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NBN EN ISO 17025:2005

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NOISE LAB
REPORT Number A-2013_EC_21-E519/41471_E

Customer : **Gummiwerk Kraiburg Relastec Gmbh**
Fuchsberger Straße 4
29410 Salzwedel
Deutschland

Contacts : Client : Mr. Frank Dylewski
Noise lab : Christophe Debonne

Tests : **Laboratory measurement of the reduction of impact noise by floor coverings on a heavyweight standard floor**
Product name : **DAMTEC multi 3mm**

Reference norm :

NBN EN ISO 10140-3:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 3: Measurements of impact sound insulation

Various other related norms:

NBN EN ISO 10140-1:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products
NBN EN ISO 10140-4:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 4: Measurement procedures and requirements
NBN EN ISO 10140-5:2010	Acoustics - Laboratory measurement of sound insulation of building elements - Part 5: Requirements for test facilities and equipment
NBN EN 20140-2:1995	Acoustics - Measurement of sound insulation in buildings and of building elements - Part 2: Determination, verification and application of precision data
EN ISO 717-2: 1996	Acoustics - Rating of sound insulation in buildings and of building elements - Part 2: Impact sound insulation
NEN 5079:1990	Geluidwering in woongebouwen - Het weergeven in één getal van de geluidislatie van bouwelementen, gemeten in het laboratorium

To perform the above measurements, the laboratory of eco-scan is accredited by BELAC "The Belgian Accreditation Body"
BELAC is a signatory of all existing MLAs (multilateral agreements) and MRAs (multilateral recognition agreements) of EA (European co-operation for Accreditation), ILAC (International Laboratory Accreditation Cooperation) and IAF (International Accreditation Forum).
In this way, reports and certificates issued by BELAC accredited bodies are internationally accredited.

Date and reference of the request:	27/05/2013	2013_EC_21
Date of receipt of the specimen (s):	12/07/2013	SONE519
Date of tests:	16/07/2013	
Date of preparation of the report:	30/07/2013	

This test report together with its annexes contains : 15 pages and must be multiplies only in its entirety

Technical Manager,

ing. C. Debonne

Laboratory Engineer,

Karolien Benoit

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MEASURING EQUIPMENT

Signaal
Brüel & Kjaer - 4292 : Omni Power Sound Source
Brüel & Kjaer - 3207 : Tapping machine conform ISO 10140-5 Annex E

Microfoons en opname
Brüel & Kjaer - 4189 : 1/2" free field microphone, 6Hz to 20kHz, prepolarized
Brüel & Kjaer - ZC-0032 : 1/2" microphone preamplifier
Brüel & Kjaer - 4231 : Sound calibrator 94&114dB SPL-1000Hz, Fulfils IEC 60942(2003)Class1
Brüel & Kjaer - JP 1041 : dual 10-pole adaptor JP-1041
Brüel & Kjaer - 2270 : Sound level meter - dual channel instrument (measuring both channels simultaneously)
Conforms with IEC 61672-1 (2002-05) Class 1
Brüel & Kjear - 3923 : rotating microphone boom

Number of tapping machine positions: 3
Minimum 0,7m between the different source positions
Distances to the board of the floor at least 0.5 m
Random positions and orientation of the tapping machine.
Number of microphone positions for each tapping machine position: 3
Microphone position with a rotating microphone
Number of rotations: 3
Rotation speed: 16 sec/tr
Minimum rotation time: 30 sec
Just not a rotation angle <10 ° to the chamber surfaces

Signals
Brüel & Kjaer - BZ-5503 : utility software for hand-held analyzers
Brüel & Kjaer - BZ-7229 : dual-channel building acoustics software
Brüel & Kjear - 2716 : Power amplifier
Brüel & Kjaer - 7830 :Qualifier Software for reporting of results
A computer with proprietary software

Averaging Time per measurement: 48 sec
Number of reverberation time measurements (with graphic control): 27

Test chambers
Volume receiving room: 55,62 m³
Reference floor area: 12 m²
Surface test floor : 12,00 m²
There is absorption material available

Standard floor
The measurement support floor consists of a 14cm thick solid reinforced concrete slab.
In the standard ISO 10140-5 Annex C is this the "heavyweight standard floor".

