MFPA Leipzig GmbH

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

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Recognized Testing Laboratory by the VMPA
Acoustic Testing VMPA-SPG-129-97-SN

Test Report No. PB 4.2/15-245-1
- English version of Test Report PB 4.2/15-105-2 dated 06 May 2015-

24 June 2015
No. Copy

Subject matter:	Laboratory measurement of impact-sound reduction of an impact sound insulating material named *Regupol® comfort, 5 mm thick* in accordance with DIN EN ISO 10140
Client:	BSW GmbH Berleburger Schaumstoffwerke Am Hilgenacker 24 D-57319 Bad Berleburg
Date of order:	5 March 2015
Sample receipt:	24 March 2015
Date of test:	30 April 2015
Responsible for preparation:	Dipl.-Ing. M. Busch Dipl.-Phys. D. Sprinz

This test report covers 8 sheets and 2 appendixes.

Test laboratory accredited by DAkkS GmbH according to DIN EN ISO/IEC 17025. The accreditation only applies to the test methods listed in the certificate (in this document marked with *) which can be seen on www.mfpa-leipzig.de

Notified testing laboratories, inspection bodies and certification bodies recognized according to the Construction Products Regulation (NB 800) and the State Building Code (SAC 02).

Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen Leipzig mbH (MFPA Leipzig GmbH)

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1 Task specification

Impact-sound reduction* of an impact sound insulating material named *Regupol® comfort, 5 mm thick* under screed shall be measured in accordance with DIN EN ISO 10140 (all parts) by order of the manufacturer

BSW GmbH
Berleburger Schaumstoffwerke
Am Hilgenacker 24
D-57319 Bad Berleburg

on a heavyweight standard floor in the testing laboratory of the MFPA Leipzig GmbH.

2 Sampling, location and date of measurement

The test specimen

- Impact sound insulating material *Regupol® comfort, 5 mm thick* in plate shape, 2250 mm length x 1150 mm width x 5 mm thickness

was delivered by client on 24 March 2015.

Cement screed with Impact sound insulating material (*Regupol® comfort, 5 mm thick)* was installed by craftsmen in order of MFPA Leipzig in the testing laboratory (B F.01/B T.01) of MFPA Leipzig GmbH on 09 April 2015.

The impact-sound reduction of test object was measured on 30 April 2015.
The impact-sound reduction of heavyweight standard floor was measured on 04 May 2015.

3 Test object

Regupol® comfort, 5 mm thick is an impact sound insulating layer with flat surfaces (without profiling) and consists of rubber granulates and PU foam. The test object as described in the following was tested.

* accredited test method conformable to DAkkS

Test object: (from top to bottom)

- 55 mm[1]	floating floor cement screed ZE 20 acc. DIN 18560 (CT-C25-F4 acc. EN 13813)
-	PE foil
- 5 mm	impact sound insulating material *Regupol® comfort, 5 mm thick* (weight per unit area 2.0 kg/m², see results of dynamic stiffness PB 4.2/15-105-1, dated 05 May 2015 of MFPA Leipzig GmbH)
- 140 mm	reinforced concrete floor

Assembly: (see Annex 2)

Assembly of test object was full faced on reinforced concrete floor. One layer of impact sound insulating material, *Regupol® comfort, 5 mm thick,* was laying, with butt joints sealed with duct tape on top for fixing of position. On flanking walls the edge insulation strips consisting of 2 layers PE foam (2 x 8 mm) was laying. The top of impact sound insulating material was covered by PE foil. Finally, screed was mounted.

Size of test object: 20.1 m²
Curing time: 21 days

4 Testing rooms

Testing room complies with requirements imposed by DIN EN ISO 10140-5. It consists of a source room B F.01 (V = 64.5 m³) and a receiving room below the ceiling B T.01 (V = 58.9 m³).

Ceiling area between source room and receiving room is 20.1 m², with a true length of 4.67 m and a width of 4.30 m.

The ground plan of source room has one rectangular angle and three oblique angles. Masonry walls are made of sand-lime bricks 2 DF, raw density class 2.0, 24 cm thick and for reduction of flanking transmission cased with 10 cm gypsum plasterboard and mineral wool. Additionally, a floating screed is mounted to the reduction of flanking transmission.

