONCE AGAIN - The most common risks in mooring

Equipment:
• Use of old, damaged wire
• Poor equipment
• Poorly designed mooring system
• No overview of mooring area
• Hazard/tripping risk sites not highlighted

Work processes:
• Lack of communication and planning
• Poor wire/line handling

Crew qualifications:
• Lack of knowledge about the hazards of the job
• Unclear instructions
• Lack of information
• Lack of supervision (supervisor involved elsewhere)
• Small, untrained deck crew
• Ineffective on-board mooring training, without identifying and understanding the dangers associated with snap back zones

Crew concentration:
• Stress and fatigue

Ship’s safety culture:
• Procedures not followed
• Shortcuts taken
• Standing in the wrong places (snap back zone)
• Standing/walking on a bight
• Walking over a wire
• Quick mooring versus safe mooring
• No risk assessment process prior to mooring operations
• Cluttered mooring area
• Cluttered deck

Weather:
• Icy, slippery deck
25.2 Anchoring and Weighing Anchor

25.2.1 Before using an anchor a competent seafarer should check that the brakes are securely on and then clear voyage securing devices.

A responsible person should be in charge of the anchoring team, with an adequate communications system with the vessel’s bridge.

The anchoring party should wear appropriate safety clothing - safety helmets, safety shoes and goggles as a minimum protection from injury from dirt, rust particles and debris which may be thrown off during the operation. Wherever possible, they should stand aft of the windlass.
25.2.2 Where the means of communication between bridge and anchoring party is by portable radio, the identification of the ship should be clear to avoid misinterpretation of instructions from other users of such equipment.

25.2.3 Before anchors are let go, a check should be made that no small craft or other obstacle is 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 walked out all the way to avoid excessive strain on the brakes (and on the bitter end if the brakes fail to stop the anchor and chain).
25.2.4 Where the anchor is let go from the stowed position, if upon release of the brake, the anchor does not run, personnel should NOT attempt to shake the cable, but the brake should be re-applied, the windlass placed in gear, and the anchor walked out clear prior to release.

25.2.5 Cable should stow automatically. If, for any reason, it is necessary for personnel to enter the cable locker, they should stand in a protected position and, as far as possible, have constant communication with the windlass operator.

25.2.6 Anchors housed and not required should be properly secured to prevent accidental release.

- Steel hook to work with chain in cable locker

Please watch a Video on WEB page

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25.3 Making Fast and Casting Off

25.3.1 During mooring and unmooring operations a sufficient number of personnel should always be available at each end of the vessel to ensure a safe operation.

A responsible officer should be in charge of each of the mooring parties, and a suitable means of communication to the vessel’s bridge team should be established. If VHF/UHF radios are used, then the ship’s bridge and each group should be clearly identified by name to prevent confusion.

NOTE! Always remember to bring along a VHF/UHF radio

The tie up should be supervised, where possible, by an officer, as laid out in STCW Chapter 25.

UHF RADIO & COMMUNICATION

1. Mooring personnel must always use UHF radio communication
2. Upon arrival at/departure from the quay, the vessel and mooring personnel must establish radio communication on the specified mooring frequency channel.
3. Mooring personnel must by radio communication make sure that secondary means of communication is in order (Public Address system, another VHF/UHF handset etc).
Personal protective equipment (PPE) can be classified as follows:

Type Examples

- **Head protection** - Safety helmets, bump caps, hair protection
- **Hearing protection** - Ear muffs, ear plugs
- **Face and eye protection** - Goggles and spectacles, facial shields
- **Respiratory protective** - Dust masks, respirators, breathing equipment apparatus
- **Hand and foot protection** - Gloves, safety boots and shoes
- **Body protection** - Safety suits, safety belts, harnesses, aprons, high visibility clothing.
- **Protection against drowning** - Lifejackets, buoyancy aids and lifebuoys
- **Protection against hypothermia** - Immersion suits and anti-exposure suits

25.3 Making Fast and Casting Off

25.3.1 ...All personnel involved in such operations should wear suitable protective clothing (see Chapter 4).

The mooring watch must use the following clothes / equipment:

- **Service uniform / work clothes**
- **Hard hat**
- **Gloves**
- **Safety shoes**
25.3.2 Vessels’ heaving lines should be constructed with a ‘monkey’s fist’ at one end. To prevent personal injury, the ‘fist’ should be made only with rope and should not contain added weighting material.

25.3.3 Areas where mooring operations are to be undertaken should be clutter free as far as possible. 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.
Repair and Maintenance

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.

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.

Certification and Marking

It should be ensured that the relevant certificate has been obtained before putting a rope into service. The marking on the rope or its package should be verified and match the certificate. The certificate should be retained in a safe place for identification of the rope when carrying out subsequent periodic examinations in service.
Repair and Maintenance

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.

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.

25.3.4 All equipment used in mooring operations should be regularly inspected for defects. Any defects found should be corrected as soon as possible.

AMSA (Australian Maritime Safety Authority)
Focused Inspection Campaign on Mooring Arrangements:

AMSA Surveyors recorded 62 deficiencies on 36 vessels with the deficiencies identified in the following areas:

- Windlasses and Winches 0
- **Bollards and Fairleads 19**
- Mooring lines 5
- **Procedures 38** Total 62

PSC Deficiencies Related to FIC Matters:

- **Windlasses and Winches 20**
- Bollards and Fairleads 2
- Mooring lines 3
- Procedures 7 Total 32
Below 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.
25.3.4

Particular attention should be paid to the risk of oil leaks from winches, and surfaces of fairleads, bollards, bitts and drum ends should be clean and in good condition. Rollers and fairleads should turn smoothly and a visual check be made that corrosion has not weakened them.

