



Finnish Institute of
Occupational Health

TEST REPORT AR23-2015-273902
27.1.2015

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DETERMINATION OF ACOUSTIC ABSORPTION COEFFICIENT IN LABORATORY CONDITIONS



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DETERMINATION OF ACOUSTIC ABSORPTION COEFFICIENT IN LABORATORY CONDITIONS

1 Description of the commission

Client: Kurki Decoration Oy, Sami Kurki, tender 31.12.2014.
Product: KD-Akustiikkataulu
Test methods: Sound absorption test by ISO 354:2003
Classification by EN ISO 11654:1997

2 Results

The sound absorption class was A.
The detailed test results are presented in Annex 1.

Valtteri Hongisto
senior research scientist
Good Indoor Environment
Work Environment Development

Jarkko Hakala
laboratory engineer
Good Indoor Environment
Work Environment Development

Annexes

Annex 1: Test results (1 page)
Annex 2: Structure drawings (2 pages)
Annex 3: Mounting of specimen (1 page)
Annex 4: Measurement arrangements (1 page)



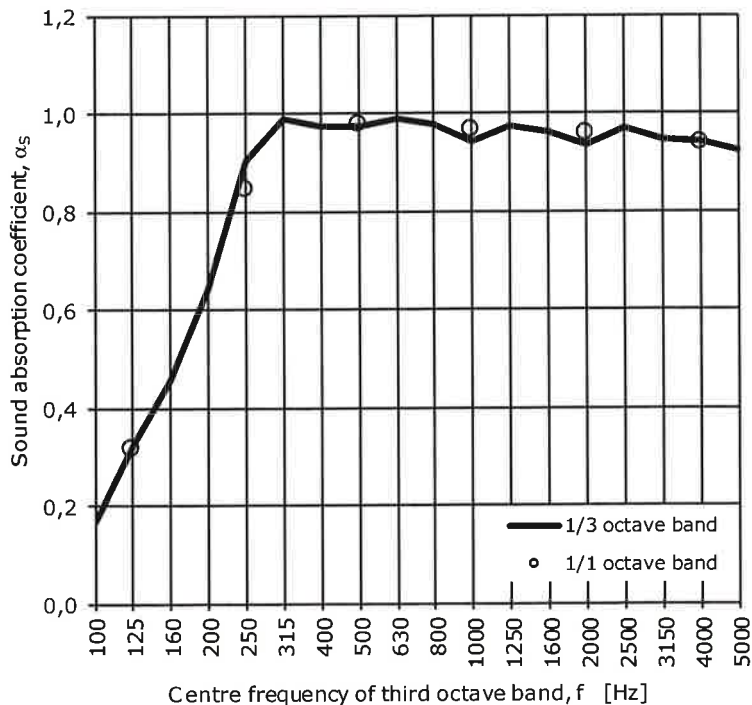
Determination of acoustic absorption coefficient according to ISO 354:2003

Specimen: KD-Akustiikkataulu
Mounted on reflective surface
(Decotex-fabric surface, Ecophon Solo 40 mm and 10 mm airgap)

Manufacturer: Kurki Decoration Oy
Client: Kurki Decoration Oy / Sami Kurki
Laboratory: Finnish Institute of Occupational Health, Work Environment Development, Acoustics
Lemminkäisenkatu 14-18 B, FIN-20520 Turku, Finland

| | | | |
|---------------------------|-------------------------------------|---------------------------|--------------------|
| Specimen area: | 11,5 m ² | Test room volume: | 155 m ³ |
| Temperature of test room: | 21 21 °C (without / with specimen) | Room boundary area: | 179 m ² |
| Relative humidity: | 57 59 % (without / with specimen) | Test date: | 14.1.2015 |
| Atmospheric pressure: | 99 99 kPa (without / with specimen) | Test file identification: | T140115a |

