

Mfpa Leipzig GmbH

Leipzig Institute for Materials
Research and Testing

Testing, Inspection and Certification
Authority for Construction
Products and Constructions Types

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Sound Insulation

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Testing laboratory accredited by
DAkkS GmbH according to DIN EN
ISO/IEC 17025.
Recognized Testing Laboratory by
the VMPA

Acoustic Testing VMPA-SPG-129-
97-SN

Test Report No. PB 2.3/23-025-3

- English version of test report No. PB 4.2/16-252-32 dated 25-09-2017 -

31 March 2023

No. Copy

Subject matter: Laboratory measurement of impact-sound insulation of an impact-sound insulating mat *REGUPOL comfort 12* on a massive wood ceiling on a PUR bound compensating and sound insulating fill *REGUPOL comfort S1* under a dry screed (OSB) acc. to DIN EN ISO 10140
REGUPOL comfort S1 with variant rock granulation Diabas grit 2/5 mm

Client: REGUPOL BSW GmbH
Am Hilgenacker 24
57319 Bad Berleburg
Germany

Date of order: 13-02-2023

Date of test: 21-09-2017

Person in charge: Dipl.-Ing. M. Busch
Dipl.-Phys. D. Sprinz

This document consists of 8 pages and 2 annexes.

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1. Task specification

Impact-sound insulation of an impact sound insulating mat named *REGUPOL comfort 12* of the manufacturer

REGUPOL BSW GmbH
Am Hilgenacker 24
57319 Bad Berleburg
Germany,

on a PUR bound compensating and sound insulating fill *REGUPOL comfort S1* on a massivwood ceiling, has to be determined acc. to DIN EN ISO 10140-3 in the test bench of MFPA Leipzig GmbH. The test has to be performed with an applied dry screed of OSB boards on *REGUPOL comfort 12*.

In the present case, a rock granulation with designation Diabas grit 2/5 mm has to be used for compensating and sound insulating fill *REGUPOL comfort S1* as ordered.

2. Sampling, location and date of measurement

Massivwood ceiling (manufacturer Eugen Decker Holzindustrie KG) was delivered in the form of four prefabricated elements for mounting in test bench.

The following materials for floor setup of test object were provided:

- impact sound insulating mat *REGUPOL comfort 12*, in the form of long webs, 13 m length x 1150 mm wide x 4/12 mm thickness, profiled
- PUR bounding material *REGUPOL comfort 1* for compensating and sound insulating fill *REGUPOL comfort S1* of the BSW company
- mineralic rock granulation *REGUPOL comfort S* for compensating and sound insulating fill *REGUPOL comfort S1* of the BSW company
- roof underlayer Alujet Difujet, with adhesive tape
- edge insulation strip of mineral wool (20 mm thick)
- glass filament tape in roll form, self adhesive, 100 mm wide
- OSB boards, 22 mm thick, with system of groove and tongue

Massivwood ceiling was mounted by craftsmen of MFPA Leipzig in the test bench.

Installation of compensating and sound insulating fill on massivwood ceiling was made by client together with craftsmen of MFPA Leipzig. The material to be tested and the dry of OSB boards screed were laid on top of this by craftsmen of MFPA Leipzig.

Date of test is revealed on the cover sheet of this report. The setting time of the compensating and sound insulating fill *REGUPOL comfort S1* was 1 day.

3. Test object

REGUPOL comfort 12 is an impact sound insulation mat under floating screed, on underside profiled and made of rubber granules and polyurethane foam. As dry screed, one layer OSB boards (22 mm thick) was installed. Compensating and sound insulating fill *REGUPOL comfort S1* between top edge Massivwood ceiling and impact sound insulation mat was made of components *REGUPOL comfort S* (mineralic rock granulation) und *REGUPOL comfort 1* (bounding material). It is ready for covering after approx. 1 day according to the client.

Test setup of massivwood ceiling was described in test report PB 4.2/16-252-24 of MFA Leipzig GmbH dated 08-08-2017.