Do not allow oil leaks from hydraulic winches to go unnoticed, it could be you that slips on that pool!

SAFETY REMINDERS

✓ Ensure that the "heave-in" and "slack-out" directions are clearly marked the winch handles and controls.
✓ Steam pipes in vicinity of an operator or rope handler must be lagged or adequately guarded against accidental contact.
✓ Do not allow oil leaks from hydraulic winches to go unnoticed, it could be YOU that slips on that pool.
✓ Do not try to assess the tension in a line by kicking or standing on it is dangerous as well as being futile.
Particular attention is drawn to the need to ensure that pedestal roller fairleads, lead bollards, mooring bitts etc are:

(a) properly designed to meet all foreseeable operational loads and conditions,
(b) correctly sited, and
(c) effectively secured to a part of the ship's structure which is suitably strengthened.

Sharp objects can chafe mooring lines.

Once again – Please, memorize...

Please watch a Video on WEB page 6
Mooring ropes, wires and stoppers that are to be used in the operation 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 (see section 21.2.28) and inspected for deterioration internally and broken strands externally.

STEEL WIRE ROPES

Construction of Wire Ropes

When a high Minimum Breaking Load (MBL) together with reasonable ease of handling is required, it is usual to select wire ropes. A wire rope consists of a number of strands laid up around a central core of fibre or wire. Each strand in turn consists of a number of wires laid up to form the strand.

Lay - the twisting of strands to form a rope, or wires to form a strand, during its manufacture.

Right-hand or Left-hand Lay - the angle or direction of the strands relative to the centre of a rope.

Ordinary Lay (Fig. 15) - a method of making a rope where the lay of the wires in the strand is opposite to the lay of the strands in the rope.

Lang's Lay (Fig. 16) - a method of making a rope where the lay of the wires in the strand is the same as the lay of the strands in the rope. Although this construction has better wearing properties than ordinary lay, because it tends to untwist it has only limited use. It is not used for mooring lines.
Wires should be regularly treated with suitable lubricants.
Inspection of Wire Ropes

At routine intervals, the entire length of rope should be inspected by a competent person with particular attention paid to those sections that are proven by experience to be the main areas of deterioration. Excessive wear, broken wires, distortion and corrosion are the usual signs of deterioration. For a more detailed examination, special tools are necessary to facilitate internal inspection. In cases where severe rope wear takes place at one end of a wire rope, the life of the rope may be extended by reversing the drum end with the load end, i.e. turning the rope `end for end', before deterioration becomes excessive.

Nature and Number of Broken Wires

If the number of visible broken wires found in a rope is more than 4 over a length of 6 DIA, or 8 over a length of 30 DIA, `DIA' - nominal diameter of the rope, the rope should be discarded.

Reduction of Rope Diameter Resulting from Core Deterioration

Reduction of rope diameter resulting from deterioration of the core can be caused by:
- Internal wear and wire indentation
- Internal wear caused by friction between individual strands and wires in the rope. If these factors cause the actual rope diameter to decrease by 10%, the rope should be discarded even if no broken wires are visible.

Note: New ropes will normally have an actual diameter greater than the nominal diameter.

External Wear

If the actual rope diameter has decreased due to external wear by 7% or more of the nominal rope diameter even if no wire breaks are visible, the rope should be discarded.
External Corrosion
Corrosion of the outer surface of the wire can be detected visually. Wire slackness due to corrosion attack/steel loss is justification for immediate rope discard.

Internal Corrosion
This condition is more difficult to detect. If there is any indication of internal corrosion, the rope should be subjected to internal examination carried out by a competent person. Confirmation of severe internal corrosion is justification for immediate rope discard.

SAFETY REMINDERS
- ALWAYS stand well clear of a wire under load
- NEVER stand in the bight of a wire
- ALWAYS wear gloves when handling wires

<table>
<thead>
<tr>
<th>Section</th>
<th>Criteria</th>
<th>Discard Criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Wire Breaks</td>
<td>C.3.2 Number in length of 6d or 30d</td>
<td>Discard if over 4 in length 6d or 8 over 30d</td>
</tr>
<tr>
<td>Wire Breaks at Termination</td>
<td>C.3.3 Evidence of broken wires</td>
<td>Remake termination or discard rope</td>
</tr>
<tr>
<td>Fracture of Strand</td>
<td>C.3.6 Strand fracture</td>
<td>Discard if present</td>
</tr>
<tr>
<td>Reduction of Rope Diameter</td>
<td>C.3.7 % reduction</td>
<td>Discard if diameter decreased by 10%</td>
</tr>
<tr>
<td>Abrasion of Outer Wires</td>
<td>C.3.8 Degree of deterioration (%)</td>
<td>Discard if over 2%</td>
</tr>
</tbody>
</table>
25.3.5 Splices in both ropes and wires should be inspected regularly to check 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.

Cow hitch
The most common materials used for fibre mooring lines are polyester, polyamide, polypropylene and polyethylene. Some ropes are made of combinations of these materials.

