

TFI-Report 24-001181-02

Sound Absorption

Report established for Zimmer + Rohde GmbH
Zimmersmühlenweg 14-18
61440 Oberursel (Taunus)
DE

Product 1310

This report includes 8 pages.



Aachen, 13.11.2024

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	12.11.2024
Order number	24-001181 - AB2400940
Product designation	1310
Charge	-
Item number	-
TFI sample number	2401908
Date of sample receipt	22.10.2024

Test order:

Sound absorption in a reverberation room according to EN ISO 354 ^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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2 Product description

TFI sample number 2401908



Total thickness in mm keine Angabe/not specified
Total mass per unit area in g/m² keine Angabe/not specified

*Angabe des Auftraggebers/Customer Information

3 Results

Sound absorption $\alpha_w = 0.70$

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

Sound absorption in a reverberation room according to EN ISO 354

Partial Report – Sound absorption according to EN ISO 354 and EN ISO 11654

Measurement of sound absorption coefficient in a reverberation room

TFI sample number: 2401908 Testing period: 23.10.2024
 Installed by: TFI Aachen GmbH Installation: 23.10.2024

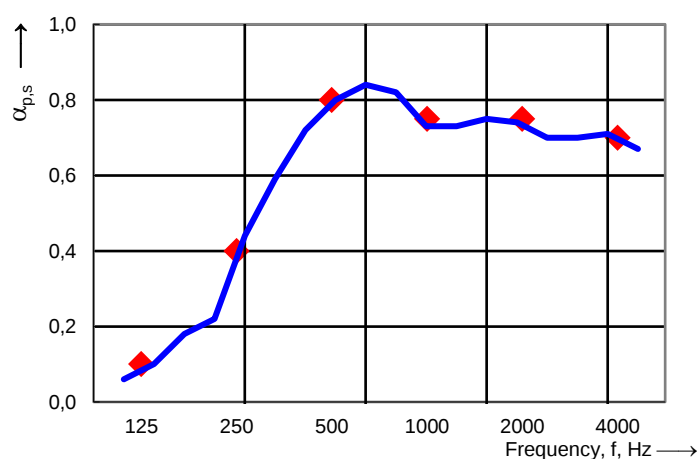
Mounting type: G-200, tested with 20 cm distance parallel to the room surface.
 (ISO 354 Annex B) The sides of the set-up were closed.

Remarks: 150 % gather

Object set-up: -
 (if multi-parted;
 from top to bottom)

Surface area: 12,00 m²
 Room volume: 222,30 m³
 Total room area S_T : 223,60 m²

Frequency f [Hz]	α_p Oktave
100	0,10
125	
160	
200	0,40
250	
315	
400	0,80
500	
630	
800	0,75
1000	
1250	
1600	0,75
2000	
2500	
3150	0,70
4000	
5000	



Weighted sound absorption coefficient according to ISO 11654

$\alpha_w = 0,70$

It is strongly recommended to use this single-number rating in combination with the complete sound absorption coefficient curve.

Sound absorption according to EN ISO 354 and EN ISO 11654

Measurement of sound absorption coefficient in a reverberation room

Weighted sound absorption coefficient according to ISO 11654

$$\alpha_w = 0,70$$

It is strongly recommended to use this single-number rating in combination with the complete sound absorption coefficient curve.

Frequency [Hz]	α_p	α_s		T1 [s]	T2 [s]
50		-0,01		8,35	8,54
63	0,00	0,00		13,36	13,14
80		0,06		12,72	10,10
100		0,06		11,98	9,79
125	0,10	0,10		12,86	9,11
160		0,18		13,73	7,53
200		0,22		14,45	6,95
250	0,40	0,44		14,78	4,64
315		0,59		14,53	3,76
400		0,72		12,95	3,14
500	0,80	0,80		12,57	2,89
630		0,84		12,03	2,75
800		0,82		10,98	2,74
1000	0,75	0,73		9,56	2,88
1250		0,73		8,54	2,77
1600		0,75		7,42	2,60
2000	0,75	0,74		6,39	2,48
2500		0,70		5,24	2,36
3150		0,70		4,27	2,14
4000	0,70	0,71		3,46	1,90
5000		0,67		2,57	1,63

