

Submitted for recognition as an American National Standard

STATIONARY SOUND LEVEL MEASUREMENT PROCEDURE FOR PLEASURE MOTORBOATS

1. Scope—This SAE Recommended Practice establishes the procedure for determining if pleasure motorboats have effective exhaust muffling means when operating in the stationary mode. It is intended as a guide toward standard practice and is subject to change to keep pace with experience and technical advances.

1.1 Purpose—This document specifies guidelines for stationary sound level measurements for boats with above-water exhaust systems.

2. References

2.1 Applicable Publication—The following publications form a part of this specification to the extent specified herein.

2.1.1 ANSI PUBLICATION—Available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036-8002.

ANSI S1.4-1983 and S1.4A-1985—Specifications for Sound Level Meters

2.2 Related Publications—The following publications are provided for information purposes only and are not a required part of this document.

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

SAE J34—Exterior Sound Level Measurement Procedure for Pleasure Motorboats

2.2.2 ANSI PUBLICATIONS—Available from the American National Standards Institute, Inc., 11 West 42nd Street, New York, NY 10036-8002.

ANSI S1.1-1960(1976)—Acoustical Terminology

ANSI S1.13-1971(R1986)—Methods for the Measurement of Sound Pressure Levels

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

- 3.1 A sound level meter which meets ANSI Standard S1.4-1983 Type 1 or Type 2 Specification for Sound Level Meters.
- 3.2 A microphone windscreen that does not affect the overall reading by more than ± 0.5 dB(A).
- 3.3 A sound level calibrator. (See 5.3.)

4. Procedure

4.1 Measurement Site—A suitable site is a body of water free of large obstructions or reflective surfaces such as buildings, boats other than those involved in this procedure, large embankments or breakwaters, etc. for a minimum distance of 8 m (25 ft) from the boat being measured. The boat being tested shall either be moored to a dock or lashed to another boat. If moored to a dock, the dock shall be of open construction so that it presents a minimum of reflecting surfaces. If the measurement is made in open water, the boat being evaluated shall be lashed to the measurement boat to prevent relative motion and to allow positioning of the microphone in the prescribed location. The measurement boat shall be positioned to minimize reflected sound.

4.2 Boat Operation—The engine shall be operated at low idle speed within the engine manufacturer's recommended operating range, in neutral gear if so equipped. For motorboats without a neutral gear, the engine shall be operated at its lowest operational speed. The engine shall be operated for a sufficient amount of time to allow water to flow through the exhaust system before taking measurements.

4.3 Measurements

- 4.3.1 The microphone shall be placed at a distance of 1.2 to 1.5 m (4 to 5 ft) above the water and no closer than 1 m (3.3 ft) from the vertical projection of any part of the boat in the area adjacent to the exhaust outlet(s).
- 4.3.2 The meter shall be set for slow response and the A-weighting network.
- 4.3.3 The observer reading the meter shall not be closer than arm's length from the microphone to minimize sound reflections.
- 4.3.4 The applicable reading shall be the average sound level measured during a period when the background sound level is at least 10 dB lower than the measured sound level. Background sound level includes wind effects, noise from boats other than the one being measured, wave action, boat wakes, and other extraneous noises. Peak readings of intermittent sound levels created by wave slaps or changes in sound level due to wave action and/or engine speed variation shall not be included in the applicable reading.
- 4.3.5 The observer shall record the applicable reading and the background sound levels taken immediately before and immediately after the applicable reading.

5. General Requirements

- 5.1 The measurements shall be conducted only by persons qualified by training to perform these measurements.
- 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 consulted for both recommended operation of the instrument, and precautions to be observed.
- 5.3 Proper acoustical calibration shall comprise the complete measurement system including extension cables, etc. Field calibration shall be performed immediately before and after each test sequence.

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- 5.4 A measurement shall be invalid if changes in the background sound level affect the applicable reading.
- 5.5 The use of the word "shall" in the procedure is to be understood to be mandatory, while the word "should" is to be understood as advisory.

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APPENDIX A

This procedure has been developed as a guide for governmental agencies to enforce the requirement for effective muffling means in pleasure motorboats. The measured level is not an indication of maximum operational sound levels.

In most applications involving thru-transom exhaust the microphone location should be 1 m (3.3 ft) aft of the intersection of the vertical plane of the aft-most part of the transom and the vertical plane of the port-most or starboard-most part of the gunnel at the specified height of 1.2 to 1.5 m (4 to 5 ft) above the surface of the water with the microphone oriented toward the exhaust outlet(s).

Care must be taken to avoid erroneous readings due to sound reflections by proper positioning of the enforcement boat such that minimal extension of the enforcement hull protrudes into the area surrounding the microphone during measurements. Only one enforcement boat shall be in the area where measurements are being taken.

Sound level limits should generally have tolerance band to compensate for variations in test sites, boats, and weather conditions. Background information is included in the SAE J2005 Rationale Statement.

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