<table>
<thead>
<tr>
<th>Material</th>
<th>Specific Gravity</th>
<th>Specific Modulus N/tex</th>
<th>Specific Strength N/tex</th>
<th>Dynamic Coefficient of Friction against Metal</th>
<th>Melt Point Deg. C</th>
<th>Other Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyester</td>
<td>1.38</td>
<td>10</td>
<td>0.84</td>
<td>0.12 – 0.15</td>
<td>256</td>
<td>Good wet internal abrasion resistance</td>
</tr>
<tr>
<td>Polyamide</td>
<td>1.14</td>
<td>4</td>
<td>0.84</td>
<td>0.1 – 0.12</td>
<td>218</td>
<td>10-15% Wet strength loss. Poor wet internal abrasion resistance</td>
</tr>
<tr>
<td>Polypropylene</td>
<td>0.91</td>
<td>8</td>
<td>0.73</td>
<td>0.15 – 0.22</td>
<td>165</td>
<td>Lighter than water. Low strength</td>
</tr>
</tbody>
</table>

Selection Criteria:
- Strength
- Construction
- Elastic Elongation
- Coefficient of Friction
Polyester
Polyester is the **most durable** of the common materials. It has **high strength**, both wet and dry. It has good **resistance against external abrasion** and does not lose strength rapidly due to cyclic loading. Polyester's low coefficient of friction allows it to slide easily around bitts. Its relatively high melting POINT (256°C) reduces the chances of fusion. Polyester is therefore useful for large and small ropes where strength and durability are important and where moderate elasticity is required.

**Polyamide** (previously referred to as `Nylon')
Polyamide rope **loses 10–15% of its strength when wet**. It has the highest elasticity of regularly used materials with good temperature and abrasion resistance.

**Polypropylene**
Polypropylene rope has approximately the **same elasticity as polyester rope**. Polypropylene has **limited temperature resistance** and has **poor cyclic loading characteristics**. Prolonged exposure to the sun's ultraviolet rays can cause polypropylene fibres to disintegrate.
Polypropylene is **lighter than water** and can be used for **floating** messenger lines. The use of moorings manufactured from 100% polypropylene is not recommended. However, suitable composites or melt mixes with other fibres such as polyethylene or polyester are available and acceptable for use as moorings.

The **melting point** (or, rarely, liquefaction point) of a solid is the temperature at which it changes state from solid to liquid.

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**Table:** **Minimum Breaking Forces** in kN of Synthetic Ropes (New, Dry Ropes, Unspliced)

<table>
<thead>
<tr>
<th>Ref Number</th>
<th>Polyester</th>
<th>Polyamide</th>
<th>Polypropylene</th>
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<tbody>
<tr>
<td>52</td>
<td>380</td>
<td>479</td>
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<td>708</td>
<td>887</td>
<td>608</td>
</tr>
<tr>
<td>80</td>
<td>867</td>
<td>1,080</td>
<td>740</td>
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<tr>
<td>88</td>
<td>1,040</td>
<td>1,300</td>
<td>887</td>
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<tr>
<td>96</td>
<td>1,230</td>
<td>1,530</td>
<td>1,040</td>
</tr>
</tbody>
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**Notes:**
1. `Ref Number' is the approx diameter in millimeters
2. A spliced test piece must achieve at least 90% of EN and ISO standard values
Handling and Storage of Synthetic Lines

Handling

• **Surging** of lines on winch warping drums is **not recommended** for synthetic lines.
• **Stoppers made of polyester are recommended.** They should be used in double line configurations.
• When holding and tensioning the line on the warping drum, capstan or bitt, the line handler **must stand** back and grasp the line **about 1 metre** from the drum or bitt.
• Synthetic lines are **not very resistant to cuts and abrasion.**
• Care should be taken when dragging synthetic lines along a deck. Contact with sharp edges and rough surfaces should be avoided.
• When dirt, grit or rust - internal abrasion will result.
• Twisted rope must be coiled in the proper direction. **Most lines are right-hand lay and should be coiled clockwise.**
• When removing new rope from a coil, the coil should be suspended on a shaft and rotated.
• Winch-mounted synthetic lines should be periodically **end-to-ended** to distribute wear.

Storage

• Should be stored in **clean and dry** surroundings. Excessive heat can damage synthetic fibres, especially polypropylene and polyethylene.
• **Ultraviolet** rays from sunlight can damage fibres. (Polypropylene and polyethylene). Small ropes should never be stored in direct sunlight.
• **Chemicals, oil and petroleum products** damage most synthetic lines if they are stored in paint lockers or near paints and paint fumes.
• If a line becomes oily or greasy, it should be scrubbed with fresh water and soap.
25.3.6 Ropes and wires which 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 of the amount required, then the complete reel should be run off.
25.3.7 It is often difficult to achieve an ideal mooring layout. Ship’s equipment can be employed to the best advantage if the following general principles are remembered:

(a) breastlines provide the bulk of athwartships restraint;

(b) backsprings provide the largest proportion of the longitudinal restraint;

(c) very short lengths of line should be avoided when possible, as such lines will take a greater proportion of the total load, when movement of the ship occurs.

**Forces Acting on the Ship**

The moorings of a ship must resist the forces due to the following factors:
- Wind + current + tides
- surges from passing ships
- waves + swell + seiche
- ice
- changes in draft + trim + list.
Careful thought should be given to the layout of moorings, so that 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 recommended and a risk assessment of the operation should be completed, especially in cases where the ship is having to use an unusual or non-standard mooring arrangement.

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Purpose</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Bow line</td>
<td>Prevent backwards movement</td>
</tr>
<tr>
<td>2</td>
<td>Forward Breast line</td>
<td>Keep close to pier</td>
</tr>
<tr>
<td>3</td>
<td>After Bow Spring line</td>
<td>Prevent from advancing</td>
</tr>
<tr>
<td>4</td>
<td>Forward Quarter Spring line</td>
<td>Prevent from moving back</td>
</tr>
<tr>
<td>5</td>
<td>Quarter Breast line</td>
<td>Keep close to pier</td>
</tr>
<tr>
<td>6</td>
<td>Stern line</td>
<td>Prevent forwards movement</td>
</tr>
</tbody>
</table>
In some ports, the **mooring team is informed quite late** about which and how many lines are going to be used and about the need for a tugboat. This information is usually provided **by the pilot**, who then informs the captain, who informs the mooring teams fore and aft by radio. It is therefore a **good idea to carry out a pre-arrival meeting** (some call it a toolbox meeting). That alternative arrangements can be discussed in good time without any rush.

