Performance of Vehicle Traffic Horns—SAE J377

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LAND SEA AIR SPACE

PREPRINT

PERFORMANCE OF VEHICLE TRAFFIC HORNS—SAE J377

SAE Standard

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1. Introduction—This SAE Standard establishes the minimum operational life cycles, corrosion resistance, and sound level output for traffic horns (electric) on new automotive highway vehicles. Test equipment, environment, and procedures are specified.

2. Performance Requirements—When measured in accordance with the procedures described herein, new vehicle horns shall equal or exceed the following requirements, using new horns for each of the tests.

2.1 Complete 50 000 cycles of the laboratory operation test without loss of more than 6 dB(A) output.

2.2 Complete 72 h of salt spray exposure, after which the horn must be operational with a loss of output no more than 6 dB(A).

2.3 Produce a sound level, when mounted in the specified position(s) on a vehicle, of 82–102 dB(A) at a distance of 50 ft directly in front of the vehicle.

3. Instrumentation

The following instrumentation shall be used for the measurement required:

3.1 A precision sound level meter which meets the requirements of International Electrotechnical Commission Publication 179.

3.2 A sound level calibrator.

3.3 A calibrated windscreen.

3.4 A d-c voltmeter.

4. Procedure

4.1 Laboratory Tests—Sound level output of the horn shall be measured according to the requirements of paragraphs 4.1.1 and 4.1.2 before and after life cycle and corrosion tests.

4.1.1 Test Conditions—Measure the sound level output in an anechoic chamber or a free field at a distance of 2.5 or 3 ft from the horn on the acoustical axis (highest output) of the horn. The horn and microphone are to be mounted at the same height within 6 in of 4 ft from the ground. The horn shall be mounted by the bracket to a rigid surface during measurement. Ambient temperature during test shall be 72–80 F.

4.1.2 Power Supply—The power source shall consist of an automotive battery of the correct rated voltage for the horn tested, with an electrical power supply connected in parallel to maintain the state of charge of the battery. The electrical power supply shall have sufficient capacity to maintain full battery charge during test and shall deliver filtered direct current with a voltage regulation of 0.1% or less. The power supply voltage and the circuit resistance from the power supply to the horn terminal shall be as specified by the horn manufacturer.

4.1.3 Life Cycle Test

(a) Operate the horn for 50 000 cycles, each cycle consisting of 0.75 s on and 3.25 s off. The horn may be adjusted to nominal settings before conducting the test, but not thereafter.

(b) After completing the life cycle test, the sound level output shall be measured under the same conditions as before the test. The horn must satisfy the condition of paragraph 2.1.

4.1.4 Corrosion Resistance Test

(a) Subject the horn to a salt spray test in accordance with ASTM B 117 for 72 h.

(b) After completing the salt spray test, the sound level output shall be measured under the same conditions as before the test. The horn must satisfy the conditions of paragraph 2.2.

4.2 Sound Output Test—Sound output is measured with the horn or horns, mounted on the vehicle in the specified position. The vehicle must be operated for at least 15 min to stabilize conditions before test. The engine on the vehicle shall be running at a speed at which the voltage regulator produces the vehicle manufacturer's specified voltage. Ambient temperature must be between 55 and 85 F. Sound level output must satisfy paragraph 2.3, with all horns with which the vehicle is equipped operating.

4.2.1 Test Site—A suitable test site shall consist of a flat open space free of large reflecting surfaces such as signboards, buildings, or hillsides located within 100 ft of either the vehicle or the microphone. During measurement, the surface of the ground shall be free from material such as powdery snow, long grass, loose soil, or ashes. The microphone location shall be 50 ft directly in front of the vehicle center. The area between the microphone and the vehicle shall be concrete or asphalt, in the form of a lane at least 12 ft wide.

4.2.2 Measurements

(a) The microphone shall be located at a height of 4 ft above the ground plane.

(b) The meter shall be set for fast response and for the A-weighting network.

(c) Because bystanders may have an appreciable influence on meter response, no person other than the observer reading the meter, shall be near the vehicle or microphone.

(d) The ambient sound level (including wind effects) coming from sources other than the vehicle being measured shall be at least 10 dbA lower than the level of the horn being tested. Measurements shall be made only when wind speed does not exceed 12 mph.

(e) The meter shall be observed with the horn(s) sounding. Duration of sound signal shall not exceed 3 s. The applicable reading shall be the highest sound level obtained, ignoring unrelated peaks due to extraneous ambient noises. At least two measurements shall be made. All of the values should be recorded.

(f) The sound level shall be the average of two readings which are within 2 dB of each other.

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 The range of acceptable sound level (82–102 dB(A)) is specified to accommodate horn variation, vehicle and mounting differences, number of horns used, and other variables, and thus is not a tolerance for any one installation. 82 dB(A) is considered the minimum sound level for an acceptable signal, while the 102 dB(A) maximum serves to limit disturbance.

5.3 Instrument manufacturer's specifications for orientation of the microphone, relative to the source of sound and the location of the observer relative to the meter, should be adhered to.

5.4 When a windscreen is required, a previously calibrated windscreen should be used.

5.5 The instrument manufacturer's recommended calibration check of the instruments should be made at appropriate times. Field calibration should be made immediately before or after each test. Either an external calibrator or internal calibration means is acceptable for field use, provided that external calibration is accomplished before and after field use.

5.6 Horn location and position should be chosen to minimize impairment of horn performance by foreign material.

5.7 It is recognized that extraordinary conditions of vehicle operation or environment may produce abnormal measurements, in which case such conditions should be corrected before repeating the test.

6. Reference Material

International Electrotechnical Commission Publication 179.

ASTM B117, Testing for Salt Spray (Fog).

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

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