MFPA Leipzig GmbH

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

Leipzig Institute for Materials Research and Testing
Business Division IV - Building Physics
Prof. Dr.-Ing. habil. Peter Bauer

Work Group 4.2 - Sound Protection
Dipl.- Ing. (FH) S. Böhmer
Tel.: +49 (0) 341 - 6582-163
boehmer@mfpa-leipzig.de
Dipl.-Phys. D. Sprinz
Tel.: +49 (0) 341 - 6582-115
sprinz@mfpa-leipzig.de

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

Test Report No. PB 4.2/13-444-3
- as annex to Supervisory Report ÜB 4.1/13-321-2 -
- English Version -
21 July 2014
No. Copy 1

Subject matter:	Laboratory measurement of impact-sound reduction of an impact sound insulating material named *Regupol® sound 17* on a heavy-weight standard floor in accordance with DIN EN ISO 10140
Applicant:	BSW GmbH Berleburger Schaumstoffwerke Am Hilgenacker 24 D-57319 Bad Berleburg
Date of order:	7 November 2013
Supply:	19 November 2013
Date of test:	30 January 2014
Responsible for preparation:	Dipl.-Ing.(FH) S. Böhmer Dipl.-Phys. D. Sprinz

This test report covers 7 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)

Head Office: Hans-Weigel-Str. 2b – 04319 Leipzig/Germany
Managing Director: Prof. Dr.-Ing. Frank Dehn
Comm. Register: Local Court Leipzig HRB 17719
VAT-ID: DE 813200649
Tel.: +49 (0) 341 - 6582-0
Fax: +49 (0) 341 - 6582-135

1 Task specification

Impact-sound reduction* of an impact sound insulating material named *Regupol® sound 17* 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® sound 17* in plate shape, 1200 mm length x 1020 mm width x 17 mm thickness

was sampled in manufactory on 07 November 2013 by an employee of MFPA Leipzig GmbH. In addition, the following materials were delivered on 18 December 2013 by client:

- Edge insulation strips *Regupol® sound 17*, 1200 mm length x 200 mm width x 17 mm thickness
- Pressure-sensitive glassfilament tape, spool, 100 mm width.

Impact sound insulating material (*Regupol® sound 17)* with edge insulation strips and cement screed were installed by craftsmen of MFPA Leipzig in the testing laboratory (B F.01/B T.01) of MFPA Leipzig GmbH on 09 January 2014. The test was carried out on 30 January 2014.

3 Test object

Regupol® sound 17 is an impact sound insulating layer from rubber granulates with a binder material, dimpled underneath (paraboloid-shaped), covered on the top by an aluminum composite-layer film.

Test object: (from top to bottom)

- 115 mm[1]	floating floor cement screed ZE 20 acc. DIN 18560 (CT-C25-F4 acc. EN 13813)
- 8/17 mm	Impact sound insulating material *Regupol® sound 17*, dimpled side laid facing downwards (weight per unit area 6,7 kg/m², see results of dynamic stiffness PB 4.2/13-444-1 dated 19 December 2013 of MFPA Leipzig GmbH)
- 140 mm	Reinforced concrete floor

* accredited test method conformable to DAkkS
[1] measured thickness (arithmetic mean) see point. 7.2

Assembly: (see Annex 2)
Assembly of test object was full faced on reinforced concrete floor. One layer of impact sound insulating material was laying, with butt joints, dimpled side laid facing to reinforced concrete floor. On flanking walls the edge insulation strips *Regupol® sound 17* was laying, dimpled side laid facing to walls. The top of impact sound insulating material was covered by an aluminum composite-layer film, butt joints were sealed with pressure-sensitive glassfilament tape. 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.
Following conditions prevailed in testing rooms during the measurements:

Table 1: air temperature, relative humidity, static pressure

measurand		concrete floor		test object	
		source room	receiving room	source room	receiving room
air temperature	θ [°C]	18	18	18	17
relative humidity	φ [%]	41	39	40	49
static pressure	p [kPa]	101		100	

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*, May 2012 issue in connection with other parts of DIN EN ISO 10140, December 2010 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

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

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:

* accredited test method conformable to DAkkS

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

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

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	235	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	$C_{I,0}$ = -12 dB	-
115 mm Floating floor cement screed , 8/17 mm Impact sound insulating material *Regupol® sound 17*, 140 mm Reinforced concrete floor	$L_{n,r,w}$ = 51 dB	$C_{I,r}$ = 2 dB	1
	ΔL_w = 27 dB ΔL_{lin} = 14 dB	$C_{I,\Delta}$ = -13 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: 112 mm
- Weight per unit area: 220 kg/m² (determined from mining waste)

Arithmetic mean of thickness was determined on 15 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, 21 July 2014

Prof. Dr.-Ing. P. Bauer	Dipl.-Phys. D. Sprinz	Dipl.-Ing. (FH) S. Böhmer
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

