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(23) *Test sample* means the collection of vehicles from the same category, configuration or subgroup thereof which is drawn from the batch sample and which will receive noise emissions tests.

(24) *Failing vehicle* means that the measured emissions of the vehicle, when measured in accordance with the applicable procedure, exceeds the applicable standard.

(25) *Acceptance of a vehicle* means that the measured emissions of the vehicle when measured in accordance with the applicable procedure, conforms to the applicable standard.

(26) *Tampering* means those acts prohibited by section 10(a)(2) of the Act.

(27) *Test sample size* means the number of vehicles of the same category or configuration in a test sample.

(28) *Test vehicle* means a vehicle selected and used to demonstrate compliance with the applicable noise emission standards.

(29) *Vehicle* means any motor vehicle, machine or tractor, which is propelled by mechanical power and capable of transportation of property on a street or highway and which has a gross vehicle weight rating in excess of 10,000 pounds and a partially or fully enclosed operator's compartment.

[41 FR 15544, Apr. 13, 1976, as amended at 42 FR 61456, 61458, Dec. 5, 1977; 47 FR 57714, Dec. 28, 1982]

§ 205.52 Vehicle noise emission standards.

(a) *Low Speed Noise Emission Standard.* Vehicles which are manufactured after the following effective dates shall be designed, built and equipped so that they will not produce sound emissions in excess of the levels indicated.

Effective date	Level
(i) January 1, 1979	83 dBA.
(ii) January 1, 1988	80 dBA.

(b) The standards set forth in paragraph (a) of this section refer to the sound emissions as measured in accordance with the procedures prescribed in § 205.54-1.2.

(c) Every manufacturer of a new motor vehicle subject to the standards prescribed in this paragraph shall, prior to taking any of the actions spec-

ified in section 10(a)(1) of the Act, comply with the other provisions of this subpart or Subpart A, as applicable.

(d) *In-Use Standard.* [Reserved]

(e) *Low Noise Emission Product.* [Reserved]

(Sec. 6, Pub. L. 92-574, 86 Stat. 1237 (42 U.S.C. 4905, 4906))

[41 FR 15544, Apr. 13, 1976, as amended at 42 FR 61456, Dec. 5, 1977; 51 FR 852, Jan. 8, 1986]

§ 205.54 Test procedures.

The procedures described in this and subsequent sections will be the test program to determine the conformity of vehicles with the standards set forth in § 205.52 for the purposes of Selective Enforcement Auditing and Testing by the Administrator.

[47 FR 57714, Dec. 28, 1982]

§ 205.54-1 Low speed sound emission test procedures.

(a) *Instrumentation.* The following instrumentation shall be used, where applicable.

(1) A sound level meter which meets the Type 1 requirements of ANSI S1.4-1971, Specification for Sound Level Meters, or a sound level meter may be used with a magnetic tape recorder and/or a graphic level recorder or indicating meter, providing the system meets the requirements of § 205.54-2.

(2) A sound level calibrator. The calibrator shall produce a sound pressure level, at the microphone diaphragm, that is known to within an accuracy of ±0.5 dB. The calibrator shall be checked annually to verify that its output has not changed.

(3) An engine-speed tachometer which is accurate within ±2 percent of meter reading.

(4) An anemometer or other device for measurement of ambient wind speed accurate within ±10 percent.

(5) A thermometer for measurement of ambient temperature accurate within ±1 C.

(6) A barometer for measurement of ambient pressure accurate within ±1 percent.

(b)(1) The test site shall be such that the truck radiates sound into a free field over a reflecting plane. This condition may be considered fulfilled if the test site consists of an open space free

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of large reflecting surfaces, such as parked vehicles, signboards, buildings or hillsides, located within 100 feet (30.4 meters) of either the vehicle path or the microphone.

