AES standard for acoustics - 
Methods of measuring and specifying 
the performance of loudspeakers for 
professional applications - 
Drive units

Users of this standard are encouraged to determine if they are using the latest 
printing incorporating all current amendments and editorial corrections. Informa-
tion on the latest status, edition, and printing of a standard can be found at:
http://www.aes.org/standards

AUDIO ENGINEERING SOCIETY, INC.
697 3rd Ave., New York, New York 10017, US.
The AES Standards Committee is the organization responsible for the standards program of the Audio Engineering Society. It publishes technical standards, information documents and technical reports. Working groups and task groups with a fully international membership are engaged in writing standards covering fields that include topics of specific relevance to professional audio. Membership of any AES standards working group is open to all individuals who are materially and directly affected by the documents that may be issued under the scope of that working group.

Complete information, including working group scopes and project status is available at http://www.aes.org/standards. Enquiries may be addressed to standards@aes.org

The AES Standards Committee is supported in part by those listed below who, as Standards Sustainers, make significant financial contribution to its operation.

This list is current as of 2018/6/11
AES standard for acoustics -
Methods of measuring and specifying
the performance of loudspeakers for
professional applications -
Drive units

Published by
Audio Engineering Society, Inc.
Copyright © 1984, 2012, 2018, 2023 by the Audio Engineering Society

Abstract

This document is a recommended practice for describing and specifying loudspeaker components used in professional audio and sound-reinforcement systems. These components include high-frequency drivers and low-frequency drivers. Specifications are given for describing frequency response, impedance, distortion, and power handling.

An AES standard implies a consensus of those directly and materially affected by its scope and provisions and is intended as a guide to aid the manufacturer, the consumer, and the general public. The existence of an AES standard does not in any respect preclude anyone, whether or not he or she has approved the document, from manufacturing, marketing, purchasing, or using products, processes, or procedures not in agreement with the standard. Prior to approval, all parties were provided opportunities to comment or object to any provision. Attention is drawn to the possibility that some of the elements of this AES standard or information document may be the subject of patent rights. AES shall not be held responsible for identifying any or all such patents. Approval does not assume any liability to any patent owner, nor does it assume any obligation whatever to parties adopting the standards document. This document is subject to periodic review and users are cautioned to obtain the latest edition. Recipients of this document are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.
Contents

1 Scope ..................................................................................................................................................4
2 Normative references ........................................................................................................................4
3 Definitions ..........................................................................................................................................5
4 Conditions for measurements ..........................................................................................................7
  4.1 Rated conditions ...........................................................................................................................7
  4.2 Normal measuring conditions .......................................................................................................7
  4.3 Requirements for test signals .......................................................................................................7
  4.4 Unwanted acoustical and electrical noises ...................................................................................8
  4.5 Distance of the measuring microphone from the loudspeaker .....................................................8
  4.6 Measuring equipment ...................................................................................................................8
  4.7 Mounting .......................................................................................................................................8
5 Characteristics to be specified, methods of measurements and presentation of results ..........9
  5.1 Characteristics and methods of measurement .............................................................................9
  5.2 Method of measurement of frequency response using a plane-wave tube ................................11
  5.3 Method of measurement for maximum usable continuous output sound-pressure level ..........11
  5.4 Methods of measurement of Thiele-Small parameters ...............................................................12
  5.5 Measurement of maximum useful displacement of the voice-coil or equivalent element ........14
  5.6 Directional responses .................................................................................................................14
6 Power-Handling ...............................................................................................................................14
  6.1 Test Conditions and Equipment ..................................................................................................14
  6.2 Test procedure ............................................................................................................................14
  6.3 Displacement limit .......................................................................................................................15
  6.4 Thermal test information .............................................................................................................15
  6.5 Low Resonance ..........................................................................................................................15
Annex A: (Informative) - Informative references .............................................................................16
Annex B (Informative) - Crest Factor ................................................................................................17
  B.1 Crest Factor of Random Noise ...................................................................................................17
  B.2 Signal Organization ....................................................................................................................18
  B.3 Implications for Loudspeaker Testing .......................................................................................19
This foreword is not part of the AES2-2012 *AES standard for acoustics - Methods of measuring and specifying the performance of loudspeakers for professional applications - Drive units*

**Foreword to 1984 edition**

The purpose of this document is to recommend methods of specifying the performance of loudspeaker components used in music, speech, and fixed-signal (such as siren alert) systems. It is needed so that these components may be compared on an equal basis, by methods which directly relate to their specific real use. Previously, no such practice or standard existed for this class of acoustical product. Tests and nomenclature used in this document are compatible with IEC Standard, Publication 268-5 (1972) and Supplement 268-5A (1980).

The document presented here is a complete recommendation.

This committee was suggested and formed by John Eargle in 1975 November, and the following members have contributed to the processing and approval of this Recommended Practice:

Clifford Henricksen, *Chairman*


**Foreword to 2012 edition**

This document substantially revises and updates AES2-1984.


Steve Hutt
Chair, Working Group SC-04-03 on Loudspeaker Modeling and Measurement

**Note on normative language**

In AES standards documents, sentences containing the word “shall” are requirements for compliance with the document. Sentences containing the verb “should” are strong suggestions (recommendations). Sentences giving permission use the verb “may”. Sentences expressing a possibility use the verb “can”.

2013-02-11 printing
AES standard for acoustics - Methods of measuring and specifying the performance of loudspeakers for professional applications - Drive units

1 Scope
This document defines a minimum set of characteristics of loudspeaker drivers for inclusion in manufacturers' specification documents, and identifies the relevant methods of measurement.

The document considers drivers and passive loudspeaker systems for professional applications. It does not consider sub-components such as spiders or cones. It is intended for loudspeaker system designers, and drive-unit manufacturers.

2 Normative references
The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.


ISO 3741: Acoustics - Determination of sound power levels of noise sources using sound pressure - Precision methods for reverberation rooms. International Organization for Standardization, Geneva, Switzerland.