



MARITIME
International Inc

1.0 General

1.1 Scope of Work

This specification details the requirements for the supply and installation of the cast steel mooring bollards as shown on the drawings. Installation includes bolting of bollard to embedded anchors, grouting of base, filling bollard with concrete, and filling of bolt holes with grout.

1.2 References

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|----|-------------|---|
| a) | ASTM A 27 | (1991) Steel Castings, Carbon, for General Application |
| b) | ASTM A 53 | (1997) Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless |
| c) | ASTM A 153 | (1989) Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products |
| d) | ASTM F 1554 | (1999) Quenched and Tempered Anchor Rods and Bolts 36/55/105 Yield Strength |

2.0 Submittals

2.1 Bid Submittals

Bollard supplier is to submit the following information at bid time.

- a) Drawing of proposed bollard and hardware.
- b) Price for supply of mooring system including the cost for shipping to the jobsite.
- c) Product liability insurance certificate for the vendor with a minimum of \$2 million coverage per incident including design errors or omissions.
- d) Five reference letters from US clients with US clients with contact information.
- e) A list of 10 completed projects with the same type bollard installed for more than 5 years.

2.2 Pre-Manufacture

Bollard supplier is to submit the following manufacturer information for approval prior to manufacturing of bollards and hardware.

- a) Installation Procedures
- b) Shop drawings for bollard and all related mounting hardware.
- c) Detailed design calculations demonstrating proposed bollard meets the loading requirements with the required factor of safety found in Section 3.1. Calculations must be stamped by a Professional Engineer registered in the United States.
- d) Coating system data sheets.
- h) All bollards must have their serial numbers stenciled onto the surface of the bollard.

2.3 Post-Manufacture

Contractor is to submit the following information after manufacture of bollards and hardware but prior to shipment.

- a) Mill test certificates for each heat number.
- b) Mill certificates for all mounting hardware.

- c) Galvanizing Certificate certifying that the galvanizing on the hardware was done according to the ASTM A153 galvanizing specification.
- d) Certificate of conformance for line pull rating.
- e) Record showing heat numbers and serial numbers.
- f) One bollard from each heat shall be made with two (2) coupons. One coupon shall be tested at the factory, and the results are to be sent to the contractor prior to shipment of the bollard(s). The second coupon will remain attached to the bollard until final delivery for testing by the bollard owner.

3.0 Materials and Design

3.1 Bollard

Bollard shall be a new **[Maritime bollard model #]** as manufactured by Maritime International, Inc. or approved equal as shown on the drawings. Bollard material shall be stress-relieved cast steel conforming to ASTM A27 Grade 65-35. Bollards shall have a load rating of **[Load rating required]** kips in the direction of 0° to 45° in the vertical plane and 0° to 180° in the horizontal plane. The theoretical point of loading for the line pull shall be the intersection of the bollard vertical axis centerline and the horizontal axis running through the center of the horns. The factor of safety of the bollard against yielding shall be 2.5 and the factor of safety against breaking shall be 3.5. Bollard shall have a **[required hole diameter]** diameter hole through the top through which concrete will be deposited after placement and bolting of bollards. Bollards shall be delivered to the site in a primed condition. Primer to be that or equal to primer listed in the section 3.4 labeled, "Finish".

3.2 Anchorage Hardware

The proposed bollard shall be anchored to the concrete with a minimum of **[number & size of mounting hardware]** diameter bolts conforming to ASTM F1554. Bollard anchor hardware is to be supplied by the bollard manufacturer to ensure proper fit. All anchorage hardware shall be hot dipped galvanized to ASTM A153. Pipe sleeves (if necessary) shall conform to ASTM A53 and be hot dipped galvanized.

3.3 Grout

Grout used for around base of bollard shall have a minimum 4000psi compressive stress and a maximum aggregate size of 3/8". NON SHRINK GROUT

3.4 Finish

Bollard shall be blasted to SSPC-SP6 and cleaned of any grease or other foreign matter with suitable degreaser before applying any coatings. Bollard shall be finished with a 3-coat paint system as recommended below or approved equal:

At Factory:

- Primer, 2.0 to 3.0 mils D.F.T. Carbozinc 11 Inorganic Zinc

At Jobsite:

- Bollard must be blasted and re-primed with:
 - 3.0 - 5.0 mils Carbozinc 859
- Intermediate Coat, 3.0 - 4.0 mils Carboguard 893
- Top Coat, 3.0 - 5.0 mils Carbothane 134
Cycloaliphatic Amine Epoxy

4.0 Execution

Anchor bolts and sleeves shall be held in place with templates that match bollard manufacturers bolt pattern. Templates shall ensure proper location of bolts and sleeves during placement of concrete.

Bollards base shall be leveled on top of a grout bed. Nuts shall be hand tight before grouting of base. After grouting has cured for seven days nuts shall be tightened to the snug tight condition. Areas around nuts in bollard base shall be filled with a non-shrink grout so as to prevent standing water. To prevent damage to vessel mooring lines, no sharp edges around bolting area shall exist after installation.

Bollard shall be painted in accordance with section 3.4 above after installation is complete.

Approved manufactures for bollards and hardware include:

Maritime International, Inc.
1186 Petroleum Parkway
Broussard, LA 70518
PH (337) 321-4240
FAX (337) 321-4241
E-mail: info@maritime-international.com

(Or approved equal)

[All items in bold should be adjusted to meet the qualifications of this particular project]