

STANDARD

7196

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**Acoustics — Frequency-weighting
characteristic for infrasound
measurements**

Acoustique — Pondération fréquentielle pour le mesurage des infrasons



Reference number
ISO 7196:1995(E)

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 7196 was prepared by Technical Committee ISO/TC 43, *Acoustics*, Subcommittee SC 1, *Noise*.

Annexes A and B of this International Standard are for information only.

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International Organization for Standardization
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Introduction

Methods have already been standardized for the description and assessment of noise from various sources and with respect to various effects on human subjects (risk of hearing damage, annoyance reactions, loudness, perceived noisiness, interference with speech communication). These methods are described in outline in ISO 2204 and in detail in other International Standards, including ISO 226, ISO 1996-1, ISO 1999, ISO/TR 3352 and ISO 3891. In all these cases, the bandwidth of the noise is either considered to lie within the conventional audio frequency limits from 20 Hz to 20 000 Hz or within a specified narrower band (for example, 45 Hz to 11 200 Hz in the case of perceived noisiness of aircraft). The band limits of 20 Hz and 20 000 Hz also define the frequency range for which the characteristics of sound level meters are fully specified (see IEC 651).

In practice, some noises consist of, or contain components at, frequencies below 20 Hz. At present, there are no standardized methods for sound pressure measurements of these noises, nor for their description and assessment with respect to human response. Although research in this field is comparatively sparse, there is evidence of infrasonic effects which are potentially harmful or unpleasant to human subjects and some authorities may desire to extend their regulations or codes of practice governing noise emissions to cover sources of infrasound. For this reason, it is considered to be highly desirable to standardize measurement and description methods in order to facilitate the exchange of information and to avoid proliferation of incompatible procedures.

Many types of human response can be distinguished and, correspondingly, different description methods are, in principle, appropriate. The method described in this International Standard corresponds to the direct perception of infrasound. At present, this is the only human response for which there is an ample research base. Some literature on annoyance from infrasound suggests that annoyance may be closely related to the direct perception. On that precondition, levels measured according to this International Standard would reflect the annoyance as well as the direct perception.

The perception of infrasound, although apparently achieved through the auditory mechanism, differs in some respects from that usually understood by hearing. The normal threshold of perception is considerably higher than at audio frequencies (about 100 dB relative to 20 μ Pa at 10 Hz), whilst toleration for high levels is not raised correspondingly, that is, the dynamic range is smaller and the rate of growth of sensation with sound pressure level is much more rapid. In the frequency range 1 Hz to 20 Hz, sounds that are just perceptible to an average listener will yield weighted sound pressure levels close to 100 dB when measured in accordance with this International Standard. A very loud noise will yield a weighted level in the order of 120 dB, only 20 dB above. Weighted sound pressure levels which fall below about 90 dB will not normally be significant for human perception.

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Attention should be paid to the fact that, due to the combined effect of individual differences in perception threshold and the steep rise in sensation above the threshold, the same infrasonic noise may appear loud and annoying to some people while others can hardly perceive it.

Publication of this International Standard is not intended to inhibit research into infrasonics, for which methods of physical measurement other than those specified here may be appropriate, for example frequency analysis.

The specification of measuring equipment for use in conjunction with this International Standard is expected to be undertaken by Technical Committee IEC/TC 29. This International Standard contains an informative annex A outlining requirements for instrumentation to measure weighted levels, which may be used until a suitable IEC standard has been issued.

It should be emphasized that the measurement and description of a wide-band noise, containing infrasonic components, in accordance with this International Standard shall be considered as being independent of, and supplementary to, the measurement, description and assessment of the same noise by the methods defined in existing International Standards.

A bibliography is given for information in annex B.

Acoustics — Frequency-weighting characteristic for infrasound measurements

1 Scope

This International Standard specifies a frequency-weighting characteristic, designated G, for the determination of weighted sound pressure levels of sound or noise whose spectrum lies partly or wholly within the frequency band from 1 Hz to 20 Hz.

NOTES

1 In the case of wide-band noises whose spectrum embraces both the infrasonic and audio-frequency ranges, use of this International Standard to determine the infrasonic weighted sound pressure level is supplementary to the description of the same noise by methods already standardized which cover the audio-frequency range only, for example the description in terms of A-weighted sound pressure level. The numerical value of the results will, in general, differ from the G-weighted result. No significance should be attached to this difference since the respective results relate to different parts of the noise spectrum with little overlap.

2 The G-weighting can also be used in connection with the determination of sound power levels and sound intensity levels. When measured with the G-curve, these are symbolized respectively as L_{WG} and L_{IG} .

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.

IEC 651:1979, *Sound level meters*.

3 Definitions

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

3.1 infrasound: Sound or noise whose frequency spectrum lies mainly in the band from 1 Hz to 20 Hz.

3.2 audio-frequency sound: Sound or noise whose frequency spectrum lies mainly in the band from 20 Hz to 20 000 Hz.