

1. TECHNICAL SPECIFICATION

1.1. SUPERCONE FENDER SYSTEM (SCN 1400)

1.1.1. Rubber Fender Cone

- 1.1.1.1. Rubber fender units shall be compression moulded from natural or synthetic or both rubber compounds in compliance with Appendix A of WG33. "Procedure to determine and report the performance of marine fenders".
- 1.1.1.2. The Rubber shall be fully vulcanised and homogenous with no foreign particles, and free from voids, cracks and cuts.
- 1.1.1.3. All rubber compounds to resist harsh environmental effects of ozone and ultra violet light.
- 1.1.1.4. Steel plates shall be fully embedded and fully bonded to the rubber during vulcanisation process to avoid separation between the rubber and the steel.

1.1.2. Fender Box

- 1.1.2.1. The steel fender panels shall be stiffened closed box panels, structurally designed by appropriately qualified structural engineers to withstand the applied loading.
- 1.1.2.2. The panels shall be designed to resist the reaction forces imposed by the fender and its supporting chains to keep in equilibrium with the vessel berthing force.
- 1.1.2.3. Steel panels shall be fabricated using grade 350WA structural steel complying with SANS 1431.
- 1.1.2.4. The steel panels are sized to exert a hull pressure of not more than 300 kPa.
- 1.1.2.5. Panels shall have a minimum overall depth of not less than 300mm and shall be sealed and pressure tested. Plate thickness shall be not less than 10mm for all external plates, and 8mm for internal stiffening plates. All panel edges shall be chamfered.
- 1.1.2.6. Corrosion Protection System to be applied to all steel panels to protect the steel from the marine environment and shall comply to the standards of the Steel Structures Painting Council and ISO 8501-1 (Surface Preparation Standards for Painting Steel Surfaces). The Corrosion Protection System shall typically comprise of, a Primer Coat at 85 microns thickness, an Intermediate Coat at 465 microns and a Top Coat at 50 microns.

DOCUMENT NO. TECHNICAL SPECIFICATION	REVISION 000	PAGE 1 OF 6
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1.1.3. Panel Facing (Fender Pads)

- 1.1.3.1. Panel facings shall be fabricated using double sintered ultra-high molecular weight polyethylene (UHMWPE), having a thickness of at least 50mm.
- 1.1.3.2. Edge pads shall be chamfered to match the chamfered panels, and pads planned to ensure that there are no steps in excess of 1mm between pads.
- 1.1.3.3. Panel facings are to be fixed to the steel panels using stainless steel grade 8.8 studs or bolts of at least 20mm diameter.

1.1.4. Anchors, bolts, nuts, washers and other metallic components

- 1.1.4.1. All anchor sockets, bolts, nuts, washers and other metallic components shall be stainless steel grade 316.
- 1.1.4.2. Thread clearances and lubrication shall be such as to avoid galling of the fixings.
- 1.1.4.3. All other bolts, nuts, washers and other metallic components sizes and number required shall be as detailed in the fender detail drawing no:BDD059C.SH.G4.01

1.1.5. Fender Chains

- 1.1.5.1. Fender restraining chains shall be provided for vertical and lateral restraint for fender panels.
- 1.1.5.2. Chains shall be provided for torsional, tensioning and bending support.
- 1.1.5.3. Chains shall be galvanised in grade 350WA or higher and shall have a factor of safety 2.0.
- 1.1.5.4. Chains shall be certified grade U2 to Lloyds Rules for the Manufacture, Testing and Certification of Materials. Chains and fixings shall be galvanised. Chain and fixing form and dimensions shall conform to ISO/1704.
- 1.1.5.5. The connecting chain, swivel and shackles have the same requirements as those specified for foam filled fenders. Restraint chains and fixings shall be designed with a factor of safety of 3.0. A weak link shall be provided to avoid any damage to fixings.
- 1.1.5.6. All stainless steel shall be Grade 1.4404 to EN 10088.

Refer to Annexure A, Fender Details Drawing No: BDD059C.SH.G4.01 for more details on the Super cone fender system.

