

TFI-Report 23-001001-01

Impact Sound Insulation

Customer Forbo Flooring B.V.
Industrieweg 12
1566 JP Assendelft
NL

Product Marmoleum 2.5 mm

This report includes 9 pages.



Aachen, 18.09.2023

Dr. Andreas Zoëga
Head of Testing Laboratory



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This report only applies to the tested samples and has been established to the best of our knowledge. Only the entire report shall be reproduced. Under no circumstances, extracts shall be used. Furthermore, we apply the "General Terms and Conditions for the Execution of Contracts" of the TFI Aachen GmbH, also with regard to the order execution.

The test result does not include any addition or deduction for uncertainties due to measurement, sample preparation, sample collection and production tolerances.



1 Transaction

Order date	06.09.2023
Order number	23-001001 - AB2300752
Your reference	K. Hoogland
Product designation	Marmoleum 2.5 mm
Charge	61647
Item number	3860
TFI sample number	2301449
Date of sample receipt	13.09.2023

Test order:

Impact sound insulation according to EN ISO 10140 ^a

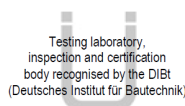
a ... Die mit a gekennzeichnete Prüfung basiert auf nach EN ISO/IEC 17025 akkreditierten Prüfungen./The test marked a are based on tests accredited in accordance with EN ISO/IEC 17025.

Responsible at TFI:

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Notified Body
No. 1656



Testing laboratory,
inspection and certification
body recognised by the DIBT
(Deutsches Institut für Bautechnik)



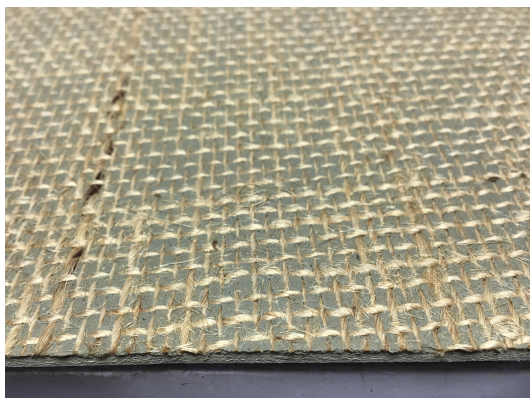
Accredited for the methods indicated in
the partial reports to the DAkkS certificate

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HRB 8157 Aachen
UST-IdNr. DE209411312
Managing Director
Dr. Jacqueline Lemm

2 Product description

TFI sample number 2301449



Total thickness in mm * 2,50
Total mass per unit area in g/m² *keine Angabe/not specified

*Angabe des Auftraggebers/Customer Information

3 Results

Impact sound insulation $\Delta L_w = 5 \text{ dB}$

The measurement results are evaluated without consideration of the measurement uncertainty with reference to compliance with limit values, unless otherwise specified by the test standard.

