

SECTION 13950 – CYLINDRICAL RUBBER FENDERS

All work and materials shall conform to the Drawings, MDOT Standard Specifications and the following:

PART 1 - GENERAL

1.01 DESCRIPTION

- A. This work includes, but not necessarily limited to, furnishing and installation of all cylindrical rubber fenders as indicated on the drawings and specifications herein.

1.02 PERFORMANCE

- A. The proposed fender shall be capable of absorbing a minimum energy with a maximum reaction at the following design deflection. The tolerance for performance shall be $\pm 10\%$ per industry specifications.

Design Deflection	= 50%
Minimum Energy Absorption	= 15.4 ft·kips / ft
Maximum Reaction	= 29.8 kips / ft

B. Submittals

1. Items to be provided upon award of the project shall include at a minimum the following items:
 - a. A drawing of the proposed fender.
 - b. Performance curves for reaction, energy, and deflection for the proposed fender.
2. Items to be provided upon delivery of the fender systems shall include at a minimum the following items:
 - a. Test certificates for the rubber material properties as required in section 2.0 of this specification.
 - b. Performance test certificates for fender performance as required in section 2.0 of this specification.
 - c. Final set of all material certificates

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURER

- A. Maritime International, Inc. or approved equal, 204 Ida Rd., Broussard, LA 70518 U.S.A. P: 337-837-7160 F.337-837-3610

2.02 MATERIALS

A. Rubber Properties:

1. The fender shall be molded from rubber that is homogenous in quality and free from foreign materials, bubbles, injuries, cracks and other harmful defects.

2. The rubber for proposed fender to be used will be of vulcanized natural or synthetic rubber or a mixture of them. These shall be reinforced with carbon black and resistant to aging, seawater, abrasion, and ultraviolet rays. It shall conform the following ASTM D2000 line callouts:

3BA 720 A₁₄, B₁₃, C₁₂, EA₁₄, F₁₇, G₁₁^A

Grade, Type, and Class		
Callout	Property	Requirement
3	Grade	N/A
B	Type (Heat resistance)	100°C Test Temp
A	Class (Oil resistance)	No requirement

Callout	Property Tested	ASTM Test Method	ASTM Acceptance Requirements
7	Hardness Shore A	D2240	70±5°
20	Tensile strength	D412 die C	2000 psi Minimum
	Elongation		300% Minimum
A ₁₄	Heat resistance	D573, 70 hrs @ 100°C	-
	Change in hardness		+10° maximum
	Change in tensile strength		-25% maximum
	Change in ultimate elongation		-25% maximum
B ₁₃	Compression set	D395, method B, 22 hours at 70°C	25 % maximum
C ₁₂	Resistance to ozone	D1171, method A	100%
EA ₁₄	Water resistance	D471, 70 hours at 100°C	+10% maximum by volume
F ₁₇	Low temperature resistance	D2137, method A, 9.3.2, 3 minutes at -40°C	Non-brittle
G ₁₁ ^A	Tear Resistance	D624, die B	250 ppi (lbs. per inch) minimum

- B. Fender Geometry:
 1. Outside diameter shall be 32 inches plus or minus 3%.
 2. Inside diameter shall be 16 inches plus or minus 3%.
 3. Length shall be between 35.5 inches and 36 inches.
 4. All edges shall be provided with a 2 inch chamfer.

PART 3 – EXECUTION

3.01 PERFORMANCE VERIFICATION

- A. Testing and Inspection
 1. The performance of the fender is expressed by the value of the energy absorbed during compression of the fender up to the designed deflection and the maximum value of the reaction

load thus generated. In the performance test of the fender, compression shall be applied toward the top face of the fender. The specimen will be “broken-in” by deflecting it three or more times up to its rated deflection or more. The specimen should be allowed to recover for at least one hour, with no load. Before the performance test, the fender temperature must be stabilized. The data obtained in the following test shall be the performance values. The values shall be within the allowed tolerance for the energy absorption and reaction load.

2. For the performance test of the fender, the room temperature at the time of the tests shall be recorded.
- B. Sampling
1. The specimen for testing and inspection of the materials, dimensions, and performance shall be sampled as specified below. The specimen to be used for the material test shall be taken directly from the product or from the rubber prepared in the quality check and under the condition of the same vulcanization as the products.

Test Item	Number of Sampling
Material	1 set from the lot of compound for the manufacture of the fenders.
Dimensions	All fenders.
Performance	1 piece per 10 pieces of fender to verify quality.

3.02 PACKAGING

- A. The rubber fenders shall be packaged in a manner that will prevent damage to the fenders.

*** END OF SECTION **