DOCUMENT NO. TECHNICAL SPECIFICATION	REVISION 000	PAGE 2 OF 6
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1.1.6. Fender Performance & Basic Design Criteria

- 1.1.6.1. The specified fender is designed for quarter point berthing of a 50 000 DWT Chemical Tanker vessel berthing at 0.15 m/s with a safety factor of 2 for abnormal berthing.
- 1.1.6.2. The energy absorption of the fender is 1554kNm, and the reaction force is 2141kN.
- 1.1.6.3. The fender panel is dimensioned to limit the hull pressure to 300kPa.
- 1.1.6.4. The maximum fender projection is 2000mm.
- 1.1.6.5. The fender units provided shall be of a proven design that can be shown to provide satisfactory service. Prototypes will not be acceptable.
- 1.1.6.6. Fenders shall be pre-compressed to the rated deflection at least once prior to delivery.
- 1.1.6.7. Fendering shall be designed to absorb the full berthing energy for both normal and abnormal impacts for all vessels, fully laden, part laden or unladen in ballast, over the range of operating water levels given in the Site Specific Specification. Adequate allowance for vessel pitch, roll and heave due to waves and currents shall also be provided. Vessel details are contained in referenced drawings.
- 1.1.6.8. Fenders shall be designed to take account of bow flare, bow radius and bulbous bows.
- 1.1.6.9. Fender designs shall take into account manufacturer's tolerances on both energies and reactions.

1.1.7. Performance Testing

- 1.1.7.1. Rubber fenders shall be tested in accordance with the requirements of Appendix A, of WG33. "Procedure to determine and report the performance of marine fenders".
- 1.1.7.2. Verification testing of fender performance and rubber material properties are to be 3rd party witnessed. The costs of testing and witnessing are to be borne by the manufacturer and included in the tendered rates.
- 1.1.7.3. TNPA staff may also be present at all verification testing of fender performance and rubber material properties. Arrangement for witnessing of the tests shall be made with the winning bidder.

DOCUMENT NO. TECHNICAL SPECIFICATION	REVISION 000	PAGE 3 OF 6
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1.1.8. Handling and Storage

- 1.1.8.1. Fender components (rubbers, chains, shackles and fixings) shall be handled and stored in accordance with manufacturer's instructions.
- 1.1.8.2. Fenders shall normally be stored in protective packing's in which they have been transported.
- 1.1.8.3. Fenders purchased shall be handled in such a way as to prevent them from being distorted, overstressed, torn or damaged in any way.

1.1.9. General

- 1.1.9.1. The fenders that are to be procured for berth 208 shall match the basic performance specifications and properties of the existing fenders at berth 208 as per drawings issued.
- 1.1.9.2. All performance curves and shop drawings shall be provided by the tenderers to confirm compliance with the design criteria.
- 1.1.9.3. Fenders shall be in compliance with the PIANC Guidelines for the Design of Fender Systems: Report of Working Group 33: 2002, hereinafter referred to as "WG33", and is further modified in this specification.
- 1.1.9.4. Any painting of metals shall be in accordance with C5M or equivalent with a 450 micron DFT.
- 1.1.9.5. Fender maintenance manuals shall be provided.

1.2. TYRE FENDER COMPONENTS

1.2.1. Tyre Fender Chains

- 1.2.1.1. Chains to be galvanised to SABS 763 for heavy duty operation.
- 1.2.1.2. Chains to be fabricated from 25mm diameter grade 300W steel.
- 1.2.1.3. Chains to be supplied in rolls of 100m.

DOCUMENT NO. TECHNICAL SPECIFICATION	REVISION 000	PAGE 4 OF 6
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1.2.2. Tyre Fender Shackles

- 1.2.2.1. Shackles to be 9/9.5 ton D shackle with a maximum pin size of 38mm in diameter galvanised to SABS 763 for heavy duty operation.

1.2.3. Handling and Storage

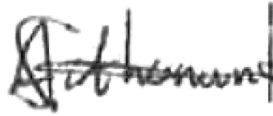
- 1.2.3.1. Tyre fender accessories (chains and shackles) shall be handled and stored in accordance with manufacturer's instructions.
- 1.2.3.2. Fender accessories shall be handled in such a way as to prevent them from being distorted, overstressed, torn or damaged in any way.

All metallic components shall be stainless steel grade 316 and chains to be galvanised to grade 350WA or higher and shall have a factor of safety 2.0.

Refer to Annexure A, Dry Bulk Jetty Fixtures Drawing No: RBH 87-B-100-SH98.00 for more details on the tyre fender components.

Example of the Super cone Fender



2. RECOMMENDATION & APPROVALCompiled by:**CIVIL ENGINEER**
ASHVEER SATHANUND

Signature

13 December 2021

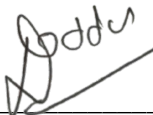
Date

Recommended by:**CIVIL MAINTENANCE MANAGER**
KANGELANI NONTSWABU

Signature

22/12/2021

Date

Approved by:**ACTING PORT ENGINEER**
DEON REDDY

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22/12/2021

Date