

Tensile Test Report

Tensile Test Report, 2013

The EPCO bow and stern eyes are designed for mooring boats in accordance with ABTC H-40.3 and are not intended for lifting boats. The tensile strength of the 304 and 316 series stainless steel used in the production of these products is an important consideration for designers when selecting what style, diameter and material is to be used in their product.

EPCO engaged the Indiana Purdue University, Fort Wayne, Indiana to conduct tests and report its findings as to the point of failure that was obtained while doing two different tests. The tests consisted of a straight pull tensile test (Figures 1 & 2) and an edge pull (Figures 3 & 4). The tests were conducted from December 28, 2012 to February 11, 2013.

Tests were performed on randomly selected samples of both 304 and 316 series stainless steel bow eyes. Fixtures for each series of tests were fabricated by the university to accommodate the tensile and edge pull on the bow eyes. Copies of material certifications were provided with the test samples. Testing was conducted on a 400,000 lb Tinius Olson machine (certified calibration on 06-03-2009).



Figure 1 Tensile Test



Figure 2 Bow Eye Tensile



Figure 3 Edge Pull

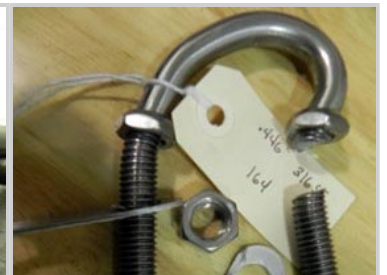


Figure 4 Bow Eye Edge

Failure

Failure

The representative sample products of the 304 and 316 series stainless steel that were tested were EPCO part numbers:

- 151 (.625" diameter – cut thread)
- 113 (.500" diameter – cut thread)
- 164 (.446" diameter – rolled thread)
- 123 (.331" diameter – rolled thread)

Failure Loads for Bow Eyes					
Tensile (lbs)	TYPE	151	113	164	123
	304	50,600	30,704	32,000	17,690
	316	47,400	25,700	30,200	17,760
Edge (lbs)	TYPE	151	113	164	123
	304	20,400	18,600	11,190	10,940
	316	18,570	14,990	14,340	10,630

Test Results certified by:

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Tensile Test Report, 2003

EPCO's bow and stern eyes are designed for mooring boats in accordance with ABYC H-40.3 and are not intended for lifting boats. The tensile strength of the 304 and 316 series stainless steel used in the production of these products is an important consideration for designers when selecting what style, diameter and material that is used in their product.

EPCO engaged a major midwestern university to conduct tests to report its findings as to the points of failure that were obtained while doing three different tests. The tests were done on a straight pull tensile test (Figures 1 & 2 Tensile Test), an edge pull (Figures 3 & 4 Edge Pull) and a side pull (Figures 5 & 6 Side Pull). The tests were conducted from June 10 – August 18, 2003.*

The tests were done on randomly selected production samples of both 304 and 316 series stainless steel bow eyes. Fixtures for each series of tests were fabricated at the university to accommodate tensile, side pull, and edge pull on the bow eyes. Copies of material certifications were provided with the test samples.



Figure 1 Tensile Test



Figure 2 Bow Eye Tensile Failure



Figure 3 Edge Pull



Figure 4 Bow Eye Edge Failure



Figure 5 Side Pull



Figure 6 Side Pull Failure

The representative samples of 304 and 316 series stainless steel that were tested were EPCO part numbers:

- 151 5/8" diameter—cut thread
- 113 1/2" diameter—cut thread
- 164 .446" diameter—roll thread
- 123 .331" diameter—roll thread

Failure Loads for Bow Eyes—August 27, 2003					
Tensile (lbs)	TYPE	151	113	164	123
	304	47,000	31,400	31,900	18,000
	316	36,300	28,800	29,900	16,800
Edge (lbs)	TYPE	151	113	164	123
	304	18,400	18,900	11,200	7,500
	316	21,100	21,000	14,500	11,200
Side (lbs)	TYPE	151	113	164	123

304	6,400	3,900	10,600	6,000
316	32,300	3,400	3,500	11,700

June 10, 2003 – August 18, 2003

Test Conclusion

“Tensile tests results and edge pull test results correlate to expectations of material behavior for a single test situation. Side pull tests are not as conclusive, even with a second series of tests. However, with an appropriate factor for safety, side pull results can be used.” —quote from test report on August 27, 2003.

[* Complete Test Report \(PDF\)](#)

Statement of Compliance

All the products that EPCO produces meet or exceed the requirements for that product as defined by [ABYC H-40](#).