

Test Report No.: A-2021-210-01



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The accreditation is valid for the test procedures listed in the annex of the certificate D-PL-11217-01-01.

Test Order: Laboratory measurement of impact sound insulation of building elements according DIN EN ISO 10140-3:2015-11
Measurement of sound absorption in a reverberation room according DIN EN ISO 354:2003-12

Order date: 20.04.2021

Sample description: textile floor covering
E FORCE comfortBack

Number of samples: N/A

Sampling: by client

Sample receipt: 16.04.2021

Test period: 21.04.2021 - 26.04.2021

Aachen, 17.05.2021

A handwritten signature in black ink, appearing to read "A. Siebel".

i.V. Dr.-Ing. Alexander Siebel
Laboratory Manager

A handwritten signature in black ink, appearing to read "P. Thomas".

i.A. Patrick Thomas M.Eng
Test engineer

The test results relate only on the items tested. Without the written approval of the testing laboratory, a duplication in extracts of the test report is not permitted.

1 Product Description

Product Description

* customer information

Position	Description	Thickness [mm]	Weight [g/m ²]
1	E FORCE comfortBack	11,7*	4900*

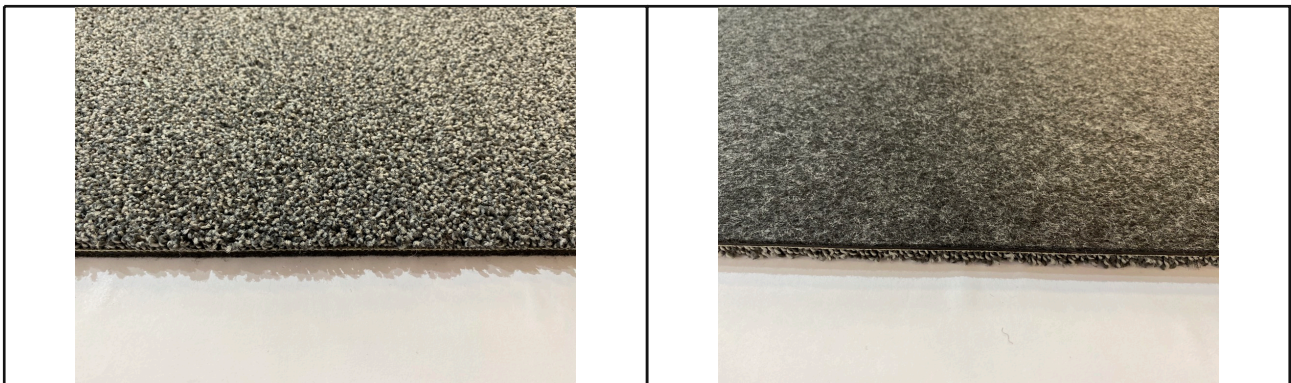


Illustration / drawing for sample assembly

2 Scope of testing / Annexes

No	Annex	Designation	Standard	Pages general	Pages evaluation
1	SA	Sound Absorption in Reverberation Rooms	DIN EN ISO 354:2003-12	1	1
2	TS	Impact Sound Insulation	DIN EN ISO 10140-3:2015-11	2	1

General Annex SA for Measurement of sound absorption in reverberation rooms

1 Test stand description

Test rooms:	Laboratory of Kiwa GmbH, Hauptstraße 133, 52477 Alsdorf
Test method:	reverberation room method
Volume:	211 m ³
Total surface:	213 m ²
Floor plan:	trapezoidal
Reflectors:	6 aluminium plates 1.0 m x 2.0 m 7 plywood boards 1.5 m x 1.3 m 1 aluminium plate 1.8 m x 0.9 m
Test noise:	broadband pink noise
Receive filter:	third octave band filter
Measurement:	2 loudspeaker positions 6 microphone positions

2 Evaluation

The decay curves are determined using the interrupted noise method. Several decay curves measured at one microphone and/or loudspeaker position are averaged in order to reach a sufficient reproducibility. The reverberation time of the room is expressed by the arithmetic mean derived from the total number of all reverberation time measurements in each frequency band.

The equivalent sound absorption area of the test specimen AT is calculated as the difference between the equivalent sound absorption area of the reverberation room with test specimen A2 and the equivalent sound absorption area of the empty reverberation room A1 without test specimen.

The equivalent sound absorption coefficient α_s describes the ratio of the equivalent sound absorption area AT of a test specimen divided by the area of the test specimen.

