Australian Standard™

# Acoustics—Preferred frequencies and band centre frequencies

Standards Australia

This Australian Standard was prepared by Committee AV-001, Acoustics—Vibration—Terms, Units and Symbols. It was approved on behalf of the Council of Standards Australia on 15 November 2002 and published on 23 December 2002.

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The following are represented on Committee AV-001:

Association of Australian Acoustical Consultants

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Australian Standard™

# Acoustics—Preferred frequencies and band centre frequencies

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# PREFACE

This Standard was prepared by Standards Australia Committee AV-001 on Acoustics—Vibration—Terms, Units and Symbols to supersede AS 2533—1982, *Acoustics—Preferred frequencies for measurements*.

The objective of this Standard is to set out preferred frequencies, and frequency labels that form a geometric series for acoustical measurements to be used within the acoustical industry to simplify and standardize the interchange and comparison of data. These preferred frequencies should also be used as geometric centre frequencies for acoustic band measurements.

This Standard differs from ISO 266:1997, *Acoustics—Preferred frequencies* in that—

(a) the frequency labels are clearly described as labels or names and not the exact frequencies they represent;

(b) frequencies based on powers of two are put in an appendix and are limited to the audio frequency range to avoid the cumulative differences between frequencies based on powers of two and powers of ten; and

(c) this Standard also provides tables with 1/12 and 1/24 octave frequencies based on both powers of ten and two.

The term ‘normative’ has been used in this Standard to define the application of the appendix to which it applies. A ‘normative’ appendix is an integral part of a Standard.

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# FOREWORD

The standardization of frequencies used for acoustic measurements facilitates comparison between results. The purpose of this Standard is to align all frequency-series at a single reference frequency, and to select other frequencies in such a way as to afford a maximum number of common frequencies in the various series. The resulting simplification thus reduces to a minimum the number of frequencies needed for the tabulation of acoustical data.

There are many kinds of measuring equipment in current use, so it is inevitable that certain equipment will not conform to this Standard; nor is it to be expected that existing equipment will be immediately discarded. This Standard, however, provides a guide to future design and construction of apparatus and to the selection of the various frequencies in an orderly fashion.

The frequency of 1000 Hz is of great importance in acoustics. For example, it is the reference frequency to the definition of the phon; 1000 Hz has therefore been selected as the basic frequency for all series of preferred frequencies for acoustical measurements. For certain kinds of acoustical measurements, it is convenient to space the frequencies by fractions of an octave, but for extensions into the infrasonic and ultrasonic ranges, it is convenient to use powers of 10. These two requirements are, strictly, incompatible.

However, it has proved possible to use the $10^{1/10}$ series for calculating the entries in the table because of the fact that $2^{1/3}$ (= 1.2599) is very nearly the same as $10^{1/10}$ (=1.2589). That is, ten successive intervals in the one-third octave series may be accepted as a sufficient approximation to the preferred frequency ratio of 10. This Standard specifies the preferred frequency to five-figure accuracy and the corresponding frequency label used to simplify communication of the results.

STANDARDS AUSTRALIA

# Australian Standard
# Acoustics—Preferred frequencies and band centre frequencies

## 1 SCOPE

This Standard specifies preferred frequencies for acoustical measurements and identifier label frequencies.

This Standard does not deal with frequencies for music.

## 2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

| | |
|---|---|
| AS 1633 | Acoustics—Glossary of terms and related symbols |
| 2752 | Preferred numbers and their use |
| AS/NZS 4476 | Acoustics—Octave-band and fractional-octave-band filters |

## 3 DEFINITIONS

For the purposes of this Standard, the definitions given in AS 1633 and those below apply.

### 3.1 Exact frequencies

Frequencies intervals using the powers 10 and 2.

### 3.2 Preferred frequencies

Preferred frequencies correspond to calculated values of preferred numbers, or multiples thereof, given in AS 2752.

### 3.3 Preferred labels

Preferred frequency labels correspond to the R10 basic series of number, of decadic multiples thereof, given in AS 2752. Band centre frequencies correspond to preferred frequency labels.

## 4 FREQUENCY IDENTIFIER LABELS TABLES

### 4.1 General

Many acoustical measurements and calculations are appropriately based on frequency intervals with a common ratio forming a geometric series and standardisation using the preferred frequencies facilitate data interchange and comparison.

Whilst colloquially referred to as ‘octave’ and ‘1/3 octave’ intervals, the measuring interval for instruments conforming to the common standards (for example AS/NZS 4476:1997), actually measure to 3/10 decade, 1/10 decade intervals.

The use of the decadic terminology, 3/10 decade, 1/10 decade, 1/40 decade and 1/80 decade, is encouraged in lieu of the corresponding 1/1 octave, 1/3 octave, 1/12 octave and 1/24 octave.

See Table 1 for preferred frequencies using base 10 for measurements of 1/3 octave and 1/1 octave intervals.