**25.3.8** Careful thought should be given to the layout of moorings, so that 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 recommended and a risk assessment of the operation should be completed, especially in cases where the ship is having to use an unusual or non-standard mooring arrangement.

- **Two ropes through one lead!**

- **Sharp angle!**

- **Something’s wrong, guys!!!**
25.3.9 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 moorings.

**Caught by a bight**

Watch out for bights. It is very dangerous to stand in a bight of line or wire. It is extremely important that competent personnel are used to operate winches to ensure that mooring, towing and hauling lines are not subject to sudden, excessive loads.

**THE BEST WAYS TO AVOID ACCIDENTS DUE TO BIGHTS OF LINE ARE:**

- The crew must at all times be aware of where they are standing while handling lines or when near them.

- The supervisor must concentrate on others’ actions and should not get involved in operations as a working hand !!!!

- Inexperienced crew such as cadets and fresh ratings should only be allowed to handle lines under supervision.

- Only the crew required should be present at the mooring station. Persons not actively involved in the mooring operation (engine or off-duty crew coming on deck) have often been seen visiting the area of the mooring station. So a restricted entry notice should be posted.

- Sufficient deck hands are to be present at the mooring station to perform the operation smoothly.

Remember – bights do not allways look like bights!
25.3.10 When moorings are under strain all personnel in the vicinity should remain in positions of safety, i.e. avoiding all 'Snap-Back' Zones.

The killing force of a broken line: The area travelled by a parted line with enough force to kill someone on its way is known as the **snap back zone**.

If any line parts with a bang, then its **broken ends are moving faster than 690 knots** which is the speed of sound in air.

1, 2, 3 – position of broken rope (line)
- Point of rope break (burst)

**snap back** - отскок, резкое раскручивание

**part** – гл. а) разделяться, разрываться, раскалываться; б) разделять, разрезать, разъединять. Syn: divide, break,
The most serious danger from synthetic ropes is "snapback" which is the sudden release of the energy stored in the stretched synthetic line when it breaks.

The primary rule is to treat every synthetic line under load with extreme caution; stand clear of the potential path of snapback whenever possible!

Synthetic lines normally break suddenly and without warning.
Unlike wires, they do not give audible signs of pending failure and they may not exhibit any broken elements before completely parting.
When a line is loaded, it stretches. Energy is stored in the line in proportion to the load and the stretch.
When the line breaks, this energy is suddenly released.

The ends of the line snap back striking anything in their path with tremendous force.
This snapback is common to all lines. Even long wire lines under tension can stretch sufficiently to snap back with considerable energy.

Synthetic lines are much more elastic, and thus the danger of snapback is more severe.
The potential path of snapback extends to the sides of and far beyond the ends of the tensioned line.
Marking of snap-back zones on mooring stations:

Wrong marking can lead to incident!

Are they correct?
It is strongly recommended that a bird’s eye view of the mooring deck arrangement is produced (an aerial view from a high point of the ship can be utilised) to more readily identify danger areas.

1. Make a picture or take a drawing of mooring arrangements
2. Identify danger areas
3. Make a snap-back zones scheme for mooring pattern
Can you identify snap-back zones and assess a risk looking on these pictures?

CREWMEN ARE CLEAR OF THE DANGER ZONE

25.3.11 Annex 25.1 shows diagrams of simple and complex mooring systems, as well as an example of an actual mooring deck arrangement, illustrating the associated ‘Snap-Back’ Zones.

25.3.12 Further information on ‘Snap-Back’ Zones can be found in section 6.3.5 of the Oil Companies International Marine Forum (OCIMF) publication “Mooring Equipment Guidelines”.
THE BEST WAYS TO AVOID BEING HIT BY BROKEN LINES:

• Keep a close eye on your workmates and alert them immediately if any of them are in a snap back zone.

• Treat every line under load with extreme caution and remember to stay clear of the potential path of a snap back.

• Experience shows that the first lines ashore, such as spring lines, have the greatest potential of breaking as they are the only lines holding the ship. So be extra aware where you stand when handling the first line.

• When lines are subject to a straight pull, the snap back zone is minimal, but if the lines are angled round a bollard or roller, then the snap back area increases.

• The crew performing the operation must be thoroughly trained and qualified to appreciate snap back zones. This could be done by a constant focus at pre-arrival meetings and in risk assessment processes.

• Be aware of the risk of a line snapping back onto the deck if it parts outboard of the ship’s side, particularly if the deck is protected only by open railings.

25.3.10 Immediate action should be taken to reduce the load should any part of the system appear to be under excessive strain.
Once again - Watch, please video to memorize...

Please watch a Video on WEB page
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 area will change and increase in area. Where possible, lines should NOT be led round pedestals except during the operation of mooring the ship, thereafter lines should be made up on bitts, clear of pedestals if at all possible.

In bad spooling, riding turns trap the line in gaps in lower layers. Poorly spooled lines should be manually re-spoled properly before each berthing.
25.3.13 Where moorings are to be heaved on a drum end, one person should be stationed at the drum end, backed up by a second person backing and coiling down the slack. In most circumstances three turns on the drum end are sufficient to undertake a successful operation. A wire on a drum end should never be used as a check wire.