The evaluated sound absorption coefficient α_w is a single-number frequency-independent value which equals the value of the reference curve at 500 Hz after shifting it.

3 Standards

Standard:	title
DIN EN ISO 354:2003 ²	Messung der Schallabsorption in Hallräumen
DIN EN ISO 11654:1997 ²	Schallabsorber für die Anwendung in Gebäuden – Bewertung der Schallabsorption

² german issue

Measurement of sound absorption in reverberation rooms according DIN EN ISO 354:2003-12

Annex SA - α_w

Rating of sound absorption DIN EN ISO 11654:1997-07

Determination and application of measurement uncertainties DIN EN ISO 12999-2:2020-11

Testing period: 21.04.2021

Description: E FORCE comfortBack
(for a construction from top to bottom)

Remarks: -

Type of Mounting: - Type A, the test object is attached directly to a room surface or applied to it

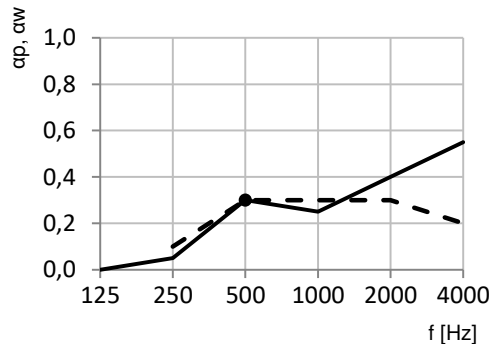
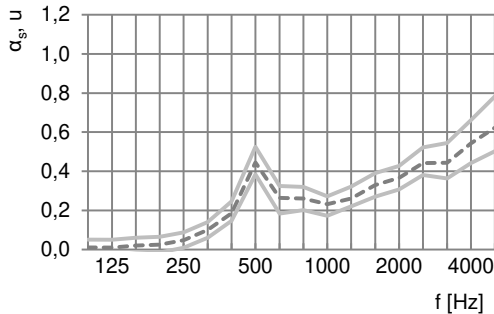
Boundary conditions:	T1	T2
Temperature:	18,6 °C	18,6 °C
Relative humidity:	46,0 %	46,0 %
Surface area:	12,00 m ²	
Room volume:	211 m ³	
Total room area S _r :	213 m ²	

f [Hz]	α_p [-]	$\pm U$ (k=2)	α_s [-]	$\pm U$ (k=2)	A _r [m ²]	$\pm U$ (k=2)	T1 [s]	T2 [s]
50			0,00	\	0,0	\	7,43	7,43
63			0,01	0,04	0,1	0,4	7,75	7,53
80			0,03	0,04	0,3	0,6	9,90	9,05
100			0,01	0,04	0,1	0,4	11,89	11,39
125	0,00	\	0,01	0,04	0,1	0,4	8,27	8,03
160			0,02	0,04	0,3	0,4	6,86	6,53
200			0,02	0,04	0,3	0,4	7,31	6,87
250	0,05	0,04	0,05	0,04	0,6	0,4	6,80	6,09
315			0,10	0,04	1,2	0,4	5,76	4,78
400			0,19	0,06	2,2	0,6	5,71	4,16
500	0,30	0,08	0,44	0,08	5,3	0,8	5,89	3,07
630			0,26	0,06	3,2	0,6	5,85	3,79
800			0,26	0,06	3,1	0,6	5,88	3,82
1000	0,25	0,08	0,23	0,04	2,8	0,6	5,36	3,73
1250			0,26	0,06	3,1	0,6	5,37	3,60
1600			0,33	0,06	4,0	0,6	5,10	3,21
2000	0,40	0,08	0,37	0,06	4,4	0,8	4,80	2,96
2500			0,44	0,08	5,3	0,8	4,24	2,56
3150			0,44	0,10	5,3	1,0	3,35	2,20
4000	0,55	0,10	0,54	0,12	6,5	1,2	2,69	1,78
5000			0,62	0,16	7,5	1,6	1,99	1,39

α_p : practical sound absorption coefficient
 α_s : sound absorption coefficient
A_r: Equivalent sound absorption area of the sample
T1: Reverberation time in the empty reverberation room
T2: Reverberation time in the reverberation room with sample
U: Expanded measurement uncertainty (k=2)

Diagram:

- α_s
- _____ U
- _____ α_p
- - - - - Shifted reference curve
- α_w



Weighted sound absorption coefficient Expanded measurement uncertainty U

$\alpha_w = 0,30$ (H)

