

TRANSNET NATIONAL PORTS AUTHORITY

TENDER NUMBER: TNPA/2024/02/0007/58036/RFP

DESCRIPTION OF THE WORKS: FOR THE PROVISION OF REPAIRS AND MAINTENANCE WORKS OF THE SUPER CONE FENDERS IN THE PORT OF DURBAN FOR A PERIOD OF THREE (3) YEARS

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## ANNEXURE A: PARTICULAR SPECIFICATIONS

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## SECTION A

### 1. Specification for Inspections, Repairs and Replacement Works

#### 1.1. Specification – Baseline Visual Inspections

The Port of Durban has a total of 77 Super Cone Fenders fitted at Maydon Wharf Berths 1 – 4, 12 – 14 and Island View Berth 2.

Conduct a detailed visual inspection for all elements of the Super Cone Fender. Record and report the findings from the inspections. A detailed report of inspections shall include but not limited to the following:

- Photographs of all defects that were identified on site.
- Proposed remedial or repair actions/procedures including the costs estimates.

#### 1.2. Specification – Repairs of the Super Cone Fender Components

1.2.1. The Contractor shall remove (for offsite repairs) the fender and install the spare fender.

1.2.2. Rubber Fender – Cleaning

- i. Clean the surface of the Rubber Fender for any spillages (paint, oil, and other matter) using water and a biodegradable organic based cleaner.
- ii. Remove sea growth with bristle or nylon brush, and clean with water and a biodegradable organic based cleaner.

1.2.3. Rubber Fender – Cracks Repairs

- i. The rubber surfaces to be repaired must be free from dust, loose or friable materials, surface contaminants and any other materials which could reduce the bond of the repair materials.
- ii. Remove buffing dust with a dry brush.
- iii. Remove dirt and rust from metal by shot blasting or disk grinder.
- iv. Wash the treated areas with a cleaning solvent designed to remove grease, oil and other contamination from rubber to prepare the surface for bonding or coating.
- v. Repair small cracks and splits shall be repaired with a suitable repair compound like rubber cement
- vi. The repair compound shall be mixed and used as per Supplier's instructions.

#### 1.2.4. Steel Frontal Frame

The rust that is visible on the steel frame of the fender and damaged paintwork shall be treated the following way:

- i. Remove face panels to assess the extent of the rust and/or damage paintwork.
  - ii. Pressure wash with fresh water the damage/rusted area. The surface should be free from all contamination and foreign material.
  - iii. Clean the rusted spot using wire brush/hand/power tools to St 3 grade of surface preparation. Roughen the adjacent paint on the overlapped areas.
  - iv. Chamfer the edges of the existing coat at least 50mm for better overlapping on the existing paint.
  - v. Apply the following paint system using roller or brush.
    - o Two (2) coats of 200 microns of a two component polyamine cured epoxy mastic coating in grey.
    - o One (1) coat of 50 microns polyurethane topcoat in RAL 5005 or RAL 2004
    - o Total Dry film thickness of 450 microns minimum
- **Note:** Where damage area is found only on the topcoat layer, a freshwater wash feathering of edges using abrasive paper and application of topcoat is only required.

#### 1.2.5. Frame Fixing to the Fender Bolts

- i. If the corrosion is apparent on the bolts fixing the fender to the Steel Frontal Frame, the *Contractor* shall remove/clean the corrosion from the bolt and treat with rust inhibitor. Ensure that non-soluble vegetable grease is applied to the bolt and the ferrule before refitting.

#### 1.2.6. UHMW-PE Facing Pads

- i. Remove/clean the corrosion and retighten loose bolts at correct preload.

#### 1.2.7. Chain Brackets and Bolts

- i. In areas where rust is observed, the *Contractor* shall wire brush and treat with the rust inhibiting paint.
- ii. The *Contractor* shall retighten loose Hex Bolts at correct preload.

#### 1.2.8. Chains

- i. The *Contractor* shall tighten chains so that no slack is present.
- ii. If heavily rusted, chains shall be sent for re-Hot Dipped Galvanizing (HDG) to minimum 85 microns in accordance with EN ISO 1461.

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### 1.3. Specification – Replacement Works

Fender systems are supplied by a reputable manufacturer able to demonstrate a satisfactory supply record over a number of years for the type of fender being offered and a record of successful applications. The technical specifications for the Fender that provides requirements for the design and testing of the SuperCone Fender, and components is as presented in **SECTION B** of this document.

