



Fuel System Anti-Siphoning Test - Design Analysis

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. The purpose of this test procedure is to determine if the fuel fill system of a vehicle capable of running on 20% or greater alcohol content is consistent with the anti-siphoning test requirements of the Federal Motor Vehicle Safety Standard (FMVSS) and Canada Motor Vehicle Safety Standard (CMVSS) Number 301.

1.2 Applicability. Alcohol fuel vehicles in the following categories: Passenger cars, multi-purpose passenger vehicles, trucks and buses with a Gross Vehicle Weight Rating (GVWR) of 4536 kg (10 000 lb) or less, and school buses regardless of weight. All vehicles would use a fuel with a boiling point of above 0 °C (32 °F).

1.3 Remarks. This procedure contains only anti-siphoning requirements associated with FMVSS 301 and CMVSS 301. Other FMVSS and CMVSS specifications and requirements are covered in other GM specifications.

Design analysis or testing (per this specification) may be used as a means of demonstrating compliance with anti-siphoning performance. If design analysis is used, a judgment letter must be jointly prepared by a Chassis Fuel and Validation Engineer according to the template stored in Global Document Management (GDM), and the rationale and analysis to ensure it is complete and defensible.

2 References

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

2.1 External Standards/Specifications.

CMVSS 301 FMVSS 301

2.2 GM Standards/Specifications.

GMW14508

2.3 Additional References.

Global Document Management (GDM), <https://gmweb.gm.com/sites/GDM/Pages/default.aspx> (ID)

(ID) = This website is limited to internal access within General Motors and is not available outside the company. Contact the GM Lead Engineer for further instructions.

3 Resources

3.1 Facilities.

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. For the physical test, a straight vinyl plastic or rubber hose with a length of 119.40 cm to 120.00 cm is required. The hose will have an outside diameter of 4.94 mm to 5.20 mm. Siphon hose length, diameter, and tolerances are as specified in FMVSS 301 and CMVSS 301.

3.3 Test Vehicle/Test Piece. Test vehicle or fuel tank test buck with specific combination of fuel storage system components to be evaluated.

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Documents

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3.4 Test Time.

Calendar time: 1 day
Test time: 4 hours
Coordination time: 0 hours

3.5 Test Required Information. The drawings in 3.5.1 and 3.5.2 are required for the design analysis portion of this procedure.

3.5.1 Layout of the fuel tank with fuel filler neck attached to the fuel tank and the anti-siphoning device or flame arrester shown in the installed position. The layout must indicate the level surface of the liquid fuel when fuel tank is filled to 95% of customer usable capacity (reference GMW14508). This level must take into account the orientation of the fuel system in the vehicle. The layout or drawing must also clarify the tank/neck is intended to be used for alcohol fuels.

3.5.2 Detail drawing of the anti-siphoning device.

3.6 Personnel/Skills. The design analysis portion of this procedure requires the ability to read and comprehend layouts and drawings of a vehicle fuel tank and fuel fill system. No specialized skills are required for the physical test.

4 Procedure

4.1 Preparation. Record vehicle or test buck information on the Data Sheets A1 and A2, Appendix A. For the physical test, position the test vehicle or fuel tank test buck on a level surface and fill the fuel tank with Stoddard solvent to 95% of its customer usable capacity (reference GMW14508).

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.

4.3 Instructions.

4.3.1 Design Analysis.

4.3.1.1 From the layout, determine if the fuel fill system has an anti-siphoning device. Record on Data Sheet A1, Appendix A.

4.3.1.2 Determine if the entire top surface (the surface closest to the fuel cap) of each anti-siphoning device is above the level surface of the fuel under the conditions specified in 3.5.1. Record on Data Sheet A1, Appendix A.

4.3.1.3 Record the part number of the anti-siphoning device on Data Sheet A1, Appendix A.

4.3.1.4 From the detail drawing of the anti-siphoning device, determine if any hose made of vinyl plastic or rubber, with an outside diameter of not less than 5.2 mm could pass through each anti-siphoning device. Record on Data Sheet A1, Appendix A.

4.3.2 Physical Test.

4.3.2.1 Insert one end of the test hose into the fuel filler neck and determine whether the hose will pass through the anti-siphoning device. This will require several repetitions at various angles and orientations to assure the system has been fully evaluated. Record on Data Sheet A2, Appendix A.

4.3.2.2 Insert the test hose as far into the filler neck as possible or until it is completely within the fuel filler neck or blocked by the anti-siphoning device. Measure the length of any remaining portion of the test hose outside of the fuel filler neck. Record on Data Sheet A2, Appendix A.

Note: During insertion, keep the test hose concentric with the opening of the anti-siphoning device, if possible. This will help ensure that the siphon hose does not catch on the side wall of the fuel filler pipe during hose insertion.

4.3.2.3 Pull the test hose out of the fuel filler neck carefully. Examine the hose for evidence that the hose had contacted the level surface of the Stoddard solvent in the fuel tank. The end of the hose will be saturated if the hose was submerged in the solvent. Record on Data Sheet A2, Appendix A.

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