



Tire Rapid Air Loss Test Procedure

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.

1.1.1 Method A: The purpose of this procedure is to define a test method for determining if a rim can retain a deflated tire in the event of a rapid loss of inflation pressure from 97 km/h (60 mph), until the vehicle can be stopped with a controlled braking application, in accordance with FMVSS 110 and FMVSS 139.

1.1.2 Method B: The purpose of this procedure is to define a test method for determining if a rim can retain a deflated tire in the event of a rapid loss of inflation pressure from 97 km/h (60 mph), until the vehicle can be stopped with a controlled braking application, in accordance with KMVSS 88-2.

1.2 Applicability.

1.2.1 Method A. This test procedure applies to tires and compact spares for passenger cars and light trucks with a Gross Vehicle Weight Rating (GVWR) of 4536 kg (10 000 lb) or less (see Section 2.1).

1.2.2 Method B. This test procedure applies to tires and compact spares for passenger cars with a maximum capacity of ten (10) persons (see Section 2.1).

1.3 Remarks.

1.3.1 Method A

1.3.1.1 European hard metric tire size designations are judged to be equivalent to P-metric size designations and vice versa for this test.

1.3.1.2 Tire speed rating and tire type can be ignored for this test.

1.3.1.3 The rim must be approved for usage with the release tire size in accordance with the requirements of FMVSS 109.

1.3.1.4 For the purposes of this test, rim widths within 12.7 mm (0.5 in) are judged to be equivalent.

1.3.1.5 The vehicle maximum load on the tire shall not be greater than the applicable maximum load rating, as marked on the sidewall of the tire.

1.3.1.6 The rim must retain the tire in the event of rapid loss of air until the vehicle can be stopped from 97 km/h (60 mph) by controlled braking.

1.3.1.7 The tire deflation system should be capable of deflating the tire in 1 s or less.

1.3.2 Method B

1.3.2.1 The rim must be approved for usage with the release tire size in accordance with the requirements of industrial standard.

1.3.2.2 Test rim used should be the designed wheel for the applicable program.

1.3.2.3 The vehicle maximum load on the tire shall not be greater than the applicable maximum load rating as marked on the sidewall of the tire.

1.3.2.4 The rim must retain the tire in the event of rapid loss of air until the vehicle can be stopped from 97km/h running on leveled surface in a straight line.

1.3.2.5 The tire deflation system should be capable of deflating 90% of the tire pressure within 3 s.

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2 References

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

2.1 External Standards/Specifications.

FMVSS 109

FMVSS 110

FMVSS 139

KMVSS 88-2

2.2 GM Standards/Specifications.

GMW16590

2.3 Additional References.

European Tyre and Rim Technical Organization (ETRTO) Procedures

Japanese Automobile Tyre Manufacturers Association (JATMA) Procedures

Tire and Rim Association (T&RA) Procedures

3 Resources

3.1 Facilities. This test is run on a straight level asphalt surface with a grade not to exceed 1% in any direction and sufficient to achieve the required test speed and that is clear of debris.

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 Method A.

3.2.1.1 Use a scale of sufficient capacity to measure maximum weight on either front or rear axle. Record the vehicle weight.

3.2.1.2 Full driver safety equipment per test location requirements.

3.2.1.3 Calibrated tire inflation gauge.

3.2.1.4 Equipment for measurement of deceleration.

3.2.1.5 Equipment for tire deflation.

3.2.1.6 Sandbags or other ballast.

3.2.1.7 Use calibrated road speed measurement equipment, such as fifth wheel and associated speed readout. The test vehicle may be equipped with a calibrated speedometer as an alternative.

3.2.2 Method B.

3.2.2.1 Use a scale of sufficient capacity to measure maximum weight on either front or rear axle. Record the vehicle weight.

3.2.2.2 Full driver safety equipment per test location requirements.

3.2.2.3 Calibrated tire inflation gauge.

3.2.2.4 Equipment for measurement of the following:

- Stopping distance.
- Deceleration Rate.
- Bias-distance from center-line.

3.2.2.5 Manufacture-designed wheel to fit the deflation system.

3.2.2.6 Sandbags or other ballast.

3.2.2.7 Equipment for tire deflation capable of deflating 90% of the tire within 3 s. Refer to Appendix F, Figure F1.

3.3 Test Vehicle/Test Piece.

3.3.1 Test Vehicle

3.3.1.1 Method A. A vehicle equipped to the extent necessary (and as prescribed by the requesting test engineer) to perform the test and loaded to the equivalent of maximum tire load capacity.

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3.3.1.2 Method B. A representative vehicle of applicable program for the Korean market.

3.3.2 Test Piece. The test tire and wheel sizes are specified by the test requestor.

3.3.2.1 Method A. A new tire and wheel should be used which are confirmed as being within production tolerance by the test requestor/component supplier, in accordance with FMVSS 109. Two (2) tire and wheel assemblies are required for the rapid loss of air test.

3.3.2.2 Method B. A new tire and wheel should be used which are confirmed as being within production tolerance by the test requestor/component supplier, in accordance with KMVSS 88-2.

