GM	WORLDWIDE ENGINEERING STANDARDS	Test Procedure	GMW14802

Fuel Expulsion Due to Tank Pressures

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 define the pressures and volumes at which a fuel system will and will not expel fuel.

1.2 Applicability. This test applies to all passenger car and light truck fuel fill and containment systems that are capable of building pressure.

1.3 Remarks. This test is conducted to determine if during a maximum tank pressure situation, liquid expulsion will occur when the filler cap is removed or a fuel dispensing nozzle is inserted into a capless fill pipe.

2 References

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

2.1 External Standards/Specifications.

None

2.2 GM Standards/Specifications.

GMW14508

3 Resources

3.1 Facilities. If fuel is used, testing should be performed at a facility free of ignition sources. The test facility should be an explosion-proof room with adequate ventilation to meet all local safety codes.

If water is used, testing can be performed at any test facility.

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 Pressure gauge 0 kPa to 34.5 kPa (0 psi to 5 psi).

3.2.2 Air regulator with filter.

3.2.3 Needle valve.

3.2.4 Fuel pump.

3.2.5 A 1 L (or larger) container graduated in milliliters (mL).

3.2.6 Tubing and adapters necessary to fabricate the setup.

3.2.7 Catch basin for liquid spillage.

3.2.8 Supply of water.

3.3 Test Vehicle/Test Piece.

3.3.1 Frame, underbody or fixturing required to provide mounting for the fuel tank and related hardware.

3.3.2 Fuel tank assembly with straps.

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3.3.3 Fuel Fill Pipe assembly.

3.3.4 Fuel fill pipe cap (if required).

3.3.5 Charcoal canister.

3.3.6 Ventilator valve.

3.4 Test Time. Preparation and other downtime, actual test, and analysis of data are considered in capturing a total calendar time.

Calendar time:	10 hours
Technician resource time:	6 hours
Engineer resource time:	3 hours to 4 hours

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Lab test personnel with fuel system test experience.

4 Procedure

4.1 Preparation. Determine the maximum fill capacity of the fuel tank assembly to be tested by using the regional specific three (3)-click fill method (GN-1, GE-1 or GK-1). This information is outlined in GMW14508.

Determine the volume of fuel at which the inlet fill spud or Inlet Check Valve (ICV) is covered in fuel, but just barely so. Record these volumes on the Data Sheet A1, Appendix A.

Verify that the fuel tank orientation is in agreement with the latest design information and that the fuel fill pipe is installed correctly into the fuel tank.

4.2 Conditions.

4.2.1 Environmental Conditions. Testing should be done in ambient conditions of 21 °C (70 °F). If fuel is used as the test liquid, Reid Vapor Pressure should be 62 kPa ± 2 kPa (9 psi ± 0.3 psi).

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 Testing should be performed on level ground in the vehicle design position.

4.3 Instructions.

4.3.1 Test Setup Instructions.

4.3.1.1 Attach fuel tank assembly to fixture, maintaining vehicle position of tank. Secure metering unit to tank assembly. Attach all vapor canisters and vapor relief valves, etc., necessary to simulate actual production intent of the system. Fill fuel tank to maximum fill capacity using the regional specific three (3)-click fill method from GMW14508 (GN-1, GE-1 or GK-1). Install production-intent fuel fill cap (not required on capless fill pipes). Charge tank with air pressure (at some point above the liquid level using an existing orifice or build one if necessary), and slowly increase pressure until normal pressure relief mechanism starts functioning. Record this as the maximum pressure obtainable in the tank. Block off all pressure relief orifices. Verify maximum fill volume by draining tank and refilling using calibrated containers. Secure fuel fill cap (not required on capless fill pipes) and fabricate some means of catching the liquid which may expel from the fuel filler pipe opening.

4.3.2 Test Operation.

4.3.2.1 With tank at maximum liquid capacity, and maximum pressure (as established in 4.3.1.1), remove fuel filler cap as quickly as possible (on capless fill pipes insert a non-booted fuel dispensing nozzle as quickly as possible). If liquid does not expel from filler neck, go to 4.3.2.3.

4.3.2.2 If there was liquid expulsion from the filler neck, measure and record the amount on Data Sheet A1, Appendix A. Note any observations about liquid expulsion (flow vs. spray, delay after opening, etc., record the facts only). Repeat pressurizing at maximum pressure until no more liquid is expelled (do not add any additional liquid to the tank). Record the amount of liquid remaining in fuel tank on Data Sheet A1, Appendix A.

4.3.2.3 Fill the tank to the volume at which the inlet fill spud or ICV is just barely covered. Charge tank to maximum pressure (as established in 4.3.1.1); remove the fuel filler cap as quickly as possible (on capless fill pipes insert a non-booted fuel dispensing nozzle as quickly as possible). If liquid does not expel from the filler neck, testing is complete.

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