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STANDARD METHOD

The normalised impact sound pressure level Ln and the reduction of sound pressure level (improvement of impact sound insulation) ΔL were measured according to the standard NBN EN ISO 10140-3:2010. A detailed description of the test set up has been given in the figures of annex 1 of this report.

The tests were measured as follows:

- The test sample is mounted onto a heavyweight standard floor, in accordance with the descriptions in the standard NBN EN ISO 10140-1 and 10140-3
- The standardized (see NBN EN ISO 10140-5:2010 Annex E) tapping machine is positioned in at least 4 positions on the test floor. The impact sound pressure levels are measured in the receiving room below the test floor using a moving microphone. A one-third octave band analyser measured the averaged sound levels in the third octave bands from 100 to 5000 Hz. If required, the levels are corrected to account for the background noise. The individual measurements are then averaged energetically for each one-third octave band and converted with the reverberation time measurements to the normalized impact sound pressure level Ln for a receiving room having 10m² of equivalent sound absorption area.
- The normalized impact sound pressure level of the heavyweight standard floor Ln,0 is measured using the identical procedure.
- The normalized impact sound pressure level is calculated according to the following equation:

$$L_n = L_i + 10 \log (A/A_0) \quad [dB]$$

met L_n = The normalized impact sound pressure level, expressed in dB (ref 20μPa)
L_i = the energy average sound pressure level in a one-third octave band in the receiving room when the floor under test is excited by the standardized tapping machine
A_0 = the reference equivalent absorption area (= 10m²)
A = the measured equivalent absorption area

- The temperature, relative humidity and static pressure is also measured in the test rooms
- The improvement ΔL of the impact sound insulation is calculated from the difference between the weighted impact sound levels of the bare floor without and with the floor covering

$$\Delta L = L_{n,0} - L_n \quad [dB]$$

met ΔL = The improvement of the impact sound insulation
$L_{n,0}$ = normalized impact sound pressure level of the bare floor
L_n = normalized impact sound pressure level of the bare floor with floor covering

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STANDARD METHOD

Single rating numbers

Evaluation according to EN ISO 717-2 defines single-number quantities, $L_{n,w}$ (C_i) for the impact sound insulation of floors and $\Delta L_w(C_{I,\Delta})$ for the impact sound reduction of floor coverings and floating floors from the results of measurements carried out in accordance with NBN EN ISO 10140-3
The values obtained in accordance with ISO 10140-3 are compared with reference values at the frequencies of measurement within the range 100Hz to 3150 Hz for measurements in one-third octave bands. The calculation of the single-value indicator can not be summarised in a few lines. See standard NBN EN ISO 717-2 for details.

$L_{n,w}$ = weighted normalized impact sound pressure level

$L_{n,w}+C_i$ = weighted normalized impact sound pressure level corrected with the adaptation term Ci

$C_i = L_{n,sum} - 15 - L_{n,w}$ With $L_{n,sum}$ the summation on an energetic basis for the one-third octave bands in the frequency range 100Hz to 2,5kHz

$$L_{n,sum} = 10 \log \sum_{i=1}^{x} 10^{\frac{L_i}{10}}$$

Calculations of the spectrum adaptation term may additionally be carried out for an enlarged frequency range.
The single-number quantities of impact sound insulation properties of floors, presented as $L_{n,w}$ (C_i)
The single-number quantities of the weighted reduction in impact sound pressure level for floorcoverings, is presented as ΔL_w ($C_{i,\Delta}$) and ΔL_{lin}

The normalized impact sound pressure level of the bare floor

$L_{n,0} = L_i + 10 \log (A/10)$ and $L_{n,0,w}$ ($C_{I,0}$)

The normalized impact sound pressure level of the bare floor with floor covering

$L_n = L_i + 10 \log (A/10)$ and $L_{n,w}$ (C_I)

$\Delta L = L_{n,0} - L_n$ Reduction of impact sound pressure level

To compare the measurement results obtained in different test laboratories, the normalized impact sound level Ln, is referred to the reference floor defined in ISO 717-2 in the following way. The quantity is designated by the index "r" ("reference floor"): $L_{n,r}$

$L_{n,r} = L_{n,r,0} - \Delta L$ and $L_{n,r,w}$ ($C_{I,r}$)

with $L_{n,r,0}$ is the defined normalized impact sound pressure level of the reference floor (see ISO 717-2 point 5.2)

$\Delta L_w = L_{n,r,0,w} - L_{n,r,w} = 78 - L_{n,r,w}$ with $C_{I,\Delta} = C_{I,r,0} - C_{I,r} = -11 - C_{I,r}$

$\Delta L_{lin} = \Delta L_w + C_{I,\Delta}$

Other of old national single-value indicators are also given in the annex to this report.

