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Sound Level for Truck Cab Interior

SAE Recommended Practice
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Submitted for Recognition as
an American National Standard

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HIGHWAY VEHICLE PRACTICE

Submitted for recognition as an American National Standard

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SOUND LEVEL FOR TRUCK CAB INTERIOR

1. INTRODUCTION: This SAE Recommended Practice describes the equipment and procedure for determining the maximum truck cab interior sound level. This practice applies to motor trucks and truck-tractors and does not include construction and industrial machinery. The Appendix contains SAE recommended design criteria for new vehicles.

2. INSTRUMENTATION: The following instrumentation shall be used, where applicable, for the measurement required:

2.1 A sound level meter which meets the Type 1 or S1A requirements of American National Standard, Specification for Sound Level Meters, S1.4-1983.

2.2 A set of octave bandpass filters which meet the Class II requirements of American National Standard Specification for Octave, Half-Octave, and Third-Octave Band Filter Sets, S1.11-1966 (R1976).

2.2.1 As an alternative to making direct measurements with a sound level meter and octave band filter set, a microphone or sound level meter may be used with a magnetic tape recorder and/or a graphic level recorder or indicating instrument, provided that the system used meets the requirements of SAE J184 MAR85, Qualifying a Sound Data Acquisition System.

2.3 A sound level calibrator (see paragraph 4.2.3).

2.4 An engine-speed tachometer.

3. TEST PROCEDURE: The following procedure is to be used for the purpose of this SAE Recommended Practice.

3.1 Establish a seat reference point at the intersection of the tangent lines to the predominant surfaces of the undeflected cushion and backrest at the lateral center of the seat (or intended operator location). Adjust the seat to the midpoint of its horizontal and vertical travel. Locate the microphone, oriented vertically upward, at a point 29 in (740 mm) vertically above the seat reference point and 10 in (250 mm) laterally to the right (to the left for right-hand drive vehicles) of the seat reference point.

Position the driver so that his ear is reasonably aligned with, and approximately 6 in (150 mm) laterally from, the microphone. Seat adjustment may be made to meet this provision.

3.2 Sound level tests may be conducted with or without a trailer or body on the vehicle.

3.3 On vehicles equipped with radiator shutters, the shutter position causing the maximum sound level should be determined and the tests conducted with the shutters in such position.

3.4 Vehicle windows and vents are to be in the fully closed position with all accessories "off."

3.5 The tests are to be conducted on smooth, dry concrete or asphalt road surfaces. No large sound reflecting surfaces should be within 50 ft (15 m) of the test vehicle. Wind speed should not exceed 15 mph (24 km h).

3.6 Select a transmission and/or axle gear ratio so that approximately 50 mph (80 km h) is obtained at rated engine speed.

3.7 Obtain the maximum band pressure level reading in each octave band during acceleration in the selected gear ratio of paragraph 3.6 at wide-open throttle from a beginning engine speed of one-half rated engine speed up to rated engine speed. The meter shall be set for "fast" response for these measurements and a minimum of four test runs shall be made.

3.7.1 If a magnetic tape recording system is used, make recordings during at least four test runs. Obtain a band pressure level measurement for each octave band for each test recording. Set the level indicating device for "fast" response or equivalent for these measurements.

3.8 The applicable reading for each band shall be the highest band pressure level observed. The band pressure levels reported shall be the average of the two highest readings within 2 dB of each other. The observer is cautioned to rerun the test if unrelated peaks should occur due to extraneous ambient noises.

4. GENERAL COMMENTS:

4.1 It is strongly recommended that technically qualified personnel select the equipment and that tests are conducted only by qualified persons trained in the current techniques of sound measurement.

4.2 Proper use of all test instrumentation 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. Specific items to be considered are:

4.2.1 The effects of ambient weater conditions on the performance of all instruments (that is, temperature, humidity, and barometric pressure).

4.2.2 Proper signal levels, terminating impedances, and cable lengths on multi-instrument measurement systems.

4.2.3 Proper acoustical calibration procedure, to include the influence of extension cables, etc. Field calibration shall be made immediately before and after each test sequence. Internal calibration means is acceptable for field use provided the external calibration is accomplished immediately before or after field use.

If a magnetic tape recorder is used, record a calibration signal of known acoustic level immediately prior to, or following, each sequence of test recordings.

4.2.4 For analysis of the recordings, use the calibration signal to establish playback gain and thus calibrate the analysis system.

4.3 Vehicles used for tests must not be operated in a manner such that the break-in procedure specified by the manufacturer is violated.

5. REFERENCES:

5.1 ANSI S1.4-1983, Specification for Sound Level Meters.

5.2 ANSI S1.11-1966 (R1976), Octave, Half-Octave, and Third-Octave Band Filter Sets.

5.3 SAE J184 MAR85, Qualifying a Sound Data Acquisition System.

ANSI documents are available from the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.

APPENDIX
DESIGN CRITERIA

The SAE recommends that the octave band pressure levels listed below be considered during the development of new vehicles.

Octave Band Center Frequency, Hz	Band Pressure Level, dB	Octave Band Center Frequency, Hz	Band Pressure Level, dB
63	101.5	1000	79.5
125	96.0	2000	74.0
250	90.5	4000	70.0
500	85.0	8000	70.0

Trucks meet the design criteria if the sum of reported band pressure levels does not exceed the sum of the criteria band pressure levels, provided that no reported band pressure level exceeds the corresponding criteria band level by more than 3 dB (See paragraph 3.8).