Reverberation room without sample:

Relative humidity: 52,6 %
 Temperature: 18,8 °C
 Barometric pressure: 101,6 kPa

Reverberation room with sample:

Relative humidity: 52,6 %
 Temperature: 18,8 °C
 Barometric pressure: 101,6 kPa

Remarks:

-

TFI sample number: 2401908

Rev 1

Procedure description – Sound absorption in a reverberation room according to EN ISO 354

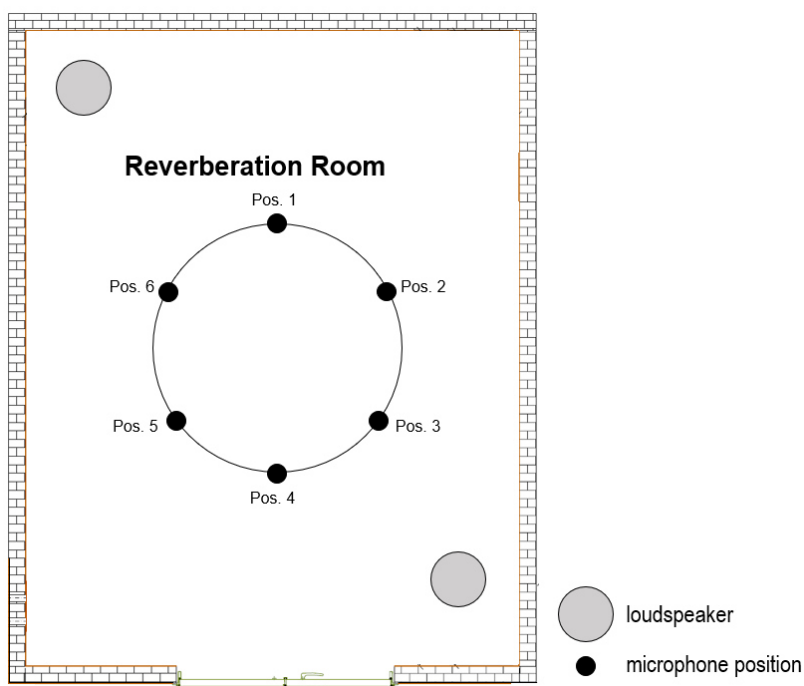
1 Test method / Requirements

EN ISO 354:2003	Acoustics - Measurement of sound absorption in a reverberation room
EN ISO 11654:1997	Acoustics - Sound absorbers for use in buildings - Rating of sound absorption
ISO 12999-2:2020	Acoustics - Determination and application of measurement uncertainties in building acoustics - Part 2: Sound absorption

2 Laboratories

Test rooms:	TFI Aachen GmbH, Charlottenburger Allee 41, 52068 Aachen
Test method:	reverberation room method
Volume:	$V = 7,60 \text{ m} \times 5,91 \text{ m} \times 4,95 \text{ m} = 222,33 \text{ m}^3$
Total surface:	$S_t = 223,60 \text{ m}^2$
Floor plan:	rectangular
Diffusors:	15

Plan of the reverberation room:



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3 Measuring devices

Real-time analyzer:	1 Norsonic Nor140
Microphone:	1 Norsonic Type1209
Loudspeaker:	2 Norsonic Nor229

4 Measuring operation

Test noise:	broadband noise
Receive filter:	one-third octave band filter
Measurement:	2 loudspeaker positions 6 microphone positions

5 Evaluation

The decay curves are determined using the interrupted noise method. A minimum of one decay curve is measured at each of the 6 microphone positions. The decays are averaged for every microphone position to enhance 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 A_T is calculated as the difference between the equivalent sound absorption area of the reverberation room with test specimen A_2 and the equivalent sound absorption area of the empty reverberation room A_1 without test specimen.

The equivalent sound absorption coefficient α_s describes the ratio of the equivalent sound absorption area A_T 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.

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.