1.3.1. The Contractor shall supply, deliver, and install the following:

- UHMW-PE Frontal Facing Pads (including all fixtures i.e., bolts or fasteners)

1.3.2. The Contractor shall supply and deliver the following:

- 1 (one) x SCN1400 Fender
- 2 (two) x SCN1600 Fenders

## 2. PLANT AND EQUIPMENT

All plant and or equipment provided by the *Contractor* for the execution and maintenance of the works shall be of a character comparable with the scope of the works. The *Contractor* shall provide and maintain sufficient plant and or equipment to meet all contractual requirements and shall not remove any of this plant and or equipment from the site without the written permission of the *Project Manager*. He shall, however, remove unsuitable, obsolete, or worn-out plant and or equipment from the site when ordered to do so by the *Project Manager* and replace these with plant and or equipment approved by the *Project Manager*.

## 3. APPLICABLE STANDARDS

For the purpose of this contract the Standardized Specification and Codes of Practice for Civil Engineering Construction as issued at date of tender shall apply. Although not included or issued with the Works Information, the following Specifications apply and form part of the Works Information. The *Contractor* is to ensure that he is in possession of the following documents:

- i. South African National Standards.
- ii. DIN or British Standard Specifications. / DIN, EN and ASME Standard Specifications
- iii. Occupational Health and Safety (OHS) Act No. 85 of 1993
- iv. N.O.S.A. Safety Guidelines

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## SECTION B: FENDERS TECHNICAL SPECIFICATION

### 1. SCOPE

This specification provides definitions and requirements for the design, supply, testing and installation of the fendering system for Maydon Wharf Berths 1 – 4 & 12 - 14 and Island View Berth 2 in the Port of Durban. This specification also covers the requirements for a fender with a steel fender panel.

Fender details are shown on the drawings and shall conform to the requirements of this specification.

### 2. INTERPRETATIONS

**Fender** : An energy absorption unit mounted to the quay wall cope, comprising a rubber fender unit and fender panel.

**Rubber Fender Unit** : A molded rubber unit that is the energy absorption component of the fender.

**Fender Panel** : Steel frame mounted on the front of the rubber fender unit to spread the reaction load over the ship's hull.

**Reference is made in this specification to the following:**

**PIANC 2002** - "Procedure to Determine and Report the Performance of Marine Fenders ", Section 7.3 of

**PIANC 2002** - "Guidelines for the Design of Fenders Systems 2002: Report of Working Group 33 of the MARITIME NAVIGATION COMMISSION".

**BS 6349-4** - Maritime structures. Code of practice for the design of fendering and mooring systems.

**BS EN ISO 12944** - Paints and varnishes. Corrosion protection of steel structures by protective paints systems.

### 3. FENDER PERFORMANCE

#### 3.1. Requirements

The fenders shall be able to absorb the required berthing energy (namely largest energy stipulated) in the combinations of direct and angular compression indicated below in Table 1. The fenders are to be designed in accordance with either BS 6349-4 or in accordance with PIANC 2002, with a design life of 20 years. The fenders are not required to be designed for belted vessels.

*Table 1: Required Berthing Energy*

<b>Berthing Speed</b>	0.15 m/s
<b>Factor of Safety for Abnormal Berthing (FOS)</b>	2.0
<b>Maximum Design Berthing Angle (<math>\alpha</math>)</b>	10°
<b>Permissible Hull Pressure</b>	200 kPa

*Table 2: Quay/Berth Details*

	<b>Maydon Wharf Berths</b>	<b>Island View Berths</b>
The top of the fender panel shall be at	+3.72 m CD	+5.00 m CD
Maximum Fender Projection	2.200 meters	2.230 meters
Quay Type	Steel combi-pile wall with a concrete cope down to -0.5 m CD.	Composite deck on tubular piles (Open structure)

*Table 3: Design Vessel*

Design Ship	Maydon Wharf Berths	Island View Berth
	Bulk Carrier	Tanker
DWT	65 000 tonne	74 000 tonne
Displacement	85 000 tonne	86 000 tonne
Overall Length	225 meters	245 meters
Beam	32.3 meters	32.3 meters
Draft	13.0 meters	13.1 meters

*Table 4: Astronomical Tide Predictions (The Hydrographer, South Africa, 2019)*

Tide	Abbreviation	Level (m, Chart Datum Port)
Highest Astronomical Tide	HAT	2.287
Mean High Water Springs	MHWS	1.997
Mean Level	ML	1.097
Mean Low Water Springs	MLWS	0.197
Lowest Astronomical Tide	LAT	-0.013

### 3.2. Performance

The selected fender should perform satisfactorily under the given conditions for the specified berthing velocity and berthing angle.

### 3.3. Supply of Fenders

Fender systems are supplied by a reputable manufacturer able to demonstrate a satisfactory supply record over a number of years for the type of fender being offered and a record of successful applications.