| f (Hz) | 1/3 | 1/1 | 1/1 |
|-----------|------------|------------|------------|
| | α_s | α_s | α_p |
| 100 | 0,17 | | |
| 125 | 0,32 | 0,32 | 0,30 ** |
| 160 | 0,46 | | ** |
| 200 | 0,64 | | |
| 250 | 0,90 | 0,85 | 0,85 |
| 315 | 0,99 | | |
| 400 | 0,97 | | |
| 500 | 0,97 | 0,98 | 1,00 |
| 630 | 0,99 | | |
| 800 | 0,98 | | |
| 1000 | 0,94 | 0,96 | 0,95 |
| 1250 | 0,97 | | |
| 1600 | 0,96 | | |
| 2000 | 0,93 | 0,96 | 0,95 |
| 2500 | 0,97 | | |
| 3150 | 0,95 | | |
| 4000 | 0,94 | 0,94 | 0,95 |
| 5000 | 0,92 | | |

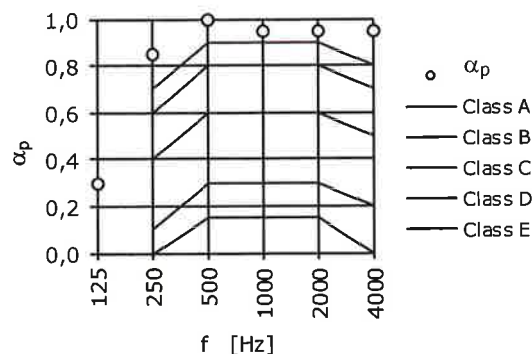


Absorption class (EN ISO 11654)

A

** Total absorption area of the empty test room is higher than ISO 354 requires.

The uncertainty of the test result is higher than ISO 354 expects.



Jarkko Hakala
Jarkko Hakala

laboratory engineer, test performer



Georg+Otto Friedrich

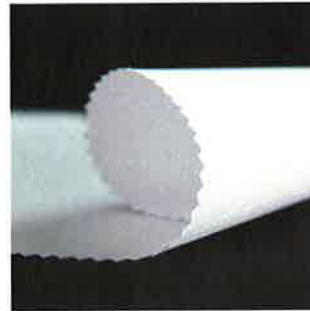
EUROPAS GROSSE WIRKWARENPRODUZENTEN

Product 7058FL

Standard Decotex - bestseller

Technical data

Indication: PTX-PES-DECOTEX
 Field of application: exhibition, banners, display-systems, blinds
 Material: 100 % Polyester
 Weight: 215 g/m² (± 3 %)
 Stock widths: 153 cm, 183 cm, 203 cm, 253 cm, 310 cm
 Remarks: with flame retardant treatment



Product Features



Information and Downloads

- DIN 4102 B1 certificate for fabric 7058FL.
- Oeko-Tex Standard 100 certificate for warp knitted fabrics made of 100 % polyester for decoration, colour white, with flame retardant treatment and printing agent for digital printing.
- Certificate for the quality management system according DIN EN ISO 9001:2008.
- General considerations regarding further processing of fabrics for digital printing.

For possible errors no liability will be assumed. Misprint, mistakes and modifications are subject to change without prior notice.

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 Konto-Nr.: 138 111 117



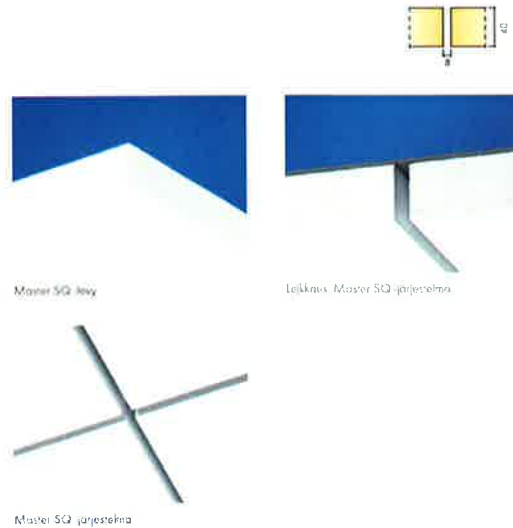


Ecophon Master™ SQ

Kouluihin, päiväkodeihin, avokonttoreihin tai muihin tiloihin, joissa vaaditaan erinomainen akustiikka ja puheen erottavuus. Levyt liimataan taustapintaan avosaumoin. Ecophon Master SQ -levyjä väliin jää näkyvä rako. Levyjä ei voida avata.

