MOORING ROPE STANDARDS

Oct 2022

NYK GROUP

Mooring Rope Standards - Objective

1. To improve the quality, safety and standardize the mooring rope requirements across bulk carriers and container ships always keeping safety first.

2. To judge and incorporate practical solutions taking into consideration the vessel design, mooring rope standards without compromising on safety.

3. Ensure standards are realistic, achievable and easily understood keeping the end users (**The Seafarers**) in mind.

4. Consider the MEG4, ISO, International Regulatory requirements, Ships in service and the terminal conditions to arrive at an optimum standard to ensure safe operations.

Mooring Rope Standards – Standards

1. Mooring Rope Standard
2. Addendum 1 Contents of LMP & MSMP
3. Addendum 2 Procedure to carry out brake rendering test
4. Addendum 3 Brake Rendering Test Calculation

Additional Discussion Items

1. LDBF of the mooring ropes should not be restricted based on the SDMBL.

a) It is preferable to use overstrength ropes to reduce the number of rope parting incidents. If we reduce the strength of the ropes, we will experience higher frequency of ropes parting. Risk analysis of frequency versus consequence indicates it is preferable to reduce the frequency as the consequence is similar in both cases. When overstrength ropes are used, if the load on the system increases the brakes are expected to render being the weakest link in the system.

b) We have traditionally used over strength ropes, up to 160% of the SDMBL however never experienced any fixture failures due to the ropes being overstrength. Below data taken from NYK operated vessels:

Data from 2017 to 2022:

- Total number of ships averaging between 800 to 850 ships.
- Number of rope parting incidents: 17
- Number of rope rendering incidents: 0
- Number of incidents where fixtures were damaged: 2 (Cause was due to incorrect lead of the rope around the fixture, not overstrength ropes).

Additional Discussion Items

2. **Use of same diameter of rope.**

   In different parts of the world and for different manufacturers the diameter and construction of the ropes for a given LDBF are not the same. Therefore, this requirement is impossible to implement for a worldwide tramping bulk carrier. It is also therefore not applicable to link the LDBF to the ships SDMBL. The benefit of using design diameter is limited and ropes not biting into the reel is dependent on good rope handling practices onboard.

3. **Use of Chafe Protectors.**

   The use of chafe protectors is not recommended because while the protection they provide the ropes is marginal, the risk of injury to the crew when installing or adjusting the chafe protectors is very high. Permanent chafe protectors that are embedded into the ropes removes the risk of injury but from trials we have conducted they barely provide any additional protection to the ropes to justify using them.

4. **Use of Tails for synthetic ropes:**

   4 rope manufacturers were consulted. None recommended tails for synthetic ropes. One maker said it compromises the strength of the system.

Mooring Winch Brake Holding Capacities

Although this information is not provided in the manual, below is a table provided by a winch maker as the standard for reference. 47 MT Winch Brake capacity can be operated up to but not exceeding 54 MT on the first layer. An increase of 25 %

Drum Layer	47 Ton Rated Winch	Max 54 Ton Rated Winch
1st Layer	47 MT	54 MT
2nd Layer	38 MT	44 MT
3rd Layer	32 MT	37 MT
4th Layer	27 MT	32 MT
5th Layer	24 MT	28 MT

The brake holding capacity on the first layer is the maximum torque that can be applied on the mooring winch brake. Therefore, as the layers keep increasing the brake rendering capacity will keep reducing in order to maintain the same torque as the first layer.

Torque = Force X Lever

Therefore, as the lever increases by the rope diameter for each layer the force must reduce to keep the torque constant, in order not to overload the brakes.

Mooring Rope Comparison Table – OBAMA ROPE MFG Co. LTD

Mooring Rope Types - Comparison Table

Summary of characteristics for types of mooring rope

Item	Strength	Elasticity	Specific Gravity – Floatability	Abrasion Resistance from Heat	Remarks
Polypropylene	Low	Medium	0.91 - Yes	Slightly low / Medium	100% PP ropes are not recommended by MEG4
Polypropylene and Polyester Composite	Medium	Medium	1.0 or less - Yes	Medium	
Nylon	Slightly High	High	1.14 – No	Medium	Curing with use, strength (10-15%) loss due to water content
HMPE	High	Low	0.97 - Yes	Slightly High	Must be used with Tail Rope

Mooring Rope Construction – By OBAMA ROPE MFG Co. LTD

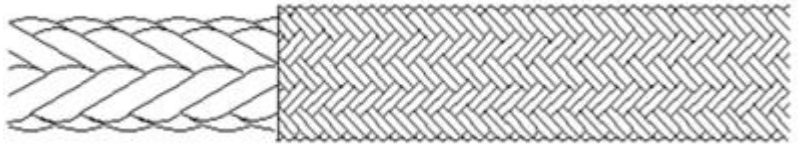
1. 8 - Strand Rope

- Most Popular and stable structure for ship use.
- Easy to Splice

2. 12 – Strand Rope

- Higher strength but lower elasticity compared to 8 strand ropes
- Splicing relatively more difficult.
- Also widely used on ships

3. Double Braided Ropes



- Structure has core rope protected by finely braided outer cover
- Strongest and most flexible. Splicing requires high skill level.
- Inner core the provides the rope strength but cannot be checked from outside.
- Most suitable for bulk carriers, as outer layer protects the inner core rope.