25.3.14 A wire should never be led across a fibre rope on a bollard. Wires and ropes should be kept in separate fairleads or bollards.
Mooring line chafing against winch structure
Lines not paid out properly may rub on the ship’s structure (winch frames, platforms, etc.) involving a considerable risk of damage through chafing, abrasion or cutting.

ONCE AGAIN –
Samples of bad practice

Synthetic mooring line heaved tight on the storage section of a split-drum type winch.

Fairlead rollers being “strangled” in order to improve the incoming angle on the winch drum
Strangling the roller causes the mooring line to chafe.
Improper spooling of wire line
Wire mooring line irregularly/unevenly spooled onto the winch drum.

Note crossed wires in underlying layers which are severely damaged or crushed by upper layers of the wire.

Abrasion damage to mooring lines from frozen fairleads
Chafing between a mooring line and other equipment such as cocks and fairleads causes surface abrasion.

Rust or evidence of wear may be an indication that the rollers do not rotate freely.

Mooring wire and lines through same Panama lead
Friction or chafing between mooring lines and mooring wire causes damage from surface abrasion and contamination of the line.

The lubricated mooring wire leaves grease deposits on the panama lead and stains mooring lines with grease residues.
DO NOT DO LIKE THIS!
Stopper left on lines after they have been secured. It may also result in the stopper rope tightening to the point where it can't be released.

Only rope stoppers should be used with rope mooring lines; chain stoppers are for use with wires.

Use an approved method!

Do not stay too close!

Do not forget PPE even in training!

Unsafe or damaged equipment

Extreme wear and grooving on rollers
Grooving over part of the surface of the roller indicates that the roller is frozen and that the line/wire is always chafing against the roller in the same area.

Grooving or corrosion and scale accelerates damage to the mooring lines/wires.

Generally, and when under tension, lines/wires will tend to settle in the groove which will cause further accelerated wear to the grooved surface.

Extreme grooving in button type roller fairlead
The depth and size of the groove indicate that it has previously been used for wire lines, which might cause hard caging or corkscrewing when new wires are installed.

If the fairlead is subsequently used for lines with a different diameter, the sharp edges of the groove will damage the line through abrasion and chafing.

Eye screw pin of D-shackle for connecting the line stopper to the stoppering eye/hog not properly fitted.
Experience has shown that the ideal rope for shippers should satisfy the following requirements:

(a) The stopper should be a synthetic fibre rope.

(b) The stopper should be used "on the double".

(c) The stopper should be very flexible and the size should be appropriate for the size of moorings, that is, about 50% of the rope diameter.

(d) The stopper rope should be of low stretch material.

(e) The man-made fibre ropes used for the stopper should be made from high melting point material, i.e. polyester or polyamide (?).

(f) The double rope used for the stopper should, where possible, have a combined strength equal to 50% of the breaking load of the mooring rope on which it is to be used. There is no requirement for fibre handling tail ropes to be proof tested.
Once again - About stopper...

Correct method of stoppering off a synthetic mooring rope

How to tie Cow Hitch?

1. To capstan or drum end.
2. To overside fairlead.
3. At least 4 criss-crosses.

www.netknots.com
Rat-Tail Stopper Tying:

The two ends are then wrapped around the Mooring Line. The two ends alternately pass over and under each other. After several complete turns have been made, the ends are secured with a Square Knot (Video).

The abbreviated name "Stopper" is commonly used. In technical publications several names are used including:

- Mooring Line Stopper;
- Rat-Tailed Stopper;
- Rat Tail Stopper

Please watch a Video on WEB page
One or Two Cow Hitches (Spread Apart to Prevent Jamming)

Chain Stopper (Wire Rope)

Cross Over and Under Rope

Apply Seizing or twist and Hold by Hand

Synthetic Fibre Rope Stopper

One or Two Half Hitches Taken Against the Lay of the Rope (Spread Apart to Prevent Jamming)

Apply Seizing or Hold by Hand

Natural Cordage Stopper

Carpenter's Stopper on a Wire Rope and in Detail

Groove for Setscrew

Alternative Wedge
25.4.3 Where mooring to buoys is undertaken from the ship, a lifebuoy with attached line of sufficient length should be available for immediate use.

25.4.1 Where mooring to buoys is undertaken from a ship’s launch or boat, personnel engaged in the operation should wear lifejackets and a lifebuoy with attached lifeline should be kept readily available in the boat.

25.4.2 Means should be provided to enable a person who has fallen into the water to climb back on board the launch or boat. If a boarding ladder with flexible sides is used, it should be weighted so that the lower rungs remain below the surface.

Single Point Mooring (SPM):

Please watch a Video on WEB page.
25.4.4 When slip wires are used for mooring to buoys or dolphins, the eyes of the wires should never be put over the bitts, as 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.

Slipping a Mooring

For this maneuver, a strong line or flexible wire is run through the buoy ring and back on deck for use as a slip rope. A strain is taken on it, and the chain is unshackled. Should the ship be riding to a bight of the chain, an easing-out line is used to ease the chain through the ring while the chain is being hauled in. The ship now rides to the slip rope, and unmooring is completed by letting the end of the slip rope go and reeving it through the buoy ring.
25.5 Towing

25.5.1 A number of accidents to persons have occurred during the relatively simple operation of making fast and letting go of tug’s tow lines.

The common factor was that, for various reasons, the tow lines became taut, causing, for instance, messengers to part and strike ship’s crew, and seamens’ hands to become trapped, all of which resulted in major injuries.

