



EXTERIOR LOUDNESS EVALUATION OF HEAVY TRUCKS AND BUSES — SAE J672a

SAE Standard

Report of Truck and Bus Technical Committee approved January 1957 and last revised by Vehicle Sound Level Committee March 1968. Editorial change September 1970.

1. Introduction—This SAE Standard establishes the design criteria for loudness of highway trucks, buses, and truck-tractors exceeding 6000 lb gvwt; it describes the equipment, test environment, and procedure for determining the loudness. In this method, the sound level is recorded on a tape recorder at a test site as the truck passes by under load. The sound thus recorded is played back through a set of octave bandpass filters. The maximum band pressure level readings are converted to sones by established relationships. The sones are then totaled to obtain a single loudness reading for the vehicle.

2. Loudness Limit—The maximum loudness produced by a new truck, bus, or truck-tractor shall not exceed 125 sones at 50 ft, when measured in accordance with the procedure described herein.

3. Instrumentation—The following instrumentation shall be used:

3.1 A microphone/magnetic tape recorder/readout system shall be used which meets the requirements of SAE J184.

3.2 A set of octave bandpass filters meeting the Class II requirements of ANSI S1.11—1966, Octave, Half-Octave and Third-Octave Band Filter Sets.

3.3 A sound level calibrator (see paragraph 5.2).

3.4 A calibrated engine speed tachometer.

3.5 An anemometer.

4. Procedure

4.1 A suitable test site is a flat open space free of large reflecting surfaces such as parked vehicles, signboards, buildings, or hillsides located within 100 ft of either the vehicle or the microphone.

4.1.1 The surface of the ground within the measurement area shall be free from powdery snow, long grass, loose soil, or ashes.

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

4.1.3 It is required that the ambient band pressure levels in each band (including wind effects) coming from sources other than the vehicle being measured be at least 10 dB lower than corresponding band pressure levels of the tested vehicle. If a direct method is not used for determining whether this condition is being met, it is best to operate at a place and time where other noises are obviously and definitely not adding significantly to the vehicle sound level.

4.1.4 The path of vehicle travel shall be relatively smooth dry concrete or asphalt, free of extraneous materials such as gravel.

4.2 Test Procedure

4.2.1 Determine steady engine speed which produces maximum sound. An engine tachometer is a valuable aid. Maximum sound usually occurs at maximum engine load, but not necessarily at maximum engine speed, especially if muffler or pipe resonances occur. Full load may be imposed by braking, by using a towing dynamometer, or by operating on a grade. Lower axle or transmission ratios may be used to keep road speeds under 35 mph.

4.2.2 The microphone shall be located 50 ft from the centerline of the vehicle path and 4 ft above the ground plane. As the vehicle passes

by under the maximum sound conditions previously determined, the sound shall be recorded on the tape recorder using an unweighted amplifier setting, embracing sufficient truck travel so that the maximum sound is recorded. (This does not always occur when the truck is centered on the microphone.) Record at least two such passes for each side of the vehicle.

4.2.3 Record a calibration tone of known acoustic level on the tape immediately before or after the series of recordings.

4.3 Laboratory Procedure

4.3.1 Use the field calibration signal recorded on the tape to set playback gain and thus calibrate the playback system. Make band pressure level readings in each octave band for each test recording. The applicable reading for each band shall be the highest band level obtained, ignoring unrelated peaks due to extraneous ambient noises. Convert the octave band levels to sones using Table 1, and then add these values to give a single total loudness reading for each test run.

4.3.2 The loudness for each side of the vehicle shall be the average of the two largest total loudness values. The loudness reported shall be that of the louder side of the vehicle.

5. General Comments

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

5.2 Proper usage 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 type of microphone, its directional response characteristics, and its orientation relative to the ground plane and source of noise.

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

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

5.2.4 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.

5.3 Measurements shall be made only when the wind velocity is below 12 mph.

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

6. References—Suggested reference material is as follows:

ANSI S1.1—1960, Acoustical Terminology.