Test object: (from top to bottom)

- 22 mm dry screed of 1 layer OSB boards (with system of groove and tongue)
- Alujet Difujet
- 12 mm impact sound insulation mat *REGUPOL comfort 12* (mass per unit area 3.0 kg/m², see result protocol for dynamic stiffness PB 4.2/16-252-4 dated 22-08-2016 der MFA Leipzig GmbH), thickness 4/12 mm, profiled
- 100 mm¹ compensating and sound insulating fill *REGUPOL comfort S1*
- Alujet Difujet
- 160 mm massivwood raw ceiling

Following in the table stated dimensions, mass per unit area and raw density of dry screet components were detemined by testing institute.

Table 1: determined dimensions and mass per unit area and raw density

designation	lengt h mm	wide mm	thick- ness mm	mass per unit area	raw density
OSB-board	2050	675	22	13,8 kg/m ²	631 kg/m ³

¹ Measured Thickness (Average Value) of compensating and sound insulating fill is shown under 7.2.

Assembly (s. annex 2):

Floor was installed on massivwood raw ceiling full-surface. The surrounding edge insulation strip on the flanking walls consisted of 20 mm thick mineral wool. Compensating and sound insulating fill *REGUPOL comfort S1* was put in place, after laying out of Alujet Difujet for protecting the massivwood raw ceiling. Impact sound insulation mats *REGUPOL comfort 12* were installed in one layer on hardened Compensating and sound insulating fill, with the profiled side down. The butt joints of the impact sound insulation mats were all fixed in position on the top side with standard adhesive tape. The layer of impact sound insulation mats was covered with Alujet Difujet on the top side. Finally, the dry screed of 1 layer OSB boards (22 mm thick), with system of groove and tongue, was mounted.

4. Testing room

Testing room for ceilings complies with requirements imposed by DIN EN ISO 10140-5. The source room is enclosed by of plasterboard stud walls. The receiving room has enclosing walls of 24 cm sand-lime brick masonry, raw density class 1.8. Source room and receiving room have rectangular geometry. For reduction of flanking transmission, Source room is elastically supported on receiving room. Additionally, a floating screed is mounted in receiving room for the reduction of flanking transmission.

A circumferential reinforced concrete ring beam, with console with 19.5 cm wide, overlies on top edge of sand-lime brick masonry of receiving room for supporting the test object.

Size of test opening was 18.0 m² (4.75 m length x 3.79 m wide).

The room volumes of the source- and receiving room are shown in Annex 1. The air temperatures and relative humidities in the test rooms as well as the static pressure at the time of measurement are also shown in Annex 1.

5. Test method

The measurements of the impact sound reduction were carried out according to:

- DIN EN ISO 10140-3, Acoustic, Laboratory measurement of sound insulation of building elements – Part 3: Measurement of impact sound insulation, issue November 2015

The calculation of the rated normalized impact-sound level was carried out according to:

- DIN EN ISO 717-2, Acoustic, Rating of sound insulation in buildings and of building elements, Part 1: impact sound insulation, issue June 2013

Impact-sound level was measured by a rotating microphone in receiving room for 10 positions of standard tapping machine on the standard concrete ceiling (reinforced concrete ceiling) without suspended ceiling and 10 positions of the standard tapping machine on the standard concrete ceiling with the suspended ceiling. Measurement was carried out on 1/3rd octave band frequencies of 50 – 5000 Hz. The normalized impact-sound level results from the equation

$$L_n = L_i + 10 \lg\left(\frac{A}{A_0}\right)$$

Where:

- L_n normalized impact-sound level
- L_i impact-sound level
- A equivalent absorption area in the receiving room in m^2 , determined from measurement of the reverberation period and the volume of receiving room
- A_0 reference absorption area (A_0 is defined to $10 m^2$)

Procedure and volume of measurements are in accordance with the principles of the research group of the building authorized acoustic noise laboratories.

