



Non Metallic Fuel Tank Permeability - UN ECE

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. Preconditioning a non-metallic diesel or gasoline primary or secondary fuel tank for other specifications and to evaluate the fuel permeability of these tanks.

1.2 Applicability. This procedure applies to all vehicles in Category M, N, or O which have a primary or secondary non-metallic diesel or gasoline fuel tank. The vehicle categories defined by United Nations Economic Commission for Europe (UN ECE) are:

- Category M: Power-driven vehicles having at least four wheels and used for the carriage of passengers.
- Category N: Power-driven vehicles having at least four wheels and used for the carriage of goods.
- Category O: Trailers (including semi-trailers).

1.3 Remarks. This procedure can be used to show compliance with UN R 34.03 Annex 5, Section 3 regulations.

Note: Fuel tanks which have completed this specification are required for use in GMW14847 and GMW14848.

2 References

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

2.1 External Standards/Specifications.

UN R 34.03

2.2 GM Standards/Specifications.

GMW15311

3 Resources

3.1 Facilities. The test facility shall be able to store fuel tanks (with fuel) for up to eight (8) weeks in a temperature controlled room.

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.

3.1.3 The test facility shall have fuel dispensing equipment and safety equipment, fume detection equipment, spill clean equipment, etc. needed to handle fuel.

3.1.4 The test site shall have firefighting equipment available which would be able to control any potential fire. This equipment should include personal protection equipment, respirator, clothing, etc.

3.2 Equipment.

3.2.1 A fuel tank holding fixture is used for mounting the tank in simulated vehicle position.

3.2.2 Storage room which has the capability of maintaining ambient temperatures of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($73.4\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$) or $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($104.0\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$) for eight (8) weeks.

3.2.3 Weighing equipment capable of measuring (in grams) the tank filled with fuel.

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

3.3 Test Vehicle/Test Piece. Fuel system under test includes the fuel tank and all attached accessories. Reference Data Sheet A2 in Appendix A.

3.3.1 Test Fuel. The use of unleaded premium gasoline as per GMW15311 (Specification for Fuel Storage and Handling Subsystem) section titled Test Fuels, is required.

3.4 Test Time.

Calendar time: 85 d

Test time: 2016 h

Coordination time: 8 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Personnel involved in the fuel handling and testing portion of this procedure shall have been trained in the use of the firefighting and personal protection equipment available on site, see 3.1.4. The UN R 34.03 Annex 5 tests for UN ECE type approval require witness presence, which shall be arranged with the regulatory agency.

4 Procedure

4.1 Preparation. Install the fuel tank onto the fuel tank holding fixture in simulated vehicle position. Do not seal the fuel tank.

4.1.1 Fill the fuel tank to 50% of the rated capacity with test fuel and store the fuel tank at an ambient temperature of $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($104.0\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$) until the weight loss per 24 h becomes constant. Record the day/time, weight information and the calculations on Data Sheet A3 in Appendix A.

4.1.2 Remove the stale fuel and refill to 50% of the rated capacity with fresh test fuel. Seal all openings to avoid any vapor or liquid losses.

4.1.3 Store the fuel tank at an ambient temperature of $40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($104.0\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$). When the temperature of the fuel reaches ambient temperature, vent any excess pressure or vacuum. Reseal the tank.

4.1.4 Plot fuel system weight loss versus time on Data Sheet A4 in Appendix A, to determine when the fuel tank is ready for the permeability test.

Note: All firefighting equipment shall be readily available during the fuel handling and testing portion of this procedure.

Note: The weight loss is constant when the last three (3) points on the plotted line are horizontal.

4.2 Conditions.

4.2.1 Environmental Conditions. Refer to 3.1 and 3.2.2.

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. Record the day/time and initial weight of the fuel on Data Sheet A5 in Appendix A.

4.3.1 After a storage period of eight (8) weeks, at this constant temperature, reweigh the fuel tank and test fuel. Record the final day/time and weight on Data Sheet A5 in Appendix A.

Note: Intermediate weighing and calculations may be made at any time to monitor weight loss and avoid loss of test time due to unexpected results.

4.3.2 Calculate the average loss of fuel in grams per 24 h and record on Data Sheet A5 in Appendix A.

4.3.3 If the average loss of fuel in grams per 24 h is $> 20\text{ g/24 h}$, repeat the permeability test on the same fuel tank, starting with 4.1.4, with the exception that the ambient temperature shall be $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($73.4\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$).

4.3.4 If needed, record data related to this second permeability test on Data Sheet A5 in Appendix A.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. During this test, the fuel tank shall lose < 20 g/24 h for the first permeability test or < 10 g/24 h for the second permeability test.

5.3 Test Documentation. Record all pertinent test results on the Data Sheet A1 through Data Sheet A5 in Appendix A.

6 Safety

This Engineering Standard may involve safety requirements for hazardous materials, the method of operations and equipment. This standard does not propose to address all the safety issues associated with its use. It is the responsibility of the user of this standard to ensure compliance with all appropriate safety and health practices. This would include any specific training that may be required. The safety and health standards include site specific rules and procedures, company rules and procedures, and Government Standards. Contact shall be made with the appropriate site Safety and Health personnel for further direction and guidance in these matters.

7 Notes

7.1 Glossary. Not applicable.

7.2 Acronyms, Abbreviations, and Symbols.

GSSLT Global Subsystem Leadership Team

UN ECE United Nations Economic Commission for Europe

8 Coding System

This standard shall be referenced in other documents, drawings, etc., as follows:

Test to GMW14846

9 Release and Revisions

This standard was originated in November 2005. It was first approved by the Global Chassis Powertrain Team in January 2006. It was first published in February 2006.

Issue	Publication Date	Description (Organization)
1	FEB 2006	Initial publication.
2	OCT 2008	Reference to ECE R34 removed and replaced with 70/221/EEC in 1.2.1 and 2.1. Removed the 4 week limit in 4.1.3. Removed reference to "Export". (Powertrain Integration)
3	OCT 2012	Revise to current template. (Fuel Storage and Handling GSSLT)
4	APR 2018	Revised to current template. Added UN ECE to title and clarified R34 reference. Added test time. (Chassis Fuel Storage and Handling Global Subsystem Leadership Team (GSSLT))