HA-407 PNEUMATIC TESTS

As an alternative to the hydrostatic test required in HA-406.1(c), cast aluminum boiler sections may be pneumatically tested provided the following requirements are met:

(a) The use of pneumatic testing in lieu of hydrostatic testing shall be documented in the quality control system.
(b) Maximum material thickness of any component part shall not exceed 1/2 in. (12.7 mm).
(c) The calculated potential energy of the boiler, \( E \), when under pneumatic pressure testing shall be less than 1,000 ft-lb (1356 J).

\[
E = C \times P_{at} \times V \left[ 1 - \left( \frac{P_a}{P_{at}} \right)^{0.286} \right]
\]

where

- \( C = \text{constant, } 360 \text{ in}^2/\text{ft}^2 \text{ (2500 Pa/kPa)} \)
- \( E = \text{stored energy, } \text{ft-lb (J)} \)
- \( P_a = \text{absolute atmospheric pressure, 14.7 psia (101 kPa)} \)
- \( P_{at} = \text{absolute test pressure, psia (kPa)} \)
- \( V = \text{total volume under test pressure, } \text{ft}^3 \text{ (m}^3) \)

NOTE: \( V \) includes the volume of the vessel and any connected volume to the pressure supply pump or valve.

(d) Nitrogen or clean, dry, oil-free air shall be used.
(e) The boiler shall be visually inspected for evidence of damage before pressurization.
(f) The boiler should be tested in such a manner as to ensure personnel safety from a release of the total internal energy of the vessel.
(g) The required test pressure shall be the greater of 38 psi (262 kPa) or 1.1 times the MAWP.
(h) Overpressure relief protection shall be provided. The set pressure of a pressure relief device shall not exceed the greater of the following:
   (1) the test pressure plus 10 psi (70 kPa), or
   (2) 110% of the test pressure
   (i) A minimum hold time of 5 min shall be maintained on the boiler at the required test pressure.
(j) The pneumatic test method shall be immersed visual inspection.
   (1) The boiler shall be externally cleaned to prevent air bubble adherence while being tested to prevent leaks from being masked.
   (2) The uppermost portion of the boiler, as oriented in the test tank, shall be a minimum of 6 in. (150 mm) below the surface of the water, and the water shall have a minimum temperature of 60°F (16°C).
   (3) Before the holding period, the immersed boiler shall be rotated a minimum of 180 deg around a lateral axis to release any trapped air.

Proposed HA-407 Text

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   (3) Before the holding period, the immersed boiler shall be rotated a minimum of 180 deg around a lateral axis to release any trapped air.
(4) After the holding period, the pressure may be reduced to the MAWP, but not less than 38 psi (262 kPa), and maintained at this pressure while a thorough visual inspection for leakage is made with the boiler submerged in water.

(5) After the holding period, and during the visual inspection, the immersed boiler shall be rotated a minimum of 180 deg around a lateral axis to permit easy visual detection of any leakage.

(6) Any evidence of air leaking from the vessel will indicate failure of the pneumatic pressure test.