6. Measuring instruments

The following listed measuring devices were used.

Table 2: Measuring devices

Device	Type	Manufacturer
Real time analyser with noise generator	840	Norsonic
Free field microphone	1220	Norsonic
Preamplifier	1201	Norsonic
Calibrator	4231	B & K
Power amplifier	260	Norsonic
Speaker combination (Dodekaeder)	229	Norsonic
Mikrophone panning system	231, 252, 253	Norsonic
Standard tapping machine	211	Norsonic

Measuring instruments are calibrated regularly, and the measurement chain is calibrated before and after each measurement. MFPA Leipzig regularly takes part in the comparative measurements for Group 1 testing laboratories (qualification testing laboratories) of the Physikalisch Technischen Bundesanstalt (PTB = German national metrology institute) Braunschweig (the last one being in 2016) and registered as a testing laboratory in the “List of testing, monitoring and certifying laboratories in accordance with the state building codes” of the Deutschen Institutes für Bautechnik DIBt (German Institute for Construction Technology) under the code number “SAC 02”.

MFPA Leipzig is a testing laboratory accredited by DAkkS GmbH according to DIN EN ISO/IEC 17025.

7. Measuring results

7.1 Impact sound insulation

The rated normalized impact-sound level $L_{n,w}$, in accordance with DIN EN ISO 717-1, as result of measurement is given for the frequency range from 100 to 3150 Hz including the spectrum adaptation values C and C_{tr} in following table.

Table 3: Test results

test object	test result rated normalized im- pact-sound level $L_{n,w} (C)$ [dB]	spectrum values $C_{1,50-2500}$ [dB]	see an- nex
22 mm OSB boards Alujet Difujet 12 mm impact sound insulation mat <i>REGUPOL comfort 12</i> compensating and sound insu- lating fill <i>REGUPOL comfort S1</i> Alujet Difujet massivwood raw ceiling	46 (1)	7	1

For graphical and tabular representation of L_n values depending on the frequency please refer to Annex 1.

7.2 Thickness and mass per unit area of screed

Compensating and sound insulating fill:

- Arithmetic mean of thickness: 101 mm
- Mass per unit area: 162 kg/m²

The respective arithmetic mean of thickness was determined on 10 dots of compensating and sound insulating fill. The mass per unit area was determined by weighting the whole demolition waste from compensating and sound insulating fill.

During demolition, it was found that within some partial areas, the PUR binder had not firmly bonded the aggregates in the thickness range of approx. 1 - 2 cm from the lower edge of the compensating and sound insulating fill.

8. Notes on the test results

The result are values determined in the laboratory.

The results of the tests exclusively relate to the items tested. This document does not replace a certificate of conformity or suitability according to national and European building codes.

Leipzig, 31 March 2023

Dipl.-Phys. D. Sprinz
Head of Work Group

Dipl.-Ing. M. Busch
Testing Engineer

Impact sound pressure level according to ISO 10140-3

Laboratory measurements of impact sound insulation of ceilings

Client / Manufacturer: REGUPOL BSW GmbH, Am Hilgenacker 24, 57319 Bad Berleburg, Germany Date of test: 21-09-2017

Test object installed by: Client / MFPA Leipzig Marking of testing rooms: BD.02 / BD.01

Product: dry screed (OSB) on impact sound insulation mat *REGUPOL comfort 12* and compensating and sound insulating fill *REGUPOL comfort S1* (with rock granulation with designation Diabas grit 2/5 mm) on massivwood raw ceiling

Setup of test object:

- 22 mm dry screed of 1 layer OSB boards (with system of groove and tongue)
- Alujet Difujet
- 12 mm impact sound insulation mat REGUPOL comfort 12, thickness 4/12 mm, profiled
- 100 mm compensating and sound insulating fill REGUPOL comfort S1
- Alujet Difujet
- 160 mm massivwood raw ceiling

Mass per unit area: approx. 77 kg/m² (massivwood raw ceiling) plus approx. 179 kg/m² (floor setup)

