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| GM WORLDWIDE ENGINEERING STANDARDS | Test Procedure | GMW17536 |

# Fuel Fill Hose Sealing 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.** This standard tests the ability of a fuel filler hose/fitting/clamp system to seal a fuel filler hose joint successfully under conditions of temperature cycling and pressurization with air.

**1.2 Applicability.** This standard is applicable to all fuel fill hoses.

## 2 References

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

**2.1 External Standards/Specifications.**

None

**2.2 GM Standards/Specifications.**

GMW15667

**2.3 Additional References.**

GMPT-6-030

GMPT-5-020

## 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.**

**3.2.1** An air-circulating oven capable of maintaining a uniform temperature throughout the oven of 85 °C ± 2 °C.

**3.2.2** An environmental chamber capable of maintaining a uniform temperature throughout the chamber of -40 °C ± 2 °C.

**3.2.3** A water bath of sufficient size and depth to allow for the submergence of an air-pressurized fuel filler hose sample with installed fittings and clamps.

**3.2.4** Torque wrench capable of 3.2 N·m measurement to within ± 0.1 N·m.

**3.2.5** Source of clean, filtered air capable of 276 kPa pressurization, with gauging capable of pressure measurement within ± 34.5 kPa.

**3.3 Test Vehicle/Test Piece.**

**3.3.1** Fuel filler hose samples, 25 cm to 30 cm in length. Inner Diameter (ID) of hose samples should be the largest value permitted by the ID tolerance of the hose, and shall be specified on the hose blueprint, if a production part. Minimum sample set size for the test method is twelve (12) samples. Record hose ID measurements for each sample.



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**3.3.2** Hose fittings, one for each end of the hose. The fittings to be used for the test are to be the production release fittings for the hose, or as specified by the GM Design Release Engineer for the program for which the hose is to be used. Fitting Outer Diameter (OD) should be the smallest value permitted by the OD tolerance of the fitting. Record the fitting OD, as well as the fitting roundness.

**3.3.3** Constant-dimension clamps, one for each end of each test hose sample. The clamps to be used for the test are to be the production release clamps for the hose, or as specified by the GM Design Release Engineer for the program for which the hose is to be used.

**3.3.4** Static fuel soak for gasoline applications use GMPT-6-030. Diesel applications use GMPT-5-020. Fuel is to be applied to interior (only) of hose/fitting assembly to soak the interior joints of the test samples.

**3.4 Test Time.**

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| Calendar time: | 16 d |
| Test time: | 336 h |
| Coordination time: | 48 h |

**3.5 Test Required Information.** Not applicable.

**3.6 Personnel/Skills.** Test technician/engineer qualified in data acquisition, test set-up, and technical reporting.

## 4 Procedure

**4.1 Preparation.** Insert fittings into each end of hose sample, to design position. Use no lubricant for fitting installation. Install clamps on each end of hose sample, in design position. Torque each clamp to its production specification. Use no lubricant on the clamp.

**4.2 Conditions.**

**4.2.1 Environmental Conditions.** See 4.3.1.

**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 Summary of Test Method.** Two (2) tests are conducted on the hose samples after a 4 h heat aging, and then a one (1) week fuel soak at ambient temperature with fittings inserted into each end of the hose, and the joint sealed with a constant dimension clamp torqued to a specified value. For the first test, subject half of the samples to an air leak test of the assembly up to 276 kPa, after the one (1) week soak. In the second test, subject the other half of the samples to cold temperature testing and evaluate for liquid leaks after the one week soak.

**4.3.2 Test Procedure.**

**4.3.2.1** After preparation of samples, as described in 4.1, allow hose assembly to stand for a minimum of 168 h at an ambient temperature of 23 °C ± 2 °C followed by a heat-soak of the assemblies in an air-circulating oven at 85 °C ± 2 °C for a minimum of 4 h. After heat-soak, allow assemblies to return to ambient condition. Add liquid fuel, per 3.3.4, and allow hose assembly to stand for a minimum of 168 h at an ambient temperature of 23 °C ± 2 °C with end-form of hose joint to be evaluated in vertical orientation (pointed upwards). Upon completion of the 168 h fuel soak, perform the Ambient Temperature Seal Test with half of the assembly samples and the Cold Temperature Seal Test with the other half of the samples.

**4.3.2.2 Ambient Temperature Seal Test.** Submerge hose assembly in water bath at ambient temperature, and apply 69.0 kPa internal air pressure to the assembly. Hold for 3 minutes to 5 minutes, observing for air bubbles emanating from hose assembly, indicative of air leak.

**4.3.2.2.1** Increase air pressure of assembly in 69.0 kPa increments, maintaining for 1 minute to 3 minutes, until a maximum pressure of 276 kPa has been attained. Record the pressure and location of any air leaks. Each pressure increment must be reached in no more than 30 s.

**4.3.2.3 Cold Temperature Seal Test.** Place the test samples in a cold chamber maintaining vertical orientation as stated per 4.3.2.4. For fuel tank hose joint, the end form of the tank inlet should point upward. For fill pipe joint, the end form of the filler pipe should point upward. Cold soak the hose assembly at -40 °C ± 2 °C for a minimum of 4 h.



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