ANSI S1.2—1962, Physical Measurement of Sound.

ANSI S1.11—1966, Octave, Half-Octave, and Third-Octave Band Filter Sets.

Applications for copies of these documents should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, New York 10018.

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TABLE 1

BPL, dB	Octave Band Center Frequency, Hz								BPL, dB	BPL, dB	Octave Band Center Frequency, Hz								BPL, dB
	63	125	250	500	1000	2000	4000	8000			63	125	250	500	1000	2000	4000	8000	
40	0	0.1	0.5	0.9	1.0	1.2	1.2	0.2	40	81	6.9	10.9	15.8	20.1	23.5	29.1	31.6	6.9	81
41	0	0.1	0.5	1.0	1.1	1.3	1.3	0.2	41	82	7.8	12.0	17.0	21.4	25.4	32.2	35.2	7.6	82
42	0	0.1	0.6	1.0	1.2	1.4	1.4	0.3	42	83	8.7	13.1	18.3	22.9	27.4	35.5	39.2	8.4	83
43	0	0.2	0.6	1.1	1.3	1.5	1.5	0.3	43	84	9.8	14.3	19.7	24.4	29.5	39.2	43.6	9.3	84
44	0	0.2	0.7	1.2	1.4	1.6	1.6	0.3	44	85	10.9	15.6	21.2	26.1	31.9	43.3	48.6	10.4	85
45	0	0.2	0.8	1.3	1.5	1.7	1.8	0.3	45	86	12.1	17.0	22.8	27.9	34.4	47.8	54.1	11.5	86
46	0	0.2	0.8	1.4	1.6	1.9	1.9	0.4	46	87	13.4	18.5	24.6	29.8	37.1	52.8	60.2	12.7	87
47	0	0.3	0.9	1.5	1.7	2.0	2.1	0.4	47	88	14.8	20.1	26.4	31.8	40.1	58.3	67.0	14.1	88
48	0	0.3	1.0	1.6	1.9	2.2	2.2	0.4	48	89	16.3	21.8	28.3	34.0	43.3	64.4	74.6	15.6	89
49	0	0.3	1.1	1.8	2.0	2.4	2.4	0.5	49	90	18.0	23.7	30.4	36.3	46.7	71.1	83.0	17.3	90
50	0	0.4	1.2	1.9	2.2	2.6	2.6	0.5	50	91	19.7	25.7	32.6	38.7	50.4	78.5	92.4	19.1	91
51	0	0.4	1.3	2.1	2.4	2.8	2.8	0.6	51	92	21.6	27.8	34.9	41.4	54.4	86.7	102.9	21.2	92
52	0.1	0.5	1.4	2.2	2.6	3.0	3.1	0.6	52	93	23.6	30.1	37.4	44.2	58.7	95.7	114.5	23.4	93
53	0.1	0.6	1.6	2.4	2.8	3.3	3.3	0.7	53	94	25.7	32.5	40.1	47.2	63.4	105.7	127.5	26.0	94
54	0.1	0.6	1.7	2.6	3.0	3.5	3.6	0.7	54	95	28.0	35.1	42.9	50.4	68.4	116.7	141.9	28.8	95
55	0.1	0.7	1.9	2.8	3.2	3.8	3.9	0.8	55	96	30.3	37.9	45.9	53.8	73.9	128.8	157.9	31.9	96
56	0.1	0.8	2.1	3.0	3.5	4.1	4.2	0.8	56	97	32.9	40.8	49.1	57.5	79.7	142.3	175.8	35.3	97
57	0.2	0.9	2.3	3.3	3.8	4.4	4.6	0.9	57	98	35.5	43.9	52.4	61.4	86.1	157.1	195.7	39.1	98
58	0.2	1.0	2.5	3.5	4.1	4.8	4.9	1.0	58	99	38.3	47.2	56.0	65.6	92.9	173.5	217.8	43.3	99
