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VACUUM BOX TEST PROCEDURE

1. SCOPE

The objective of the vacuum box technique of bubble leak testing is to locate leaks in a pressure boundary that cannot be directly pressurized. This is accomplished by applying a solution to a local area of the pressure boundary surface and creating a differential pressure across that local area of the boundary causing the formation of bubbles as leakage gas passes through the solution.

2. PURPOSE

The purpose of this procedure is provide a guide line to carry out the Vacuum box test to check soundness of annular joints, bottom(long seam & short seam) and welding joints for annular plates.

3. REFERENCE CODE

1. API 650 (Latest edition) 7.3.4 & 8.6 Fourteenth edition
2. ASME Sec.V

4. EQUIPMENT

- 4.1. The Vacuum box test is performed by using a box with visible window of fiber glass (i.e.6" Wide by 30" long metallic box with a fiber glass). The open bottom is sealed against the tank surface by a sponge rubber gasket. The test scheme shall have suitable connections, necessary valve and calibrated Vacuum gauge. The gauge shall have a range of 0 psi to 15 psi or equivalent Pressure limits such as 0 in.Hg to 30 in.Hg.
- 4.2. The Test scheme shall be demonstrated with sample test block by application bubble solution at site before conduction the test on the job. The bubble forming solution shall produce a film that does not break away from the area to be tested, and the bubbles formed shall not break rapidly due to air drying or low surface tension, soaps or detergents designed specifically for cleaning shall not be used for the bubble forming solution.

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<p>4.3. A vacuum can be drawn on the box by any convenient method, such as connection to a gasoline or diesel motor intake manifold or to an air ejector or special vacuum pump. The gauge shall register a partial vacuum of at least 2 psi (4in.Hg)(15KPa) below atmospheric pressure.</p> <p>4.4. Bubble forming solution (Brand name / Type will be furnished prior to execution) to be established vide 4.2 & to be recorded.</p> <p><u>5. PERSONAL</u></p> <p>The personnel shall be competent and have through knowledge in performing this method.</p> <p><u>6. SURFACE PREPARATION</u></p> <p>The surface to be examined and all adjacent areas shall be cleaned thoroughly and be free from all dirt, grease, lint, scale, welding flux, weld spatters, paint, oil and other extraneous matter that could obstruct surface openings or otherwise with the examination.</p> <p>Prior to vacuum testing all joints shall be checked visually.</p> <p><u>7. PROCEDURE</u></p> <p>The temperature of the surface of the part to be examined shall not be below 40°F(5°C) nor above 125°F(50°C)</p> <p>The weld seam on the test shall be applied with a bubble solution for detecting leaks prior to placing vacuum box.</p> <p>The foaming shall be minimized by means of uniform application of bubble solution.</p> <p>The gauge shall at least register a partial Vacuum of 21 Kpa or 3 Lbf/in ² for inspection of the joints</p> <p>An Overlap of 2" minimum for adjacent placement of the Vacuum box shall be given for each subsequent examination.</p> <p>The required partial vacuum shall be maintained for at least for 10 seconds examination time stop watch to be used after reaching the 21 KPA / Designated vacuum.</p>				
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<p><u>8. EVALUATION</u></p> <p>Bubbles produced by air sucked through the welded seam can detect the presence of defect. The tested areas are accepted only when no continuous bubbles formation is observed. A minimum light intensity of 1000 lux is required for conducting the examination.</p> <p><u>9. REPAIR/RETEST</u></p> <p>Defects in welds shall be repaired by chipping, grinding or melting out the defects from one side or both sides of the joints, as required and rewelding. Only the cutting out of defective joints that is necessary to correct the defects is required. After repairing retest of Vacuum box test shall be carried out.</p> <p><u>10. CLEANING</u></p> <p>After test the area shall be thoroughly cleaned for the further activities.</p> <p><u>11. INSPECTION REPORT</u></p> <p>The test shall be carried out in presence of the HPCL Engineer. Upon satisfactory inspection, a report shall be prepared as per HPCL approved format.</p> <p><u>12. SAFETY</u></p> <p>Safety shall be followed as per HSE specification during test.</p>		
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