[1] measured thickness (arithmetic mean) see point. 7.2

Following conditions prevailed in testing rooms during the measurements:

Table 1: air temperature, relative humidity, static pressure

measurand		30 April 2015		04 May 2015	
		source room	receiving room	source room	receiving room
air temperature	θ [°C]	21	21	21	21
relative humidity	φ [%]	35	37	38	38
static pressure	p [kPa]	100		99	

5 Test method

Measurements were carried out on a heavyweight standard floor (reinforced concrete) with a thickness of 140 mm in accordance with DIN EN ISO 10140-1, section C.2 in the laboratory of MFPA Leipzig GmbH.

Measurement* was carried out according to category II (large test specimen) of:

- DIN EN ISO 10140-1, *Akustik - Messung der Schalldämmung von Bauteilen im Prüfstand – Teil 1: Anwendungsregeln für bestimmte Produkte*, September 2014 issue in connection with other parts of DIN EN ISO 10140 (parts Teil 2, 3, 4, December 2010 issue; part Teil 5, September 2014 issue).

Impact sound reduction was calculated according to:

- DIN EN ISO 717-2, *Akustik - Bewertung der Schalldämmung in Gebäuden und von Bauteilen – Teil 2: Trittschalldämmung*, Juni 2013 issue

Impact-sound level was measured by a rotating microphone in receiving room for 6 positions of standard tapping machine on reinforced concrete floor (heavyweight standard floor) and 6 positions of the standard tapping machine on floating floor cement screed. Measurement was carried out on ⅓rd octave band frequencies of 50 – 5000 Hz. The normalized impact-sound level results from the equation

$$L_n = L_i + 10 \lg A/A_0 \text{ in dB}$$

* accredited test method conformable to DAkkS

Note:

L_n normalized impact-sound level

L_i impact-sound level

A equivalent absorption area in the receiving room in m², determined from measurement of the reverberation period and the volume of receiving room

A_0 reference absorption area (A_0 is defined to 10 m²)

Impact sound reduction was determined from the difference of the normalized impact-sound level of the heavyweight standard floor and the heavyweight standard floor with impact sound insulating material in accordance with the following equation:

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

Note:

ΔL impact sound reduction

$L_{n,0}$ normalized impact-sound level of the heavyweight standard floor without test specimen

L_n normalized impact-sound level of the heavyweight standard floor with test specimen

The weighted impact sound reduction ΔL_w was calculated according to the following equations:

$$L_{n,r} = L_{n,r,0} - \Delta L$$

$$\Delta L_w = 78\ \text{dB} - L_{n,r,w}$$

Note:

$L_{n,r}$ calculated normalized impact-sound level of reference floor with the floor covering to be tested

$L_{n,r,0}$ given normalized impact-sound level of reference floor acc. to DIN EN ISO 717-2

$L_{n,r,w}$ weighted normalized impact-sound level of the reference floor with the floor covering to be tested

ΔL_w weighted impact sound reduction of the test specimen

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

Following measuring instruments were used:

Table 2: Measuring instruments

Apparatus	Type	Manufacturer
Real time analyser with noise generator	840	Norsonic
Free field microphone, Pre-amplifier	1220, 1201	Norsonic
Rotating microphone boom	252, 253	Norsonic
Calibration unit	4231	B & K
Output amplifier	260	Norsonic
Standard tapping machine	211	Norsonic
Loudspeaker combination (Dodecahedron)	229	Norsonic

Measuring instruments are calibrated in regular intervals and the measuring chain is calibrated prior to and after each measuring.
Testing laboratory participates regularly at the reference measurements for test boards of group I (suitability test boards) of the *Physikalisch Technische Bundesanstalt (PTB) Brunswick* (last 2013) and has been registered as test board in the “List of test, monitoring and certification boards in accordance with the regional building regulations” of *Deutsches Institut für Bautechnik DIBt* under 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 reduction

The normalized impact-sound levels without and with test object are listed in the following table.