Peruslevy on tiheää lasivillaa, joka on valmistettu 3RD-tekniikalla. Näkyvällä pinnalla on valkoinen Akutex FT -pinnoite ja taustapinnalla väriön lasihuopa. Reunat on maalattu. Levyjen paino on noin 5 kg/m².

Ecophon suosittelee Connect Absorber Glue -liimaa nopeaan ja helppoon asentukseen.



JÄRJESTELMÄN TIEDOT

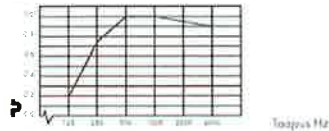
| Mittaus | 1200 | 1200 |
|----------------|------|------|
| Leveys | 1200 | 1200 |
| Syväisyys | 40 | 40 |
| Paksuus | 15,5 | 15,5 |
| Asennuskorkeus | 15,5 | 15,5 |

TEKNISEET OMINAISUUDET

AKUSTIIKKA

Äänenvaimennus: Koetulokset standardin EN ISO 354 mukaan, luokitus standardin EN ISO 11654 mukaan

α_w Toteellinen äänenvaimennusteho



Ecophon Master SQ 43 mm α_w d,s
α_w d,s = asennuksen lokamääräkeruus

| Luokka | Määrittäjä |
|--------------------|------------|
| α _w d,s | 122 |
| Asennuskeruus | 0,3 |
| Asennuskeruus | A |
| α _w | 1,400 |
| α _w d,s | 0,925 |
| α _w d,s | 0,925 |

Ääneneristys: Ei mitattulosta

Yksityisyys: Ei mitattulosta

AVATTAVUUS Levyt ei ole avattavissa

PUHDISTETTAVUUS Imurointi päivittäin, nihkeäpyyhintä viikoittain

VALONHEIJASTAVUUS White Frost, lähin NCS-värikoodi S 0500-N, 85% valonheijastavuus (josta yli 99% diffuusia heijastusta). Takaisheijastavuuskerroin 0,3 mcd/(m²lx). Kiiltoaste < 1.

KOSTEUDENKESTO Levyt kestävät 95% suhteellista kosteutta 30°C lämpötilassa ilman näkyviä muodonmuutoksia. (ISO 4611).

SISÄILMA M1-päästöluokiteltu.

YMPÄRISTÖVAIKUTUS Peruslevy valmistettu 3RD-valmistusmenetelmällä. Myönnetty Pohjoismainen Joutsen-merkki. Kierrätettävissä.

PALOTURVALLISUUS Peruslevy on testattu ja luokiteltu palamattomaksi standardin EN ISO 1182 mukaan.

Syngemääräluokitus

| Määrä | Standardi | Luokka |
|-------------|------------|----------|
| Erityisessä | EN 13501-1 | B2s1, B3 |

MEKAANISET OMINAISUUDET Lisäkuormat on luettava kantavaan rakenteeseen.

ASENNUS Asennetaan ohjeiden asennuskuvien, asennusohjeiden sekä mallikuvien mukaan. Asennuksen kokonaissyvyyden näet määrälaskelemasta. Liimattavan taustapinnan on kyettävä kannattelemaan liimattujen levyjen paino. Mikäli tästä on epäilystä, on suositeltava koeilmasto. Taustapinnan on oltava puhtas ja kuiva. Parhaan asennustuloksen saavuttamiseksi taustapinnan on myös oltava tasainen. Tyydyttävä asennustulos voidaan kuitenkin saavuttaa myös hieman epätasaisella pinnalla.

