# INTERNATIONAL STANDARD

**ISO 6242-3**

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**Building construction — Expression of users' requirements —**

**Part 3:**
Acoustical requirements

*Construction immobilière — Expression des exigences de l'utilisateur — Partie 3: Confort auditif*

Reference number
ISO 6242-3:1992(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 6242-3 was prepared by Technical Committee ISO/TC 59, *Building construction*, Sub-Committee SC 3, *Functional/user requirements and performance in building construction*.

ISO 6242 consists of the following parts, under the general title *Building construction — Expression of users' requirements*:

— *Part 1: Thermal requirements*

— *Part 2: Air purity requirements*

— *Part 3: Acoustical requirements*

— *Part 4: Lighting requirements*

Annex A of this part of ISO 6242 is for information only.





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## Introduction

This part of ISO 6242 is one of a set dealing with the expression of environmental requirements for buildings, in terms suitable for use in regulations and briefs for building projects. The parameters defined can be used for routine verification of the performance of buildings, either by calculation (for example at the design stage) or measurement (for example of elements, equipment, spaces or whole buildings), and are meant to provide readily understood information on users' requirements throughout the building process.

This set of International Standards is not intended to represent the complete state of knowledge about these aspects of environmental science, some of which are the concern of other ISO Technical Committees.

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# Building construction — Expression of users' requirements —

# Part 3:
Acoustical requirements



## 1 Scope

This part of ISO 6242 defines how the acoustical requirements of building users can be identified, expressed and quantified. It describes users' objectives and the parameters used to express them. For each parameter, it specifies units of measurement, preferred increments for values and means of evaluation. It also lists the environmental and human factors affecting the choice of a value (criterion) for each parameter.

It is intended for use

a) in preparing briefs for building projects;

b) in formulating building laws and regulations;

c) in drafting standards and other normative documents; and

d) more generally when specifying the required performance of buildings in terms of users' requirements.

Some of the parameters given in this part of ISO 6242 apply only to certain types of building. Compliance with this part of ISO 6242 does not therefore depend on implementing the whole of its contents in every case.

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 6242. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 6242 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 140-3:1978, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 3: Laboratory measurements of airborne sound insulation of building elements.*

ISO 140-4:1978, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 4: Field measurements of airborne sound insulation between rooms.*

ISO 140-5:1978, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 5: Field measurements of airborne sound insulation of facade elements and facades.*

ISO 140-6:1978, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 6: Laboratory measurements of impact sound insulation of floors.*

ISO 140-7:1978, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 7: Field measurements of impact sound insulation of floors.*

ISO 140-8:1978, *Acoustics — Measurement of sound insulation in buildings and of building elements — Part 8: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a standard floor.*

ISO 140-9:1985, *Acoustics — Measurements of sound insulation in buildings and of building elements — Part 9: Laboratory measurement of room-to-room airborne sound insulation of a suspended ceiling with a plenum above it.*

ISO 717-1:1982, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation in buildings and of interior building elements.*

ISO 717-2:1982, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 2: Impact sound insulation.*

ISO 717-3:1982, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 3: Airborne sound insulation of facade elements and facades.*

ISO 1996-1:1982, *Acoustics — Description and measurement of environmental noise — Part 1: Basic quantities and procedures.*

ISO 3382:1975, *Acoustics — Measurement of reverberation time in auditoria.*

IEC 651:1979, *Sound level meters.*

IEC 804:1985, *Integrating-averaging sound level meters.*

## 3 Users' objectives

**3.1** Control of the acoustical environment within buildings shall fulfil the following objectives:

a) to provide a suitable standard of freedom from annoyance due to intrusive noises, whether originating within or outside the building;

b) to provide a suitable standard of speech privacy between rooms or spaces; and

c) to provide a suitable standard of acoustic quality within rooms or spaces.

**3.2** Criteria to meet these objectives shall reflect the following:

a) activities to be accommodated;

b) age and health of the occupants;

c) proportion of likely occupants it is intended to satisfy;

d) time during which the requirements must be satisfied (taking account of variations in the noise emitted by various sources); and

e) acceptable (or required) level of background sound.

The choice of some parameters and criteria will differ, depending on the type of external noise to which the building is subjected.

## 4 Parameters for expressing users' requirements

Acoustical comfort, quality and privacy depend on

a) the airborne sound insulation provided by interior building elements (walls, floors, doors, etc.);

b) the airborne sound insulation provided by exterior building elements (external walls, façades, windows, etc.);

c) the impact sound insulation of floors and walls;

d) acceptable sound pressure levels, taking into account any sound required for masking (privacy); and

e) the reverberation time of rooms or spaces.

### 4.1 Location, uniformity and tolerance for acoustical parameters

As the level of sound will be essentially uniform in all but the largest rooms or spaces, it is not necessary to state requirements linked to the locations at which the requirements will apply.

Uniformity may be required of the acoustic quality of auditoria, but this involves details beyond the scope of this part of ISO 6242.

The various sound indices incorporate a certain tolerance in their treatment of sound of differing frequencies. Conventional tolerance requirements apply only to reverberation time, and are stated as part of the parameter.