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SPECIAL MEASUREMENT CONDITIONS

/

ACCURACY

The accuracy of the impact sound insulation as calculated can be expressed in terms of repeatability (tests within one laboratory) and reproducibility (between various laboratories)

Repeatability [r]
When: - two tests are performed on identical test material - within a short period of time - by the same person or team - using the same instrumentation - under unchanged environmental conditions - the probability will be 95% that the difference between the two test results will be less than or equal to r

Reproducibility [R]
When: - two tests are performed on identical test material - in different laboratories - by different person(s) - under different environmental conditions - the probability will be 95% that the difference between the two test results will be less than or equal to R

In NBN EN 20140-2 there is a statement on the reproducibility R to be expected, based on the results of various inter-laboratory tests.
The reproducibility of the single figure rating Lw, ΔLw is about 3 dB.

The specific value of uncertainty is available on request

ENVIRONMENTAL CONDITIONS during the tests

		Source room	*Receiving room*
Temperature :	T =	21,9 °C	19,7 °C
Atmospheric pressure :	p =	1017,7 hPa	1018,2 hPa
Relative humidity :	h_r =	72,7 %	82,7 %

B

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MEASUREMENT AND CALCULATION DETAILS

The results as presented here relate only to the tested items and laboratory conditions as described in this report.

The results of the measurements are presented on the next pages (6 till 9)
- on page 7 : the measurement results for the normalized impact sound level for the bare floor (the naked laboratory floor)
- on page 8 : the measurement results for the normalized impact sound level for the bare floor with floor covering, composition of the test element in annex 2
- on page 9 : the calculation of the reduction of impact sound pressure

The results are given at all frequencies of measurement, both in tabular form and in the form of a graph.

The next table present an overview of the measurements and calculations

f (Hz)	Ln,0 bare floor (dB)	Ln bare floor + floor covering (dB)	ΔL $L_{n,0}$- L_n (dB)	$L_{n,r,0}$ reference floor *conform ISO 717-2 point 5.2* (dB)	$L_{n,r}$ reference floor + floor covering $L_{n,r,0}$- ΔL (dB)
50	53,0	43,1			
63	56,2	58,0			
80	52,6	53,3			
100	56,7	55,0	1,7	67,0	**65,3**
125	57,4	58,1	-0,7	67,5	**68,2**
160	62,6	59,5	3,1	68,0	**64,9**
200	66,4	62,3	4,1	68,5	**64,4**
250	67,8	60,1	7,7	69,0	**61,3**
315	68,5	58,5	10,0	69,5	**59,5**
400	70,2	57,1	13,1	70,0	**56,9**
500	71,3	55,3	16,0	70,5	**54,5**
630	72,3	52,4	19,9	71,0	**51,1**
800	71,1	48,9	22,2	71,5	**49,3**
1000	70,5	44,8	25,7	72,0	**46,3**
1250	70,9	40,8	30,1	72,0	**41,9**
1600	71,8	39,8	32,0	72,0	**40,0**
2000	69,9	35,9	34,0	72,0	**38,0**
2500	70,5	34,8	35,7	72,0	**36,3**
3150	69,7	30,2	39,5	72,0	**32,5**
4000	70,1	26,3	43,8	/	/
5000	69,4	22,6	46,8	/	/

ISO 717-2	$L_{n,0,w}$	$L_{n,w}$		$L_{n,r,0,w}$	$L_{n,r,w}$	ΔL_w =78-Ln,r,w	
	77	**53**		78	57	**21**	**dB**
	$C_{I,0}$	C_I		$C_{I,r,0}$	$C_{I,r}$	$C_{I,\Delta}$ = CI,r,0 - CI,r	
	-10	**0**		-11	1	**-12**	**dB**

NBN S01-400	I a	I b	(cat)	ΔL_{lin} =ΔL_w+$C_{I,\Delta}$	
NEN 5079	-8 dB	5 dB	(Ico,lab)	**9**	**dB**
NF S 31-053	82 dB(A)	60 dB(A)	(niveau Ln exprimé en dB(A))	21	niveau delta Lw en dB(A)

