
INTERNATIONAL STANDARD



532

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Acoustics — Method for calculating loudness level

Acoustique — Méthode de calcul du niveau d'isotonie

First edition — 1975-07-15

Corrected and reprinted — 1977-04-15

UDC 534.61

Ref. No. ISO 532-1975 (E)

Descriptors : acoustics, acoustic measurement, sound pressure, loudness, computation.

Price based on 18 pages

ISO 532-1975 (E)

FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

Prior to 1972, the results of the work of the Technical Committees were published as ISO Recommendations; these documents are now in the process of being transformed into International Standards. As part of this process, Technical Committee ISO/TC 43 has reviewed ISO Recommendation R 532 and found it technically suitable for transformation. International Standard ISO 532 therefore replaces ISO Recommendation R 532-1966 to which it is technically identical.

ISO Recommendation R 532 was approved by the Member Bodies of the following countries :

Australia	Denmark	Netherlands
Austria	Finland	New Zealand
Belgium	Germany	Sweden
Brazil	Greece	Switzerland
Canada	Hungary	United Kingdom
Chile	India	U.S.A.
Colombia	Italy	U.S.S.R.
Czechoslovakia	Korea, Rep. of	Yugoslavia

The Member Body of the following country expressed disapproval of the Recommendation on technical grounds :

France

The Member Bodies of the following countries disapproved the transformation of ISO/R 532 into an International Standard :

Canada
U.S.A.

Acoustics – Method for calculating loudness level

0 INTRODUCTION

It is often desirable to seek a single number that corresponds to the loudness or to the loudness level of a given sound. Such a number can be calculated if there is available a spectrum analysis of the sound obtained by physical measurement. It has to be understood that the calculated number is a statistic, i.e. it conveys less information than the spectrum measurements from which it is derived.

Such analysis is often accomplished in terms of either octave bands or one-third octave bands. Sounds in which the spectra do not have discontinuities as a function of frequency can be represented adequately in terms of octave bands, but sounds which contain such discontinuities may require one-third octave-band analysis if they are to be described adequately.

This International Standard specifies two methods for calculating the loudness or loudness level of a complex

sound, which differ not only in the method of analysis of the sound, but also in the principles of computation. The first, Method A, utilizes physical measurements obtained from spectrum analysis in terms of octave bands. The second, Method B, utilizes spectrum analysis in terms of one-third octave bands.

In addition to the different band widths involved in the basic physical measurements, the two methods differ in other respects, and the results obtained do not always agree. Method B generally gives slightly higher results than those obtained for the same sounds by Method A, the difference being possibly as much as 5 phons; but it would seem to take better into account those variations in sound spectra that occur within narrow ranges of frequency.

The quantities calculated by either method should be designated with specific reference to one or other method using the system of symbols and abbreviations given in table 1.

TABLE 1 – Designations for calculating loudnesses and loudness levels

Method	Quantity measured		Band width of analysis	Sound field
	loudness	loudness level		
A	sones (OD)	phons (OD)	octave	diffuse
B	{ sones (GD) sones (GF)	{ phons (GD) phons (GF)	1/3 octave	{ diffuse free