

Informationen

zur Zertifizierung des Schallabsorbtionsgrads nach DIN EN ISO 354

Stoff • paris

Farb.-Nr. 418.xx

Zertifikat-Nummer **4024-19-AA-20-PP005**

Bestätigung Die Firma erfal bestätigt, dass dieser Qualität das Zertifikat 4024-19-AA-20-PP005 zugrunde liegt.



Jörg Erler
Geschäftsführer

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Test protocol

4024-19-AA-20-PP005

Procedure: Determination of sound absorption
according to ISO 354

Test item: stage fabric
Polaris



Test protocol

Sound absorption coefficient ISO 354 Measurement of sound absorption in reverberation rooms

Protocol

Protocol no.: 4024 - 19 - AA - 20 - PP005

Tested by (+ signature): Schädlich

C. Schädlich
.....

Approved by (+ signature): Andreis

Andreis
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Date of issue.....: 14.02.2020

Contents: 5 Pages, 1 Appendix

Testing laboratory

Name: SLG Prüf- und Zertifizierungs GmbH

Address.....: Burgstädter Straße 20, 09232 Hartmannsdorf, Germany

Testing location: As above

Client

Name: van Clewe Sun Protection GmbH

Address.....: Loikumer Str. 20

.....: 46499 Hamminkeln-Dingden, Germany

Test specifications

Standard: ISO 354:2003

ISO 11654:1997

Test procedure: Measurement of sound absorption

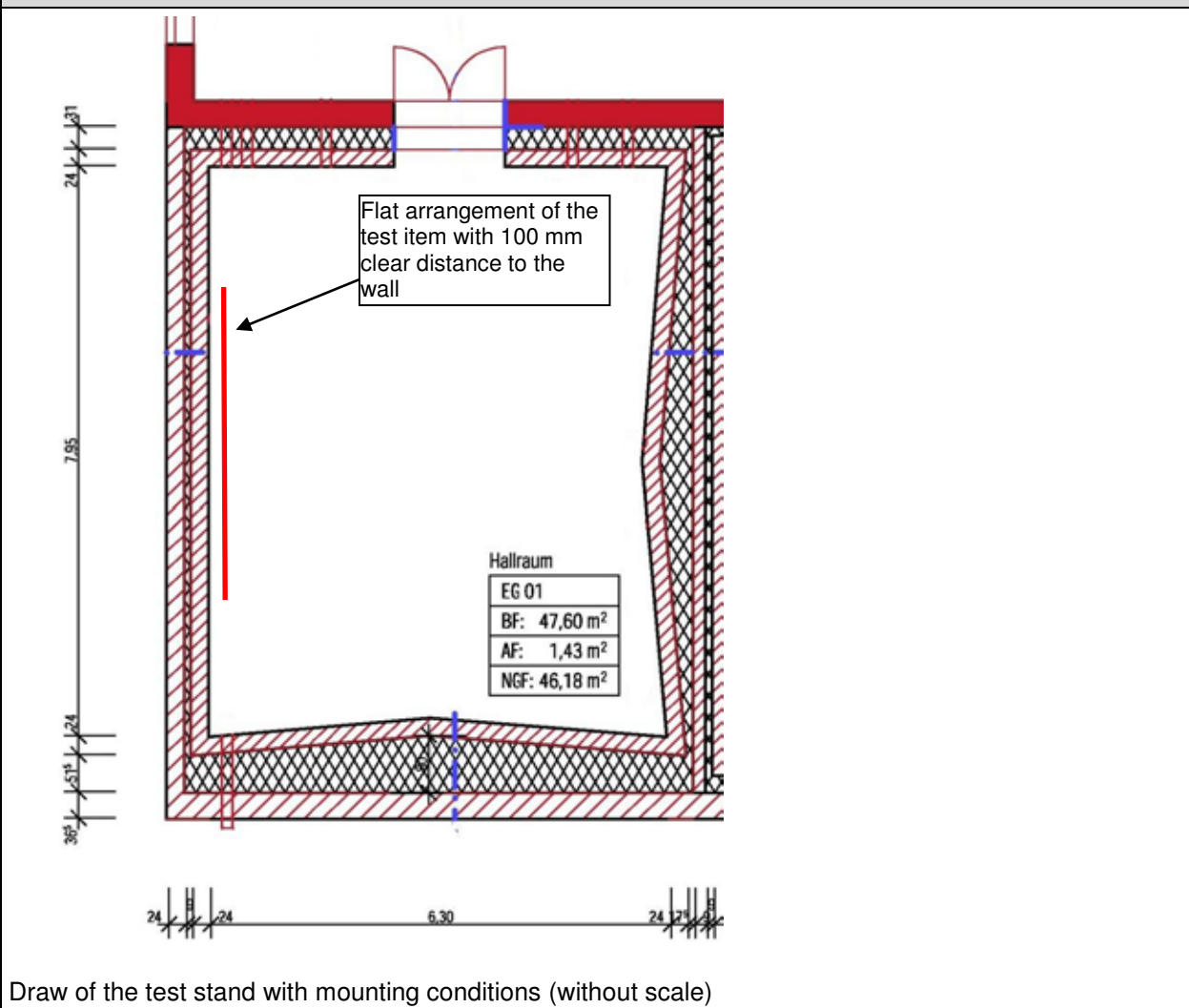
Test item

Name: stage fabric

Results of measurements

| Test item | Weighted sound absorption coefficient | Sound absorption class | Annex |
|------------------|---------------------------------------|------------------------|-------|
| flat arrangement | $\alpha_w = 0,15$ | E | 1.1 |

SKETCH OF MOUNTING CONDITIONS



GENERAL INFORMATION

Testing

Date of performance of tests : 2020-02-06

Place of performance of tests : Reverberation room of the SLG Hartmannsdorf

General remarks

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.