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L_n NORMALIZED IMPACT SOUND PRESURRE LEVEL in accordance with ISO 10140-3:2010

Standardized Impact Sound Pressure Level according to ISO 140-7

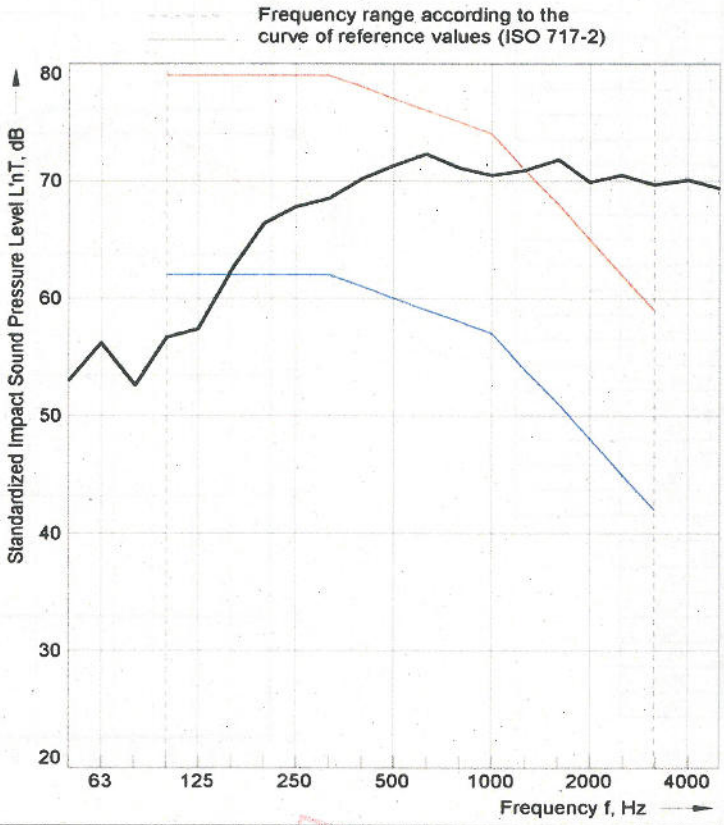
Field measurements of impact sound insulation of floors

Client: Date of test: 16/07/2013

Description and identification of the building construction and test arrangement:
14cm concrete floor

Receiving room volume V: 55,60 m³

Frequency f Hz	L'nT 1/3 Octave dB
50	53,0
63	56,2
80	52,6
100	56,7
125	57,4
160	62,6
200	66,4
250	67,8
315	68,5
400	70,2
500	71,3
630	72,3
800	71,1
1000	70,5
1250	70,9
1600	71,8
2000	69,9
2500	70,5
3150	69,7
4000	70,1
5000	69,4



Rating according to ISO 717-2

$L'_{nT,w}(C_i)$ = 77 (-11) dB $C_{i,50\text{-}2500}$ = -11 dB

Evaluation based on field measurement results obtained in one-third-octave bands by an engineering method

No. of test report: SONE539 Name of test institute: Eco-scan

Date: 18/07/2013 Signature:

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L_n NORMALIZED IMPACT SOUND PRESURRE LEVEL in accordance with ISO 10140-3:2010

Client: Gummiwerk Kraiburg Relastec Gmbh — Date of test: 16/07/2013

Discription and identification of the building construction and test arrangement:
DAMTEC multi 3mm

