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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J1174

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Submitted for recognition as an American National Standard

OPERATOR EAR SOUND LEVEL MEASUREMENT PROCEDURE FOR SMALL ENGINE POWERED EQUIPMENT

Foreword—This Reaffirmed Document has been changed only to reflect the new SAE Technical Standards Board Format.

1. Scope—This SAE Recommended Practice establishes the instrumentation and procedure to be used in measuring the operator ear sound level for engine powered equipment under 15 kW (20 bhp). The sound levels obtained by using this procedure are representative of the sound levels generated by the equipment under typical operating conditions. It is intended to include equipment such as lawn mowers, snow blowers, and tillers. It is not intended to include equipment designed primarily for operation on highways or within factories or buildings, or vehicles such as motorcycles, snowmobiles, and pleasure motorboats that are covered by other SAE Standards or Recommended Practices.

This procedure does not cover chain saws.

This SAE Recommended Practice may also be used when measuring the operator ear sound level of similar equipment powered by electricity or other power sources.

2. References

2.1 Applicable Publications—The following publications form a part of the specification to the extent specified herein. Unless otherwise indicated the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J833a—Human Physical Dimensions

2.1.2 ANSI PUBLICATION—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002

ANSI S1.4-1971—Specification for Sound Level Meters

2.1.3 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-295

ASTM C423-66—Method of Test for Sound Absorption of Acoustical Materials in Reverberation Rooms

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2.2 Related Publications

2.2.1 ANSI PUBLICATION—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002

ANSI S1.1-1960—Acoustical Terminology
ANSI S1.13-1971—Methods of Measurement of Sound Pressure

3. Instrumentation—The following instrumentation shall be used for the measurement required.

3.1 A precision sound level meter which meets the Type 1 requirements of American National Standard Specification for Sound Level Meters, S1.4-1971.

3.2 A sound level calibrator (see 5.3.3).

3.3 The microphone shall be used with a foam windscreen. The windscreen shall not affect the overall reading by more than ±0.5 dB(A) for the sound source that is being measured (see 5.4).

3.4 An anemometer or other device for measurement of ambient wind speed.

3.5 An engine speed indicator (accuracy ±1% of full range).

3.6 A thermometer for measurement of ambient temperature.

4. Procedure

4.1 Test Site—The test area shall consist of a flat open space free from the effects of signboards, buildings, or hillsides for at least 15 m (50 ft) from the measurement zone.

4.1.1 The minimum dimensions of the measurement zone are 1.0 m (3.3 ft) wider than the equipment being tested and 10 m (33 ft) long for moving tests. (See Figure 1.)

4.1.2 The entire surface of the measurement zone shall be a synthetic surface mounted to 19 mm (¾ in) exterior plywood or 13 mm (½ in) marine plywood with a suitable adhesive.

The acoustical properties tested per ASTM C423-66 after mounting shall be as shown in Table 1.

TABLE 1—ACOUSTICAL PROPERTIES

Hz	Sound Absorption Coefficient
125	0.00-0.06
250	0.07-0.12
500	0.15-0.28
1000	0.28-0.34
2000	0.38-0.47
4000	0.40-0.62

4.1.3 The observer reading the sound level meter shall be at least 2 m (6.6 ft) from the equipment being tested and not affect the measured sound level. One other person may be directly behind the observer reading the meter. All others, except the operator of the equipment being tested, shall be at least 7 m (23 ft) from the equipment.

4.1.4 The A-weighted sound level, (including wind effects) due to sources other than the equipment being measured, shall be at least 10 dB lower than the level of the equipment being measured.