+/- 0,07 (k=2)

according DIN EN ISO 11654:1997-07

according DIN EN ISO 12999-2:2020-11

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General Annex TS for laboratory impact sound tests

1 Test stand description

Test rooms:	Laboratory of Kiwa GmbH, Hauptstraße 133, 52477 Alsdorf
Sending room:	4,27 m x 4,45 m x 2,74 m; V = 52,1 m ³ (cubic, with diffusers)
Receiving room:	3,95 m x 4,08 m x 3,33 m; V = 53,6 m ³ (cubic, with diffusers)
Reference ceiling:	4,27 m x 4,45 m; S = 19 m ² 14 cm concrete solid plate ceiling with an area-related mass $m' \approx 322 \text{ kg/m}^2$
Flanking walls:	lime sand brick walls with light weighting facing shells (d = 12cm) with a medium area-related mass of $m' \approx 330 \text{ kg/m}^2$

2 Analysis

The impact sound levels generated by the standardized tapping machine are measured in the receiving room under a solid ceiling without and with a textile floor covering. From the measured values the reduction of impact sound pressure is calculated as follows:

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

$$L_{n,0} = \text{Impact sound level without floor covering in dB}$$

$$L_n = \text{Impact sound level with floor covering in dB}$$

To determine the weighted impact sound reduction the applicable reference curve is shifted in 1 dB steps into the measured curve so that the sum of the most unfavorable deviations corresponds as close as possible to the value of 32 dB without exceeding this value.

The linear impact sound level ΔL_{lin} you can calculate after the following equation:

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

$L_{n,r,w}$ the calculated weighted norm impact sound level of the cover blanket with the blanket edition to be checked is.

$L_{n,r,0,w}$ 78 dB, investigates $L_{n,r,0}$ to 4.3.1 DIN EN ISO 717-2:2021-05.

$C_{I,r}$ Spectrum customization value.

$C_{I,r,0}$ Spectrum customization value.

2.1 Test Standards

Standard: (Issue)	Title
DIN EN ISO 10140-1:2016-12	Akustik – Messung der Schalldämmung von Bauteilen im Prüfstand – Teil 1: Anwendungsregeln für bestimmte Produkte
DIN EN ISO 10140-2:2010-12	Akustik – Messung der Schalldämmung von Bauteilen im Prüfstand – Teil 2: Messung der Luftschalldämmung
DIN EN ISO 10140-3:2015-11	Akustik – Messung der Schalldämmung von Bauteilen im Prüfstand – Teil 3: Messung der Trittschalldämmung
DIN EN ISO 10140-4:2010-12	Akustik – Messung der Schalldämmung von Bauteilen im Prüfstand – Teil 4: Messverfahren und Anforderungen
DIN EN ISO 10140-5:2014-09	Akustik – Messung der Schalldämmung von Bauteilen im Prüfstand – Teil 5: Anforderungen an Prüfstände und Prüfeinrichtungen

2.2 Evaluation Standards

Standard: (Issue)	Title
DIN EN ISO 717-2:2021-05 ²	Akustik – Bewertung der Schalldämmung in Gebäuden und von Bauteilen – Teil 2: Trittschalldämmung
DIN EN ISO 12999-1:2021-04 ²	Akustik - Bestimmung und Anwendung der Messunsicherheiten in der Bauakustik - Teil 1: Schalldämmung
ASTM E989 – 18 ³	Standard Classification for Determination of Single-Number Metrics for Impact Noise
ASTM E2179 - 03(2016) ³	Standard Test Method for Laboratory Measurement of the Effectiveness of Floor Coverings in Reducing Impact Sound Transmission Through Concrete Floors

² german issue

³ american issue

3 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.

**Laboratory measurement of Impact sound insulation according to
DIN EN ISO 10140-3:2015-11**

Annex TS - ΔL_w

Evaluation according DIN EN ISO 717-2:2021-05

Measurement uncertainty according DIN EN ISO 12999-1:2021-04

Date of test: 26.04.2021

Construction: E FORCE comfortBack
(from top to bottom)

Remarks: -

Installation: by the testing institute

Receiving room:

Volume: 53,6 m³

Sending room:

Volume: 52,1 m³

Air temperature: 18,5 °C

Relative air humidity: 35,2 %

Boundary conditions:

