



- .3 Arrangement and attachment of fender panels, UHMW-PE facing pads and chain assemblies if applicable.
- .4 Structural details and design calculations for fenders.
- .5 Supporting system and connection to concrete structures.

1.5 Environmental Conditions

- .1 Fenders will be located in splash zone, and may in addition be partially submerged in sea- water.
- .2 Sea- water may be contaminated by oil products.
- .3 Mean annual maximum and minimum temperatures are -5 ° C and 16 ° C.

1.6 Waste Management and Disposal

- .1 Separate and recycle waste materials in accordance with Section 01 74 21 - Construction/Demolition Waste Management And Disposal.
- .2 Collect and separate for disposal paper plastic polystyrene corrugated cardboard packaging material in appropriate on-site bins for recycling in accordance with Waste Management Plan.
- .3 Divert unused metal materials from landfill to metal recycling facility as approved by Departmental Representative.
- .4 Fold up metal banding, flatten and place in designated area for recycling.

1.7 Qualifications

- .1 Fender manufacturer must be a reputed name in the marine fender industry with a proven track record and a minimum of ten (10) years experience of manufacturing and supply of similar products.

- .2 Upon request, fender manufacturer to supply project reference list of at least ten (10) projects. Reference list must contain project references of similar projects supplied. Supply a minimum of ten (10) project references within North America and a minimum of five (5) within Canada.
- .3 Warranties must be issued by the manufacturer of fenders via legal entity registered and operated in Canada or The United States of America belonging to the same group of company as the manufacturer.

## PART 2 - PRODUCTS

### 2.1 Materials

- .1 Vertical Fender type: Arch
  - .1 Material: High quality natural and/or synthetic rubber formulated to resist the effects of ozone, ultra violet light, seawater immersion and extreme climates.
    - .1 Minimum energy absorption capacity at 51.5% deflection: 141 kilojoules.
    - .2 Maximum allowable reaction of 454 kilonewtons.
    - .3 Embedded steel components to be totally encapsulated in rubber.
    - .4 Anchor holes spacing shall be as indicated on the drawings.
    - .5 The base width outer to outer of the fender shall be no more than 1600 mm and no less than 1500 mm.
    - .6 The face of the fender shall be no more than 550mm wide and no less than 500mm wide.

- .2 Corner Horizontal Fender type: Arch
  - .1 Material: High quality natural and/or synthetic rubber formulated to resist the effects of ozone, ultra violet light, seawater immersion and extreme climates:
    - .1 Minimum energy absorption capacity at 51.5% deflection: 62.4 kilojoules.
    - .2 Maximum allowable reaction of 321 kilonewtons.
    - .3 Embedded steel components to be totally encapsulated in rubber.
    - .4 Anchor hole spacing shall be as indicated on the drawings.
    - .5 The base width outer to outer of the fender shall be no more than 1000 mm and no less than 900 mm.
    - .6 The face of the fender shall be no more than 350mm wide and no less than 300mm wide.
- .3 Hardware:
  - .1 All fixings for vertical fenders shall be 316 Grade Stainless steel  $\geq$  M48 in size.
  - .2 All fixings for corner fenders shall be 316 Grade Stainless Steel  $\geq$  M36 in size unless noted otherwise.
  - .3 All facings, if applicable, to be connected using boss fixing method.
- .4 Verification testing of fender systems in accordance with PIANC 2002.
- .5 Fender systems and other structures supplied shall be provided with a typical certification and documentation package as detailed below:

- .1 General:
  - .1 Certificate of conformity
  - .2 Warranty certificate
  - .3 Inspection report forms
- .2 Fender:
  - .1 Physical property test certificate
  - .2 Performance test certificates for the require sampling frequency
  - .3 Third party certification certificate to ASTM D2192-05.

PART 3 - EXECUTION

- 3.1 Installation
  - .1 Install in accordance with manufacturer's instructions and as indicated on the drawings.
  - .2 Do not make alteration to system components without written permission of Departmental Representative.