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R 717

RATING OF SOUND INSULATION FOR DWELLINGS

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BRIEF HISTORY

The ISO Recommendation R 717, *Rating of sound insulation for dwellings*, was drawn up by Technical Committee ISO/TC 43, *Acoustics*, the Secretariat of which is held by the British Standards Institution (BSI).

Work on this question by the Technical Committee began in 1962 and led, in 1964, to the adoption of a Draft ISO Recommendation.

In November 1965, this Draft ISO Recommendation (No. 880) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies :

Argentina	Germany	Sweden
Australia	Hungary	Switzerland
Austria	Israel	U.A.R.
Brazil	Japan	United Kingdom
Canada	Netherlands	U.S.S.R.
Chile	New Zealand	Yugoslavia
Czechoslovakia	Poland	

6 Member Bodies opposed the approval of the Draft :

Belgium	Italy
Denmark	Norway
France	U.S.A.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council which decided, in May 1968, to accept it as an ISO RECOMMENDATION.

ISO Recommendation R 717 May 1968

RATING OF SOUND INSULATION FOR DWELLINGS

INTRODUCTION

A method of measurement of airborne and impact sound insulation has been standardized in ISO Recommendation R 140, *Field and laboratory measurements of airborne and impact sound transmission.* This has enabled objective measurements by different laboratories to be compared. The establishment of requirements for sound insulation and a method of determining whether particular measured values satisfy these requirements are also necessary.

Various countries have their own methods of evaluation such as single figures, comparison curves used as grades etc., which do not allow international comparisons to be made easily. It is the purpose of this ISO Recommendation to formalize a method of comparison which can be used internationally and by means of which the individual countries can specify their own requirements for dwellings. It is not intended that this method should restrict the choice of individual countries in setting up their requirements.

1. SCOPE

This ISO Recommendation describes a method of evaluating the airborne sound insulation and impact sound level for dwellings when the results of measurements made by the method described in ISO Recommendation R 140 are available. Reference values are given with which the measured results should be compared by the method described.

A method is given to derive from this comparison a single index, in terms of which the sound insulation requirements can be defined.

2. DEFINITIONS

2.1 Airborne sound insulation

The quantity to be measured is

$$R' = L_1 - L_2 + 10 \log_{10} (S/A) \quad \text{dB} \qquad (1)$$

where

L_1 is the average sound pressure level in the source room;

L_2 is the average sound pressure level in the receiving room;

S is the common surface wall or floor area between the two rooms;

A is the equivalent absorption area of the receiving room.

The quantity $*R'$ is the transmission loss for field measurements and corresponds with the normalized level difference taking the area S as reference absorption area (see ISO Recommendation R 140).

The corresponding value of R obtained from laboratory measurements may be useful for guidance.

Where the common area is less than about 10 m^2, or where no common partition wall surface exists, the quantity S should be replaced by the reference absorption of 10 m^2. In such cases R' is replaced by the normalized level difference D_n according to ISO Recommendation R 140, clause 3.5.

NOTES

1. The value of the quantity D_n specified in ISO Recommendation R 140 for a particular construction depends on its area. It is thought that the normalized quantity R', which does not vary so much in this way, would be more appropriate for the purpose of comparison. The value of S is normally to be taken as the area of the common part of the wall or floor. If there is any doubt as to the value of S, the relevant details should be stated in the report.
2. Where measurements relate to a common area of less than about 10 m^2, such measurements should not be used for rating a construction if the result of this rating is to apply to cases where the area is 10 m^2 or larger.

2.2 Impact sound

The normalized impact sound level to be measured is

$$L_n = L - 10 \log_{10} (A_o/A) \quad \text{dB} \qquad (2)$$

where the reference absorption area A_o is taken as 10 m^2.

2.3 Airborne sound insulation index I_a

This is the single figure in terms of which the airborne sound insulation performance is evaluated. It is derived according to the procedure described in section 5 and defined in section 6. See also the note to section 6 for another determination of rating M_a.

2.4 Impact sound index I_i

This is the corresponding figure for impact sound, also derived according to section 5 and defined in section 6. See also the note to section 6 for another determination of rating M_i.

3. METHOD OF MEASUREMENT

The measurements should be in accordance with ISO Recommendation R 140. They should preferably be made at 1/3 octave intervals with 1/3 octave band filters the centre frequencies of which cover the frequency range 100 to 3150 Hz. If octave band filters are used, the centre frequencies should cover the frequency range 125 to 2000 Hz.

If 1/3 octave band filters are used, the impact sound levels should be corrected to octave band levels by adding 5 dB.

The accuracy of the measurements should be such that the standard deviation of the mean value of a number of measurements on the same object is not greater than

1 dB at frequencies of 250 Hz and above

and

3 dB at the lower frequencies

* In this case, R' is used instead of R, in order to distinguish clearly between the values with and without flanking transmission (see ISO Recommendation R 140, *Field and laboratory measurements of airborne and impact sound transmission*, clause 3.5).

4. REFERENCE VALUES

4.1 Airborne sound insulation

A single set of reference values should be used for comparing with the measured insulation. These values are given in Table 1 and shown in Figure 1. If the measured results are presented graphically, a graph of the reference values should be plotted on the same diagram.

