INTERNATIONAL STANDARD

ISO 266

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Acoustics — Preferred frequencies

Acoustique — Fréquences normales

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 266 was prepared by Technical Committee ISO/TC 43, *Acoustics*.

This second edition cancels and replaces the first edition (ISO 266:1975), which has been technically revised.

Annex A of this International Standard is for information only.

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Introduction

This International Standard specifies a series of preferred frequencies in order to provide a common basis for comparing the results of acoustical measurements.

The frequency series is referred to the reference frequency of 1 000 Hz, which is also the reference frequency for the definition of the phon (see ISO 31-7).

The specification of the preferred frequency series reduces to a minimum the number of frequencies at which acoustical data need to be tabulated. Also measurement equipment may be specifically constructed for these frequencies.

The specified series of preferred frequencies uses powers of 10 and is therefore especially convenient for extensions into the infrasonic and ultrasonic (frequency) ranges. Another series of frequencies that is in use is based on the definition of the octave as the frequency ratio 1:2. The frequencies of this series are calculated as powers of two (IEC 1260 base-two series).

Strictly, these two series are incompatible. However the base-two series may be accepted as a sufficient approximation to the base-ten series because of the fact that $2^{1/3} = 1{,}259\,9\ldots$ is very nearly the same as $10^{1/10} = 1{,}258\,9\ldots$

Practical considerations make some additional rounding desirable: Thus 500 Hz is listed instead of 501,187 233... Hz, which is the exact frequency from the base-ten series. The calculated value of the exact frequency expressed to five significant figures is given in the second column of table 1. In this way, the maximum individual deviation, in the frequency range 20 Hz to 20 000 Hz, between the rounded preferred frequencies and the calculated frequencies for the base-ten and base-two series is 0,94 % and 1,59 %, respectively.

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Acoustics — Preferred frequencies

1 Scope

This International Standard specifies preferred frequencies for acoustical measurements. The preferred frequencies are based on the R10 series of preferred numbers in ISO 3 and the reference frequency of 1 000 Hz.

For most acoustical measurements and presentations of data, a frequency spacing based on a constant percentage increment is generally preferred and the test frequencies then form a geometric series. For certain acoustical measurements, a constant frequency increment is a suitable spacing.

The International Standard deals with the geometric series and is not intended to apply to cases where a constant frequency increment, or other particular spacing, would be more suitable, or where there may be good reasons for the adoption or retention of other frequencies.

This International Standard does not deal with:

— frequencies for music;

— all audiometric frequencies;

— series other than R10 from ISO 3.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3:1973, *Preferred numbers — Series of preferred numbers.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 exact frequency: Frequency, expressed in hertz, which is calculated from the formula:

$$f = 10^{n/10} f_r$$

where f_r is the reference frequency 1 000 Hz and n is an integer, positive or negative.

3.2 calculated frequency: Frequency approximating to the exact frequency, expressed to five significant figures.

3.3 preferred frequency: Frequency equal in magnitude to one of the R10 series of preferred numbers defined in ISO 3.

4 Preferred frequencies

4.1 The preferrred frequencies as defined by the R10 series are given in table 1.

4.2 The series of preferred frequencies given in table 1 may be extended indefinitely in either direction by successive multiplication or division by powers of ten.

4.3 Where more precision is needed, the calculated frequency may be used. Values of the calculated frequencies rounded to five significant digits and calculated from the formula given in 3.1 are also given in table 1.

4.4 The frequencies of one-octave and one-third-octave intervals based on the reference frequency of 1 000 Hz and approximated by the relevant figures of the R10 series are indicated by crosses in the corresponding columns.

NOTE — See IEC 1260 for the determination of preferred frequencies for other fractional-octave-band intervals.

Table 1 — Preferred frequencies

Preferred frequency[1] Hz or kHz	Calculated frequency Hz or kHz	One-octave interval	One-third-octave interval
1,00	1,000 0	x	x
1,25	1,258 9		x
1,60	1,584 9		x
2,00	1,995 3	x	x
2,50	2,511 9		x
3,15	3,162 3		x
4,00	3,981 1	x	x
5,00	5,011 9		x
6,30	6,309 6		x
8,00	7,943 3	x	x
10,0	10,000		x
12,5	12,589		x
16,0	15,849	x	x
20,0	19,953		x
25,0	25,119		x
31,5	31,623	x	x
40,0	39,811		x
50,0	50,119		x
63,0	63,096	x	x
80,0	79,433		x
100	100,00		x
125	125,89	x	x
160	158,49		x
200	199,53		x
250	251,19	x	x
315	316,23		x
400	398,11		x
500	501,19	x	x
630	630,96		x
800	794,33		x

1) This series may be extended. See 4.2.

Annex A
(informative)

Bibliography

[1] ISO 31-7:1992, *Quantities and units — Part 7: Acoustics.*

[2] IEC 1260:1995, *Electroacoustics — Octave-band and fractional-octave-band filters.*

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