

TEST REPORT NO. RTE10537/99

Determination of impact sound insulation

Tuplex

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Task **Determination of impact sound insulation**

Sample Parquet underlay was delivered by the customer for impact sound insulation measurements with parquet strips. The following information of the sample was reported by the customer:

Name: TUPLEX

Type: 3 mm parquet underlay - expanded polystyrene grains 2-4 mm between plastic foils

Manufacturer: Tupler Oy, Finland

Parquet strips: 14 mm oak

- width x height:	188 x 2526 mm
- area:	12 m ²
- mass per unit area:	7.7 kg/m ²

Mounting and measuring

VTT glued the parquet strips according to the manufacturers instruction together to accomplish a floating floor, which was mounted on to the concrete testing slab. The parquet underlay was mounted below the parquet strips. Weights (1 200 kg = 100 kg/m²) were lied on the sample during the measurements. The tapping machine was situated on 10 different measurement locations. The impact sound pressure levels were measured in the reverberation room below the test floor using moving microphones. After removing the sample, the same measurements were made again on the bare concrete floor.

The sample was received: 17 March 1998
 Gluing of parquet strips (PVAC glue): 17 March 1998
 Loading and measurement: 20 March 1998

Methods and equipment

The normalized impact sound pressure level L_n and the reduction of sound pressure level (improvement of impact sound insulation) ΔL were measured according to the standards *ISO 140-6:1998* [1] and *ISO 140-8:1997* [2]. The single-number quantity for the sample ΔL_w is calculated according to *ISO 717-2:1996* [3].

The construction thicknesses of the concrete walls and floors of the reverberation room are 0.25 m. The floor dimensions are 4.70 m and 5.80 m and the height is 3.70 m. The volume is 102 m³. The dimensions of the concrete test slab are 3.00 m and 4.00 m and thickness is 190 mm.

In the standard the recommended thickness of the test slab is 100-160 mm and the uniformly distributed load is 20-25 kg/m² [2].

Measuring equipment:

Condenser microphone	B&K (Brüel&Kjær) 4166
Microphone preamplifier	B&K 2639
Rotating microphone boom	B&K 3923
Power amplifier	Yamaha MX-1000
Loudspeakers	Sinmarc V121L
Real-time analyser	Norsonic 830
Sound calibrator	B&K 4220
Tapping machine	B&K 3204

Results

The reduction of impact sound pressure level ΔL in third octave bands are shown in Appendix 1. The weighted reduction of impact sound pressure level ΔL_w is 18 dB.

The measured improvement values in third octave bands have been subtracted from impact sound levels of some typical concrete bare floors in practice: three massive concrete slabs and three hollow core slabs. The sound level values of the concrete floors are given in Finnish sound isolation instructions [4].

The weighted normalized impact sound indices $L'_{n,w}$ were calculated for floor slabs (when the floating sample is in place) according to the standard *ISO 717-2:1996*.

The weighted normalized impact sound pressure levels $L'_{n,w}$ for different types of the slabs and the weighted reduction of impact sound pressure level ΔL_w are presented in Table 1.

These results are based on tests made with a standardised tapping machine in laboratory conditions.

The results of the measurement are valid only for the measured sample.

Table 1. The weighted reduction of impact sound pressure level ΔL_w and the approximated weighted normalized impact sound pressure level $L'_{n,w}$ for concrete slabs 160, 190 and 210 mm and for hollow core slabs 250-300, 300-375 and >375 kg/m². The hollows have a circle or slightly elliptical shape. The volume of the room below the test floor is at most 50 m³.
ISO 140-6:1998, ISO 140-8:1997 and ISO 717-2:1996.

slab	160/190/210 ML	250/300/375 OL	
	$L'_{n,w}$	$L'_{n,w}$	ΔL_w
floor covering	[dB]	[dB]	[dB]
Parquet 14 mm and parquet underlay: Tuplex (load 100 kg/m ²)	56/54/53	56/54/52	18

Espoo, 31 December 1999



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References

- [1] ISO 140: Acoustics - Measurement of sound insulation in buildings and of building elements - Part 6:1998: Laboratory measurements of impact sound insulation of floors
- [2] ISO 140 - Part 8:1997: Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor
- [3] ISO 717: Acoustics - Rating of sound insulation in buildings and of building elements - Part 2:1996: Impact sound insulation
- [4] Suomen Rakentamismääräyskokoelma: C5 - Ääneneristys - Ohjeet 1985