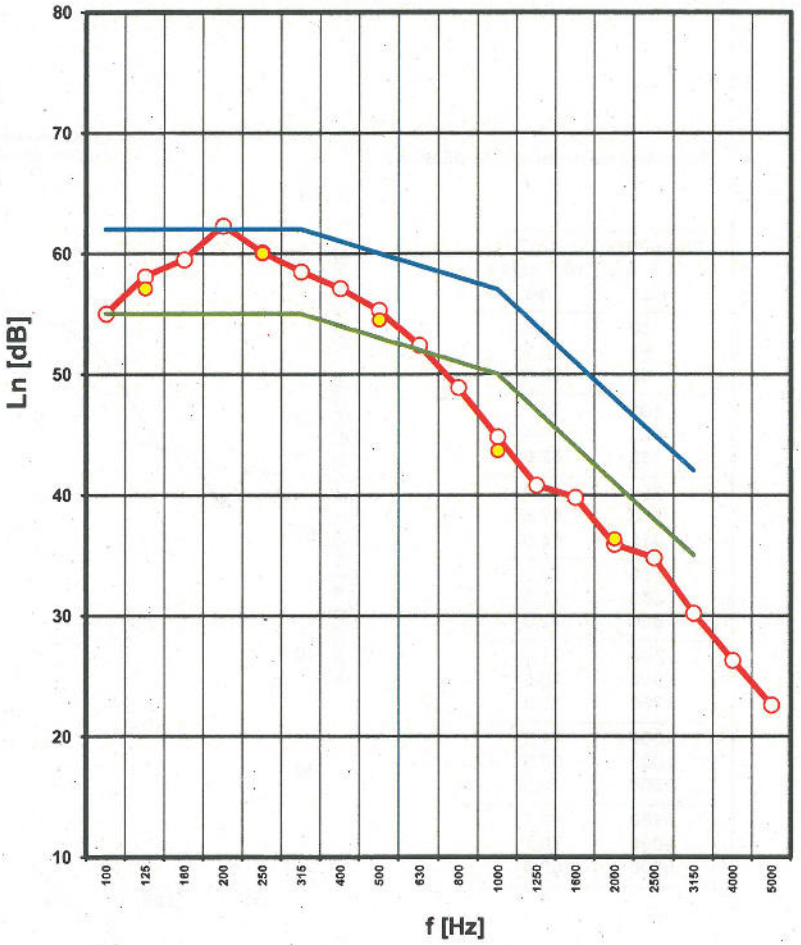
Receiving room volume V: 55,6 m³
Reference floor area : 12,0 m²
Tested floor area : 12,0 m²
Signal : the standardised tapping machine with steel-headed hammers

Frequency range according to the curve of reference values (ISO 717-2)

f (Hz)	L_n (dB)	(*)
1/3 octave bands :		
50	43,1	
63	**58,0**	
80	53,3	
100	55,0	
125	**58,1**	
160	59,5	
200	62,3	
250	**60,1**	
315	58,5	
400	57,1	
500	**55,3**	
630	52,4	
800	48,9	
1000	**44,8**	
1250	40,8	
1600	39,8	
2000	**35,9**	
2500	34,8	
3150	30,2	
4000	**26,3**	
5000	22,6	

octave bands :	
125	**57,1**
250	**60,0**
500	**54,5**
1000	**43,7**
2000	**36,4**
4000	**25,3**

B: Ln=< value shown



(*) b : background noise correction used
B : Maximum background noise correction used

Rating according to ISO 717-2

Ln,w (Ci) = 53 (0) dB

Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method

No.of test report: SONE519
Date: 16/07/2013

Name of test institute: eco-scan bvba
Signature: Christophe Debonne

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ΔL REDUCTION OF IMPACT SOUND PRESSURE LEVEL BY FLOOR COVERINGS in accordance with ISO 10140-3

