



SURFACE VEHICLE RECOMMENDED PRACTICE

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Component Level Electric Parking Brake (EPB) Actuation Noise Measurement Procedure

RATIONALE

In the global automotive industry, measuring electric parking brake (EPB) actuation noise at the component level is critical to ensure that desired noise performance is achieved at the vehicle level. Currently, a standard procedure does not exist to bring uniformity to this measurement. The development of this SAE Recommended Practice (RP) addresses this need by providing a standard method for measuring the component level EPB actuation noise.

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Documents

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1. SCOPE

Provide a description of standard test methods and analysis methods for bench test measurement of the component level EPB actuation noise in order to evaluate the noise performance of the EPB actuators.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

SAE J2521 Disc and Drum Brake Dynamometer Squeal Noise Test Procedure

SAE J3152 Taxonomy and Guidelines for Design, Fabrication, and Installation of Brake NVH Fixtures for Inertia Dynamometer Testing

2.1.2 IEC Publications

Available from IEC Central Office, 3, rue de Varembe, P.O. Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 02 11, www.iec.ch.

IEC 61672-1 Electroacoustics - Sound level meters - Part 1: Specifications

2.1.3 ISO Publications

Available from International Organization for Standardization, ISO Central Secretariat, 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland, Tel: +41 22 749 01 11, www.iso.org.

ISO 3744:1994(E) Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering method in an essentially free field over a reflecting plane

2.1.4 ANSI Accredited Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ANSI/ASA S12.2-2008 Criteria for Evaluating Room Noise

3. DEFINITIONS

To facilitate the application of this SAE Recommended Practice, the following definitions apply.

3.1 FREE FIELD

A sound field where reflections at the boundaries are negligible for the frequency range of interest.

3.2 BACKGROUND NOISE

Noise from all sources other than the EPB.

4. SYMBOLS AND ABBREVIATIONS

4.1 Abbreviations

EPB: Electric Parking Brake

NC: Noise Criterion

SPL: Sound Pressure Level

5. TEST EQUIPMENT

5.1 Hemi-Anechoic Chamber Requirements

The chamber should have free field conditions above 300 Hz and the background noise level should be a minimum of 10 dBA less than the noise level of the actuator. A maximum noise criterion (NC) rating of NC-25 is recommended (refer to ANSI/ASA S12.2-2008 for information on noise criterion ratings).

5.2 Acquisition System

An acquisition system with a dynamic range of 80 dB or greater and a minimum of four channels is recommended.

5.3 Microphone

The recommended transducer for sound measurement is a 12.7 mm (0.5 inch) diameter free-field condenser microphone, which conforms to IEC 61672-1 Class 2 or better. A corresponding windscreen is optional.

5.4 Accelerometer

The recommended transducer for acceleration measurement is a single axis accelerometer with a sensitivity of ≈ 10 mV/g and mass ≤ 7 g.

5.5 Current Probe

Clamp-on current probe capable of measuring 1 to 50 A.

5.6 Electric Power Supply

Electric power supply performance to be at least 12.5 to 14 V and 30 A.

6. TEST FIXTURE

To reduce variability, the fixture level specified for a project shall remain the same for that project or noise investigation. The project team should determine if a level 0 or level 1 fixture will be used for a specific project.

6.1 Level 0 (Generic Rigid Fixture)

Figure 1 is the level 0 generic rigid fixture for measuring component level EPB actuation noise. This fixture consists of a base, two cubes, caliper fixing adapters, rotor segment, and magnetic base stand. The base should have a minimum size of 400 x 400 x 5 mm. The rotor segment should be the same size or larger than the brake pad friction material surface and the thickness of the rotor segment should be the same as the design intent rotor for the caliper assembly that is being tested.