25.5.2 Equipment used for towing should be adequately maintained and inspected before use, as during towing operations excessive loads may be applied to ropes, wires, fairleads, bitts and connections.

Lighter towing lines with higher SWL are needed.

INSPECTION!

IMPORTANT NOTE: IF A DOUBT EXISTS AS TO THE INTEGRITY OF A ROPE IT SHOULD BE REPLACED, IMMEDIATELY.
Communication Breakdown: Standardized Commands Will Improve Tractor Tug Performance & Minimize Errors

Proper communication needed between tug and crew regarding securing towlines.

Tug boat crew should be receptive to communication while heaving and lowering towline.

All aspects of the towage should be planned in advance, taking into account such factors as tidal streams, current and water depths, as well as the size, windage, displacement and draft of the tow. The towing arrangements and procedures should be such as to reduce to a minimum any danger to personnel during the towing operations.

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

When tugs are used to assist manoeuvring the ship, additional care is required by the ship's crew.

The condition of the tug's lines is unknown, and the crew on 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 to stay well clear of the tow line at all times.*

When the tug is being secured or let go, the person in charge of the mooring should monitor the operation closely to ensure that no load comes on to the line before it is properly secured, or whilst it is being let go. Never let a tug go until instructed to do so from the bridge; do not respond to directions from the tug's crew.

If the tow line has an eye on it, heave this past the bitts so that there is sufficient slack line to work with, stopper off the line, then put the eye on the bitts. Do not try to manhandle a line on to the bitt if there is insufficient slack line. If the line has no eye and is to be turned up on the bitts then it should *always* be stoppered off before handling it.
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. The tail rope (messenger) should be at least 2m long.

Sample of CORRECT and INCORRECT way of communication:

The person talking on the radio should thoroughly understand the importance of timing, clarity and being concise.

• Incorrect & not helpful:

“Well, uh, you’re coming in more or less even, I guess, uh, and it looks like, uh, I don’t know, uh, maybe about, uh, 10 feet or so. Oh, and you’re, uh, closing kind of quick too, uh, so, like, you know, uh, you might want to think about.....”

• Correct & very helpful: “10 feet up and down, closing fast.”

For dramatic effect some may substitute the term “coming in hot” instead....

25.5.2 Equipment used for towing should be adequately maintained and inspected before use, as during towing operations excessive loads may be applied to ropes, wires, fairleads, bitts and connections.

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

**concise** [kənsaɪs] 1) краткий; сжатый; лаконичный, немногословный (о речи, стиле письма)
The anchoring/mooring party **MUST** wear:

1. Safety goggles; the windlass operator should remember that the wearing of safety goggles may reduce his field of vision, but nevertheless, they must be worn.
2. Safety helmet.
4. Overall with long sleeves.
5. Safety gloves.

25.5.4 All workers involved should be adequately briefed in their duties and safety precautions to be taken. They should be equipped with **personal protective equipment** including safety helmets and safety shoes.
25.5.5 Workers should, wherever possible, agree with the tug crew the area where the heaving line is to be thrown to, in order that they move clear.

A messenger should be used to heave the tug’s tow line on board by a winch, and then a stopper used while the eye is placed around the bollard.

Only enough turns of the messenger should be used on the warping drum end to heave in the tow line. On tankers, do not place the tow line’s eye over the bollard which has the fire wire made fast to it. Take the fire wire off, if there is no bollard available.

**Messenger**: A light line used for hauling over a heavier rope or cable.
25.5.6 Once the tow is connected, non-essential personnel 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 should a line break. Exposure time should be kept to a minimum.
25.5.7 During operations, communications should be maintained between:

(a) the towing vessel and both the bridge team and the foredeck of the vessel under tow; and

(b) the tow party and the bridge team.

In all communications clear identification of the parties communicating should be used to prevent misunderstandings. The Tug Master should be kept informed of engine movements, proposed use of thrusts etc. Persons in charge of the mooring party should monitor the tow line to give warning to the crew if the tow line should become taut, for whatever reason.
25.5.8 When letting go the tow, no attempt should be made to heave in the tow line slack before making positive communications with the tug’s crew and they have indicated that they are ready to receive their line.

Use the tug’s attached messenger to heave in the slack 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 tow line goes out and is retrieved on board the tug.

If the tow line is allowed to run out uncontrolled, it could whiplash, and strike a crew member, causing severe injuries.

Letting go tow line:

1. Tug ready?
2. Heave up messenger to make slack tow line
3. Take of eye from bollard
4. Let go tow line & control speed

DO NOT ALLOW TO RUN OUT UNCONTROLLED!

---

**messenger**: small diameter rope attached to a heavier rope such as towing line to facilitate heaving.
Safe Handling of Tug Lines

When tugs are used to assist manoeuvring the ship, additional care is required by the ship’s crew:

- The condition of the tug’s lines is unknown, and the crew on 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 to stay well clear of the tow line at all times.

- When the tug is being secured or let go, the person in charge of the mooring should monitor the operation closely to ensure that no load comes on to the line before it is properly secured, or whilst it is being let go.

- Never let a tug go until instructed to do so from the bridge; do not respond to directions from the tug’s crew.

- If the tow line has an eye on it, heave this past the bitts so that there is sufficient slack line to work with, stopper off the line, then put the eye on the bitts.

- Do not try to manhandle a line on to the bitt if there is insufficient slack line. If the line has no eye and is to be turned up on the bitts then it should always be stoppered off before handling it.

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Use turns of the messenger around the bollard to control the speed at which the tow line goes out and is retrieved on board the tug.

