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AES19-1992 (withdrawn 2003)
(ALMA TM-100)

AES–ALMA Standard test method for audio engineering — Measurement of the lowest resonance frequency of loudspeaker cones

Published by
Audio Engineering Society, Inc.

Abstract

This standard test method is intended to determine the frequency of lowest resonance of a loudspeaker cone. Such information is used for engineering design and for quality control. The method has been developed to improve correlation of measurement between cone manufacturers and loudspeaker manufacturers.

Contents

SECTION

Foreword

[This foreword is not a part of the *AES–ALMA Standard test method for audio engineering — Measurement of the lowest resonance frequency of loudspeaker cones*, AES19-1992 (ALMA TM-100).]

This document has been prepared by the Committee of Cone Suppliers of the American Loudspeaker Manufacturers Association, acting as a working group for the Audio Engineering Society Standards Committee. The following individuals have contributed to the preparation of this document: R. Brennan, C. Caldwell, D. J. Field, G. C. Johnston, G. R. Pariza, P. B. Williams, and T. Yocum.

GEORGE C. JOHNSTON, *Chairman*
Committee of Cone Suppliers
1990 December

At the time of approval of this document for publication, the AES Standards Committee had the following membership: Yoshi-Haru Abe, R. Ajemian, James S. Brawley, Richard C. Cabot, M. Cundiff, Peter D'Antonio, Donald Eger (Chair), Robert A. Finger, D. Gray, Irving Joel, William Hogan, Tomlinson F. Holman, Mike Klasco, David L. Klepper, Bart N. Locanthi, J. P. Nunn, T. Owen, Daniel Queen (Secretary), Tom Roseberry, W. T. Shelton, William D. Storm, Ted Telesky, Han Tendeloo, Floyd E. Toole, and D. Wickstrom.

The American National Standards Institute version of this standard has not been reprinted and remains available as ANSI S4.30-1992.

Note: Historically, this standard was published jointly by the AES and by ALMA.. In 2003, AESSC Subcommittee SC-04 proposed that it be withdrawn as an AES document in the understanding that ALMA International, Princeton Junction, NJ, US., will continue to publish and maintain this standard as ALMA TM-100

AES–ALMA Standard test method for audio engineering — Measurement of the lowest resonance frequency of loudspeaker cones

1 Scope

This standard test method shall be applied to determine the frequency of lowest resonance of a loudspeaker cone before assembly into a loudspeaker. The test results shall be used for engineering design purposes and for quality control. The method is intended to improve correlation of measurement between cone manufacturers and loudspeaker manufacturers. It shall not be used for finished loudspeaker assemblies. This standard applies to cones up to 380 mm (15 in) in diameter. The effects of gravity are beyond the scope of this standard.

2 Introduction

Loudspeakers are limited-bandwidth devices. They are limited at the low frequency in direct relation to the resonance of the loudspeaker assembly. This assembly resonance is a function of the mass and spring elements that make up the moving components of a loudspeaker. These elements include the mass of the diaphragm, the mass of the voice coil, the mass of the air load; the stiffness of the surround, the stiffness of the spider, and, if applicable, the stiffness of the air in the loudspeaker enclosure.

> NOTE – Because cone resonance is a function of two of these parameters (cone mass and surround stiffness), the accuracy of the test for resonance has particular importance.

The cone resonance F_0 is given by

$$F_0 = (S_S/M_D)^{½} \qquad (1)$$

and the loudspeaker resonance F_S is given by

$$F_S = [(S_S+S_P+S_A)/(M_D+M_C+M_A)]^{½} \qquad (2)$$

where

M_D = mass of diaphragm (or cone)
M_C = mass of coil and adhesive
M_A = mass of air load
S_S = stiffness of surround
S_P = stiffness of spider
S_A = stiffness of air load

As can be seen from Eqs. (1) and (2), the cone resonance value is mathematically related to the loudspeaker resonance. It is thus important to control cone resonance as a partial control on loudspeaker resonance.