



Non Metallic Fuel Tank Impact Resistance - 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. The purpose of this standard is to evaluate the impact resistance of non-metallic primary and secondary diesel and gasoline fuel 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 1 regulations.

Note: The fuel tank must be able to pass this test (GMW14847) after completing the fuel tank conditioning described in GMW14846.

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.

GMW14846

3 Resources

3.1 Facilities. A test chamber with fuel tank holding and pendulum impact test fixtures as defined in 3.2.1 able to maintain the fuel tank under test at $-40\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$).

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 Tank Holding Fixture. A fuel tank holding fixture for mounting the tank in various positions.

3.2.2 Pendulum Impact Fixture. The impact body shall be of steel and have the shape of a pyramid with equilateral triangle faces and a square base, the summit and the edges being rounded to a radius of 3 mm (0.12 in). The center of percussion of the pendulum shall coincide with the center of gravity of the pyramid; its distance from the axis of rotation of the pendulum shall be 1 m. The total mass of the pendulum referred to its center of percussion shall be 15 kg (33 lb).

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.

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3.3 Test Vehicle/Test Piece. Fuel system under test includes the fuel tank and all attached accessories. Preconditioning and completion of the fuel permeability test as described in GMW14846 must be done to the fuel tank before running this test.

3.4 Test Time.

Calendar time: 3 d
Test time: 8 h
Coordination time: 16 h

3.5 Test Required Information. Not applicable.

3.6 Personnel/Skills. Trained personnel to operate the test chamber and pendulum impact testing fixture. 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.

4.1.1 By inspection, determine all points on the fuel tank which are most exposed to impact and which are more susceptible to perforation due to impact. This determination should consider the shape of the fuel tank and the location of the tank in the vehicle. Record these locations on Data Sheet A2 in Appendix A.

4.1.2 Fill the tank to rated capacity with a water-glycol mixture, or with another liquid which does not change the properties of the tank material, that remains liquid below the test temperature ($-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($-40^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$)).

4.2 Conditions.

4.2.1 Environmental Conditions. Test at $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($-40^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$).

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 With the fuel tank filled per 4.1.2 and at a temperature $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($-40^{\circ}\text{F} \pm 3.6^{\circ}\text{F}$), impact the tank with the pendulum so that the energy of the pendulum, at the moment of impact, is not $< 30 \text{ N m}$ ($< 3.1 \text{ kg m}$) and is as close to that value as possible.

Note: At the choice of the manufacturer, all the impact tests may be carried out on one (1) tank or each may be carried out on a different tank.

4.3.2 Record the results of each impact test on Data Sheet A3 and Data Sheet A4 in Appendix A. Include information about any perforation or liquid leaks. Posttest observations including comments about any perforations, leaks, unusual damages or other observations and are to be recorded on Data Sheet A5 in Appendix A.

5 Data

5.1 Calculations. Not applicable.

5.2 Interpretation of Results. Leakage as a result of impact is not permitted.

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.

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Documents

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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 GMW14847

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	"Export" removed from the title. References to ECE R34 removed from 1.2.1 and 2.1. (Powertrain Integration)
3	NOV 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))

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