If the tow line is allowed to run out uncontrolled, it could whiplash, and strike a crewmember, causing severe injuries.
Do not try to hold a line in position by standing on it just because it is slack - if the tug moves away so will you!

When letting go do not simply throw the line off the bitts and let it run out. Always slack it back to the fairlead in a controlled manner, using a messenger line if necessary to avoid whiplash.

Correct and safe procedures should be followed by all parties when making a towline connection forward with a ship making way.

Safe procedures for ship crews when securing tugs require attention. Safe procedures should also include ship’s officers keeping an eye on the tugs when securing in case something goes wrong.

Most captains and more than half of the pilots prefer that tugs approach the bow only when the ship’s crew is ready to send a heaving line. If the tow line is allowed to run out uncontrolled, it could whiplash, and strike a crewmember, causing severe injuries.
Safe mooring operations require the ship’s crew and the shore or boat mooring teams to understand one another. In many cases this may be made difficult by language differences. Background noise and environmental conditions may create further difficulties. Radios will be useful and many ports require mooring teams to have radios. However hand signals can also be a reliable means of communication. There are a set of hand signals which are recognised and understood by crews of ships of all nationalities. **Use of these signals and not carrying out any task until requested will improve the safety of mooring operations and reduce accidents.**

**Figure 1** - Vertical up and down movement of an outstretched hand means “slack away” or “slack off”.

**Figure 2** - Arms crossed in front of the body or above the head means “make fast” or “is fast”.

**Figure 3** - Rotation of a hand held up means “heave away”.

**Figure 4** - Cupped movement of the hand upwards means “let go” or “cast off”.

**Figure 5** - Hands held up together means “stop” or “Hold on”.

Note: Figures 1 to 5 from The Code of Safe Working Practice for Merchant Seamen (chapter 25)
25.5.9 Further recommendations on towing are contained in Merchant Shipping Notices MGN 308 (M+F)

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

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

This notice supersedes Merchant Shipping Notice M. 710

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 heights in mooring warps and of "Snap-Back" Zones.

1. Introduction

1.1 Operations such as mooring, towing and hauling (including trailing 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, booms and fairleads, their construction and their attachment to a vessel's structure.

2. Design and Installation of Mooring Equipment

2.1 Windlasses 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, shackles, holding down bolt, etc.) and to afford further protection by working load 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.
To reduce the risk of accidents, vessels and equipment must be maintained to a high standard.

All personnel should be adequately trained with the correct personal protective equipment.

Correct procedures should be in place and the required work permits issued with all mooring operations supervised by a competent person.

Training in mooring operations should be incorporated into vessels’ regular schedules and include all personnel.
Communication equipment has been tested and the crew has been briefed on the mooring plan.

All supervising officers are familiar with the nature of the equipment used. Experience and vigilance are vital in the prevention of accidents. Supervising officers shall have a working knowledge of:

- The characteristics of the ropes, springs and warps used
- The ropes’ breaking strength
- The criteria for condemning ropes, springs and warps
- Operating winches
- Communication
- Holding power brake band
- Winches’ self tensioning properties
- Winches’ heaving power
- The mooring plan
- The location of capstans and hawsoles and the correct handling of mooring ropes along them
- The work to be carried out
- The snap-back zones (see schedule of danger zones)

Supervision over and operation of winches and capstans should be in the hands of experienced crew.

Officers in charge should have an overall picture of the situation at all times.

Preparation of the work space is vital to safety at work. Work should only be carried out by authorised persons.
Before saying Goodbye
two more video...
Towards the end some words in Russian...

next pages
ТЕХНИКА БЕЗОПАСНОСТИ ПРИ ВЫПОЛНЕНИИ ШВАРТОВЫХ ОПЕРАЦИЙ

1. При подготовке к швартовке капитан должен находиться на ходовом мостике и сам руководить маневрами судна.

2. Перед швартовкой к причалу иллюминаторы со стороны борта швартовки должны быть закрыты.

3. Перед началом швартовных операций убедитесь, что швартовные механизмы и вьюшки находятся в исправном состоянии и работают нормально.

4. Пуск в действие швартовных механизмов производите только по команде лица, руководящего операциями.

5. Для швартовных операций применяйте только исправные тросы. Не работайте со стальными тросами, у которых торчат концы оборванных проволок, перебиты пряди или трос деформирован.

6. Не допускайте нахождения посторонних людей в местах производства швартовных операций.

7. При подготовке к швартовным операциям разнесите по палубе тросы необходимой длины. Не травите тросы непосредственно из бухт или с вьюшек.

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8. Не стойте внутри шлагов разнесенного по палубе швартовного троса. Подавая для швартовки трос, очищайте его от колышек.

9. Подавая бросательный конец, предупредите окриком "Берегись!".

10. Не давайте большой слабины швартовному тросу при выборке его поданным бросательным концом. Тяжелые тросы потравливайте через кнехт, наложив на него один—два шлага.

11. Не задерживайте руками или ногами вытравливающийся трос.

12. Накладывая трос на кнехт, следите, чтобы на нем не образовались колышки, в противном случае швартовный конец возьмите на стопор, расправьте все образовавшиеся колышки и только после этого вновь наложите его на кнехт.

13. Взяв швартовный трос на стопор, не находитесь впереди по направлению его натяжения и ближе 1 м от места наложения стопора (для синтетических канатов — не ближе 2 м).

14. При отдаче стопора находитесь только со стороны, противоположной натяжению швартовного троса, и в стороне от линии натяжения.

15. Стравливая трос из бухты, встаньте за бухту лицом по направлению движения стравливаемого троса и сбрасывайте шлаги вперед от себя.
16. Выбирайте и травите швартовные тросы только по команде лица, руководящего швартовкой.

