Handling, Storage, Installation, and Maintenance

of

Trelleborg Marine Systems
Foam Filled Marine Fenders

Contents

1.0 General Information

1.1 Introduction

This manual provides a description of Trelleborg marine fenders, and includes information on their handling, installation, storage, and maintenance. To ensure the safety of all personnel and equipment, please read and understand all the "Precautions" noted in Section 2 of this manual.

Trelleborg marine fenders are designed to absorb the kinetic berthing energy of a ship when positioned along a dock wall or alongside other vessels or structures. After the initial berthing contact, the fenders offset the vessel from the structure and resist mooring loads. The fenders typically float with a large portion of the fender body above the vessel's waterline. The fenders are attached to the pier using chains which are connected to end fittings built into the fender.

The fenders require very little maintenance, although periodic inspections are required to observe for damage or abnormal wear. Details of inspections, maintenance, operations and care are contained in the following sections of this manual.

The following sections detail all steps to ensure safe and effective operations of the fenders provided. All details should be thoroughly examined prior to installing, operating, removing or maintaining the fenders. If questions of any nature arise, please contact the Trelleborg sales office for complete details and answers to questions prior to commencing an operation.

1.2 Precautions

Marine fenders are items having substantial size and weight. Caution must be exercised in handling these items as follows:

a. Be certain overhead lifting equipment and all rigging hardware including chain, cables, shackles, etc. possess safe working loads which exceed the weights to be lifted.

b. Be certain all personnel are experienced in such operations and are supervised adequately by individuals who have familiarized themselves with all sections of this manual.

c. Be certain the sequence of operations are followed as outlined in this manual.

d. Only lift the fender by either the end fitting lifting eyes, or with nylon straps secured around the body of the fender. Do not lift the fender with cables or wire lines against the elastomer skin, and do not drag the fender across any surface.

e. The fender's elastomer skin will burn slowly if subjected to an open flame or very hot objects. For this reason, extensive caution should be taken when welding, cutting, etc. in the vicinity of the fender skin.

f. Avoid purging or allowing steam or hot exhaust gasses to come into contact with the fender skin. Initial exposure of steam or hot gas will cause cosmetic damage to the skin, and extensive or prolonged exposure could jeopardize the fender’s performance and safety overload capabilities.

g. Do not let the fender come into contact with sharp objects or debris. The fender backing surface (against which the fender will react during compression) should be smooth.

2. Handling

2.1 Unpacking

Fenders are most often shipped on flat bed truck trailers, secured with nylon straps around the fender body, or by chains/ropes connected to shackles attached to the fender end fittings (or both). In this case, the fenders should also be chocked with rounded-edged wooden blocks or other suitable dunnage to prevent them from rolling when the line attachments are released.

Flat bed truck trailers: Take care in releasing the tension from load binders on straps or chains. After the tension is released, the shipping lines may be removed. Two lifting lines may then be attached to the fender, one on each end fitting, by connecting each lifting line to a suitably sized shackle. A shackle is then attached to each end fitting, and the fender can then be lifted from the trailer and placed on the ground, or lowered into the water for installation. Lay the fender on a surface that will not cause marking or abrasion to the elastomer skin of the fender. Fenders laid on the ground should be chocked to prevent them from rolling, or moving due to incidental contact.

Flat racks: Follow the same procedure as for flat bed truck trailers.

Closed-top cargo containers: Open the doors of the cargo container in a manner that will not expose anyone in the unlikely event that the contents of the container have shifted during transport. After opening the doors, remove any dunnage that protected the ends of the fenders from contact with the doors. Remove any chocks or dunnage from the first fender in sequence, and attach a line to the fender end fitting. Gently pull the fender out of the container and place onto a smooth level surface. Ensure that the skin of the fender does not abrade against the edges of the cargo container while removing the fender from the container. Minor scuffing or discoloration of the skin caused by handling or transportation is considered normal wear, and will not affect the performance of the fender. Note the serial number of the fender, and inspect for damage that may have occurred during shipment.

2.2 Transporting

Once unpacked, the fenders should be transported to the storage or installation site by one of the following methods.