4 Partial Reports

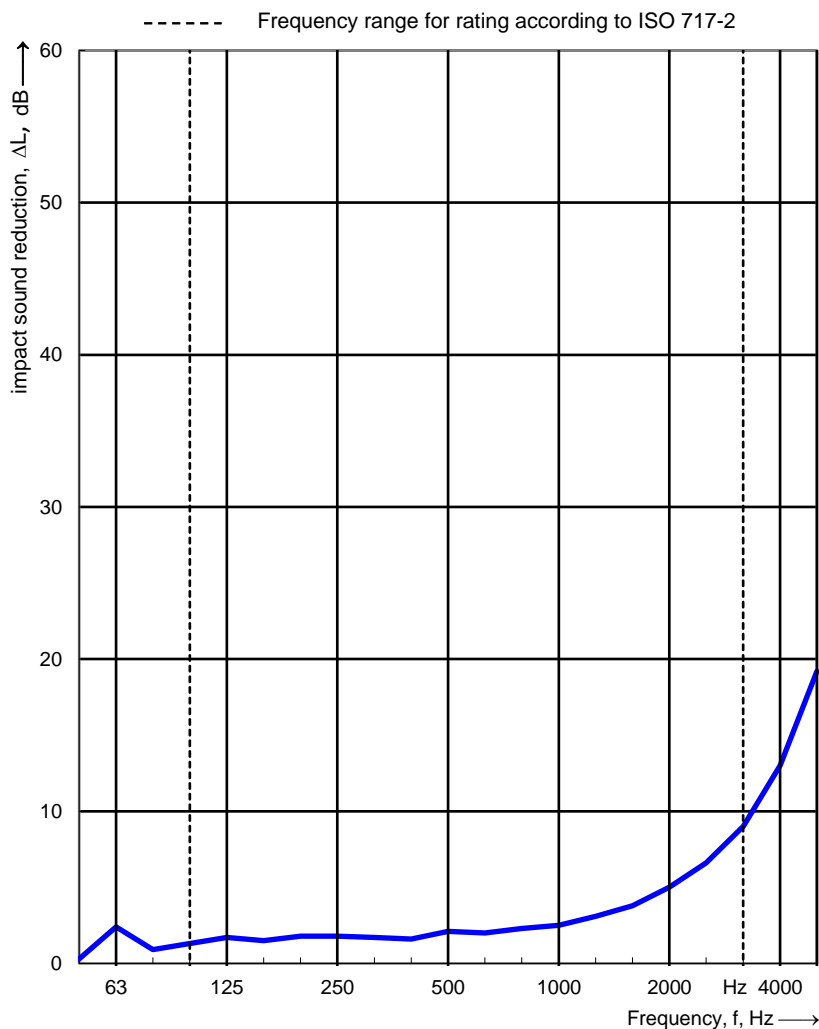
Impact sound insulation according to EN ISO 10140

Partial Report – Impact sound insulation according to EN ISO 10140-3

Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight reference floor

TFI sample number: 2301449 Testing period: 15.09.2023
 Installed by: TFI Aachen GmbH Installation: 15.09.2023
 Size of test area: 1 m²
 Category: I
 Connection with the floor: loosely laid
 Construction: -
 (if multi-parted;
 from top to bottom)

Frequency f [Hz]	L _{n,0} 1/3 oct. [dB]	ΔL 1/3 oct. [dB]
50	52,7	0,3
63	60,0	2,4
80	58,9	0,9
100	59,7	1,3
125	62,6	1,7
160	68,9	1,5
200	68,4	1,8
250	69,8	1,8
315	67,8	1,7
400	69,3	1,6
500	70,9	2,1
630	69,9	2,0
800	70,5	2,3
1000	70,3	2,5
1250	71,4	3,1
1600	71,7	3,8
2000	71,9	5,0
2500	71,4	6,6
3150	71,1	9,0
4000	70,1	13,0
5000	68,0	19,2



Evaluation according to ISO 717-2
 $\Delta L_w = 5 \text{ dB}$ $\Delta L_{in} = 2 \text{ dB}$ $C_{i,\Delta} = -3 \text{ dB}$ $C_{i,r} = -8 \text{ dB}$
 The results are based on measurements, which were performed under laboratory conditions with artificial excitation (standard procedure).
 Measurements in one-third octaves.

Impact sound insulation according to EN ISO 10140-3

Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight reference floor

Evaluation according to ISO 717-2

$$\Delta L_w = 5 \text{ dB}$$

$$C_{i,\Delta} = -3 \text{ dB}$$

$$C_{i,r} = -8 \text{ dB}$$

The results are based on measurements, which were performed under laboratory conditions with artificial excitation (standard procedure).
Measurements in one-third octaves.

