SAE International™ SURFACE VEHICLE STANDARD

SAE J1169

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Superseding J1169 MAY1998

Measurement of Light Vehicle Exhaust Sound Level Under Stationary Conditions

1. ***Scope—***This SAE Standard establishes the test procedure, environment, and instrumentation to be used for measuring the exhaust sound level for passenger cars, multipurpose vehicles, and light trucks under stationary conditions.

Measurements are taken under steady-state conditions. In this respect, this procedure differs from ISO 5130 which includes measurements under the dynamic conditions of an engine deceleration.

This sound level measurement procedure has been developed as a guide for governmental agencies establishing vehicle in-service sound level regulations and enforcement measurement procedures. It is directed at the assessment of vehicle exhaust noise and is not intended to determine maximum vehicle sound levels. (See Appendix A.)

1.1 Rationale—Technology changes have occurred that make the SAE J1169 procedure inadequate. SAE J1169 is a legacy test that specifies 3/4 maximum rated engine speed (MRES) as the test condition. Many modern engines will not allow 3/4 MRES in neutral and/or have fuel cut-off software that prevents the engine from reaching this target. Additionally, the measurement technology of slow exponential time-averaging characteristic is outdated as compared to the fast exponential time averaging characteristic used in SAE J1492. For these and other reasons, SAE J1169 will be superseded by SAE J1492, which provides a continuous measure of exhaust system sound level over a range of engine speeds.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 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 J184—Qualifying a Sound Data Acquisition System

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—Specification for Sound Level Meters
ANSI S1.40-1984—Specification for Acoustical Calibrators

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

ISO 5130-1982-15—Acoustics—Measurement of noise emitted by stationary road vehicles—Survey method

3. Instrumentation

3.1 The instrumentation necessary to conduct this test shall meet the minimum performance requirements specified as follows.

3.2 A sound level meter meeting the Type 1, S1A requirements of ANSI S1.4-1983.

3.2.1 As an alternative to making direct measurements using a sound level meter, a microphone or sound level meter may be used with a magnetic tape recorder and/or a graphic level recorder or indicating instrument, provided the system meets the requirements of SAE J184.

3.2.2 The sound level meter shall be set for the slow exponential time-averaging characteristics and for A-weighting network.

3.3 The calibration of the sound level meter shall be checked and adjusted according to the manufacturer's instructions using a calibrator meeting the requirements of ANSI S1.40-1984 at the start of measurements and rechecked and recorded at the end of them. (See 8.2.)

If the calibration readings of the sound level meter change by more than 0.5 dB during a series of measurements, the test shall be considered invalid.

3.4 A microphone windscreen may be used, provided that it does not affect the microphone response more than ±1 dB for frequencies from 20 to 4000 Hz and ±1.5 dB from 4000 to 10 000 Hz.

3.5 Engine speed shall be measured with an instrument having an accuracy of ±2% or better at the speeds required for the measurements being performed.

4. Test Environment

4.1 A suitable test site shall be out-of-doors and consist of a level concrete, asphalt, or similar hard material flat surface, free from snow, grass, loose soil, ashes, or other sound absorbing material. It shall be an open space free from large reflecting surfaces, such as parked vehicles, buildings, billboards, trees, shrubbery, parallel walls, people, etc., within a 3 m (10 ft) radius from the microphone location and any point on the vehicle.

4.1.1 As an alternative to outside testing a large hemi-anechoic chamber may be used.

4.2 The ambient sound level (including wind effects) from sources other than the vehicle being tested shall be at least 10 dB below that produced by the test vehicle.

5. Microphone Orientation

5.1 The microphone shall be located at a distance of 0.5 m from the reference point on the exhaust gas outlet pipe (refer to Figure 1) and at an angle of 45 degrees (+0, –10 degrees) to the flow axis of the pipe termination (refer to Figure 2). The microphone shall be at the height of the reference point, but not less than 0.2 m from the ground surface. The reference axis of the microphone shall lie in a plane parallel to the ground surface and shall be directed toward the reference point on the exhaust gas outlet. (See also 5.2, 5.3, and 8.5.)

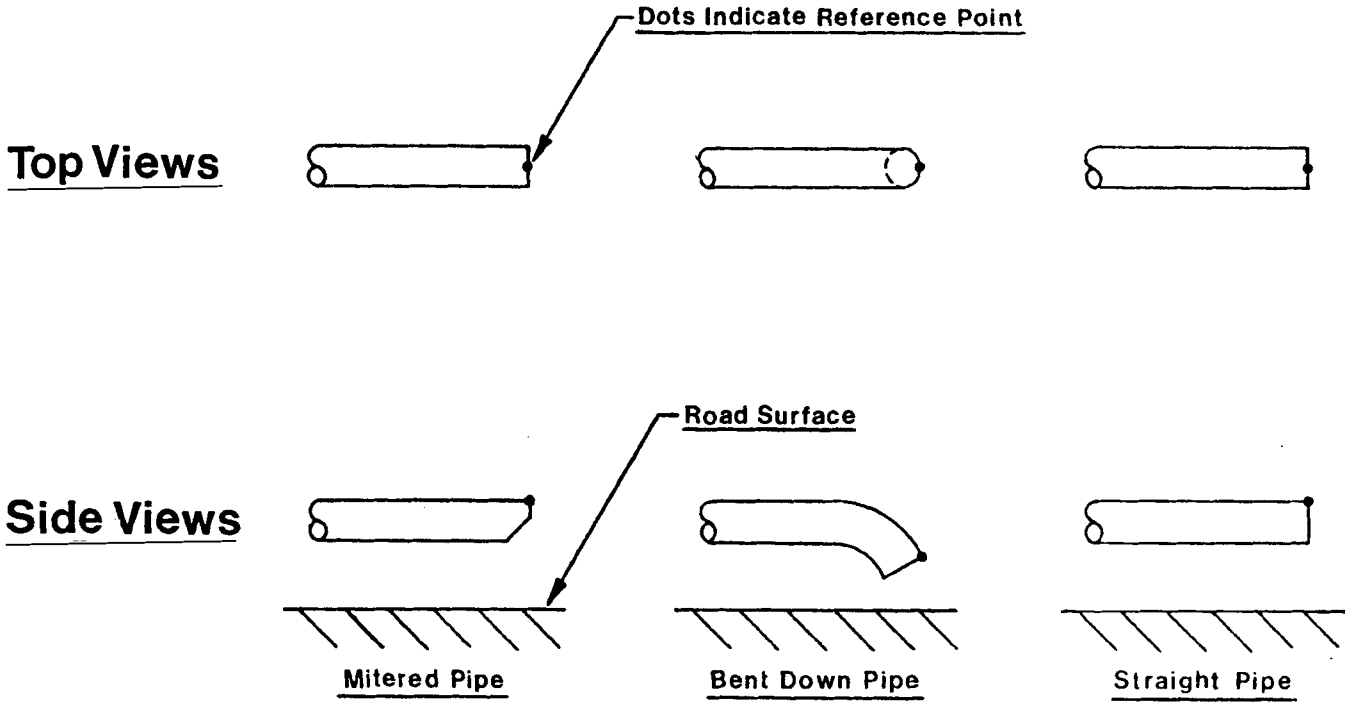

FIGURE 1—OUTLET PIPE DETAILS