Crane or hoist: Attach a lifting line to a shackle that is attached to each of the fender end fittings (one shackle each end fitting). Lift the fender, keeping it level, and set it down gently on a level surface. Insert chocks or stops on both sides of the fender to keep it from rolling. Unhook the lifting lines from the fender end fittings. Always ensure the crane or hoist capacity is adequate for the weight of the fender.

Forklift: If a forklift is used, great care must be taken to ensure the fender skin is not damaged by the forks. Forks need to be long enough to extend across the full diameter of the fender. The ends of the forks must not be allowed to contact or puncture the fender body. Ensure the forklift capacity is adequate to handle the weight of the fender, with consideration given to the center of the load when the fender is lifted and moved. When lowering the fender to lay it on the ground, make provisions to ensure it does not roll after leaving the forks.

Flatbed truck trailer: Lay the fender on the bed of the truck, after inspecting the bed to ensure there are no sharp projections or rough surfaces present. Chock the fender into position before removing lifting lines from the fender end fittings. Secure the fender to the truck bed by attaching wire rope or chain to the fender end fittings, and securing these to the truck bed. Nylon straps may be used around the body of the fender, and tightened to keep the fender secured to the bed. Securing lines must be frequently checked for tightness, chocking verified, and the load must be inspected for shifting during transport.

Avoid:

- Rolling the fender on the ground or any rough surface.
- Any contact with sharp objects.
- Any contact or proximity to high heat, steam, or sparks.
- Lifting the fender by one end.
- Dragging the fender along the ground or rough surface.
- Contact of the fender with the wheels of the transport vehicle.

3. Storage

Store the fenders on level ground and secure them from moving by chocking them in position. Use chocks with rounded edges to prevent damage to the skin.

Avoid oil and grease from contaminating the skin of the fenders. Keep the fenders away from locations where high temperature work operations are performed (torch cutting, welding, brazing, steam cleaning, heavy equipment exhaust).

Trelleborg recommends covering the fenders during storage, if the storage period will exceed 30 days. A white tarp should be used, to prevent excessive heat build up on black or dark colored fenders. Do allow for good ventilation under any cover used in hot climates.

If the fenders are stacked, use adequate chocking. Do not stack over two units high.

Periodic rotation of the fenders may be desirable if storage will be for extended periods of time.

4. Installation

Installation must be accomplished in accordance with the site plans at any location that fenders are used. Instructions herein are general in nature, and must be modified as necessary to comply with the requirements at the installation site. It is the responsibility of the purchaser of the fender to comply with approved site plans when required, or to contact Trelleborg for instructions in the absence of such site plans.

Transport the fender to the location where it will be installed, as noted in Section 2.

Make sure the fender has an adequate backing surface to prevent damage and insure proper performance. The backing surface should be smooth and free of protrusions that may cut or damage the fender. The backing surface should be of adequate size to allow the compressed fender footprint to completely bear on the backing surface under the full fender design compression.

Make fender connections in accordance with approved contract documents, using approved connecting devices and chains, mooring lines, etc.

4.1 Mounting:

Fenders are typically hung using a two-point or four-point configuration. A two-point configuration uses two chain brackets or mounting points to secure the fender. A four-point configuration uses four chain brackets or mounting points.

Two-point mounting configuration - Used when the fender is required to float during tidal variations or when the fender will hang above the water level during tidal variations. The configuration should be used only when the fender will not rise above the deck level during high tides or because of wind and wave forces.

Four-point mounting configuration – Used when the fender is not required to float during tidal variations or to keep the fender from rising above the deck level during high tides or because of wind and wave forces. This configuration holds the fender at a particular elevation when in service.

Typical two-point mounting configuration

Typical four-point mounting configuration

4.2 Mounting Considerations:

- Fender mounting points should be oriented to project the mounting chain away from the fender to resist damage due to scrapes on the skin or adverse pulling effects on the fender body. Typical fender mountings orient the chains at a 45 degree angle away from the fender ends. The chains should never be positioned to pull the fender ends toward each other, as the fender body may be damaged.

Fender with chains oriented incorrectly. Note damage to the fender ends.