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## 4. RUBBER FENDER UNIT

Equipment required by the *Contractor* for handling, transporting, and installing fenders is fit for purpose and safe to enable the fenders to be installed without damage.

### 4.1. Requirements

Rubber fender units are compression molded from natural or synthetic or both rubber compounds in compliance with Appendix A of PIANC 2002.

The rubber is fully vulcanized and homogeneous with no foreign particles, and free from voids, cracks, and cuts. Steel plates are fully embedded and fully bonded to the rubber during the vulcanization process to avoid separation between the rubber and the steel.

The fender manufacturer is required to have “Type Approval” certification, 3<sup>rd</sup> party witnessed, to demonstrate compliance with PIANC 2002 guidelines. The certificate must be submitted with the tender.

### 4.2. Testing of Fenders

Rubber fenders are tested in accordance with the requirements of Appendix A of “Procedure to Determine and Report the Performance of Marine Fenders” of PIANC 2002.

Verification testing of fender performance and rubber material properties is to be 3<sup>rd</sup> party witnessed. The cost of testing and witnessing are borne by the manufacturer and included in the tendered rates.

## **5. STEEL FENDER PANELS**

### **5.1. Requirements**

The steel fender panels are stiffened closed box panels, structurally designed by appropriately qualified structural engineers to withstand the applied loading. The panels are designed to resist the reaction forces imposed by the fender and its supporting chains to keep it in equilibrium with the vessel berthing force. Steel panels are fabricated using Grade S355JR steel conforming to SANS 50025 / EN 10025 or similar approved standard.

The fender panel is sized to exert a hull pressure of not more than 200 kPa.

Panels have a minimum overall depth of not less than 300 mm and are sealed and pressure tested. Plate thickness is not less than 10 mm for all external plates, and 8 mm for internal stiffening plates. All panel edges are chamfered.

### **5.2. Steel Corrosion Protection**

Steel panels are corrosion protected using a paint system in accordance with BS EN ISO 12944 Class C5M, high corrosivity, highest durability environment, system S8.01 with a minimum dry film thickness of 450 micron.

All sharp edges are ground to a minimum radius of 3 mm before application of corrosion protection.

The surface to be coated is clean, dry, and free from contamination.

Prior to paint application all surfaces are assessed and treated in accordance with ISO 8504: 1992

Abrasive blast clean to Sa2.5 (ISO 8501-1: 1988) SSPC-SP10

If oxidation has occurred between blasting and application, the surface is re-blasted to the specified visual standard.

Surface defects revealed by the blast cleaning process, are ground, filled, or treated in the appropriate manner.

A sharp, angular surface profile of 50 – 75 microns (2 -3 mils) is required.

Stripe coats are applied to all welds, lap joints, plate edges, corners, sharp edges, and any other areas where spray application of the overall coating system may prove difficult, resulting in low dry film thickness.

### **5.3. Miscellaneous Fender Attachments**

#### Panel Facings

Panel facings are fabricated using double sintered ultra-high molecular weight polyethylene, having a thickness of at least 50 mm. Edge pads are chamfered to match the chamfered panels, and pads planed to ensure that there are no steps in excess of 1 mm between pads.

Panel facings are fixed to the steel panels using stainless steel grade A4-70 studs or bolts of at least 20 mm diameter.

### **5.4. Anchor Sockets, Bolts and Fixings**

All anchor sockets, bolts, nuts, washers, and other metallic components are stainless steel grade A4-70. Thread clearances and lubrication are such as to avoid galling of the fixings.

### **5.5. Chain Attachments**

Fender chains are provided to support the weight of the fender panel. Chains are carbon steel and hot dipped galvanized.

## **6. QUALITY CONTROL**

### **6.1. Manufacturer Qualifications**

The fender manufacturer supplies:

- Quality certificate to IOS 9001 or equivalent
- History of previous usage of the fender type and size
- Product literature at the time of tendering
- Protocol for air pressure test of steel panels
- Protocol for paint application quality control
- Environmental certificate to ISO 14001 or equivalent

### **6.2. Fender Performance Curves**

Testing reports with fender performance curves, clearly specifying the Rated Performance Data (RPD), are supplied for each different fender type/size at the time of delivery in accordance with Appendix A of PIANC 2002

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### **6.3. Rubber Properties Certificate**

A certificate of the rubber physical properties is supplied at the time of delivery in accordance with Appendix A of PIANC 2002. Verification certificates must be supplied at this time.

### **6.4. Mill Certificate for Steel Attachment**

Mill certificates for steel panels, chains and bolts are supplied at the time of delivery.

### **6.5. UHMW – PE Properties Certificate**

Physical properties of double sintered ultra-high molecular weight polyethylene are supplied at the time of delivery.