



Tire Rolling Noise Under Load, Exterior Noise Evaluation Process

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. Determination of tire rolling noise combined with the pass-by according to ISO 362-1:2015.

Also used for determining compliance risk and/or establishing tire performance data models for use in indoor certification testing according to ISO 362-3.

1.2 Applicability. For all passenger vehicle tires.

1.3 Remarks. Since the introduction of directive UN R117, tire noise, as a partial noise source, has become increasingly significant. For this purpose, there is a need for an improved definition of tire noise. This Test Procedure examines the determination of tire noise under full load.

2 References

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

2.1 External Standards/Specifications.

ISO 362-1:2015

ISO 10844:2014

UN R51.03

UN R117

ISO 362-3

2.2 GM Standards/Specifications.

GMW14469

2.3 Additional References. None.

3 Resources

3.1 Facilities. Test track according to ISO 362-1:2015 with pavement as specified in ISO 10844:2014.

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 Measurement system for recording the noise level and speed curves over the travel.

3.2.2 For further processing of results, a system which enables logarithmic addition or subtraction of curves is advantageous.

3.3 Test Vehicle/Test Piece. Vehicle fitted with four (4) identical tires of type to be tested. These test tires should be new, but should have undergone break-in ride (to remove any mold release agents on tread surface).

The plain tread tires fulfill one of the following conditions:

- a. According to GMW14469: Rolling value ≤ 62 dB(A).
- b. Difference in rolling values, according to GMW14469, between test tires and plain tread tires > 5 dB(A).

The test vehicle is only suitable if the curves from several passes, according to ISO 362-1:2015, in gear i are almost identical.

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It is not absolutely necessary (but advantageous) if the test vehicle is modified with sound damping and sound silencing measures, such as:

- Diversion of the muffler outlet.
- Diversion of the intake orifice.
- Engine compartment cover.

Usually, the size of the test tires is allocated to a certain engine group, for a particular vehicle model. If possible, the test vehicle should be equipped with the most powerful engine of this engine group.

3.4 Test Time.

Calendar time:	2 days
Test time:	8 hours
Coordination time:	4 hours

3.5 Test Required Information. As required for UN R51.03 certification test.

3.6 Personnel/Skills. As required for exterior noise certification testing.

4 Procedure

4.1 Preparation. The measurement setup shall be according to ISO 362-1:2015 (see Appendix A, Figure A1).

4.2 Conditions.

4.2.1 Environmental Conditions. The ambient conditions shall be maintained during test runs, if possible. Condition:

- Temperature difference between individual measurements: $\leq 5^\circ$.
- Ambient temperature: 0°C to 40°C .
- Wind speed: $< 5\text{ m/s}$.
- Ambient noise level: 10 dB(A) minimum less than roll out noise level of plain tread tires.

The test track surface shall be dry and free of other materials (loose gravel, etc.), see ISO 362-1:2015.

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 The pressures (cold) of the test tire and plain tread tire shall be adjusted to the curb weight nominal values.

4.2.2.2 The measurements shall be performed at curb weight (driving condition) including fuel and operating material, vehicle equipment and driver.

4.2.2.3 The test vehicle including tires shall be at normal operating temperature prior to each measurement.

4.3 Instructions. The following measurements shall be performed:

With test tires:

- At least five (5) measurements in gear i according to ISO 362-1:2015.

With plain (blank) tread tires:

- At least five (5) measurements in gear i according to ISO 362-1:2015.
- ≥ 20 rolling measurements according to GMW14469.

Test speeds for the rolling measurements should cover the entire speed range of the passes in gear i .

The tire rolling noise levels shall be measured according to ISO 362-1:2015 at a distance of 7.5 m to the left and right of the vehicle center line (see Appendix A, Figure A1).

The following data shall be documented in addition to the noise values:

- Tire data (supplier, size, pattern designation, DOT number, tire pressure, tread depth).
- Environmental conditions, e.g., air temperature, test track temperature, air pressure, air humidity, wind speed, ambient noise level.

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