

## AeroTek Cradle Test Reports

### ProTek Composite Material

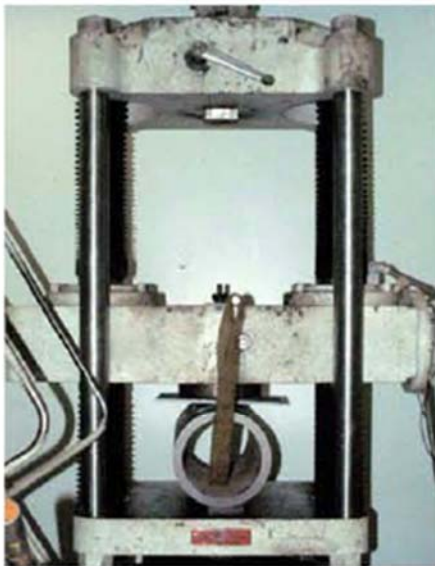
#### Compression Test – Mechanical Property

The ProTek Wear Pad compression test was requested by Chevron for their Mafumeira Norte Offshore Platform project. Compression testing demonstrates the wear pad's ability to withstand the large compressive loads it could be subjected to, such as from heavy pipe or structural components coming down on the pipe.

**Test Specification:** ASTM E8.

**Product Tested:** 10 inch wear pad (10" X 1/4" X 60 deg. X 14") attached with APP Epoxy to a 2-foot long, 10 inch, schedule 120 double extra-heavy pipe.

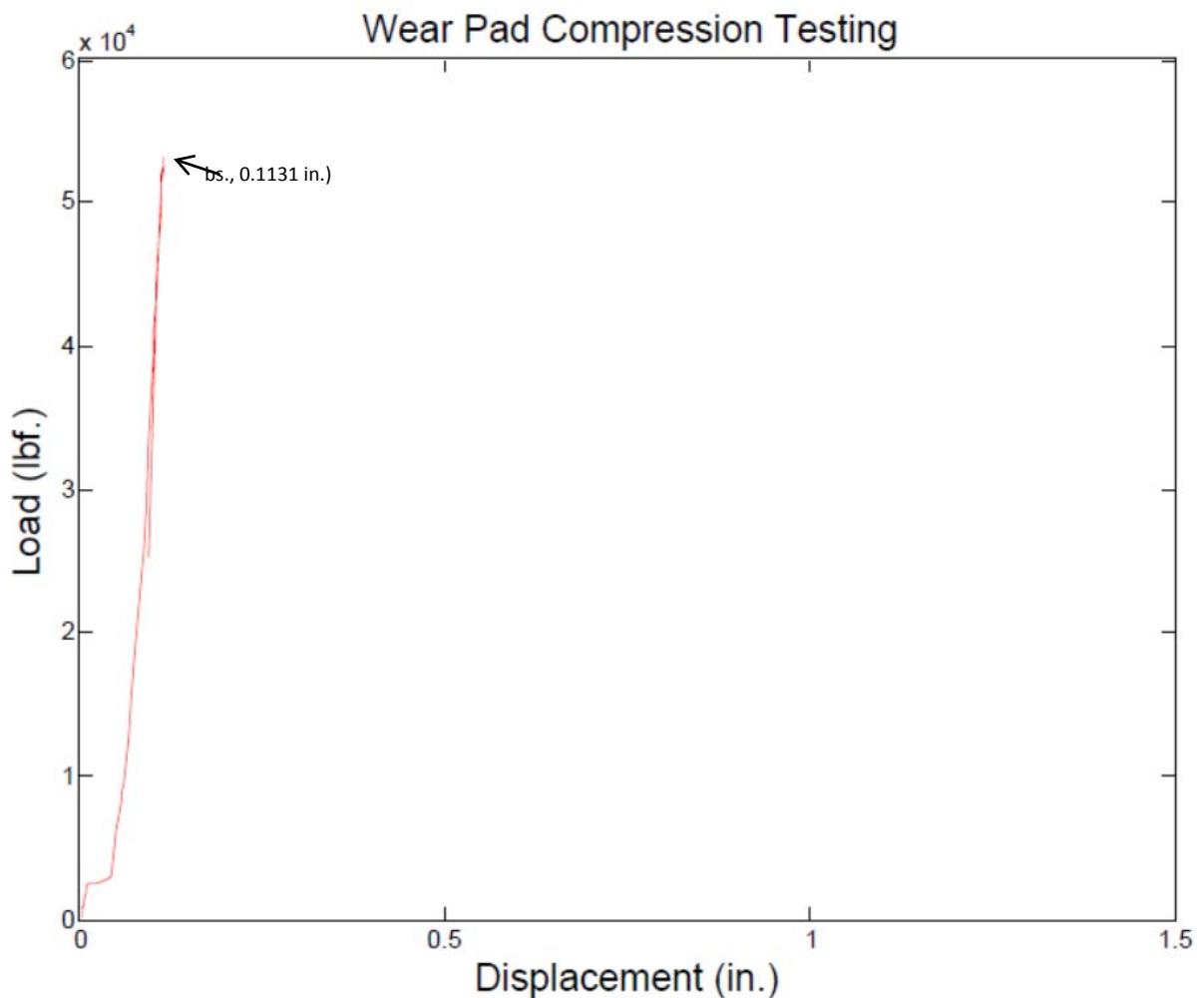
**Test Set Up:** 8-inch wide flat composite piece (simulated I-beam) was placed transverse to the longitudinal axis of the pipe and ProTek Wear Pad.



**Compression Test Results:** The Chevron test requirement was that the ProTek Wear Pad could handle a compressive load of 24,000 pounds. The results exceeded the test requirements by more than 220% with no evidence of damage incurred by the ProTek Wear Pad. The testing was stopped at 53,300 pounds due to ovalizing of the carbon steel pipe, not failure of the wear pad.

Chevron Minimum Requirement	Compressive Load	Exceeds Requirements
24,000 lbs.	53,300 lbs.	29,300 lbs.

Below is the load vs. displacement graph for the compression test:



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### Frictional Abrasion Wear Test – Mechanical Property

Pipes are subjected to movement due to changes in temperature, load, or other operating variables. A frictional abrasion wear test demonstrates how APP ProTek Wear Pads are not affected by this movement and are engineered to last.

**Product Tested:** AeroTek Cradle (made out of ProTek Composite material) (15" X ¼" X 120 deg. X 14") (cradle ID X thickness X degrees of coverage X cradle length).

**Test Set Up:** AeroTek Cradle banded to a 4-foot long section of insulated 12-inch pipe. The pipe was insulated with 2 layers of 10-millimeter Aerogel Pyrogel XT jacketed with 3/16 inch corrugated aluminum. This apparatus was sitting on an I-beam with an 8-inch wide flange.



**Test Procedure:** Load of 3,000 pounds was applied to the cradle. The test apparatus was moved longitudinally across the I-beam (4 inches in each direction). This was to simulate thermal cycling over 20 years of operation, with a safety factor of 4.

**Abrasion Wear Test Results:** The cradle only exhibited slight dusting of the ProTek Wear Pad after 150 cycles.

Below are photographs of the cradle after 150 cycles, signifying 20 years in service:

