SAE International™

SURFACE VEHICLE STANDARD

SAE J1287

REV. MAY2008

Issued 1980-06
Revised 2008-05

Superseding J1287 JUL1998

(R) Measurement of Exhaust Sound Pressure Levels of Stationary Motorcycles

RATIONALE

This Revised document has been changed to reflect the experience gained with its use in the time since its last revision. The alternate engine speed equations, intended for use in cases where the rated engine speed is not known have been eliminated as experience has shown that results using these alternate speeds may be unreliable. Requirements have been added for recording test condition data. The wording of some sections has been changed or rearranged, and the numbering changed accordingly. It has also been revised to comply with the new SAE Technical Standards Board Format.

1. SCOPE

This SAE Standard establishes the test procedure, environment, and instrumentation for determining the exhaust sound pressure levels of motorcycles under stationary conditions. Care must be taken not to confuse stationary sound pressure levels with total motorcycle sound pressure levels. This test does not evaluate total motorcycle sound during operation. For this purpose, SAE J331 or SAE J47 is recommended. Any allowable sound limits (dBA) set in relation to SAE J1287 for exhaust sound pressure level should not conflict with the allowable sound limits (dBA) for total sound pressure level per the EPA requirements specified in the US Code of Federal Regulations, 40 Part 205.

2. REFERENCES

2.1 Applicable Publications

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 724-776-4970 (outside USA), www.sae.org.

SAE J47 Maximum Sound Level Potential for Motorcycles

SAE J184 Qualifying a Sound Data Acquisition System

SAE J213 Motorcycle Classifications

SAE J331 Sound Levels for Motorcycles

SAE J1349 Engine Power Test Code—Spark Ignition and Compression Ignition—Net Power Rating

SAE TSB 002 Preparation of SAE Technical Reports

2.1.2 ANSI Publications

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, www.ansi.org.

ANSI S1.4-1983 (R 2006) with Amd.S1.4A-1985 American National Standard Specification for Sound Level Meters

ANSI S1.40-1984 (R1997) Specifications for Acoustical Calibrators

3. DEFINITIONS

3.1 Field Calibration

Calibration of the sound level meter using an external sound level calibrator, an internal calibration means, or any other method which will ensure the required accuracy of sound level meter readings.

3.2 Longitudinal Plane of Symmetry

As defined in SAE J213.

3.3 Rated Engine Speed

The engine speed in revolutions per minute at which the engine delivers its maximum Net Brake Power as defined in SAE J1349, as determined by the manufacturer.

4. INSTRUMENTATION

The following instrumentation shall be used:

4.1 A sound level meter meeting the Type 1, Type S1A, Type 2, or Type S2A requirements of ANSI S1.4-1983 (R2006).

4.1.1 As an alternative to making direct measurements using a sound level meter, a microphone or sound level meter may be used with a recorder or other indicating instrument, provided the system meets the requirements of SAE J184.

4.2 A sound level calibrator with an accuracy of ±0.5 dB conforming to IEC942 (1988) Class 1 and/or ANSI S1.40–1984 (R 1997) (see 7.9).

4.3 A windscreen which does not affect microphone response more than ±1 dB for frequencies of 63 to 4000 Hz and ±1.5 dB for frequencies of 4000 to 10 000 Hz.

4.4 An engine speed tachometer or other means of determining engine speed, with a steady-state accuracy of ±3% at the test speed.

4.5 An anemometer with steady-state accuracy of ±10% at 9 m/s (20 mph).

5. TEST SITE

5.1 The test site shall be a flat, open surface free of large sound-reflecting surfaces (other than the ground) such as parked vehicles, signboards, buildings, or hillsides located within 5 m (16 ft) of the motorcycle being tested and the location of the microphone.

5.2 The surface of the ground within the area described in 5.1 shall be paving or hard-packed earth, level within an average slope of 40 mm/m (0.5 in/ft), and shall be free of loose or powdered snow, plowed soil, grass of a height greater than 150 mm (6 in), trees, or other extraneous material.

6. PROCEDURE

6.1 A rider shall sit astride the motorcycle in normal riding position with both feet on the ground. If this is not possible because of the seat height of the motorcycle, and for three-wheeled motorcycles, the rider shall sit in the normal riding position with one or both feet on the footrests. If necessary, an assistant may hold the motorcycle by the forks, front wheel, or handlebars so that it is stationary with its longitudinal plane of symmetry vertical. In the alternative, the rider may use a box, rock, or other object to rest his feet upon to steady the motorcycle, as long as the motorcycle longitudinal plane of symmetry is vertical and stationary.

6.1.1 The rider shall run the engine with the gearbox in neutral at an rpm equal to one-half of the rated engine speed (±200 rpm) for 1 to 2 s.

6.1.2 If no neutral is provided, the motorcycle shall be operated either with the rear wheel(s) at least 50 mm (2 in) clear of the ground or with the drive chain or belt removed, or with the clutch, if the motorcycle is so equipped, disengaged.

6.2 The engine of the motorcycle under test shall be at normal operating temperature during the test.

7. MEASUREMENTS

7.1 The sound level meter shall be set for the A-weighting network and for slow dynamic response. (See Appendix A, Section A.1)

7.2 Tests shall be made on each side of the motorcycle having an exhaust outlet.

7.3 The microphone shall be located behind, 0.5 m ± 0.01 m (20 in ± 1/2 in) from, and within 0.01 m (1/2 in) of the same height as the exhaust outlet and at a 45 degrees ± 10 degrees angle to the normal line of travel of the motorcycle. If there is more than one exhaust outlet per side, the microphone shall be located with reference to the rearmost outlet. The longitudinal axis of the microphone shall be in a plane parallel to the ground plane. The axis of the microphone shall be oriented as specified by the instrument manufacturer (see Figure 1).

7.4 No wire or other rigid means of distance measurement shall be attached to the sound measuring system.

7.5 The ambient sound pressure level (including wind effects) at the test site due to sources other than the motorcycle being measured shall be at least 10 dB lower than the sound pressure level produced by the motorcycle under test.

7.6 Wind speed at the test site during the test shall be less than 9 m/s (20 mph).

7.7 While making sound pressure level measurements, not more than one person other than the rider, the measurer, and the assistant (if necessary) (see 6.1) shall be within 3 m (10 ft) of the motorcycle under test or the microphone, and that person shall be directly behind the measurer on a line through the microphone and the measurer.

7.8 Field calibration of the sound level meter using the sound level calibrator (see 4.2) shall be made immediately before the first test of each test day and should be made at the end of each test day, and at intervals of no more than 1 h.

7.9 The following data shall be recorded for each test:

7.9.1 The Sound Pressure Level

The sound pressure level recorded shall be the maximum measured on the loudest side of the motorcycle (if outlet located on both sides – see 7.2) during the test cycle determined in Sections 6.1.1 or 6.1.2 as appropriate.

7.9.2 The test speed, in rpm, corresponding to the sound pressure level measurement of 7.9.1.

7.9.3 Wind speed at the test site during the measurement.

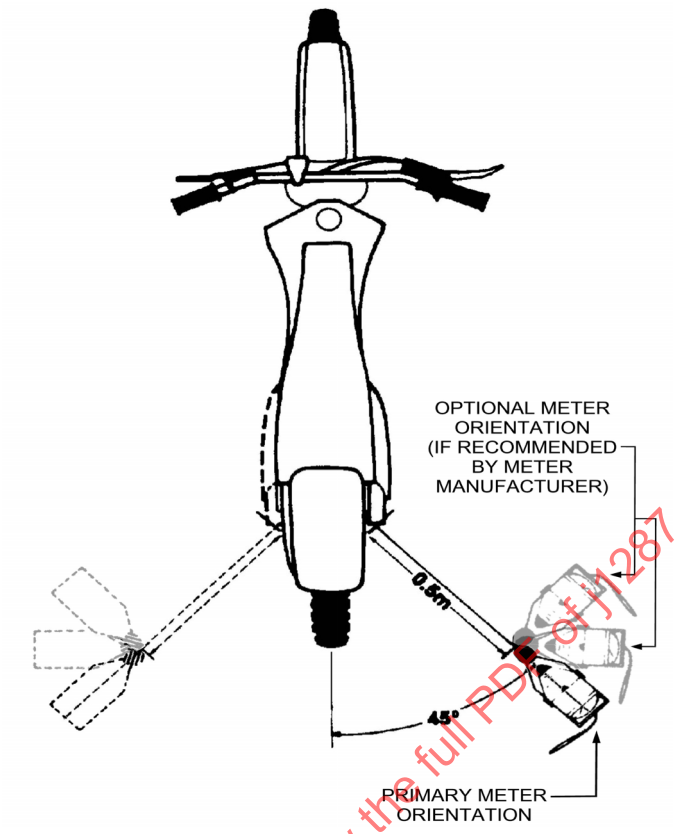

FIGURE 1 - SOUND METER LOCATION AND ORIENTATION

7.9.4 Ambient sound pressure level at the test site during the measurement.

7.9.5 The measurement method used, i.e. that of 6.1.1 or 6.1.2.

8. GENERAL COMMENTS

8.1 It is essential that persons conducting the test be knowledgeable of the test procedure and use of the instrumentation.

8.2 Proper use of all test instruments is essential to obtain valid measurements. Operating manuals or other literature furnished by the instrument manufacturer should be referred to, for both recommended operation of the instrument and precautions to be observed.

8.3 Specific Items for Consideration

8.3.1 The type of microphone, its directional response characteristics, and its orientation relative to the source of sound.

8.3.2 The effects of ambient weather conditions on the performance of all instruments (for instance, temperature, humidity, and barometric pressure).

8.3.3 Proper acoustical calibration procedure to include the influence of extension cables, etc.

8.4 Although either Type 1 or Type 2 sound level meters may be used with this procedure, it is suggested that a Type 1 instrument be considered as it generally has lesser overall tolerance, which can result in more accurate measurements.

8.5 The use of the word "shall" in the procedure is to be understood as obligatory. The use of the word "should" is to be understood as advisory. The use of the word "may" is to be understood as permissive.

9. NOTES

9.1 Marginal Indicia

The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

PREPARED BY THE SAE MOTORCYCLE COMMITTEE