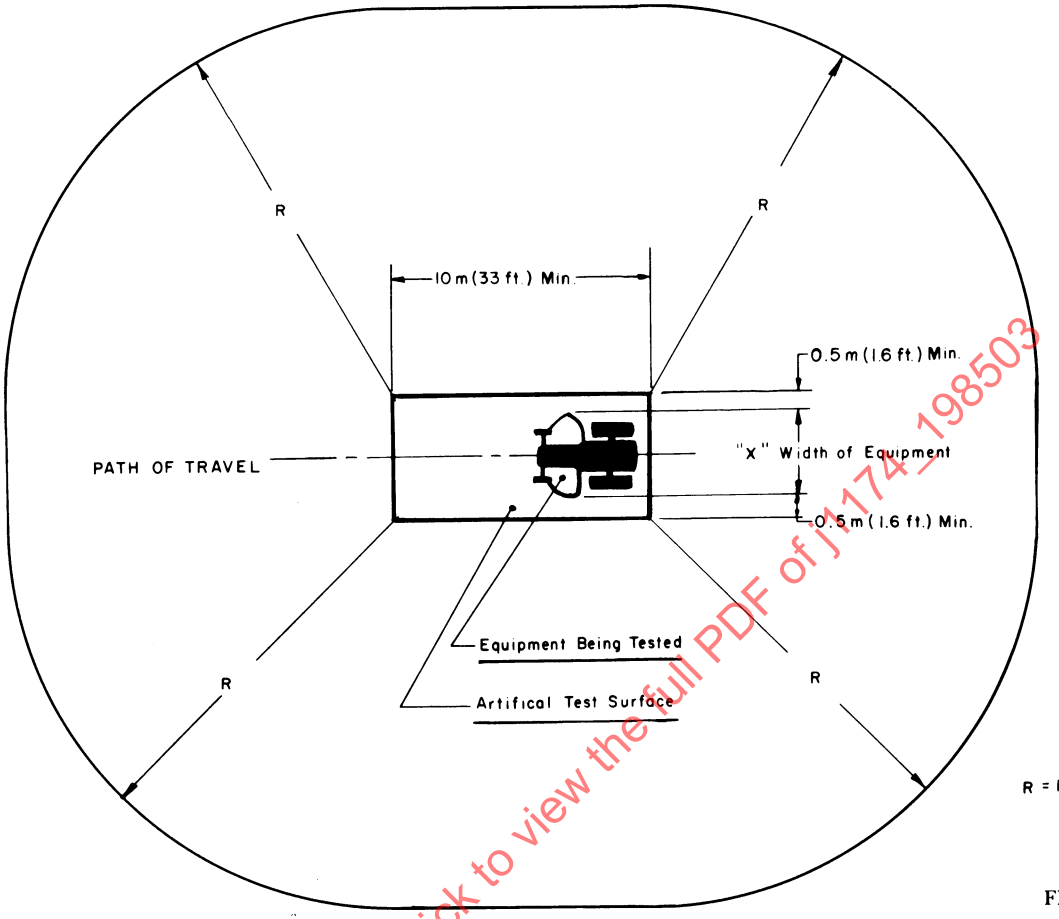

FIG. 1—TEST SITE

FIGURE 1—TEST SITE

4.2 Equipment Operation

4.2.1 All equipment shall be tested in either a traveling or stationary mode as specified in 4.2.2 to 4.2.6. Tests in the traveling mode shall be performed as the equipment moves along the centerline of the measurement zone at the closest operating speed to 5 km/h (3 mph). Tests in the stationary mode shall be made at the center of the measurement zone. Then engine(s) or motor(s) shall be set at the equipment manufacturer's maximum specified rpm. Then all mechanisms necessary for the equipment to perform its intended function shall be engaged.

4.2.2 MOWING EQUIPMENT—Test in a traveling mode. The cutting height of the blade shall be set at the closest available position to 50 mm (2 in).

4.2.3 WALK-BEHIND TILLERS—Test in a stationary mode those units that are intended to be propelled by the tines. Units propelled by other means shall be tested in the traveling mode.

4.2.4 WALK-BEHIND SNOW BLOWERS—Test in a traveling mode.

4.2.5 GARDEN TRACTORS WITH ATTACHMENTS OTHER THAN MOWERS—Test in the traveling mode except those units with attachments that are intended for stationary use. These shall be tested in the stationary mode as stationary equipment.

4.2.6 MISCELLANEOUS EQUIPMENT—Test either in a traveling or stationary mode according to its intended use.

4.3 Measurements

4.3.1 The sound level meter shall be set for *slow* response and the A-weighted network.

4.3.2 The ambient wind speed relative to the source and microphone, ambient temperature, equipment manufacturer's maximum specified engine rpm, engine rpm at test condition, and ambient A-weighted sound level shall be measured and recorded.

4.3.3 WALK-BEHIND EQUIPMENT (FOR BOTH TRAVELING AND STATIONARY MODES)—With an operator present, the microphone shall be supported independent of the equipment being tested. The microphone shall be located 1.7 m (66 in) above the test surface, 250 mm (10 in) to the right and left of the centerline of the operator's position, and 200 mm (8 in) to the rear of the rear-most point of the handle, with the handle in the forward-most position.

4.3.4 RIDE-ON EQUIPMENT—With an operator present, the microphone shall be supported independent of the equipment being tested. The microphone shall be located 760 mm (30 in) above the loaded seat, 250 mm (10 in) to the right and left of the centerline of the operator's position, and 100 mm (4 in) forward of the seat back, with the seat adjusted to its center position.

4.3.5 HAND-HELD EQUIPMENT—A standing operator shall hold the equipment under test and orient it in a normal operating position. The microphone shall be located 250 mm (10 in) to the right and left of the centerline of the operator, 1.7 mm (66 in) above the test surface, and 300 mm (12 in) to the rear of the rear-most point of the rear handle. Record equipment orientation.

4.3.6 STATIONARY EQUIPMENT—Stationary equipment normally requiring an operator shall be tested with an operator at the normal operator station. If the operator is standing, the microphone shall be located 1.7 mm (66 in) above the test surface and 460 mm (18 in) from the outer-most vertical surfaces of the equipment being tested, and 250 mm (10 in) to the right and left of the centerline of the operator. If the operator is seated, located the microphone as in 4.3.4. Record the exact microphone position relative to the equipment.

4.3.7 The sound level meter shall be observed for a minimum of 5 s or until a stabilized reading is obtained. Record the maximum sound level to the nearest 0.5 dB(A) and document the microphone position. The reported sound level shall be the highest repeatable sound level observed during the test.

5. General Requirements

5.1 It is recommended that the equipment operator size be within the SAE J833a dimensions for 5-95 percentile man.

5.2 It is strongly recommended that persons technically trained and experienced in the current techniques of sound measurement select the equipment and conduct the tests.

5.3 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:

5.3.1 The type of microphone, its directional response characteristics, and its orientation relative to the noise source.