SP REPORT
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Measurement of sound reduction index in the laboratory according to SS-EN ISO 140/3:95

(2 encl.)

Test objects

Isoflex insulation material type ISOFLEX/MONIFLEX made of 37,5 µm cellulose diacetate in layers with a thickness of 40 and 60 mm respectively. The mass per square metre was 0,52 kg/m² and 0,81 kg/m² respectively. The insulation material arrived at SP on February 12, 1998.

The measurements have been made as a comparison measurement with and without insulation in a wall. The wall was made of 0.7 mm steel plate on both sides of a wooden stud. The plates were screwed on the wooden stud with a centre distance of 200 mm. An assembly drawing of the mounting can be seen in the figure on page 4.

Date of test

February 18, 1998

Results

The sound reduction index R, the weighted sound reduction index in the laboratory R_w, and the average sound reduction index R_{mean} are stated in the encl. 1-2. On the graph sheets, under the R_w-value, the additional spectrum adaptation terms C and C_{tr} in accordance with SS-EN ISO 717-1:96 are given as well. A summary of the test results is given on page 2.

Test objects	R_w (dB)	Encl
0,7 mm steel plate + as described below + 0,7 mm steel plate. The steel plates were screwed on the wooden stud with a centre distance of 200 mm.		
- 40 mm ISOFLEX/MONIFLEX	28	01
- 40 mm air gap	25	01
- 60 mm ISOFLEX/MONIFLEX	30	02
- 60 mm air gap	27	02

Table 1. A summary of the test results.

Measurement method

The measurements have been carried out according to the Swedish and international standard SS-EN ISO 140-3:1995. The sound reduction index R has been determined according to

$$R = L_1 - L_2 + 10 \lg (S/A)$$

where
L_1 is the average sound pressure level in the source room (dB),
L_2 is the average sound pressure level in the receiving room (dB),
S is the area of the test specimen (m^2) and
A is the equivalent absorption area of the receiving room (m^2).

The average sound pressure levels have been determined by using a rotating microphone boom (radius >1,1 m) and a digital frequency analyzer. A continuously moving loudspeaker has been used in the source room. During the measurement time of 128 s, the loudspeaker has moved up and down along a line across the room.

Evaluation

The results have been evaluated regarding the weighted sound reduction index, R_w, according to the Swedish and international standard SS-EN ISO 717-1:96.

In the enclosures, R_w and the additional spectrum adaptation terms ($C;C_{tr}$) according to SS-EN ISO 717-1:96 are given. The spectrum adaptation terms are calculated in the 1/3 octave bands 100-3150 Hz and shall be added to the R_w values to obtain a summary value based on other noise spectra. C is relevant for spectrum of A-weighted pink noise and C_{tr} is relevant for spectrum of A-weighted urban traffic noise according to NT ACOU 061 and SS-EN ISO 717-1:96. $C_{50\text{-}5000}$ and $C_{tr,50\text{-}5000}$ are the corresponding terms calculated for the frequency range 50-5000 Hz. The average reduction index R_m is the arithmetic average value of R for the 16 1/3 octaves 100-3150 Hz.

Measurement uncertainty

The measurement uncertainty according to ISO 140/2:91, expressed as the reproducibility *R*, is given below. In a single frequency band, the difference between two single results on identical test material reported by two laboratories should differ by more than the reproducibility value *R* on average not more than once in 20 cases in the normal and correct operation of the method. The repeatability during measurements in the same laboratory is normally much better (in accordance with ISO 140/2:91).

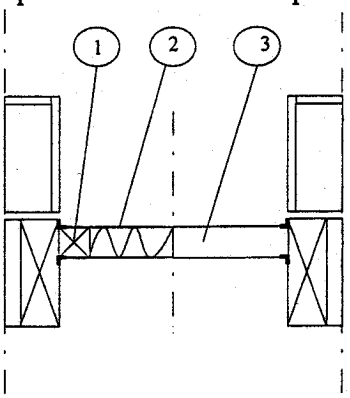
1/3 octave band centre frequency (Hz)	Reproducibility (dB)
100	9
125	8,5
160	6
200	5,5
250	5,5
315	4,5
400	4,5
500	4
630	3,5
800	3
1000	2,5
1250	3
1600	3,5
2000	3,5
2500	3,5
3150	3,5

Test room

The airborne sound reduction laboratory for doors and windows, where the volumes of the source and receiving rooms are 106 m³ and 129 m³ respectively, was used as test room. The test opening constituted 9 % and 7 % of the area of the partition wall seen from the source and receiving room respectively. The distance to the floor and the nearest wall was 0,1 m and 2,3 m respectively. The temperature during the test was 20°C ± 0.5°C.

Mounting

The steel plates were screwed on the wooden stud according to the picture below. The space between the steel plate and the test opening was sealed with tape.



1. Wooden studs
2. Steel plate 0.7 mm
3. Isoflex/Moniflex and air gap respectively.

Figure 1. The figure shows the assembly drawing of the mounting. Horizontal section.

List of instruments

Microphones	Norsonic	1230	0055	(source room)
		1230	0026	(receiving room)
Microphone preamplifiers	Brüel & Kjær	2619	970886	(source room)
		2619	970948	(receiving room)
Microphone power supplies	Brüel & Kjær	2801	618956	(source room)
		2804	1854132	(receiving room)
Microphone booms	Brüel & Kjær	3923	1419759	(source room)
		3923	9112304	(receiving room)
Parallel analyzer	Norsonic	830	10765	
Calibrator	Brüel & Kjær	4230	1410946	
Computer	"Luftljud"			
Loudspeaker	HGT4			
Power amplifier	Lab gruppen	LAB 2000		

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