Superheated Steam Test Comparison

DX 347c vs. Garlock ST 706

Scope of Test:

The scope of this side by side test was compare and record the performance data of these two in-organic fiber, compressed gasket sheets, when subjected to repeated thermal cycling, in high temperature and high pressure steam.

Test Material Details:

DXSeal 347c - 1/8” x 6” ring gasket
Garlock ST 706 with Flange Free - 1/8” x 6” ring gasket with Flange Free™

Test Method Summary:

The test fixtures consisted of two, 6” 150 lb class, cast steel flange fixtures, constructed from raised face weld neck flanges. Both fixtures had an identical surface finish of 250 min and were superheated and supplied with water by a feed pump and pressure vessel. This configuration was meant to simulate a boiler feed system. The system was equipped with steam pressure regulator in order to control the feed water and maintain a stable steam pressure.

fig 1. - Test fixture

A series of ten thermal cycles were run and leak rates were measured during the hot phase of each cycle. After each complete thermal cycle, the gasket stress was measured and a hydrostaic test was performed to expose any leaks that may have developed.

Comparative Steam Test Conditions

- Test Media - Superheated Steam
- Gasket stress - 5800 psi
- Bolt Torque - 159 ftlbs.
- ASME PCC-1 Tightening Sequence
- Electronic Torque Wrench
- Thermal Cycle Tempreture - 750° F
- Internal fixture pressure - 175 psi
- Leak rate detection - measured through pressure loss

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Test Procedure

1. Center gasket raised face flange of the test fixture
2. Install calibrated bolts, washers and nuts (finger tighten only)
3. Measure and record bolt lengths prior to tightening
4. Use calibrated torque wrench to tighten bolts, (using the ASME PCC-1 cross pattern procedure), to a gasket seating stress of 5000 psi
5. Measure and record bolt elongation at ambeint temperature
6. Perform hydrostatic test at ambient temperature and pressurize the test fixture
7. Keeping pressure at the preset value and constant, begin the first heating cycle
8. Maintain internal test pressure and max temperature for 8 hours
9. Record and measure the leak rate at set pressure and max temperture after 8 hours and just before a complete down back to room temperature
10. Repeat procedures 5 through 9 for ten complete cycles
11. The test is complete after one of the following
    - The gasket fails during hydrostatic test
    - The gasket blows out during test
    - The leak rate during the hot phase of the cycle is higher than the cpacity of the water feed pump to re-

Test Results

DX 347c - The test results shown in Figures 2 and 3, show a test duration of 10 complete cycles over a 10 day period. The leak rate of superheated steam was stable at approximately 1.0×10^{-2} mg/s.m. After each thermal cycle, a hydrostatic test was performed and completed successfully. The 347c completed the 10 cycles without failing.

Garlock ST 706 - The test results are shown in Figures 2 and 3. The material failed the hydrostatic test after one complete cycle. the test was continued and aborted after 6 cycles, because of reapeated failures during hydrostatic testing and increasing leak rates

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Figure 2

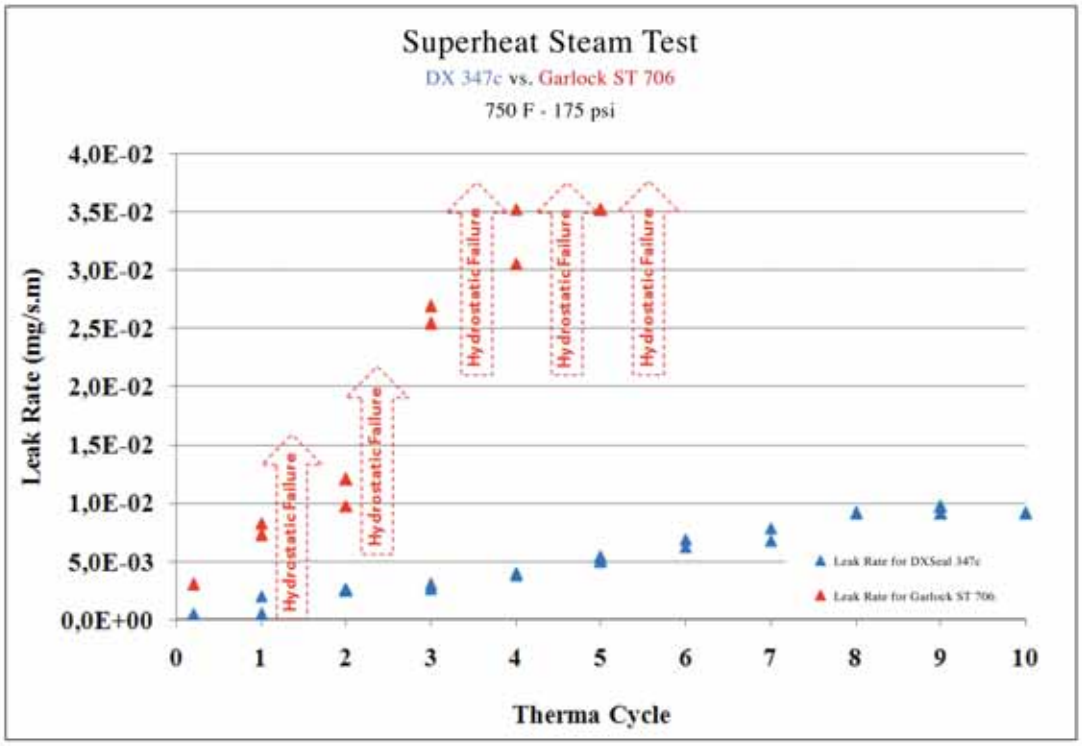

Figure 3