Client: Gummiwerk Kraiburg Relastec Gmbh Date of test: 16/07/2013

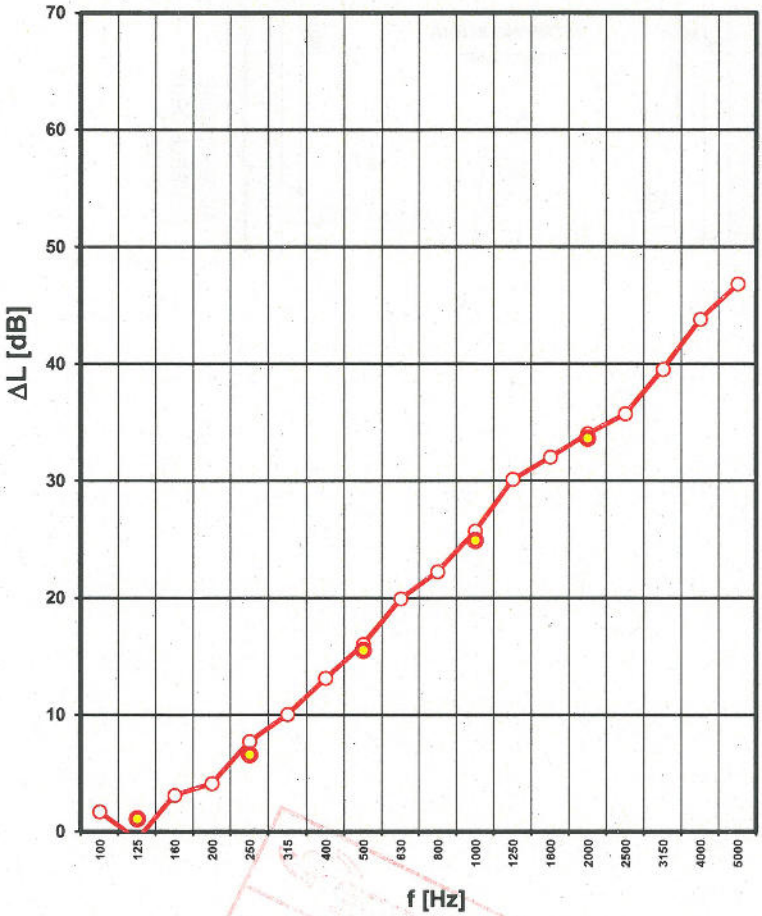
Discription and identification of the building construction and test arrangement:
DAMTEC multi 3mm

Receiving room volume V: 55,6 m³
Reference floor area : 12,0 m²
Tested floor area : 12,0 m²
Signal : the standardised tapping machine with steel-headed hammers

Frequency range according to the curve of reference values (ISO 717-2)

f (Hz)	ΔL =$L_{n,0}$- L_n (dB)
1/3 octave bands :	
50	
63	
80	
100	1,7
125	-0,7
160	3,1
200	4,1
250	7,7
315	10,0
400	13,1
500	16,0
630	19,9
800	22,2
1000	25,7
1250	30,1
1600	32,0
2000	34,0
2500	35,7
3150	39,5
4000	43,8
5000	46,8

octave bands :	
125	1,1
250	6,6
500	15,5
1000	24,9
2000	33,6
4000	42,3



Rating according to ISO 717-2

ΔL_w ($C_{i,\Delta}$) = 21 (-12) dB

ΔL_{lin} = 9 dB

Rating according to NEN 5079:1990

$\Delta l_{co,lab}$ = 9 dB

Evaluation based on laboratory measurement results obtained in one-third-octave bands by an engineering method

No.of test report: SONE519
Date: 16/07/2013

Name of test institute: eco-scan bvba
Signature: Christophe Debonne

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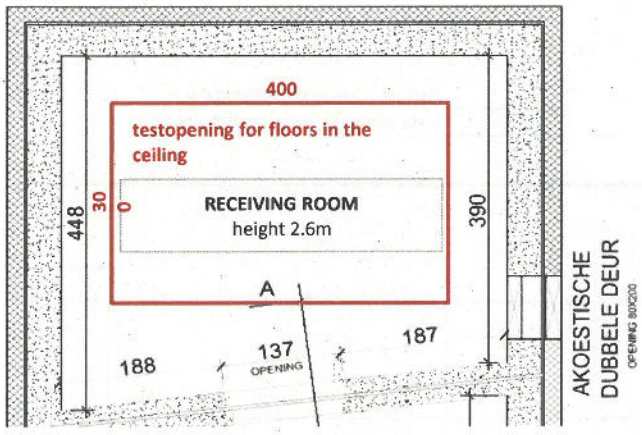
ANNEX 1 : Sound insulation test facilities

The test rooms meet the requirements of EN ISO 10140-5

Both rooms are isolated for vibrations. Flanking transmission is thus minimised.



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ANNEX 2: Description test items by manufacturer

The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

Description of the test element as a layered structure

	Thickness (mm)	ρ (kg/m³)	m'' (kg/m²)	Description of the layer
1	60	1200	72	prefab floor screed
2	3			DAMTEC multi 3mm
3	140	2300	322	heavyweight standard floor = solid reinforced concrete slab
4				
5				
6				
7				
8				
9				
10				

Total thickness = 203 mm

DAMTEC multi is a floor underlay for impact sound reduction.
It consists of granules of recycled rubber with PU elastomer bonding agent.