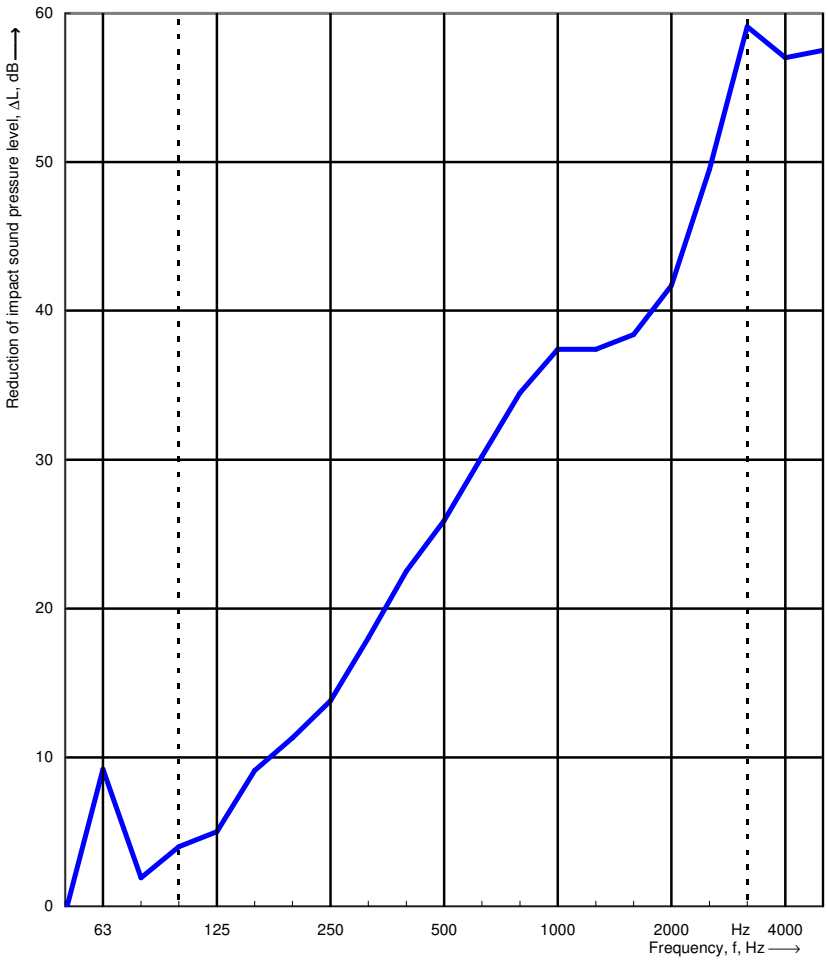
Client:	BSW GmbH, Am Hilgenacker 24, 57319 Bad Berleburg	Date of test:	30.01.2014
Manufacturer:	Client		
Test room identification:	B F.01 / B T.01		
Test specimen mounted by:	MFPA Leipzig		
Product identification:	Impact sound insulating material named Regupol® sound 17 under screed		

Description of the specimen:
- 115 mm Floating screed ZE 20 acc. DIN 18560 (CT-C25-F4 acc. EN 13813)
- 8/17 mm Impact sound insulating material Regupol® sound 17, dimpled side laid facing downwards (weight per unit area 6,7 kg/m², s. results of dynamic stiffness PB 4.2/13-444-1 dated 19 December 2013 of MFPA Leipzig GmbH)
- 140 mm Reinforced concrete floor

Air humidity:	40,0 %	- - - - - -	Frequency range for rating according to
Mass per unit area:	- kg/m²		ISO 717-2
Curing time:	21 d		
Temperature:	18,0 °C		
Static pressure:	100 kPa		
Receiving room volume:	58,9 m³		

Frequency f [Hz]	$L_{n,0}$ 1/3 octave [dB]	ΔL 1/3 octave [dB]
50	57,5	-0,5
63	64,8	9,2
80	59,3	1,9
100	61,4	4,0
125	65,0	5,0
160	64,0	9,1
200	64,8	11,3
250	64,7	13,8
315	66,4	18,0
400	67,0	22,5
500	67,1	25,9
630	67,6	30,2
800	68,7	34,5
1000	68,8	37,4
1250	69,2	37,4
1600	69,4	38,4
2000	69,8	41,7
2500	70,3	49,5
3150	71,6	59,1 [1]
4000	70,6	57,0 [1]
5000	68,3	57,5 [1]