Table 3: Test results

- $L_{n,0,w}$: weighted normalized impact-sound level of the heavyweight standard floor
- $L_{n,r,w}$: calculated weighted normalized impact-sound level of a referenc floor with the to be tested impact sound insulating material
- ΔL_w weighted impact sound reduction ΔL_w
- ΔL_{lin} non-valuated linear impact-sound level $\Delta L_{lin} = \Delta L_w + C_{I,\Delta}$
- $C_{I,0}$ spectrum value for the normalized impact-sound level of the heavyweight standard floor
- $C_{I,r}$ spectrum value for the referenc floor with the tested impact sound insulating material
- $C_{I,\Delta}$ spectrum value for the impact sound reduction of test object

test object	test results	spectrum values C_I	see annex
Reinforced concrete floor 140 mm (without test specimen)	$L_{n,0,w}$ = 76 dB	$C_{I,0}$ = -11 dB	-
55 mm cement screed PE foil 5 mm impact sound insulating material *Regupol® comfort, 5 mm thick* 140 mm reinforced concrete floor	$L_{n,r,w}$ = 58 dB	$C_{I,r}$ = 1 dB	1
	ΔL_w = 20 dB ΔL_{lin} = 8 dB	$C_{I,\Delta}$ = -12 dB	

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

7.2 Thickness and weight per unit area of screed

Screed ZE 20

- Arithmetic mean of thickness of cement screed: 53 mm
- Weight per unit area: 105 kg/m²
  (determined from mining waste)

Arithmetic mean of thickness was determined on 10 dots of screed area. Weight per unit area was determined by weighting of mining waste from cement screed.

8 Note to the test results

The result ΔL_W is a weighted impact sound reduction, achieved at laboratory conditions.

The results of the tests exclusively refer to the described test objects but not to the main unit. This document does not replace a certificate of conformity or suitability according to national and European building codes.

Leipzig, 24 June 2015

MFPA
Digital unterschrieben von Herm Dipl.-Phys. D. Sprinz
DN: cn=Herm Dipl.-Phys. D. Sprinz, o=MFPA Leipzig GmbH, ou=Bauphysik, email=sprinz@mfpa-leipzig.de, c=DE
Datum: 2015.06.25 13:15:17 +02'00'

Prof. Dr.-Ing. P. Bauer	Dipl.-Phys. D. Sprinz	Dipl.-Ing. M. Busch
Head of Business Division	*Head of Work Group*	*Testing Engineer*

Reduction of impact sound pressure level according to ISO 10140 (all parts)

Laboratory measurements of the reduction of transmitted impact noise by floor coverings on a heavyweight standard floor

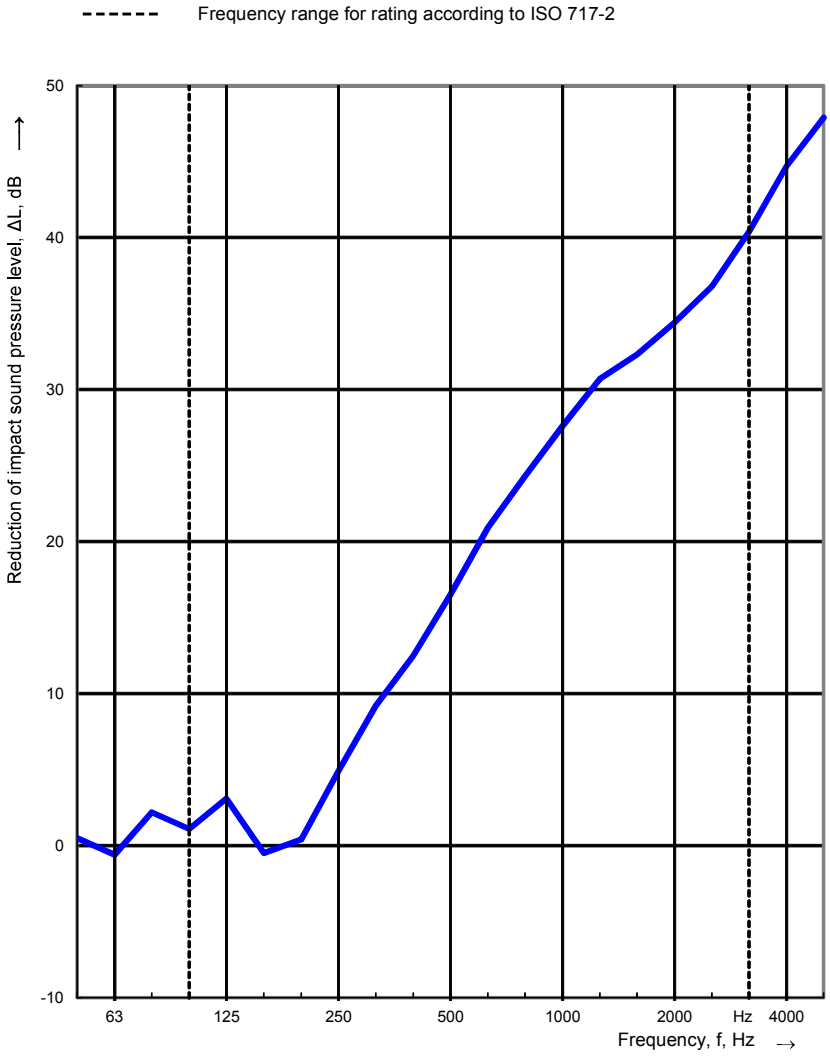
Client:	BSW GmbH, Am Hilgenacker 24, D-57319 Bad Berleburg	Date of test: 30 April 2015
Manufacturer:	client	
Test room identification:	B F.01 / B T.01	
Test specimen mounted by:	MFPA Leipzig	
Product identification:	impact sound insulating material named *Regupol® comfort, 5 mm thick*	