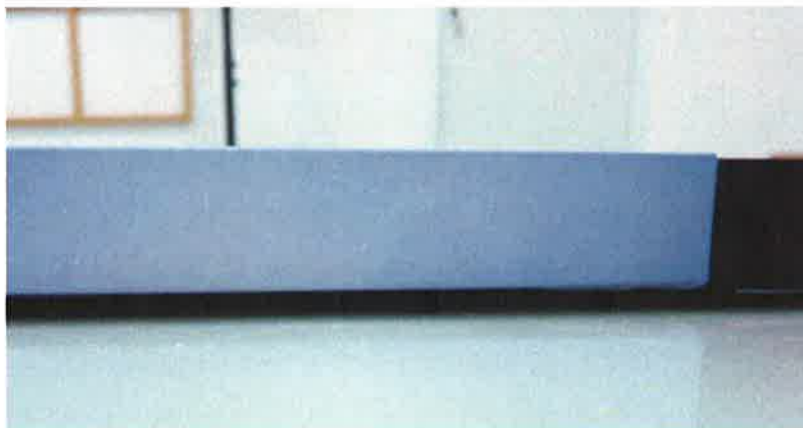


The specimen was mounted on the floor of the reverberation room in conformance with ISO 354:2003 Annex B. The side edges of the specimen were covered with 11 mm chipboard (height 55 mm). The edges were sealed with duct tape. Behind the panel were wall hangers, which lift the panel about 10 mm from the floor.

The specimen size was 2400x4800 mm consisting of four Ecophon Solo boards (1200x2400 mm each).



Specimen in reverberation room.



Approximately 10 mm thick gap between floor and the bottom of the mineral wool.



1 Acoustical measurements

The test signal was produced to the test room using three fixed omnidirectional loudspeakers (6 x Seas W12CY001). The test signal (pink noise) was produced by a real time analyzer (Norsonic 121) and amplified with terminal amplifier (QSC 1300 W USA). The sound pressure level in the reverberation room was measured with a condenser microphone on a tripod (Bruel&Kjaer 4190 equipped with a pre-amplifier Bruel&Kjaer 2669).

The reverberation time at third-octave bands was measured with the real time analyzer (Norsonic 121) using 20 dB decay range. All frequency bands were measured using 2 sources simultaneously and 6 microphone locations. In every location an 3 decays were measured. The total number of reverberation time measurements was 36.

The acoustical measurement equipment fulfilled the following IEC standards and grades of accuracy:

| | | |
|-----------|--|----------------|
| IEC 60651 | Sound level meters | type 1 |
| IEC 60804 | Integrating sound level meters | type 1 |
| IEC 61260 | Octave-band and fractional-octave-band filters | class 1 |
| IEC 60942 | Sound level calibrators | class 1 |

The test laboratory operates in conformance with EN/ISO/IEC 17025.

2 Other measurements

The temperature, the ambient atmospheric pressure and the relative humidity of the measurement room were measured using an environmental measurement device (Thermo Recorder TR-73U). The specimen was weighed with a 150 kg precision weighing machine (PM 150). The dimensions of the specimen were measured with a roll meter (K-Prof).

3 The test room

The reverberation room was equipped with six fixed diffuser panels. The positions were selected randomly in respect with altitude, angle and position. The amount of diffusers and their arrangement fulfils the requirements of Annex A in ISO 354. The reverberation time of the reverberation room fulfils the requirements of ISO 354 for 155 m³ test room except for the third octave bands 160 and 200 Hz, where the reverberation time was at most 17 % below the minimum required reverberation time.

4 References to the ISO standards

Test: ISO 354:2003 (E) Acoustics - Measurement of sound absorption in a reverberation room, International Organization for Standardization, 2003, Genève, Switzerland.

SFS-EN ISO 11654:1997 (E) Acoustics - Sound absorbers for use in buildings - Rating of sound absorption, International Organization for Standardization, 1997, Genève, Switzerland.