(2) The microphone shall be located 50 feet \pm 4 in. (15.2 \pm 0.1 meter) from the centerline of truck travel and 4 feet \pm 4 in. (1.2 \pm 0.1 meters) above the ground plane. The microphone point is defined as the point of intersection of the vehicle path and the normal to the vehicle path drawn from the microphone. The microphone shall be oriented in a fixed position to minimize the deviation from the flattest system response over the frequency range 100 Hz to 10 kHz for a vehicle traversing from the acceleration point through the end zone.

The microphone shall be oriented with respect to the source so that the sound strikes the diaphragm at the angle for which the microphone was calibrated to have the flattest frequency response characteristic over the frequency range 100 Hz to 10 kHz.

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

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

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

(6) The measurement area shall be the triangular paved (concrete or sealed asphalt) area formed by the acceleration point, the end point, and the microphone location.

(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:

(i) If the horizontal distance from the front of the vehicle to the exhaust out-

let is more than 200 inches (5.1 meters), tests shall be run using both the front and rear of the vehicle as reference points.

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

(8) The plane containing the vehicle path and the microphone location (plane ABCDE in Figure 1) shall be flat within \pm 2 inches (.05 meters).

(9) Measurements shall not be made when the road surface is wet, covered with snow, or during precipitation.

(10) Bystanders have an appreciable influence on sound level readings when they are in the vicinity of the vehicle or microphone; therefore not more than one person, other than the observer reading the meter, shall be within 50 feet (15.2 meters) of the vehicle path or instrument and the person shall be directly behind the observer reading the meter, on a line through the microphone and observer. To minimize the effect of the observer and the container of the sound level meter electronics on the measurements, cable should be used between the microphone and the sound level meter. No observer shall be located within 1 m in any direction of the microphone location.

(11) The maximum A-weighted fast response sound level observed at the test site immediately before and after the test shall be at least 10 dB below the regulated level.

(12) The road surface within the test site upon which the vehicle travels, and, at a minimum, the measurements area (BCD in figure 205.1) shall be smooth concrete or smooth sealed asphalt, free of extraneous material such as gravel.

governed rpm is reached within the end zone.

(ii) For the acceleration test, approach the acceleration point using the engine speed and gear ratio selected in paragraph (c)(1) of this section and at the acceleration point rapidly establish wide-open throttle. The vehicle reference shall be as indicated in paragraph (b)(7) of this section. Acceleration shall continue until maximum rated or governed engine speed is reached.

(iii) Wheel slip which affects maximum sound level must be avoided.

(2) *Vehicle operation for vehicles with automatic transmissions.* Full throttle acceleration and closed throttle deceleration tests are to be used. Closed throttle deceleration tests are required only for those vehicles equipped with an engine brake.

(i) Select the highest gear axle and/or transmission gear (highest gear is used in the usual sense; it is synonymous to the lowest numerical ratio) in which no up or down shifting will occur under any operational conditions of the vehicle during the test run. Also, select an initial vehicle speed such that at wide-open throttle the vehicle will accelerate from the acceleration point.

(a) Starting at two-thirds (66 percent) of maximum rated or of governed engine speed.

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

(c) Without exceeding 35 mph (56 k/h) before reaching the end point.

(d) 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.

(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.

(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, notwithstanding that approach engine speed may now exceed two-

thirds of maximum rated or of full load governed engine speed.

(4) Should the maximum rated or governed rpm still be attained before entering the end zone, and the engine rpm during approach cannot be further lowered, begin acceleration at a point 10 feet closer to the beginning of the end zone. The approach rpm to be used is to be that rpm used prior to the moving of the acceleration point 10 feet closer to the beginning of the end zone.

(5) Should the maximum rated or governed rpm still be attained before entering the end zone, repeat the instructions in paragraph (c)(2)(i)(c)(4) of this section until maximum rated or governed rpm is attained within the end zone.

(ii) For the acceleration test, approach the acceleration point using the engine speed and gear ratio selected in paragraph (c)(2)(i) of this section and at the acceleration point rapidly establish wide-open throttle. The vehicle reference shall be as indicated in paragraph (b)(7) of this section. Acceleration shall continue until maximum rated or governed engine speed is reached.