59	0.2	1.1	2.7	3.8	4.4	5.2	5.4	1.1	59	100	41.3	50.7	59.8	70.0	100.3	191.5	242.5	47.9	100
60	0.3	1.3	2.9	4.1	4.7	5.6	5.8	1.2	60	101	44.4	54.3	63.8	74.8	108.2	211.5	269.9	53.1	101
61	0.3	1.4	3.2	4.5	5.1	6.1	6.3	1.3	61	102	47.6	58.2	68.0	79.9	116.8	233.5	300.5	58.8	102
62	0.4	1.6	3.5	4.8	5.5	6.6	6.8	1.4	62	103	51.0	62.3	72.5	85.3	126.1	257.8	334.5	65.1	103
63	0.5	1.8	3.8	5.2	5.9	7.1	7.4	1.5	63	104	54.5	66.6	77.3	91.1	136.1	284.7	372.3	72.2	104
64	0.6	2.0	4.1	5.6	6.4	7.7	8.0	1.6	64	105	58.2	71.1	82.3	97.3	146.9	314.4	414.5	79.9	105
65	0.7	2.2	4.5	6.1	6.9	8.3	8.6	1.8	65	106	62.0	75.9	87.6	103.9	158.6	347.1	461.4	88.5	106
66	0.8	2.5	4.8	6.6	7.5	9.0	9.4	1.9	66	107	66.0	80.9	93.1	111.0	171.2	383.3	513.6	98.0	107
67	1.0	2.8	5.3	7.1	8.1	9.7	10.1	2.1	67	108	70.1	86.1	99.0	118.6	184.8	423.2	571.7	108.6	108
68	1.2	3.1	5.7	7.7	8.7	10.5	11.0	2.3	68	109	74.4	91.6	105.2	126.6	199.4	467.3	636.4	120.3	109
69	1.4	3.4	6.2	8.3	9.4	11.3	11.9	2.5	69	110	78.9	97.3	111.7	135.2	215.3	516.0	708.4	133.2	110
70	1.6	3.8	6.7	8.9	10.1	12.2	12.9	2.7	70	111	83.5	103.3	118.6	144.4	232.4	569.8	788.6	147.6	111
71	1.8	4.2	7.3	9.6	10.9	13.2	13.9	2.9	71	112	88.3	109.5	125.8	154.3	250.8	629.1	877.8	163.4	112
72	2.1	4.6	7.9	10.4	11.8	14.3	15.1	3.2	72	113	93.2	115.9	133.4	164.7	270.7	694.7	977.1	181.0	113
73	2.5	5.1	8.5	11.3	12.7	15.5	16.3	3.4	73	114	98.3	122.6	141.4	176.0	292.2	767.0	1087.7	200.5	114
74	2.8	5.6	9.2	12.2	13.8	16.7	17.7	3.7	74	115	103.5	129.6	149.8	187.9	315.4	847.0	1210.8	222.1	115
75	3.3	6.2	10.0	13.1	14.9	18.1	19.2	4.1	75	116	109.0	136.8	158.6	200.7	340.4	935.2	1347.8	246.0	116
76	3.7	6.8	10.8	14.2	16.0	19.6	20.7	4.4	76	117	114.6	144.2	167.8	214.3	367.5	1032.6	1500.3	272.4	117
77	4.2	7.5	11.7	15.3	17.3	21.1	22.5	4.8	77	118	120.3	151.9	177.5	228.9	396.6	1140.2	1670.0	301.8	118
78	4.8	8.3	12.6	16.6	18.7	22.9	24.3	5.2	78	119	126.3	159.8	187.6	244.5	428.1	1259.0	1859.0	334.2	119
79	5.5	9.1	13.6	17.9	20.2	24.7	26.3	5.7	79	120	132.4	168.0	198.2	261.1	462.1	1390.2	2069.4	370.2	120
80	6.2	10.0	14.7	18.8	21.8	26.7	28.4	6.2	80										

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