The worst-case tire-wheel assembly is the most narrow tire-wheel assembly. The responsible Design Release Engineer (DRE) will discuss with the certification team's recommendation of the highest volume for the Korean market.

If Program-intent design is not listed in GMNA-RAL document list, then the new program tire-wheel assembly will need to be tested to meet GMK requirements.

3.4 Test Time. Times are for testing two (2) samples.

Calendar time: 0.5 days

Test time: 1 h

Coordination time: 4 h

3.5 Test Required Information. All test required information shall be provided by the test requestor.

3.6 Personnel/Skills. Personnel must comply with local driver regulations and certifications.

4 Procedure

4.1 Preparation.

4.1.1. Measure wheels to confirm they meet specifications.

4.1.2 Complete the Metrology Data sheet in Appendix A, Data Sheet A1 (Method A) and Appendix E (Method B)

4.1.3 Record all required information on Appendix B, Data Sheet B1 (Method A) and Appendix E, Data Sheet E2

4.1.4 Mount each tire to its test rim as stated on the test request with the vehicle manufacturer's recommended lubricant.

4.1.5 Set all tire air pressures as stated on the test request.

4.1.6 Ballast the vehicle to the requested weight and weight distribution, such that the test wheel is equal to the test load specified in the test request.

Note: All equipment and ballast inside the passenger compartment of the vehicle must be securely held in place. External ballast box and a metal retaining screen installed between the cargo compartment and the passenger cab. Remove all loose equipment from the passenger compartment including tools, spare parts, and personal belongings.

4.1.7 Calibrate speedometer, or install a suitable external speed measuring device.

4.1.8 Install or set up the tire deflation system.

4.1.9 Method B: Install a device to measure the vehicles deceleration rate.

4.2 Conditions.

4.2.1 Environmental Conditions.

4.2.1.1 The test should be conducted on a dry paved surface.

4.2.1.2 The test should be performed with an ambient temperature between 0 °C and 38 °C (32 °F and 100 °F).

4.2.1.3 The test should be performed with a wind velocity not to exceed 5 m/s (16 ft/s).

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 Tire and rim combinations are tested at the maximum designated tire load and cold inflation air pressure, as documented in the Tire and Rim Association (T&RA), European Tyre and Rim Technical Organization (ETRTO), and Japanese Automobile Tyre Manufacturers Association (JATMA) procedures.

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4.3 Instructions.

4.3.1 Install the tire/wheel assembly on the test vehicle.

4.3.1.1 Method A: On test-vehicle position.

4.3.1.2 Method B: Test both Left Front and Right Rear on application vehicles.

4.3.2 Accelerate to and maintain a vehicle speed of 97 km/h (-3, +0 km/h) (60 mph (-2, +0 mph)) and simulate the rapid loss of air from the tire, through an opening at least equal to a 1.3 cm (0.5 in) diameter hole. Maintain the vehicle in straight-line position when coming to stop.

4.3.2.1 Method A: Rapid Air Loss Time ≤ 1 s.

4.3.2.2 Method B: Rapid Air Loss Time ≤ 3 s.

4.3.3 Upon initial release of air from the tire, apply the brakes to bring the vehicle to a controlled stop using the most rapid constant deceleration rate not exceeding 2.5 m/s^2 (8 ft/s^2), without wheel lock.

4.3.4 Evaluate retention of tire to wheel, paying particular attention to the location of the tire beads with respect to the wheel flanges.

4.3.5 Record the test information.

4.3.5.1 Method A:

4.3.5.1.1 Reference Appendix C, Data Sheet C1.

4.3.5.1.2 Take photos of the test tire and its punctured area. Add label on the test tire next to separation area and include the following information:

- Area of Tire cut.
- Test Request Number.
- Tire Number/lettering (if applicable).
- Date of Test.
- Test Pass/Fail.

4.3.5.2 Method B:

4.3.5.2.1 Reference Appendix E, Data Sheet E1.

4.3.5.2.2 Take photos of the tire bead from the rim flange on both inboard and outboard sides of the rim under test. Add label on the test tire next to separation area and include the following information (See Figure 1 for example):

- Area of Tire cut.
- Test Request Number.
- Tire Number/lettering (if applicable).

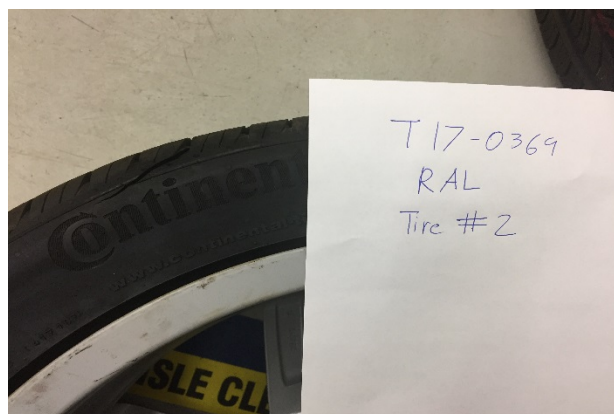


Figure 1: Tire Cut Photo

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