[1] backround noise to high



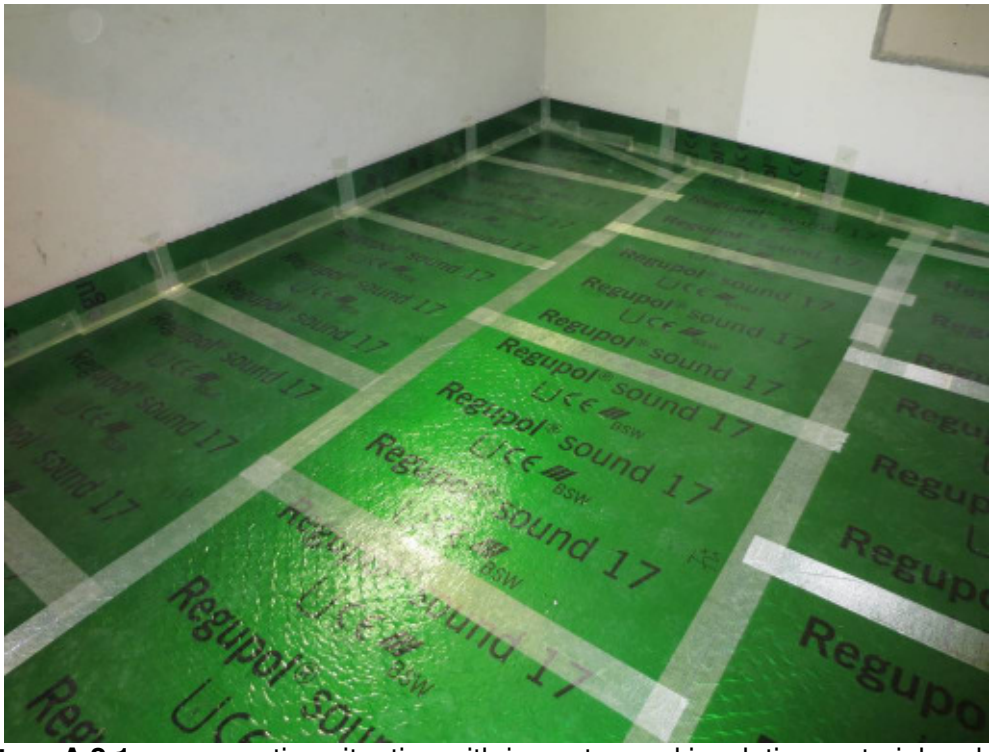
Rating according to ISO 717-2

ΔL_w = 27 dB $C_{I,\Delta}$ = -13 dB $C_{I,r}$ = 2 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.

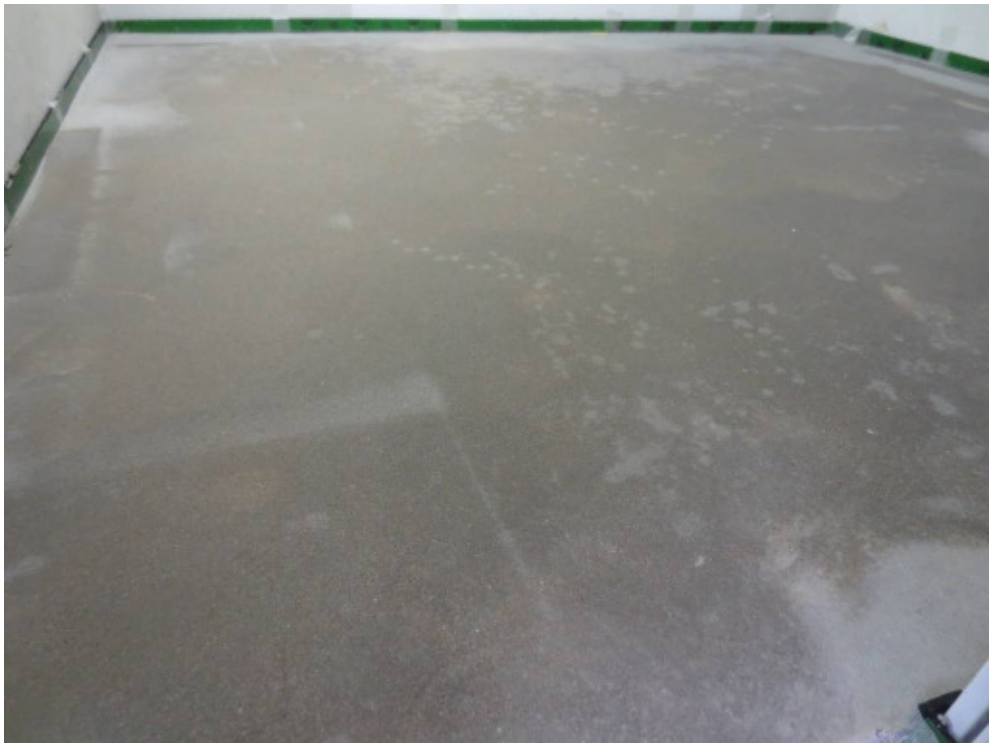
Date: Signature:

MFPA
Bereich Schallschutz
Hans-Weigel-Str. 2b
04319 Leipzig
Tel. 0341- 6582115



Picture A 2.1: mounting situation with impact sound insulating material and edge insulation strips, cutted joints with pressure-sensitive glassfilament tape

Picture A 2.2: mounting situation with floating floor cement screed



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