Description of specimen:

- 55 mm	floating floor cement screed ZE 20 acc. DIN 18560 (CT-C25-F4 acc. EN 13813)
-	PE foil
- 5 mm	impact sound insulating material *Regupol® comfort, 5 mm thick*
- 140 mm	reinforced concrete floor

Air humidity:	35 %
Mass per unit area:	105 kg/m²
Curing time:	21 d
Temperature:	21 °C
Static pressure:	100 kPa
Receiving room volume:	58,9 m³

Frequenz f [Hz]	$L_{n,0}$ Terz [dB]	ΔL Terz [dB]
50	58,1	0,5
63	62,6	-0,6
80	58,4	2,2
100	59,6	1,1
125	65,7	3,1
160	66,5	-0,5
200	66,9	0,4
250	66,2	4,9
315	66,3	9,2
400	66,2	12,5
500	66,9	16,5
630	68,1	20,9
800	68,9	24,3
1000	69,1	27,6
1250	69,2	30,7
1600	69,0	32,3
2000	69,9	34,4
2500	69,9	36,8
3150	70,7	40,4
4000	69,3	44,7
5000	66,9	47,9



Rating according to ISO 717-2

ΔL_w = 20 dB $C_{I,\Delta}$ = -12 dB $C_{I,r}$ = 1 dB

These results are based on test made with an artificial source under laboratory conditions obtained in one-third-octave bands by an engineering method.

Signature:

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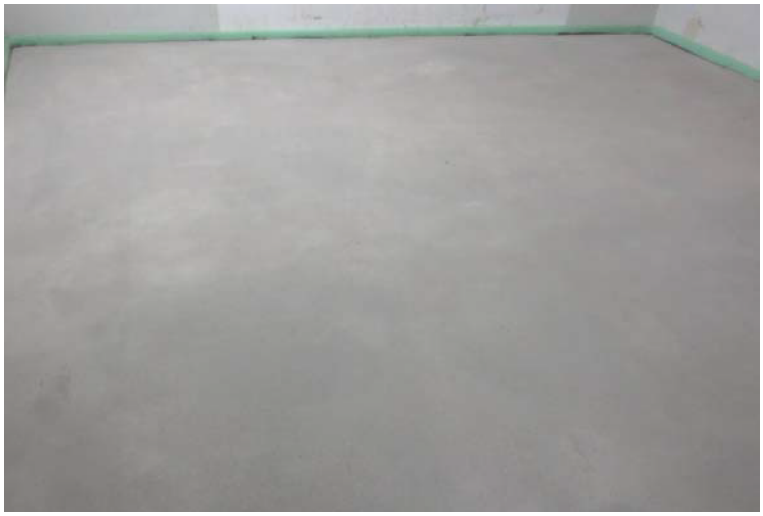
Picture A 2.1: mounting situation with impact sound insulating material and edge insulation strips

Picture A 2.2: mounting situation with floating floor cement screed



Picture A 2.3: completed floating floor screed (situation for test)