- Foam fenders rely on the friction created between the urethane skin and a concrete backing surface to resist much of the shear forces when a steel vessel hull slides along the surface of a compressed fender when in service. This friction force on the backing surface reduces the amount of resistance required by the fender end fittings. When a fender is mounted to a steel or UHMW-PE backing surface instead of concrete, the end forces on the fender may be higher requiring a larger fender end fitting and/or chain mounting system. Contact Trelleborg for specific design assistance.

Alternate backing surface requiring larger fender end fittings

4.3 Hardware:

If the mounting hardware is supplied by Trelleborg, always refer to the approved design general arrangement drawings and specifications when applicable. For other questions regarding proper installation, contact the Trelleborg sales office. Typical mounting installations may also be viewed on the Trelleborg Marine Systems website at www.Trelleborg.com/marine. Make sure that all installations conform to the contract documents when available.

If the mounting hardware was not supplied by Trelleborg, refer to the project contract documents, including drawings and specifications.

For placement, the fender must be lowered into place from above, or towed into place from the water. Do not drop the fender into position while lines are secured to its end fittings.

4.4 Inspection after Installation is Complete:

- **General:** After installation, inspect the fender body and external steel end fittings, external hardware connections including chain, shackles, chain brackets, and anchor bolts, and the overall site for compliance to approved design drawings and contract site plans.

- **Galvanizing:** All external mounting hardware, and the fender end fittings, have been hot dipped galvanized in accordance with the requirements of ASTM A-123. It is common during the shipping and handling of galvanized steel components that some abraded locations are visible. The galvanizing zinc may be scraped, resulting in slight pitting. These areas are typical and do not represent problems with performance or reliability.

- **Skin Appearance:** During and after installation, visually inspect the fender bodies to insure there was no damage during transportation which should be reviewed at installation. After installation, it is common for the fender skin at the steel end fittings to shrink and pull away slightly from the galvanized steel core. This stretching of the skin is normal and does not affect performance or the service life of the fender.

- **Chain Length:** Verify that mounting chain lengths are correct, and will provide for proper positioning of the fender with changing water levels (tides). It is important that the chain length installation provides for preventing the fender from floating up and over the top of the pier, wharf or dock during high water conditions or wave action. The fender mounting chains are intended to restrain the fender enough to maintain its proper positioning for berthing operations.

- Refer to Trelleborg approved general arrangement drawings or the contract site plans for proper mounting details. For any questions or to resolve nonconforming issues, consult the Trelleborg sales office for further information.

5. Maintenance

Trelleborg marine fenders are designed to withstand the impact and wear due to normal service conditions in moderate to harsh marine environments. The fenders general require very little maintenance. However, Trelleborg does recommend the following inspection and maintenance procedures be performed. The frequency of inspection is determined by the level and severity of use of the fender, and environmental site conditions such as adverse wind and wave action. The user of the fenders should establish the inspection interval in regard to these factors but in any case examination of the fenders should be done twice per year at a minimum.

Visual Inspection:
Inspect for damage to the fender skin. Cuts, gouges, or cracks should be repaired as soon as possible. Standard repair kits are available for minor damage. Any cut that goes through the skin to reveal the foam core of the fender needs immediate repair. Consult the marine fender repair manual for this type of repair, or call Trelleborg for specific advice.

Check the mounting shackles on the fender and dock face, and the mounting chain. Ensure all required cotter pins (in bolt-type anchor shackles), bolts, etc. are in place.

Check all fender mounting chain bracket padeyes and anchor bolts for wear.

Inspect for marine growth that has attached itself to the fender body. When the amount of growth becomes unsightly, or when it appears to be detrimentally affecting the flotation, stability, or rotation or the fender, it can be removed. Clean the excess marine growth from the fender body by scraping lightly, followed by a vigorous wipe with mineral spirits or number 2 fuel oil, followed by washing with a warm water solution of trisodium phosphate or other detergent, followed by a clean water rinse. Pressure washing can also be used cautiously so as not to damage the skin of the fender. Follow all state, local, and governmental environmental regulations.

Note: There are no parts requiring lubrication in the fender.