Exterior Sound Level for Heavy Trucks and Buses—SAE J366b

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LAND SEA AIR SPACE

PREPRINT

EXTERIOR SOUND LEVEL FOR HEAVY TRUCKS AND BUSES—SAE J366b

SAE Standard

Report of Vehicle Sound Level Committee approved July 1969 and last revised April 1973. Editorial change August 1977. Approved by the American National Standards Institute November 1976.

1. Introduction—This SAE Standard establishes the test procedure, environment, and instrumentation for determining the maximum exterior sound level for highway motor trucks, truck tractors, and buses. The Appendix contains the recommendations of SAE for maximum sound level.

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, S1.4-1971.

2.1.1 As an alternative to making direct measurements using a sound level meter, a microphone or sound level meter may be used with a magnetic tape recorder and/or a graphic level recorder or indicating instrument, providing the system meets the requirements of SAE J184, Qualifying a Sound Data Acquisition System.

2.2 A sound level calibrator (see paragraph 5.2.3).

2.3 An engine-speed tachometer (see paragraph 5.1.1).

3. Test Site

3.1 A suitable test site shall consist of a level open space free of large reflecting surfaces, such as parked vehicles, signboards, buildings, or hillsides, located within 30 m (100 ft) of either the vehicle path or the microphone. See Fig. 1.

3.2 The microphone shall be located 15 m (50 ft) from the centerline of the vehicle path and 1.2 m (4 ft) above the ground plane. The normal to the vehicle path from the microphone shall establish the microphone point on the vehicle path.

3.3 An acceleration point shall be established on the vehicle path 15 m (50 ft) before the microphone point.

3.4 An end point shall be established on the vehicle path 30 m (100 ft) from the acceleration point and 15 m (50 ft) from the microphone point.

3.5 The end zone is the last 12 m (40 ft) of vehicle path prior to the end point.

3.6 The measurement area shall be the triangular area formed by the acceleration point, the end point, and the microphone location.

3.7 The reference point on the vehicle, to indicate when the vehicle is at any of the points on the vehicle path, shall be the front of the vehicle except as follows:

3.7.1 If the horizontal distance from the front of the vehicle to the exhaust outlet is more than 5080 mm (200 in), tests shall be run using both the front and rear of the vehicle as reference points.

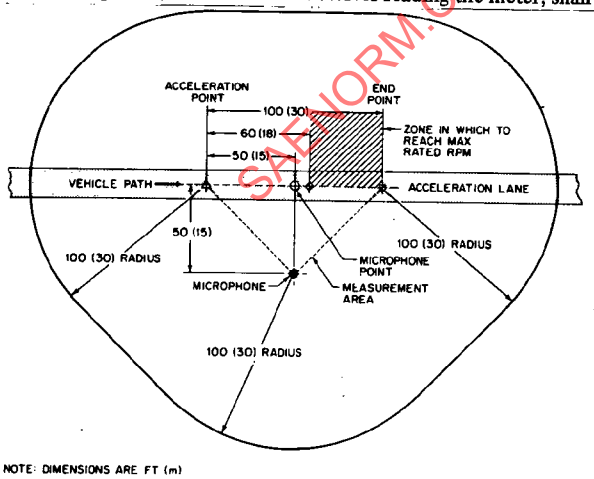
3.7.2 If the engine is located rearward to the center of the chassis, the rear of the vehicle shall be used as the reference point.

3.8 During measurement, the surface of the ground within the measurement area shall be free from powdery snow, long grass, loose soil, and ashes.

3.9 Because bystanders have an appreciable influence on meter response when they are in the vicinity of the vehicle or microphone, not more than one person, other than the observer reading the meter, shall be within 15 m (50 ft) of the vehicle path or instrument, and that person shall be directly behind the observer reading the meter, on a line through the microphone and the observer.

3.10 The ambient sound level (including wind effects) coming from sources other than the vehicle being measured shall be at least 10 dB lower than the level of the tested vehicle.

3.11 The vehicle path shall be relatively smooth, dry concrete or asphalt, free of extraneous material such as gravel.



NOTE: DIMENSIONS ARE FT (m)

FIG. 1—MINIMUM UNIDIRECTIONAL TEST SITE (SEE PARAGRAPH 3.1)

4. Procedure

4.1 Vehicle Operation—Full throttle acceleration and closed throttle deceleration tests are to be used. A beginning engine speed and proper gear ratio must be determined for use during measurements.

4.1.1 Select the highest rear axle and/or transmission gear ("highest gear" is used in the usual sense; it is synonymous to the lowest numerical ratio) and an initial vehicle speed such that at wide-open throttle the vehicle will accelerate from the acceleration point:

(a) Starting at no more than two-thirds (66%) of maximum rated or of governed engine speed.

(b) Reaching maximum rated or governed engine speed within the end zone.

(c) Without exceeding 55 km/h (35 mph) before reaching the end point.

4.1.1.1 Should maximum rated or governed rpm be attained before reaching the end zone, decrease the approach rpm in 100 rpm increments until maximum rated or governed rpm is attained within the end zone.

4.1.1.2 Should maximum rated or governed rpm not be attained until beyond the end zone, select the next lower gear until maximum rated or governed rpm is attained within the end zone.

4.1.1.3 Should the lowest gear still result in reaching maximum rated or governed rpm beyond the permissible end zone, unload the vehicle and/or increase the approach rpm in 100 rpm increments until the maximum rated or governed rpm is reached within the end zone.

4.1.2 For the acceleration test, approach the acceleration point using the engine speed and gear ratio selected in paragraph 4.1.1 and at the acceleration point rapidly establish wide-open throttle. The vehicle reference shall be as indicated in paragraph 3.7. Acceleration shall continue until maximum rated or governed engine speed is reached.

4.1.3 Wheel slip which affects maximum sound level must be avoided.

4.1.4 For the deceleration test, approach the microphone point at maximum rated or governed engine speed in the gear selected for the acceleration test. At the microphone point, close the throttle and allow the vehicle to decelerate to one-half of maximum rated or of governed engine speed. The vehicle reference shall be as indicated in paragraph 3.7. If the vehicle is equipped with an exhaust brake, this deceleration test is to be repeated with the brake full on immediately following closing of the throttle.

4.2 Measurements

4.2.1 The meter shall be set for fast response and the A-weighing network.

4.2.2 The meter shall be observed during the period while the vehicle is accelerating or decelerating. The applicable reading shall be the highest sound level obtained for the run. The observer is cautioned to rerun the test if unrelated peaks should occur due to extraneous ambient noises. Readings shall be taken on both sides of the vehicle.

4.2.3 The sound level for each side of the vehicle shall be the average of the two highest readings which are within 2 dB of each other. Report the sound level for the side of the vehicle with the highest readings.

5. General Comments—Measurements shall be made only when wind speed is below 19 km/h (12 mph).

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

5.2 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:

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

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

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

5.3 Field calibration shall be made immediately before and after each test sequence. Internal calibration means is acceptable for field use, pro-

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