



Leak Testing of Fuel Tanks (Air-Under-Water Method)

1 Introduction

Note: Nothing in this standard supercedes applicable laws and regulations.

Note: In the event of conflict between the English and domestic language, the English language shall take precedence.

1.1 Purpose. This standard provides a procedure to determine the leak integrity of a fuel tank when subjected to pressure.

1.2 Applicability. Metallic and nonmetallic fuel tanks for non-On Board Diagnostics (OBD) architectures. This procedure describes the air-under-water technique.

1.3 Remarks. Not applicable.

2 References

Note: Only the latest approved standards are applicable unless otherwise specified.

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

None

2.3 Additional References. None

3 Resources

3.1 Facilities. Capable of performing testing as specified in Section 4.

3.1.1 Calibration. The test facilities and equipment shall be in good working order and shall have a valid calibration label.

3.1.2 Alternatives. Alternative test facilities and equipment may also be used. However, all measuring variables as specified in this standard shall be determined correctly with respect to their physical definition.

3.2 Equipment.

3.2.1 Equipment capable of introducing pressure of 35 kPa $\pm$ 10% into fuel tank.

3.2.2 Pressure gauge.

3.2.3 Dunk tank or other vessel large enough to hold subject tank under water, and to provide a clear, well-lit view of the fuel tank surface.

3.2.4 Timer able to measure time in seconds.

3.2.5 Restraint system capable of supporting an assembled fuel tank.

3.3 Test Vehicle/Test Piece. Production fuel tank assembled as purchased.

3.4 Test Time. Reference Section 4.

Calendar time: 1 day

Test time: 1 hour

Coordination time: 1 hour

3.5 Test Required Information. Reference Section 4.

3.6 Personnel/Skills. Personnel performing testing should have appropriate skill sets as deemed by user of this standard.

4 Procedure

4.1 Preparation. Seal all connections in the fuel tank sufficiently to allow pressure testing. The use of electrical connector seals to stop the intrusion of water into the electrical connector or electrical wiring is permitted, but needs to be approved by the GM Design Release Engineer. When an electrical harness is released as part of the tank assembly bill of material, it is acceptable to test without the harness with approval by the GM Design Release Engineer.

4.2 Conditions.

4.2.1 Environmental Conditions. Not applicable.

4.2.2 Test Conditions. Deviations from the requirements of this standard shall have been agreed upon. Such requirements shall be specified on component drawings, test certificates, reports, etc.

4.2.2.1 Water used for dunk tank must be clear and free of debris.

4.3 Instructions.

4.3.1 Seal Tank per 4.1.

4.3.2 A pressure gauge must be installed in the inlet line or attached to one of the tank outlets to monitor the actual tank pressure.

4.3.3 Place the tank in a restraining fixture capable of supporting the tank in such a manner as to limit distortion to < 10 mm under the test pressures. The tank should be supported along the vehicle/strap interface locations in order to prevent damage to components.

4.3.4 Pressurize the tank to 35 kPa $\pm$ 10% and hold the pressure throughout the procedure.

4.3.5 Submerge the pressurized fuel tank assembly in the dunk tank filled with clear water for a minimum of 20 s.

4.3.6 The tank is to be evaluated for the presence of leaks by wiping away any formed bubbles. If the formed bubble reappears, then the tank is to be rejected. Either visual inspection or ultrasonic leak detection may be used to detect air leaks.

4.3.7 Remove the fuel tank from the dunk tank. Remove any standing water from the fuel tank surfaces and depressurize the tank. Visually inspect the exterior of the fuel tank for any damage or deformation.

4.3.8 Inspect the interior of the fuel tank to ensure no damage or deformation to components. If this procedure is used as a 100% production check, then the interior inspection is only required during the initial process validation, after fuel tank design changes, and as an audit procedure (recommend quarterly).

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results.

5.2.1 Satisfactory. No leakage or permanent deformation to the tank assembly.

5.2.2 Unsatisfactory. Permanent deformation of the tank assembly or the breakaway of a formed bubble (when tested underwater) at any tank assembly location (i.e., line to the flange, line to shipping cap, electrical connector, etc.)

Note: Breakaway is defined as a bubble forming and leaving the surface (excluding residual air pockets from the initial dunking of the tank).

5.3 Test Documentation. Documentation of the pass/fail status of each tank required at tank supplier.