17. Выбирай или потравливая швартовные тросы, держите ходовой конец, не подходя к кnehтам или барабану швартовного механизма ближе 1 м.

18. По окончании швартовки на верхние шлаги стального троса, заведенного на кnehт, накладывайте схватку из тонкого растительного троса.

19. При отдаче с кnehта туго натянутого троса, сняв схватку, потравите трос до образования достаточной слабины. Только после этого снимайте шлаги с кnehта.

20. Не находитесь на линии натяжения выбираемого или стравливаемого троса, а также вблизи кнхтов и роульсов.

21. Не выбирайте и не травите тросы, если с ними производятся работы у роульсов или киповых планок (освобождение зажатых тросов, перекладывание матов и пр.).

22. Не протаскивайте швартовные концы через клюзы без специальных крючев.

23. Во время производства швартовных работ не держите руки на планшире фальшборта, не перегибайтесь через него.

24. Не переходите с судна на причал, с причала на судно или с судна на судно до окончания швартовки.

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25. При завозке швартовного троса шлюпкой или моторным катером набирайте достаточное количество шлагов троса для свободного его потравливания.

26. Не подбирайте завезенный шлюпкой швартовный трос до тех пор, пока шлюпка не освободится от троса и не отойдет от него на безопасное расстояние.

27. Если человек находится на швартовой бочке, не травите, и не выбирайте швартовный трос.

28. Дополнительные шлаги троса накладывайте на барабан швартовной лебедки, шпилля или брашпилля только при остановленном механизме. Не стравливайте трос с вращающегося барабана швартовного механизма, когда барабан вращается в сторону выборки.

29. После окончания швартовных операций уберите свободные тросы на выюшки или в бухты, а механизмы отключите.

30. Наблюдая за полетом линеметательных ракет, находитесь за надежным укрытием.

31. При запуске линеметательной ракеты следите за тем, чтобы линь находился под ветром в стороне от Вас на расстоянии, исключающем соприкосновение с ним.

32. Запускайте линеметательную ракету с таким расчетом, чтобы она упала за целью и своим линем накрыла ее.
Швартовка (Commands for mooring)

Give on shore the heaving line
Send on shore the head-rope
Send on shore the stern-rope
Send on shore the bow spring
Send on shore the stern spring
Send on shore the breast line
Pay away the bow spring
Pay away the stern rope
Check the head-rope
Check the stern spring

Check the breast line
Make fast the bow spring
Make fast the stern rope
Make all fast
Cast off the head-rope
Let go the head-rope
Heave in the bow spring
Hold on
Avast heaving in
Heave in aft
Haul in the slack

Подать бросательный
Подать носовой
Подать кормовой
Подать носовой шпринг
Подать кормовой шпринг
Подать прижимной
Потравить носовой шпринг
Потравить кормовой
Задержать носовой
Задержать кормовой шпринг

Задержать прижимной
Крепить носовой шпринг
Крепить кормовой
Так крепить
Отдать носовой
Отдать носовой шпринг
Вира носовой
Стоп выбирать
Стоп выбирать
Выбрать комовые швартовы
Выбрать слабину

Haul taut = Haul fast
Ship the fenders
Unship the fenders
Is the propeller clear?
Yes, the propeller is clear
No, the propeller is not clear
Are the fenders on berth?
Yes, fenders are on berth
Have fenders ready fore and aft

We will be berth portside alongside
Send a heaving line ashore
Use the center lead
Use the Panama lead
Use the port quarter lead
Keep the lines tight
Report the forward distance to shore

Stand by for letting go

Выбрать втугую
Подложить кранцы
Убрать кранцы
За кормой чисто?
За кормой чисто. Винт чист.
За кормой не чисто
Кранцы на причале?
Да кранцы на причале
Кранцы на баке и корме
приготовить

Будем швартоваться
левым бортом
Подать бросательный на берег
Заводить через центральный клюз
Заводить через Панамский клюз
Заводить через левый кормовой
ключ
Держать концы в тугую
Доложить расстояние
от носа до берега

Приготовиться к отшвартовке
Команды. Commands for anchoring - Постановка на якорь.

1. Get the starboard anchor ready - Правый якорь к отдаче приготовить
2. Get the port anchor ready - Левый якорь к отдаче приготовить
3. Get both anchors ready - Оба якоря к отдаче приготовить
4. Stand by the starboard anchor - Стоять у правого якоря
5. Stand by the port anchor - Стоять у левого якоря
6. Let go the starboard anchor - Отдать правый якорь
7. Let go the port anchor - Отдать левый якорь
8. Pay away the cable - Травить якорь цепь
9. Keep the cable slackened - Держать якорь цепь слабо
10. Hold on the cable - Задержать якорь цепь
11. Put the windlass in gear - Сообщить брашпиль
12. Be ready to heave in - Приготовиться выбирать
13. Heave in the starboard anchor chain - Выбирать правую якорь цепь
14. Heave in the port anchor chain - Выбирать левую якорь цепь
15. Heave in upon the cable - Выбирать якорь цепь
16. Stop heaving in the cable - Стоп выбирать
17. Disengage the windlass - Разобраться
18. Secure the anchor for sea - Якорь по-походному
19. The anchor is up and down - Якорь панер
20. The anchor is apeak - Якорь панер
21. How is anchor? - Как якорь?
22. Clear anchor - Якорь чист
23. Foul anchor - Якорь не чист
24. Stand clear of the anchor chain - Не стоять у якорь цепи
25. Pay away three shackles of the chain - Положить три смычки
The end

Thank you! Good luck!