Throughout this report a comma is used as the decimal separator.

CHRONOLOGY OF PROTOCOL

| Protocol / Date | Valid | Version / Change | Editor |
|-------------------------------------|-------|------------------|-----------|
| 4024-19-AA-20-PP005 from 2020-02-14 | Yes | First edition | Schädlich |



SUMMARY OF TESTING

Measuring instruments:

- Multi-Analyser-System HEIM Type Link module HSS610-3001/2R, S.-No.: 051557-072012, MIC6 HS310-0020, S.-No.: 050969-042012, Zodiac Data Systems GmbH, Germany
- Condenser Microphones Type 40HL, S.-No.: 249661, 249662, 249663, 249664, 249665, 249666, G.R.A.S. Sound & Vibration A/S, Denmark
- Acoustic Sound Level Calibrator Type 4231, S.-No.: 3020640, Brüel & Kjær, Denmark, Calibration Certificate 2369-2019-03, D-K-15217-01-00, Landesamt für Mess- und Eichwesen Berlin-Brandenburg, Germany
- Temperature / Humidity measurement module Type FHAD462, S.-No.: 11060021, Ahlborn Mess- und Regelungstechnik, Germany, Calibration Certificate 14953-2018-09, D-K-11055-06-00, Siemens AG, Kalibrierdienst, Fürth, Germany
- Digital Barometer Type GPB 1300, Inv.-No.: 5049, Greisinger electronic, Germany, Calibration Certificate 0033-2019-09, D-K-15110-01-00, SLG Prüf- und Zertifizierungs GmbH, Germany

Basis for measurement:

| | |
|----------------|---|
| ISO 354:2003 | Acoustics - Measurement of sound absorption in a reverberation room |
| ISO 11654:1997 | Acoustics - Sound absorbers for use in buildings - Rating of sound absorption |

Test conditions:

- Mounting (acc. to ISO 354): Type G-100 (test item parallel to the wall)
- Test setup: flat arrangement; clear distance to the wall $d = 10$ cm
- Volume of reverberation room 254,5 m²
- Test positions of test item: 1
- Number of measurements: 36 decay curves
- Test signal: sinusoidal sweep (backward integrated impulse response)
- Frequency range: 100 Hz - 5k Hz (evaluated)
- Climatic conditions: temp.: 22,0 °C; atm. pressure: 988 hPa; humidity: 39,5 %

Determination of sound absorption coefficient α according to ISO 354:

$$\alpha_s = 55,3 \cdot \frac{V}{S} \left(\frac{1}{c_2 T_2} - \frac{1}{c_1 T_1} \right) - 4 \cdot V(m_2 - m_1) \quad \text{Equation (1)}$$

α_s Sound absorption coefficient;

S Area covered by the test item in m²;

V Volume of the empty reverberation room m³;

c_1 propagation speed of sound in air in the reverberation room without test item in m/s;

c_2 propagation speed of sound in air in the reverberation room with test item in m/s;

$$c = (331 + 0,6 \cdot t) \quad \text{Equation (2)}$$

t air temperature in °C

T_1 reverberation time in the reverberation room without test item in s

T_2 reverberation time in the reverberation room with test item in s

m_1 power attenuation coefficient in the reverberation room without test item in 1/m

m_2 power attenuation coefficient in the reverberation room with test item in 1/m

**SUMMARY OF TESTING**

Classification of sound absorber classes according to EN ISO 11654, Annex B

| Sound absorption class | Weighted sound absorption coefficient |
|------------------------|---------------------------------------|
| A | 0,90; 0,95; 1,00 |
| B | 0,80; 0,85 |
| C | 0,60; 0,65; 0,70; 0,75 |
| D | 0,30; 0,35; 0,40; 0,45; 0,50; 0,55 |
| E | 0,25; 0,20; 0,15 |
| Unclassified | 0,10; 0,05; 0,00 |

Form indicators

If the sound absorption level at one or more frequencies is significantly higher than the values of the shifted reference curve, one or more form indicators shall be given in brackets in addition to the weighted sound absorption coefficient α_w .

The following assignment applies:

| | |
|--|------------------|
| Absorption exceeded at 250 Hz | Form indicator L |
| Absorption exceeded at 500 Hz or 1k Hz | Form indicator M |
| Absorption exceeded at 2k Hz or 4k Hz | Form indicator H |

Note

If a form indicator is used, the following sentence should be added to the result:

"It is strongly recommended that this singular rating be used in conjunction with the complete sound absorption curve, which can be obtained on request."