Temperature SR / RR: 22 / 22 °C

Rel. Humidity SR / RR: 45 / 45 %

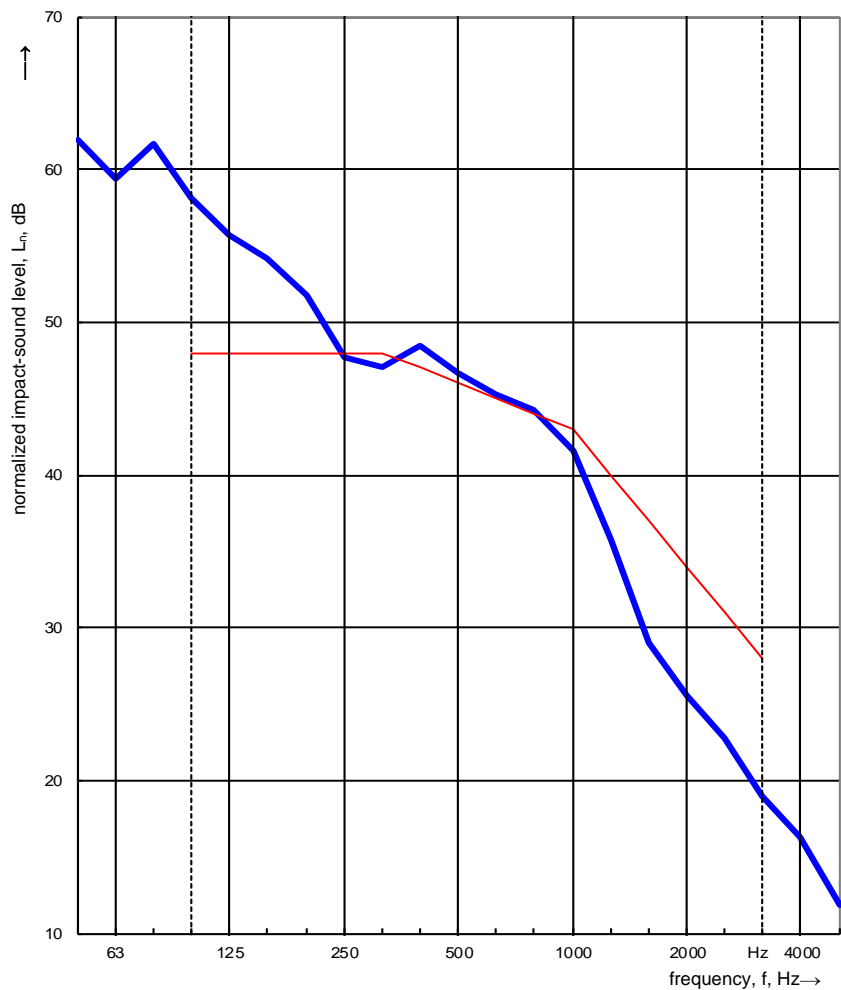
Static pressure: 100 kPa

Volume SR / RR: 55.5 / 61.2 m³

(SR = Sourceroom; RR = Receivingroom)

--- Frequency range for rating according to ISO 717-2
— Shifted ref. curve according to ISO 717-2

frequency f [Hz]	L _n 1/3 octave [dB]
50	61,9
63	59,4
80	61,7
100	58,1
125	55,7
160	54,2
200	51,7
250	47,7
315	47,0
400	48,5
500	46,7
630	45,3
800	44,2
1000	41,6
1250	35,8
1600	29,0
2000	25,6
2500	22,8
3150	18,9
4000	16,3
5000	11,8



Rating according to ISO 717-2

$$L_{n,w}(C_I) = 46 (1) \text{ dB}$$

$$C_{1,50-2500} = 7 \text{ dB}$$

These results are based on test made under laboratory conditions obtained in one-third-octave bands

Signature:

