

Foam Fender Testing Protocol

Guaranteeing the quality and performance of foam fenders can be difficult. As discussed in our interactive whitepaper, *Smarter Foam Theory*, and our recent webinar, *A Smarter Approach to Foam Fender Testing*, this is due to a lack of standardized testing procedures in foam fender manufacturing. Recent research by Trelleborg has led to the development of new foam testing procedures, which will allow specifiers to ensure the best possible fender quality and lifecycle performance.

Recommendations

Trelleborg recommends the introduction of a new test procedure for performance testing to determine and report the performance of foam fenders. Trelleborg also recommends a separate test procedure for quality assurance verification testing of foam fenders purchased for actual applications.

The primary purpose of these recommendations is to ensure that any engineering data reported in manufacturers' catalogues is based on common test methods across the industry. This is especially important in the case of foam fenders as there are no existing PIANC guidelines, or other standards available specifically for testing foam fenders.



Performance Testing

This test should be conducted to create the performance data that will be published in the manufacturer's catalogue, using the constant velocity (CV) method.

In this method, a full size fender or a model (not smaller than 0.3m in height) should be compressed to establish initial performance data under constant-slow 0.0003-0.0013 m/s (2-8 cm/min) velocity.

The following test protocol should be used for the CV method:

- The test fender temperature should be stabilized at 23 ± 5 °C for at least 48 hours (larger fenders may require more time) before testing takes place
- The test fender should be "broken-in" by compressing the fender four times consecutively, to maximum 65% of its original height (diameter) at 2-8 cm/min speed and at 0° compression angle

- The load should be removed from the test fender to allow the fender to recover for at least 24 hours
- The test fender should then be compressed once at constant-slow, 2-8 cm/min speed and at 0° compression angle
- The compression should be stopped when deflection reaches maximum 65% of the original height of the test fender

Correction factors such as velocity factors, temperature factors and angular berthing factors are needed to modify the performance of the fenders obtained by the CV method to account for site conditions, which may be different from the testing conditions.

Correction factors can be generated by testing model fenders of minimum 0.3m height using PIANC guidelines Appendix A.

Verification (Quality Assurance) Testing

This test is recommended to determine a fender's compliance with published performance (CV performance) or other specified performance requirements.

Samples for verification testing should be taken from the final fender produced for the project and selected according to the agreed testing scheme between the customer and fender manufacturer. If a specified sampling scheme has not been agreed upon, a minimum of 10% of the fender order shall be tested for verification purposes.

The following test protocol should be used:

- Test fender temperature should be stabilized at 23 ± 5 °C for at least 48 hours (larger fenders may require more time) before testing takes place

- "Break-in" the test fender by compressing it once, to maximum 65% of its original height (diameter) at 2-8 cm/min speed and at 0° compression angle
- Deflect the test fender once at constant-slow 2-8 cm/min speed immediately after the "break-in" cycle and at 0° compression angle
- A fender provides required performance, if it meets 90% of the energy (CV performance) before exceeding 110% of the reaction force (CV performance) at any point during the second compression