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ANNEX 3: Technical sheet

The test sample description given by manufacturer is checked visually as good as possible by the laboratory.
The correspondence between the test element and the commercialized product is the sole responsibility of the manufacturer

DAMTEC®
multi

KRAIBURG RELASTEC

Product Data Sheet No. 9431 - RV - 01
Edition: July 2013

1. Application Sector

DAMTEC® multi is a floor underlay for impact sound reduction.

2. Material

Granules of recycled rubber with PU elastomer bonding agent

3. Appearance

colour:	multicolour
surface:	granule structure

4. Dimensions/Tolerances

width:	1000 mm	± 1.5 %
length:	on request	
available thickness:	4.5, 5, 9, 9.5, 10 and 12 mm	± 0.6 mm
density:	approx. 970 kg/m³	

5. Physical Characteristics

tensile strength:	approx. 0.4 N/mm²	(ISO 1798)
elongation at break:	approx. 50%	(ISO 1798)
service temperature range:	- 30°C to 80°C	
impact sound improvement:	ΔL_w 14dB under 8mm tiles	
	ΔL_w 17dB under 8mm parquetry	

DISCLAIMER:
The information provided is intended only as a summary and general overview on matters of interest. The information is not intended to be comprehensive nor does it constitute expert advice. KRAIBURG RELASTEC shall not be liable for incidental and/or consequential damages directly or indirectly sustained, nor any loss caused by not complying with relevant industry/product standards and improper use of any Damtec® products. Due to varying construction methods, any other circumstances not stated above should be brought to the attention of KRAIBURG RELASTEC for review. For suitability to the prevailing site conditions, it is advised that certified testing should be conducted. It is recommended to seek further advice on your application with our technical staff prior to use.

The data sheet is not subject to any change service! All information is without guarantee.
With the publication of this product data sheet all former issues cease to be valid.

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Sitz der Gesellschaft · Salzwedel • Handelsregister Stendal HRB 525 • Geschäftsführer Georg Stockhammer

Made in Germany

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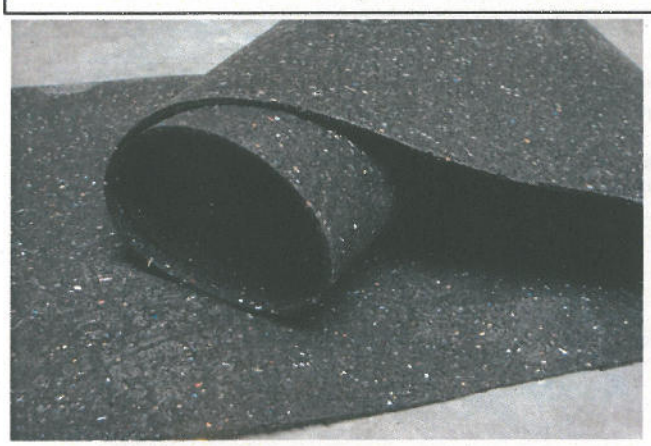
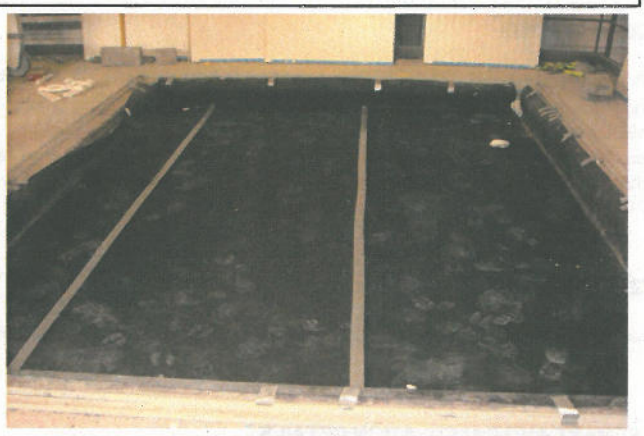
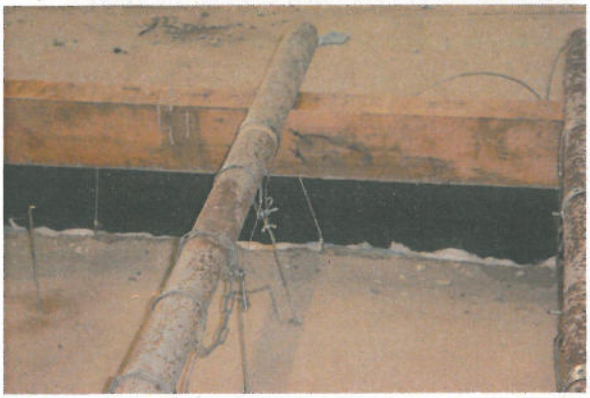
ANNEX 4: photographs of the test element or the test arrangement

Description of the assembly or drawing or photo

The product was placed on the standard concrete floor. A prefab floor screed was placed on top.
The screed had no contact with the test opening and gaps between the screed and the test opening were filled with mineral wool.