Tapping Machine positions: 4

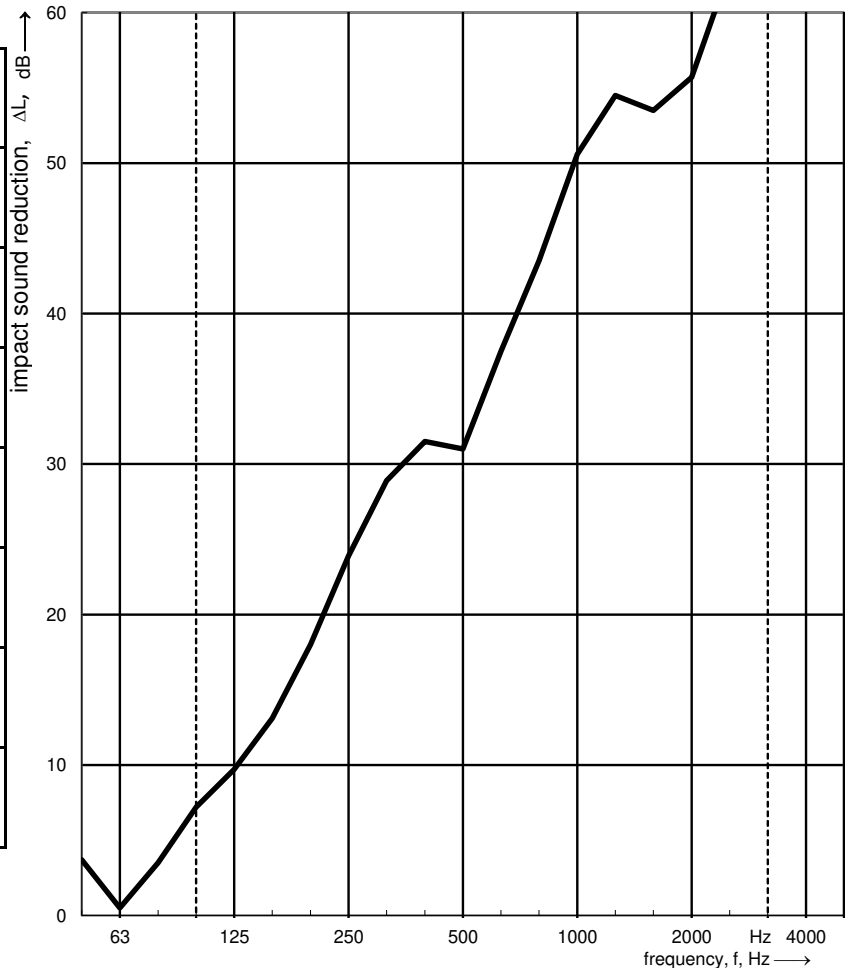
Microphone positions: 4

Category / sample area: 1 / ~1 m²

Type of reference floor: heavyweight

----- Frequency range for rating according to DIN EN ISO 717-2:2021-05

Frequency f [Hz]	$L_{n,0}$ 1/3 oct. [dB]	ΔL 1/3 oct. [dB]	U 1/3 oct. [dB]
50	61,5	3,7	± 1,4
63	58,3	0,5	± 1,3
80	58,0	3,5	± 1,2
100	59,2	7,2	± 1,1
125	60,5	9,7	± 1,0
160	61,6	13,1	± 1,0
200	63,6	18,0	± 1,0
250	67,1	23,9	± 1,0
315	64,6	28,9	± 1,0
400	63,8	31,5	± 1,1
500	64,5	31,0	± 1,2
630	65,0	37,5	± 1,3
800	66,1	43,5	± 1,6
1000	67,3	50,6	± 1,9
1250	67,5	54,5 ¹	± 2,2
1600	67,5	53,5 ¹	± 2,5
2000	68,1	55,7 ¹	± 2,8
2500	67,8	62,9 ²	± 3,2
3150	68,6	63,2 ²	± 3,6
4000	67,9	62,3 ²	± 4,0
5000	64,9	60,3 ²	± 4,4



¹ Background noise correction

² Measurement limit reached

Evaluation according DIN EN ISO 717-2:2021-05

$\Delta L_w = 32 \text{ dB}$ $C_{l,\Delta} = -13 \text{ dB}$

$\Delta L_{in} = 19 \text{ dB}$ $C_{l,r} = 2 \text{ dB}$

The results are based on measurements, which were performed under laboratory conditions with artificial excitation (standard procedure).

Measurement uncertainty according DIN EN ISO 12999-1:2021-04

$\Delta L_w = (31,8 \pm 1,1) \text{ dB}$ (k = 1, two-sided)

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