Allow use of Alternative Long Term Proof Pressure Test under PVHO-1: 2012

Approval date: December 3, 2015
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Inquiry: Under what circumstances can the Alternative Long Term Proof Pressure (ALTPP) Test defined in this Case be used in lieu of the Long Term Proof Pressure (LTPP) Test Procedure required by Section 2-2.6.5 of PVHO-1 for Nonstandard Window Geometries and Standard Window Geometries with Lower Conversion Factors.

Reply: The Alternative Long Term Proof Pressure (ALTPP) Test defined in this Case can be used in lieu of the Long Term Proof Pressure (LTPP) Test Procedure required by Section 2-2.6.5 of PVHO-1 for any window design that otherwise conforms to the requirements of Section 2 of PVHO-1.

Alternative Long Term Proof Pressure Test Procedure
An ALTPP Test as defined in this Case shall be conducted using model scale or full scale windows under one or more of the test pressure options contained in Table 1 and the acceptance criteria contained in Figure 1.

The use of model-scale window(s) for ALTPP testing is permitted only if the short-term strength of the model is equivalent to that obtained for a minimum of three full-scale windows. To verify model scale equivalence, the short term proof pressure (STPP) test in 2-2.6.4 shall be performed on a model-scale window and the failure pressure obtained shall lie within the range obtained on a minimum of three full-scale windows. The same conditions of temperature and rate of pressurization used for full-scale windows shall be applied to the model-scale window. If the model-scale test does not meet these criteria, full-scale windows shall be required for ALTPP tests.

Windows shall be subjected to sustained pressure at maximum design temperature for at least 300 hours without failure per any one of the following procedures (a, b, or c) where design pressure is determined in accordance with Table 1.

Three test options are available. In all three cases, however, the test temperature and duration shall be at maximum design temperature for at least 300 hours. Figure 1 illustrates these requirements.

a) If only one creep test is to be performed it shall be conducted at a pressure and for a duration greater than that defined by a straight line on a semi-log plot (rectilinear pressure versus logarithmic time) defined by the point at 9 times the design pressure and a duration of 0.1 hours at one end and the point at 3 times the design pressure and a duration of 80,000 hours at the other end. If the specimen test pressure and duration exceed the pressure and time defined by this line and the test duration is at least 300 hours, then the design meets the creep test requirements.
b) If three creep tests are to be performed they shall all be conducted at a pressure and for a duration greater than that defined by a straight line on a semi-log plot (rectilinear pressure versus logarithmic time) defined by the point at 9 times the design pressure and a duration of 0.1 hours at one end and at 2 times the design pressure and a duration of at 80,000 hours at the other end. If all three specimen test pressures and durations exceed the pressure and time defined by this line and test duration for each specimen is at least 300 the design meets the creep test requirements.

c) If five creep tests are to be performed they shall be conducted at a pressure and for a duration greater than that defined by a straight line on a semi-log plot (rectilinear pressure versus logarithmic time) defined by the point at 6 times the design pressure and a duration of 0.1 hours at one end and at 2 times the design pressure and a duration of 80,000 hours at the other end. If all five specimen test pressures and durations exceed the pressure and time defined by this line and the test duration for each specimen is at least 300 hours, the design meets the creep test requirements.

In all three options, if all windows of any one of the test options survive sustained pressurization without catastrophic failure, the window design is considered to have satisfied fully all requirements of the ALPP test.

<table>
<thead>
<tr>
<th>Test Option (Number of prototypes tested)</th>
<th>Minimum Test Duration of 300 hours (Lower test pressures may be used at longer test durations. See Figure 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Prototype</td>
<td>5.46 x Design Pressure</td>
</tr>
<tr>
<td>3 Prototypes</td>
<td>4.87 x Design Pressure</td>
</tr>
<tr>
<td>5 Prototypes</td>
<td>3.64 x Design Pressure</td>
</tr>
</tbody>
</table>
Figure 1 – Alternative Long Term Proof Pressure (ALTPP) Test Acceptance Criteria