(iii) Wheel slip which affects maximum sound level must be avoided.

(3) *Measurements.* (i) The meter shall be set for "fast response" and the A-weighted network.

(ii) 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.

(iii) The sound level associated with a side shall be the average of the first two pass-by measurements for that side, if they are within 2 dB(A) of each other. Average of measurements on each side shall be computed separately. If the first two measurements for a given side differ by more than 2 dB(A), two additional measurements shall be made on each side, and the average of the two highest measurements on each side, within 2 dB(A) of each other, shall be taken as the measured vehicle sound level for that side. The reported vehicle

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sound level shall be the higher of the two averages.

(d) *General requirements.* (1) Measurements shall be made only when wind velocity is below 12 mph (19 km/hr).

(2) Proper usage of all test instrumentation is essential to obtain valid measurements. Operating manuals or other literature furnished by the instrument manufacturer shall be referred to for both recommended operation of the instrument and precautions to be observed. Specific items to be adequately considered are:

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

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

(iii) 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 that external calibration is accomplished immediately before or after field use.

(3)(i) A complete calibration of the instrumentation and external acoustical calibrator over the entire frequency range of interest shall be performed at least annually and as frequently as necessary during the yearly period to insure compliance with the standards cited in American National Standard S1.4-1971 "Specifications for Sound Level Meters" for a Type 1 instrument over the frequency range 50 Hz-10,000 Hz.

(ii) If calibration devices are utilized which are not independent of ambient pressure (e.g., a piston-phone) corrections must be made for barometric or altimetric changes according to the recommendation of the instrument manufacturer.

(4) The truck shall be brought to a temperature within its normal operating temperature range prior to commencement of testing. During testing appropriate caution shall be taken to

maintain the engine temperatures within such normal operating range.

[41 FR 15544, Apr. 13, 1976, as amended at 42 FR 11836, Mar. 1, 1977; 42 FR 61456, Dec. 5, 1977]

§ 205.54-2 Sound data acquisition system.

(a) Systems employing tape recorders and graphic level recorders may be established as equivalent to a Type I—ANSI S1.4-1971 sound level meter for use in determining compliance with this regulation by meeting the requirements of this section (§205.54-2(b)). This sound data acquisition system qualification procedure is based primarily on ANSI S6.1-1973.

(1) *Performance requirements—(i) System frequency response.* It is required that the overall steady-state frequency response of the data acquisition system shall be within the tolerances prescribed in Table 205.1 when measured in accordance with section (2). The tolerances in Table 205.1 are applicable to either flat or A-weighted response. (See paragraph (a)(3)(iii) of this section.)

(ii) *Detector response.* To ensure that a (true) rms indication is provided, the difference between the level indicated for a 1000 Hz sinusoidal signal equivalent to a sound level of 86 dB (rms) and the level indicated for an octave band of random noise of equal energy as the sinusoidal signal centered at 1000 Hz shall be no greater than 0.5 dB. A true rms voltmeter shall be used to determine equivalence of two input signals.

(iii) *Indicating meter.* If an indicating meter is used to obtain sound levels or band pressure levels, it must meet the requirements of paragraphs (a)(1)(ii) and (vi)(B) of this section and the following.

TABLE 205.1—SYSTEM RESPONSE DATA

Freq. (hertz)	A-weighted response (Re-1000 Hz, dB)	Tolerance (decibels)	
		Plus—	Minus—
31.5	-39.4	1.5	1.5
40.0	-34.6	1.5	1.5
50.0	-30.2	1.0	1.0
63.0	-26.2	1.0	1.0
80.0	-22.5	1.0	1.0
100.0	-19.1	1.0	1.0
125.0	-16.1	1.0	1.0
160.0	-13.4	1.0	1.0
200.0	-10.9	1.0	1.0
250.0	-8.6	1.0	1.0