Appendix 1

Results of the measurement

Distribution

Customer
VTT

2 Originals
Original

Product:
Manufacturer:

Parquet 14 mm and parquet underlay Tuplex
Tuplex: Tupler Oy, Tampere

Reduction of impact sound pressure level

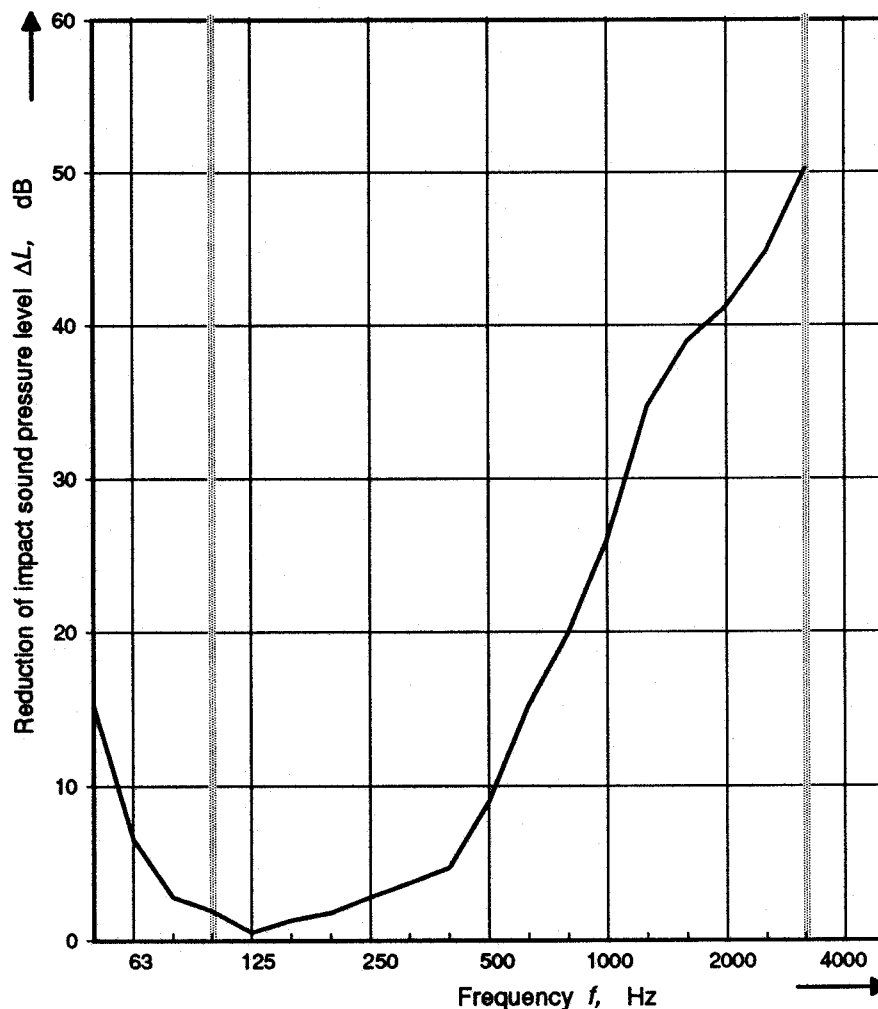
Measurement: ISO 140-8:1997 ENISO1408:1997
Rating: ISO 717-2:1996 ENISO7172:1996

Date of test: 20 March 1998
Test slab: Concrete 190 mm

Mass per unit area: kg/m²
Curing time: h
Air temp. in the source room: 20 °C
Air humidity in the source room: 19 %
Receiving room volume: 101 m³

Frequency range for rating according to ISO 717-2

frekvens <i>f</i> Hz	<i>L_{n,p}</i> Test slab 190 mm dB	ΔL One-third octave dB
50	69.3	15.3
63	59.1	6.6
80	58.4	2.8
100	59.5	1.9
125	62.7	0.5
160	66.6	1.3
200	67.2	1.8
250	70.4	2.8
315	70.6	3.7
400	70.4	4.7
500	72.3	9.0
630	72.8	15.2
800	70.7	19.9
1000	70.4	26.1
1250	71.0	34.7
1600	71.0	38.9
2000	71.0	41.2
2500	71.3	44.8
3150	70.2	50.2
4000		
5000		



Rating according to ISO 717-2:

$\Delta L_w = 18$ dB;

$C_{Lr,50-2500} = 0$ dB

These results are based on tests made with a tapping machine under laboratory conditions.