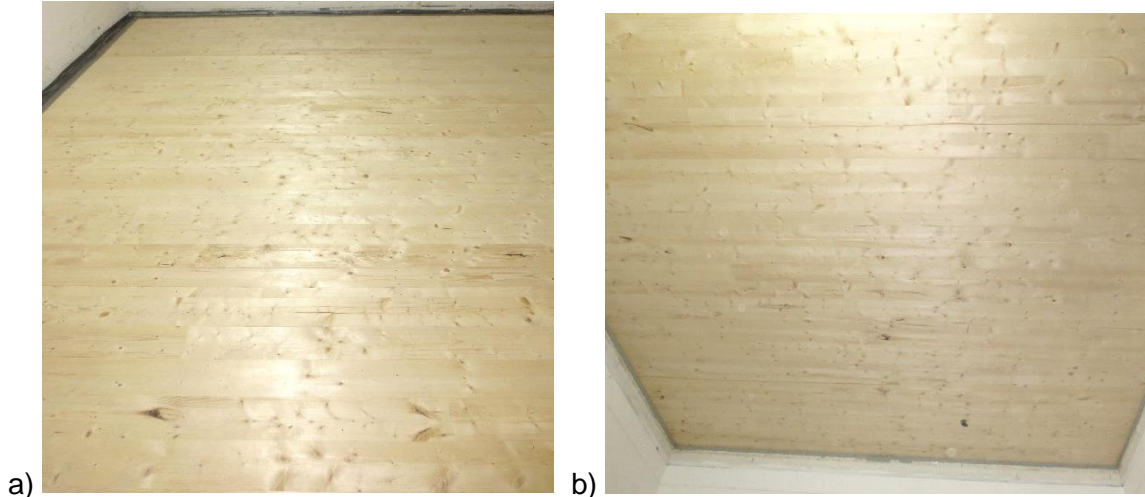


Figure A 2.1: Massivholz-Rohdecke a) top side, before installation of floor setup, b) bottom side



Figure A 2.2: situation during mounting - installation of floor compensating and sound insulating fill

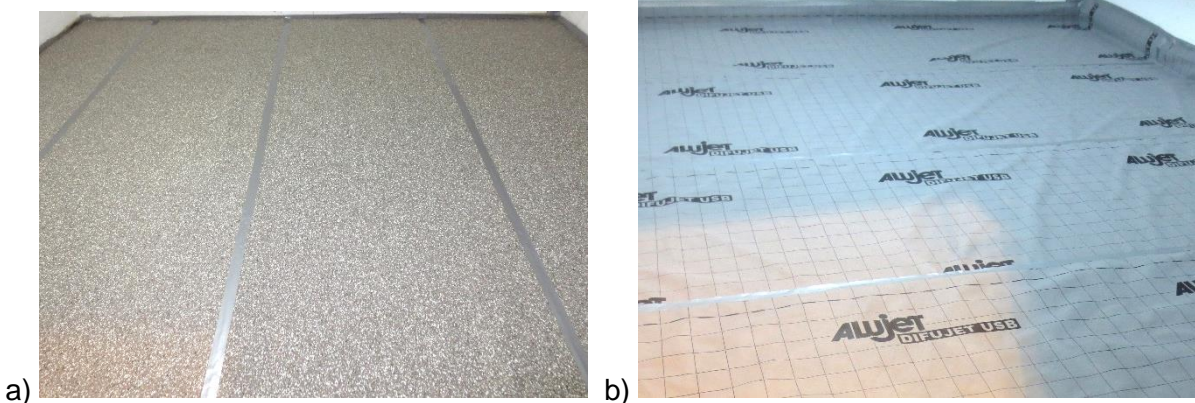


Figure A 2.3: situation during mounting a) laying out of impact sound insulation mats on hardened Compensating and sound insulating fill, butt joints with adhesive tape, b) after laying on of Alujet Difujet



Figure A 2.4: situation during mounting - dry screed



Figure A 2.5: dry screed (situation of test)