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ANNEX 5: results conform ASTM standards

This part is not under accreditation ISO 17025.
It contains the results of the laboratory measurement of impact sound transmission, conform the ASTM standards.

Standard method

The normalised impact sound pressure level Ln and the reduction of sound pressure level (improvement of impact sound insulation) were measured according to the standards ASTM E492-09 and E2179-03(2009).

Single rating numbers

Evaluation according to ASTM E2179-03(2009) and E989-06(2012) defines single-number ratings, IIC_c for the impact insulation class of floors and ΔIIC for the improvement in impact insulation class of floor coverings and floating floors from the results of measurements carried out in accordance with ASTM E492-09 and E2179-03(2009).
The values obtained in accordance with ASTM E492-09 are compared with reference values at the frequencies of measurement within the range 100Hz to 3150 Hz for measurements in one-third octave bands. The calculation of the single-value indicator can not be summarised in a few lines. See standards ASTM E2179-03(2009) and E989-06(2012).

Test arrangement

For measuring equipment, environmental conditions during the test, test set-up, description of product: see report above.

MEASUREMENT AND CALCULATION DETAILS

The results as presented here relate only to the tested items and laboratory conditions as described in this report.

The results of the measurements are presented on the pages 6 till 9.
- on page 7 : the measurement results for the normalized impact sound level for the bare floor $L_0(f)$ (the naked laboratory floor)
- on page 8 : the measurement results for the normalized impact sound level for the bare floor with floor covering $L_c(f)$, composition of the test element in annex 2
- on page 9 : the calculation of the reduction of impact sound pressure $L_d(f)$

The results are given at all frequencies of measurement, both in tabular form and in the form of a graph.

The next table (p.15) presents the same overview of the measurements and calculations as on page 6, but with the terms specific to the ASTM standards and with the single number ratings conform the ASTM standards: impact insulation class IIC_c and improvement in impact insulation class ΔIIC.

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ANNEX 5: results conform ASTM standards

f (Hz)	L_0 (f) bare floor (dB)	L_c (f) bare floor + floor covering (dB)	L_d (f) $L_0(f) - L_c(f)$ (dB)	L_{ref} reference floor *conform ASTM E2179-03 point 13.2* (dB)	$L_{ref,c}$ reference floor + floor covering $L_{ref} - L_d$ (dB)		
50	53,0	43,1					
63	56,2	58,0					
80	52,6	53,3					
100	56,7	55,0	1,7	67,0	**65,3**		
125	57,4	58,1	-0,7	67,5	**68,2**		
160	62,6	59,5	3,1	68,0	**64,9**		
200	66,4	62,3	4,1	68,5	**64,4**		
250	67,8	60,1	7,7	69,0	**61,3**		
315	68,5	58,5	10,0	69,5	**59,5**		
400	70,2	57,1	13,1	70,0	**56,9**		
500	71,3	55,3	16,0	70,5	**54,5**		
630	72,3	52,4	19,9	71,0	**51,1**		
800	71,1	48,9	22,2	71,5	**49,3**		
1000	70,5	44,8	25,7	72,0	**46,3**		
1250	70,9	40,8	30,1	72,0	**41,9**		
1600	71,8	39,8	32,0	72,0	**40,0**		
2000	69,9	35,9	34,0	72,0	**38,0**		
2500	70,5	34,8	35,7	72,0	**36,3**		
3150	69,7	30,2	39,5	72,0	**32,5**		
4000	70,1	26,3	43,8	/	/		
5000	69,4	22,6	46,8	/	/		
ASTM E2179-03 & E989-06 (2012)		IIC			IIC_c	ΔIIC =IICc-28	
		57			**52**	**24**	**dB**