Geo Tech Note:

Pressure Test Report For Model 802 Submersible Tiltmeter

Overview

As part of design qualification for the model 802 submersible tiltmeter, we conducted several non-destructive and destructive tests on the 802 enclosures. These tests were designed to demonstrate performance at low pressures, and ultimate failure pressure of the housing.

Two pressure tests were performed on Model 802, Serial No. 5327, to determine performance at extremely low pressures of <0.5 psi, and 125 psi (nominally 90m water depth). In these tests the tiltmeter was assembled without electronics or sensor, the O-ring was liberally greased with Parker O-ring lube, and a Subconn MCIL6F dummy whip was mated to the Subconn MCBH6M bulkhead connector on the case. A small piece of folded tissue was sealed inside the unit to record any evidence of leakage.

A third test was performed at 10,000 psi to determine thin wall collapse pressure of the 802 enclosure.

Test 1

The Model 802 was placed in the water-filled pressure vessel on March 3, 2003. The pressure was raised to 125 psi, equivalent to roughly 90m water depth. The unit was left in the vessel at this pressure for approximately 12 hours. The vessel was then depressurized, and the 802 removed and dried. No evidence of water or leakage was found upon opening the tiltmeter.

Test 2

O-ring seals are more prone to leakage at very low pressures because there is little external pressure to push the rubber into small imperfections in the sealing surfaces. For this reason, we tested the seals of the Model 802 at a pressure <0.5 psi. The unit was first resealed with a new piece of tissue within, and then placed in a bucket of water approximately 15 cm deep on March 4, 2003. It was completely submerged and left in the bucket for approximately 12 hours. It was then removed and dried. No evidence of leakage was found inside the tiltmeter upon opening.

Test 3

To determine ultimate failure pressure of the 802, the submersible enclosure was subjected to a high pressure test. This testing was conducted by Deepsea Power and Light company (4033 Ruffin Road, San Diego, California, 92123). The tiltmeter was assembled without electronics or sensor. The O-ring was greased with Parker O-ring lube, and a Subconn MCIL6F dummy whip was mated to the Subconn MCBH6M bulkhead connector on the case.

The enclosure was placed in Deepsea's "gun shell" pressure chamber. For the test pressure was ramped at a rate of 1000 psi per minute. Max pressure was set to 10,000 psi.

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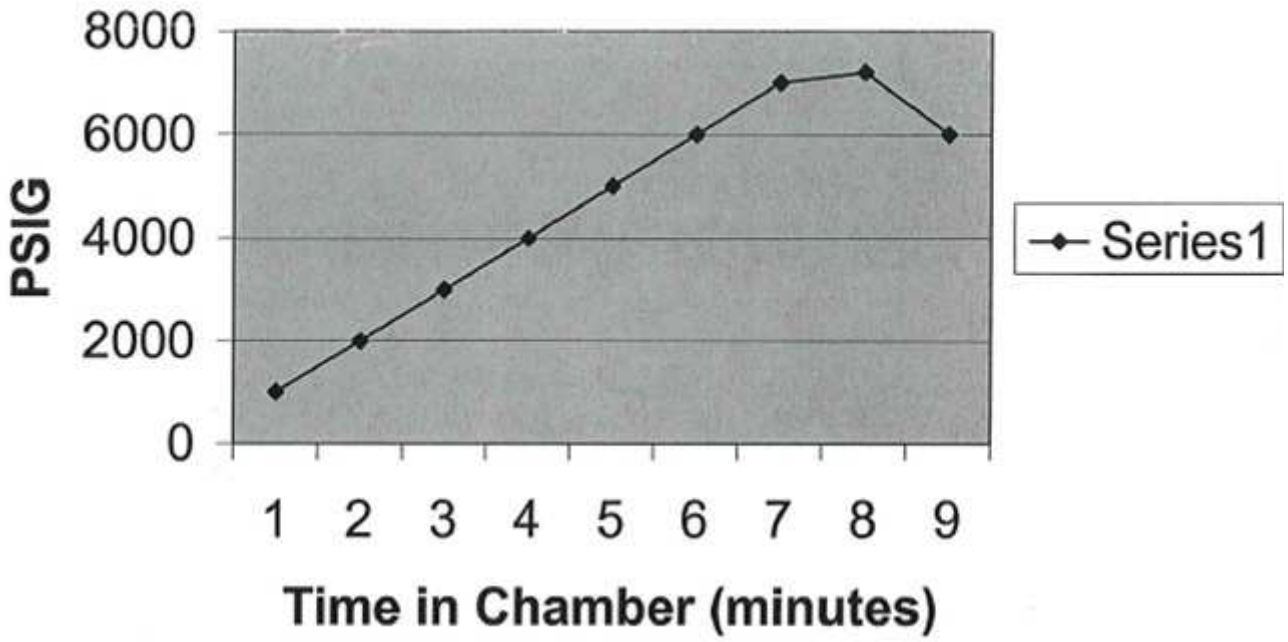

Pressure ramping was started at 2.15 pm. Chamber pressure showed linear response to nominally 7200 psi. Deepsea technicians noted a 1200 PSIG drop nominally 7 minutes into the test. Failure pressure was noted at nominally 7200 psi.

The enclosure was removed and visual inspection showed failure occurred along the two long sides of the enclosure. The side walls were noted as “caved in”, causing the seal with the top cover to be breached. It should be noted that this failure occurred along the thin wall of the enclosure, as expected. No other breach/failure points were noted.

Conclusion

The Model 802 Serial No.5327 successfully passed low both pressure tests. There was no evidence of leakage at either 125 psi or the lower <0.5 psi pressures.

The 802 Serial No. 5327 was tested to an ultimate failure pressure of nominally 7200 psi. Failure was observed to occur along the enclosure sidewall as expected.

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