PICTORIAL DOCUMENTATION



Picture 1:
Test item Polaris with flat-arrangement
in the reverberation room



Picture 2:
View of the clear distance to the wall

Sound absorption coefficient ISO 354

Measurement of sound absorption in reverberation rooms



SLG Prüf- und
Zertifizierungs GmbH

Client: van Clewe Sun Protection GmbH
Loikumer Str. 20, 46499 Hamminkeln-Dingden, Germany

Test item: stage fabric
flat arrangement

Material details: name: Polaris

Mounting: mounting type G-100 according to ISO 354, construction without enclosing frame
clear distance to the wall 100 mm
total dimensions B x H = 4,30 m x 3,00 m

Test stand: Reverberation room of SLG Prüf- und Zertifizierungs GmbH, Hartmannsdorf, Germany

Diffusers: 10 pcs plates of acrylic glass, thickness 10 mm; total surface one-sided S = 19,1 m²

Absorber: 1 pc Sound Cell UBB Broadband absorber (dimensions 840 mm x 1.240 mm x 120 mm)
2 pcs Low-frequency-membrane absorber (dimensions 680 mm x 1.020 mm x 120 mm)

Test signal: sinusoidal sweep, 2 pcs loudspeaker positions und 3x 6 pcs microphone positions

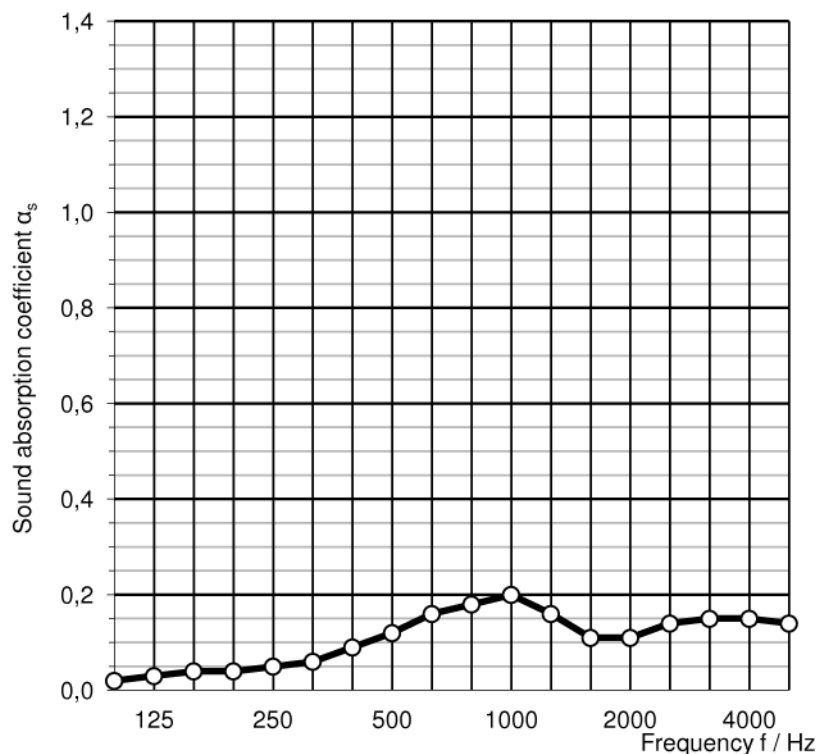
Volume: 254,5 m³

Total test surface: 12,9 m²

Date of test: 06.02.2020

| | θ [°C] | r.H. [%] | B [hPa] |
|-------------------|--------|----------|---------|
| without test item | 22,5 | 42,5 | 987 |
| with test item | 22,0 | 39,5 | 988 |

| Frequency [Hz] | α_S 1/3 octave | α_p 1/1 octave |
|-------------------|-----------------------------|-----------------------------|
| 100 | ○ 0,02 | |
| 125 | ○ 0,03 | 0,05 |
| 160 | ○ 0,04 | |
| 200 | ○ 0,04 | |
| 250 | ○ 0,05 | 0,05 |
| 315 | ○ 0,06 | |
| 400 | 0,09 | |
| 500 | 0,12 | 0,10 |
| 630 | 0,16 | |
| 800 | 0,18 | |
| 1000 | 0,20 | 0,20 |
| 1250 | 0,16 | |
| 1600 | 0,11 | |
| 2000 | 0,11 | 0,10 |
| 2500 | 0,14 | |
| 3150 | 0,15 | |
| 4000 | 0,15 | 0,15 |
| 5000 | 0,14 | |



○ Equivalent sound absorption area less than 1,0 m²

α_S Sound absorption coefficient according to ISO 354

α_p Practical sound absorption coefficient according to ISO 11654

Rating according to ISO 11654

Weighted sound absorption coefficient: $\alpha_w = 0,15$

Sound absorption class: **E**

Date: 14.02.2020

Tested by:

E. Schädlich
Erik Schädlich

Appendix: 1.1

Test-Protocol-No.: 4024-19-AA-20-PP005

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