Weighted normalized impact sound pressure level $L_{n,0,w} = 78 \text{ dB}$

Weighted normalized impact sound pressure level $L_{n,w} = 72 \text{ dB}$

Frequency [Hz]	ΔL [dB]	$L_{n,0}$ [dB]	L_n [dB]
50	0,3	52,7	52,4
63	2,4	60,0	57,6
80	0,9	58,9	58,0
100	1,3	59,7	58,4
125	1,7	62,6	60,9
160	1,5	68,9	67,4
200	1,8	68,4	66,6
250	1,8	69,8	68,0
315	1,7	67,8	66,1
400	1,6	69,3	67,7
500	2,1	70,9	68,8
630	2,0	69,9	67,9
800	2,3	70,5	68,2
1000	2,5	70,3	67,8
1250	3,1	71,4	68,3
1600	3,8	71,7	67,9
2000	5,0	71,9	66,9
2500	6,6	71,4	64,8
3150	9,0	71,1	62,1
4000	13,0	70,1	57,1
5000	19,2	68,0	48,8

Receiving room:

Volume: 62,5 m³

Air temperature: 22,3 °C

Relative air humidity: 53,8 %

Air pressure: 99,9 kPa

Sending room:

Volume: 51,4 m³

Air temperature: 22,7 °C

Relative air humidity: 53,1 %

Type of reference floor: Heavyweight

Remarks:

-

TFI sample number: 2301449

Rev 2

Procedure description – Impact sound insulation according to EN ISO 10140

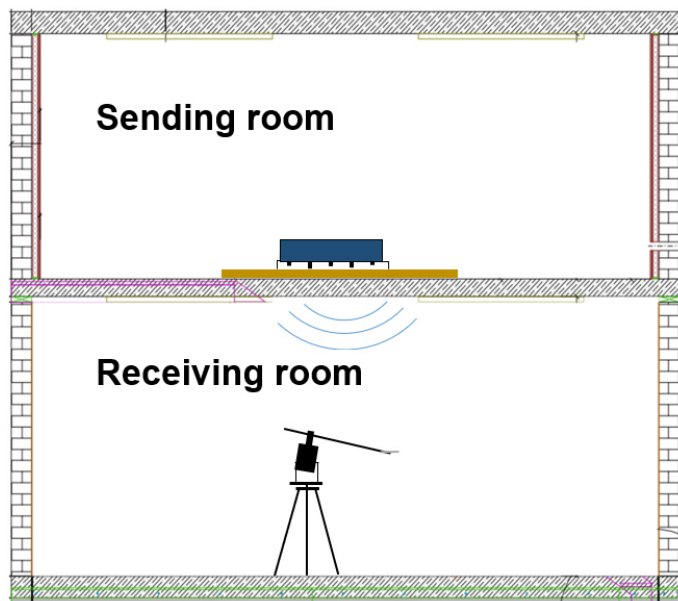
1 Test method / Requirements

EN ISO 10140-1:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
EN ISO 10140-3:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurement of impact sound insulation
EN ISO 10140-4:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
EN ISO 10140-5:2021	Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment
EN ISO 717-2:2020	Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation
ISO 12999-1:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 1: Sound insulation