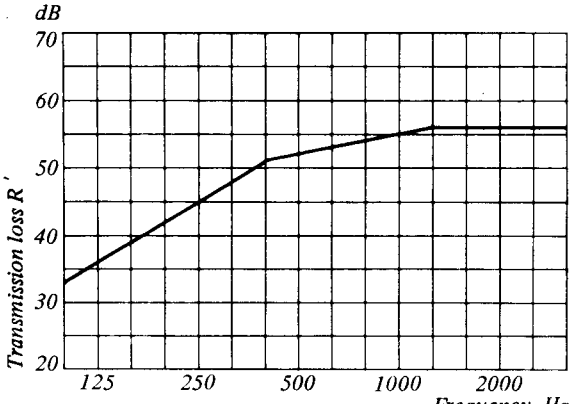

FIG. 1

TABLE 1 – **Reference values of transmission loss R' for airborne sound between dwellings***

Frequency Hz	100	**125**	160	200	**250**	315	400	**500**
R' dB	33	36	39	42	45	48	51	52
Frequency	630	800	**1000**	1250	1600	**2000**	2500	3150
R' dB	53	54	55	56	56	56	56	56

4.2 Impact sound

A single set of reference values should be used for comparing with the measured level. These values are given in Table 2 and shown in Figure 2.

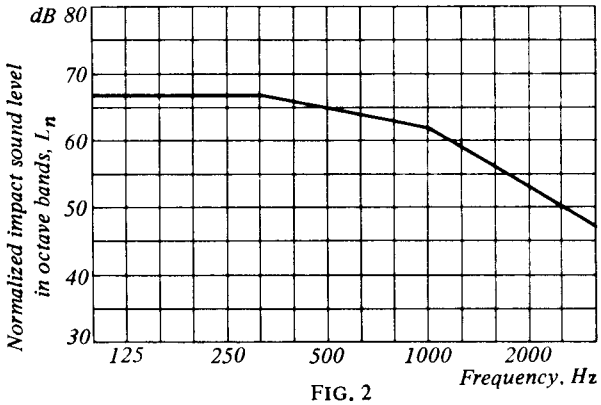

FIG. 2

TABLE 2 – **Reference values of normalized impact sound level L_n in octave bands in dwellings***

Frequency Hz	100	**125**	160	200	**250**	315	400	**500**
L_n dB	67	67	67	67	67	67	66	65
Frequency Hz	630	800	**1000**	1250	1600	**2000**	2500	3150
L_n dB	64	63	62	59	56	53	50	47

* The values underlined in Tables 1 and 2 are the centre frequencies for octave band measurements.

5. METHOD OF COMPARISON

To compare the measured values the appropriate reference curve is shifted in steps of 1 dB towards the measured curve until the most severe of the following conditions is satisfied :

(*a*) the mean unfavourable deviation, computed by dividing the sum of the unfavourable deviations by the total number of measuring frequencies, is greater than + 1 dB but not more than 2 dB; or

(*b*) the mean unfavourable deviation is less than 2 dB and the maximum unfavourable deviation at any frequency does not exceed 8 dB for measurements in 1/3 octave bands or 5 dB for measurements in octave bands.

NOTES

1. An unfavourable deviation occurs at a particular frequency when, for airborne sound insulation, the measured value is less than the comparison value and when, for impact sound level, the measured value exceeds the comparison value. Only deviations in the unfavourable direction are counted.

2. The mean deviation is intended to account both for inaccuracy of the measuring procedure and for the uncertainty of defining the reference values.

3. The different maximum deviations are introduced because dips and peaks in the measured curve of R' or L_n will be more pronounced for measurements with the 1/3 octave band filters than for those with octave band filters. So it is intended to reduce possible discrepancies between the evaluation of the insulation indices in both cases.

   Such discrepancies are most likely if the 1/3 octave band at 3150 Hz contributes essentially to the mean or even to the maximum deviation because the highest octave band used covers only the frequency range up to 2800 Hz.

   These discrepancies are, however, of minor importance compared with the advantages of including both series of filters and using the frequency range for 1/3 octave filters given in ISO Recommendation R 140.

6. DETERMINATION OF INSULATION INDICES

The airborne sound insulation index I_a and the impact sound index I_i are defined as the values of the shifted reference curves at 500 Hz.

NOTE. – Another determination of the same rank order may be made by taking the values given in Tables 1 and 2 as the zero of references and evaluating quantities ΔI_a and ΔI_i. These are the amounts in decibels which the reference curves need to be shifted in order just to satisfy the deviation requirements given in section 5 (above). The values of ΔI_a and ΔI_i are positive when the reference curves have to be shifted in the favourable directions. The quantity ΔI_a is, for the purpose of this ISO Recommendation, called the *airborne insulation margin* and is denoted by M_a given by

$$M_a = \Delta I_a = I_a - 52 \text{ dB}$$

similarly the quantity $-\Delta I_i$, is called the *impact protection margin* and is denoted by M_i which is given by

$$M_i = -\Delta I_i = -(I_i - 65) \text{ dB}$$

7. STATEMENT OF RESULTS

When an evaluation is made using the method described, the value of the insulation indices I_a or I_i or the margins M_a or M_i should be given. The number of measurements made and any other relevant details such as a sketch of the construction including the adjoining structures, should be given in the report. It is preferable that the result of measurements be given in the form of a diagram (as well as in the form of the indices) which should include the curves of Figures 1 and 2 respectively and be presented in the way specified in ISO Recommendation R 140.

The name of the testing authority and the date of the test should also be given.