### 4.2 Expression of acoustical parameters

Details of means of expression, together with associated information, are given in table 1.

## 5 Factors affecting the choice of criteria

Details of factors likely to affect the choice of criteria for particular applications, together with associated information, are given in table 2.

**Table 1 — Parameters**

| Parameter | Definition | Means of expression: units; preferred increments | Nature of criterion | Means of evaluation |
|---|---|---|---|---|
| Airborne sound transmission | Alternatives:<br>1) Weighted apparent sound reduction index, $R'_w$<br>2) Weighted standardized level difference, $D_{nT,w}$<br>See ISO 717-1 | Decibels (dB); chosen from the series:<br>25 - 28 - 30 - 33 - 35 - 38 - 40 - 43 - 45 - 48 - 50 - 53 dB | Maximum | Calculation: data on the airborne sound transmission of typical forms of construction may be obtained from national standards, codes of practice or other technical publications<br>Measurement:<br>1) for interior building elements, and for sound transmission between rooms, in accordance with ISO 140-3 and ISO 140-4<br>2) for exterior building elements, in accordance with ISO 140-5 and ISO 717-3 |
| Impact sound transmission (for floors) | Alternatives:<br>1) Weighted normalized impact sound pressure, $L_{n,w}(L'_{n,w})$<br>2) Weighted standardized impact sound pressure level, $L'_{nT,w}$<br>See ISO 717-2 | Decibels (dB); chosen from the series:<br>35 - 38 - 40 - 43 - 45 - 48 - 50 - 53 - 55 - 58 dB | Maximum | Calculation: data on the impact sound transmission of typical forms of construction may be obtained from national standards, codes of practice or other technical publications<br>Measurement: single-number quantities for impact sound transmission can be derived in accordance with ISO 140-6 and ISO 140-7 |
| Sound pressure levels | Alternatives:<br>1) A-weighted sound pressure level $L_{pA}$ for specific types of noise originating from within another part of the building, for example from equipment<br>See IEC 651<br>2) Equivalent continuous A-weighted sound pressure level $L_{Aeq,T}$ for general noise from external sources (originating either outside or within the building)<br>See ISO 1996-1 | Decibels (dB); chosen from the series:<br>25 - 28 - 30 - 33 - 35 - 38 - 40 - 43 - 45 - 48 - 50 - 53 dB | Maximum, which may be stated for specific hours of the day or night, or for specific daytime or night-time periods | Calculation: estimation from the character, intensity and distribution over time of external noise sources, taking into account the airborne sound insulation of the building envelope, in accordance with national standards or codes of practice or regulations<br>Measurement:<br>1) for $L_{pA}$, using a sound level meter in accordance with IEC 651, having a time weighting of S or F<br>2) for $L_{Aeq,T}$, using an integrating averaging sound level meter in accordance with IEC 804, or a sound level meter in accordance with IEC 651, averaged over the relevant time interval. For noise of an impulsive or tonal character, measured values may be adjusted in accordance with ISO 1996-1 |
| Reverberation time (does not usually need to be specified for residential or other small rooms) | The time $T$ required for the sound pressure level to decrease by 60 dB after the sound source has stopped | Multiples of 0,1 s | Maximum and/or minimum | Calculation: estimation from the size, form and acoustic character of surfaces will be possible<br>Measurement: for auditoria, reverberation time shall be measured within a frequency range of at least 125 Hz to 4 000 Hz, in accordance with ISO 3382. The principles of this test procedure may be applied to other types of room |

**Table 2 — Factors affecting criteria**

| Factor | Examples of classes/categories | Means of expression | Sources of information |
|---|---|---|---|
| Activities and tasks in relation to the acoustical comfort | Sleeping<br>Reading<br>Quiet study<br>General office work<br>Factories<br>Commerce<br>Auditoria, etc. | Appropriate levels of sound insulation and/or sound pressure levels; where applicable, appropriate reverberation times | National standards or codes of practice |
| Proportion of occupants to be satisfied | 80 %<br>90 %<br>95 % | Standard criteria are based on satisfying a defined proportion of occupants. This may need to be checked and, if necessary, criteria amended, to meet special needs | National standards or codes of practice |
| Time during which requirements must be satisfied (for intermittent or variable noises) | 80 %<br>90 %<br>95 % | This factor is reflected in the integration and averaging of data on sound pressure levels. Over short periods, noise levels may differ from long-term average levels | National standards or codes of practice |
| Acceptable or required background noise | 10 - 13 - 15 - 18<br>20 - 23 - ... dB | The deliberate acceptance or provision of masking noise may influence sound insulation requirements for certain types of occupancy | National standards or codes of practice |

# Annex A
(informative)

## Bibliography

[1] ISO 6240:1980, *Performance standards in building — Contents and presentation.*

[2] ISO 6241:1984, *Performance standards in building — Principles for their preparation and factors to be considered.*

[3] ISO 7162:1992, *Performance standards in building — Contents and format of standards for evaluation of performance.*

[4] ISO 7164-1:—[1], *Performance standards in building — Part 1: Definitions and means of expression for the performance of a whole building.*



1) To be published.