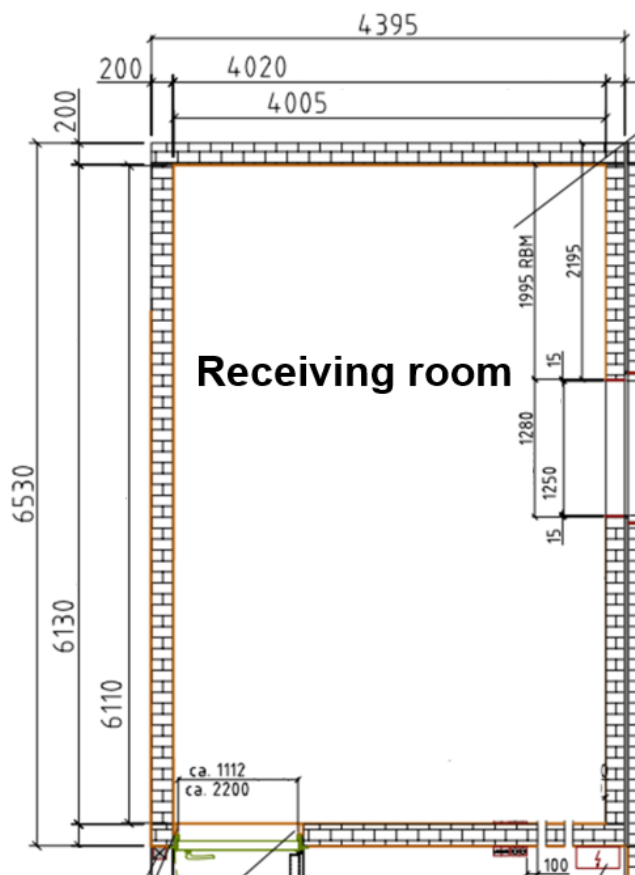
2 Laboratories

Test rooms:	TFI Aachen GmbH, Charlottenburger Allee 41, 52068 Aachen
Sending room (BAL1):	Room volume $V = 5,96 \text{ m} \times 3,85 \text{ m} \times 2,24 \text{ m} = 51,40 \text{ m}^3$ (cuboid room with absorbent cladding)
Receiving room (BAL2):	Room volume $V = 6,11 \text{ m} \times 4,01 \text{ m} \times 2,55 \text{ m} = 62,48 \text{ m}^3$ (cuboid room)
Reference floor:	$S = 5,96 \text{ m} \times 3,85 \text{ m} = 22,95 \text{ m}^2$ 16 cm concrete slab floor with an area-related mass of $m' \approx 384 \text{ kg/m}^2$ Elastically mounted to suppress flank transmission.
Flanking walls:	Walls in the sending room with acoustic facing shell to suppress flank transmission.

Profile:



Plan view receiving room:



3 Measuring devices

Real-time analyzer:	1 Norsonic Nor140
Microphone:	2 Norsonic Type1209
Loudspeaker:	1 Norsonic Nor229
Tapping machine:	1 Norsonic Nor277 (standard tapping machine with 3 feet and 5 hammers according to ISO 10140)

4 Measuring operation

Impact sound pressure level: 4 microphone positions with 2 tapping machine positions each

5 Evaluation

The impact sound pressure level generated by the standard tapping machine is measured in the receiving room under a bare heavy floor with and without a floor covering. The impact sound reduction is determined on the basis of the measured values as follows:

$$\Delta L = L_{n,0} - L_n \text{ [dB]}$$

$L_{n,0}$ Impact sound pressure level without a floor covering [dB]

L_n Impact sound pressure level with a floor covering [dB]

For the evaluation of the weighted reduction in impact sound pressure level ΔL_w , the relevant reference curve is shifted in increments of 1 dB towards the measured curve until the sum of unfavourable deviations is as large as possible, but not more than 32 dB.

The linear impact sound level ΔL_{lin} is determined according to the following equation:

$$\Delta L_{lin} = L_{n,r,0,w} + C_{l,r,0} - (L_{n,r,w} + C_{l,r}) = \Delta L_w + C_{l,\Delta}$$

$L_{n,r,w}$ the calculated weighted normalized impact sound pressure level of the reference floor with the floor covering under test

$L_{n,r,0,w}$ 78 dB, calculated from $L_{n,r,0}$ according to section 4.3.1 of EN ISO 717-2

$C_{l,r}$ Spectrum adaptation term for the reference floor with the floor covering to be tested

$C_{l,r,0}$ -11 dB, spectrum adaptation term for the reference floor with $L_{n,r,0}$ determined according to A.2.1 EN ISO 717-2

6 Note

The results are based on measurements performed under laboratory conditions with artificial excitation (standard procedure). The test results are applicable in due consideration of the national provisions and the local circumstances and/or constructions.