



Fuel Tank Assembly – Cold Roll Test

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. To evaluate the ability of fuel tank and specifically the fuel pump module attachment feature to hold liquid during a cold roll test. This test procedure may be used as a development/validation subsystem test.

1.2 Applicability. Polymer and steel fuel tanks assemblies and their applicable components.

1.3 Remarks. This test procedure can be used as a development/validation tool to evaluate the performance of fuel system components under cold conditions similar to the required vehicle test.

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.

- Component Technical Specification (CTS)
- Fuels Handbook and Test and Validation Fuels Specification (ID): http://powertrain.gm.com/portal/docs/engineering/quality_and_product_assurance/materials_engineering/advanced_materials/ds/AUTOAA000009/

(ID) = This is a specification/web site that is limited to internal distribution within General Motors. Contact the GM Lead Engineer for further instructions.

3 Resources

3.1 Facilities. An accredited test lab facility with an environmental chamber as described in 3.2.1.

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.

Note: All instrumentation is to be calibrated as required; record instrumentation details and date of calibration on Data Sheet A1, Appendix A, unless the information is otherwise preserved in the testing facility records.

3.2.1 Environmental Chamber. An environmental chamber (or equivalent) capable of housing and soaking the fuel tank assembly, related hardware, and the roll mechanism to the final temperature of -40 °C (-40 °F).

3.2.2 A fixture or frame assembly to hold the tank, vent system, vapor trap and other related fuel system components in simulated vehicle locations. The fixture must be able to rotate the system 360 degrees.

3.2.3 Equipment suitable for collecting and weighing spilled liquid to an accuracy of 3 g (0.1 oz).

GM Confidential

© Copyright 2015 General Motors Company All Rights Reserved

February 2015

Page 1 of 8

It is recommended that the test facility use dark lighting and a liquid dye to aid in the visual inspection for weep, cracks, and leaks.

3.2.4 Stopwatch or timing device to measure time intervals during which fluid spillage is to be measured.

3.2.5 Inclinator to measure the angular attitude of the tank, if required.

3.2.6 Equipment to extract fluid from the fuel tank.

3.3 Test Vehicle/Test Piece.

3.3.1 Material Components. Fuel tank assembly inclusive but not limited to fuel feed and return lines, Fuel Pump Module (FPM), Grade Vent Valve (GVV), Fuel Limiting Vent Valve (FLVV), recirculation line, and complete venting system.

3.3.2 Test Fluid. The recommended test fluids are TF-1 (GMPT-6-005-B) or Stoddard solvent with a density and viscosity close to that of gasoline, as defined by the Fuels Handbook and Test and Validation Fuels Specification. Reference 2.3.

The fuel shall be purchased from an approved GM Fuels and Lube supplier detailed in the Fuels Handbook and Test and Validation Fuels Specification. Reference 2.3.

3.4 Test Time. The following is an estimate of the amount of time (work hours) needed to perform this procedure. Consider preparation and other downtime, actual test, and analysis of data in capturing a total calendar time.

Calendar time: 2 days

Test hours: 18 hours

Coordination hours: 4 hours

3.5 Test Required Information. Three (3) consecutive tanks must meet the requirements of this test procedure. If multiple molds/cooling fixtures are used, test three (3) tanks per mold/cooling fixture combination.

3.6 Personnel/Skills.

3.6.1 Trained test lab personnel with fuel system experience shall be used.

4 Procedure

4.1 Preparation.

4.1.1 The Test Engineer shall complete Data Sheet A2, Appendix A, and provide it to the test site.

4.1.2 Add thermocouple to the tank shell within 25 mm of sender opening.

4.1.3 Add pressure transducer to tank shell within 25 mm of sender opening. Pressure transducer must be capable of measuring 0 kPa to 15 kPa (0 in H₂O to 60 in H₂O). Measure any naturally occurring pressure generated during test; no induced pressure should be applied during testing.

4.1.4 Attach the fuel tank, venting system, liquid traps and any other related hardware necessary to run the test and collect data, to the fixture in simulated vehicle position.

4.1.5 Attach the fuel fill pipe and fuel cap to fuel tank.

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 Test should be run in an environmental chamber in order to eliminate the temperature loss of the tank while the test is being run. This means the environmental chamber should be large enough for a test engineer/technician to enter to rotate fixture according to test procedure.

4.2.3 Fuel System Leak Check. The installation of pressure taps and thermocouples into the fuel system creates the potential for leakage of liquid fuel or fuel vapor from the installed test fittings and seals. The fittings and seals used for test data acquisition purposes are not intended for long term use and need to be monitored. It is required that the fuel system be pressure checked for leaks at least once during each day of testing.

GM Confidential

© Copyright 2015 General Motors Company All Rights Reserved

February 2015

Page 2 of 8



Documents

Document Sharing Hub

4.2.3.1 Leak check the tank and vent system at the canister vent line using 4 kPa to 8 kPa (15 in H₂O to 34 in H₂O). Run this pressure test for at least 5 minutes or until tank is stabilized or run it to a level and duration determined by the design or test engineer. Repair as needed.

4.2.3.2 Add fuel to the tank per 4.2.4 Fuel Fill Procedure.

Note: Any fuel removed or collected during vehicle preparation, fuel filling or vehicle testing must be properly discarded.

4.2.4 Fuel Fill Procedure. Use the three (3)-click fill method. See 7.1 for definition.

4.2.5 Fuel Fill Levels. The tanks should be filled to rated capacity unless other fuel levels are requested.

4.2.5.1 Fuel Tank Conditioning. Install the tank in a fixture. Fill it with 21 °C (70 °F) fuel to the estimated customer usable volume. Place the tank/fixture in a thermal chamber at 60 °C (140 °F) for 8 h. Allow the tank to vent. Turn off chamber heat after the 8 h soak. Leave tank/fixture in the chamber as it cools for approximately 16 h. Remove tank/fixture from chamber after the 24 h cycle of heating and cooling is complete.

Note: Fuel tank conditioning allows the internal components to absorb fuel/vapors, thus better simulates the field performance of the seals.

4.2.5.2 Testing Temperature. Stabilize the tank assembly to -40 °C ± 2 °C (-40 °F ± 3 °F). The tank assembly must remain at this temperature for the duration of the test.

4.2.5.3 If any fuel loss is observed from any part of the integrated fuel tank assembly (including all weldments, component, etc.) measure and document the conditions (location, volume, flow rate, etc.)

4.2.5.4 If fuel loss is observed from the FPM seal area, adjust the tank assembly to above -20 °C for at least 1 h, then stabilize the tank assembly to -30 °C ± 2 °C (-22 °F). Repeat 4.2.5.3 at -30 °C ± 2 °C (see Figure 1).

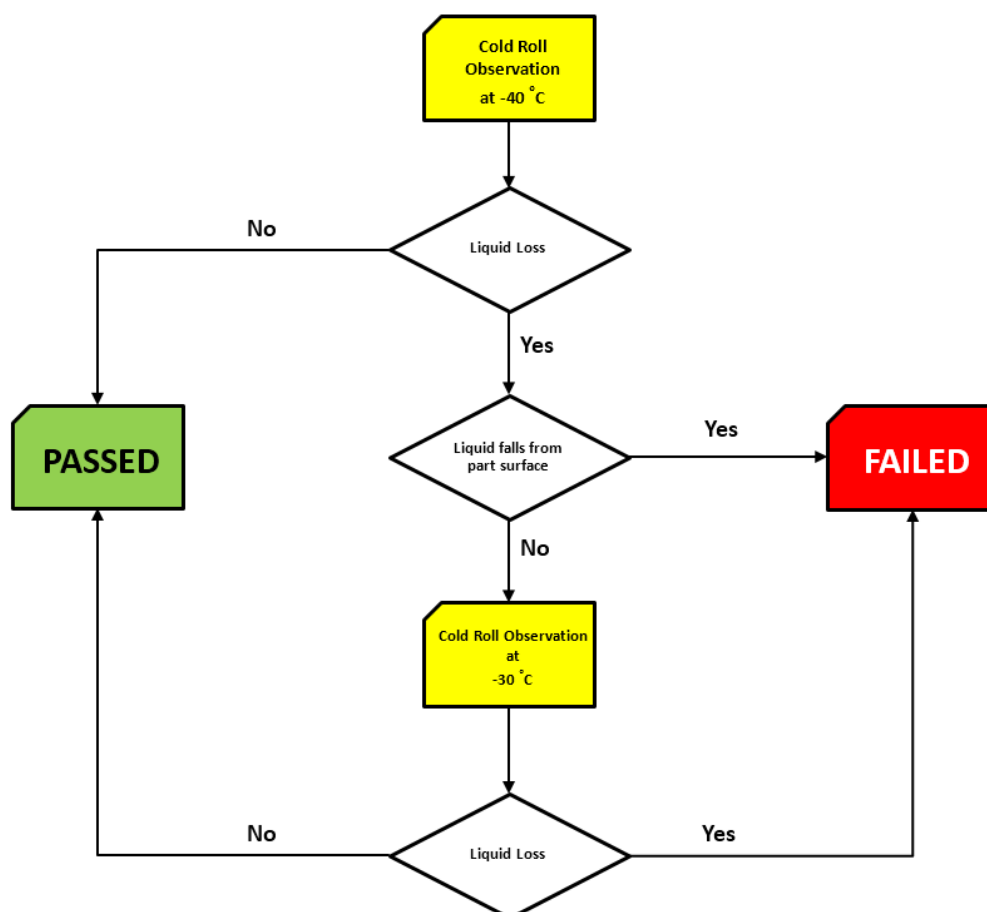


Figure 1: Decision Tree

GM Confidential

© Copyright 2015 General Motors Company All Rights Reserved

February 2015

Page 3 of 8



Documents
Document Sharing Hub