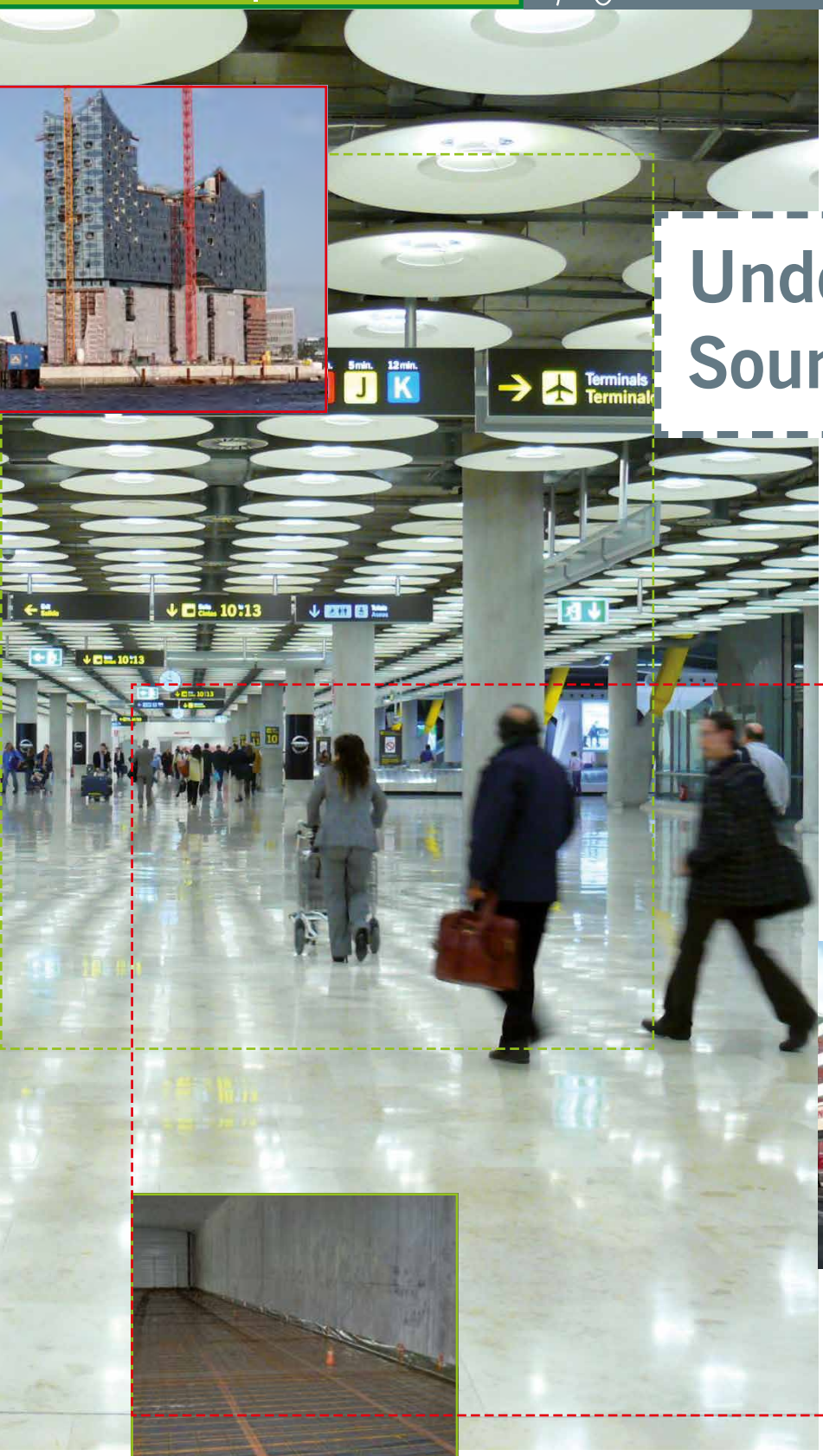


Under-Screed Impact Sound Insulation

Heavy-Duty

Technically approved

BSW

Product Overview

Regupol® sound is a compound material made of rubber fibres and polyurethane, and three versions of it were developed by BSW as heavy-duty impact sound insulation to be installed under a cement screed.

Regufoam® sound was also developed by BSW as an impact sound insulation sheet to be installed under a cement screed. The material has the highest impact sound reduction of all materials offered by BSW for this purpose. **Regufoam® sound** is a mixed-cell polyurethane foam.

Detailed technical data and test documentation can be found **starting on page 14** or at **www.bsw-vibration-technology.com**

Regupol® sound 47

Material
Polyurethane-bound rubber fibres

Impact noise reduction
$\Delta L_w \geq 20$ dB

Maximum traffic load
3,000 kg/m²

Dynamic rigidity
s' ≈ 47 MN/m³

General Technical Approval
Z-23.21-1694

Regupol® sound 12

Material
Polyurethane-bound elastomers

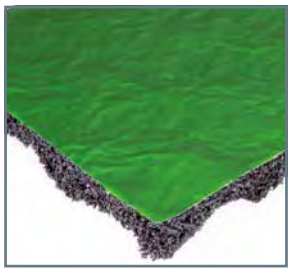
Impact noise reduction
$\Delta L_w \geq 33$ dB

Maximum traffic load
3,000 kg/m²

Dynamic rigidity
s' ≈ 12 MN/m³

General Technical Approval
Z-23.21-1935

Regupol® sound 17



Material
Polyurethane-bound rubber fibres

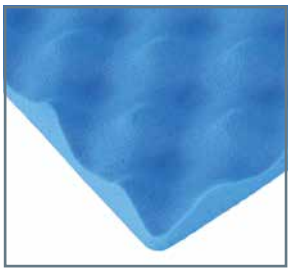
Impact noise reduction
$\Delta L_w \geq 26$ dB

Maximum traffic load
5,000 kg/m²

Dynamic rigidity
s' ≈ 17 MN/m³

General Technical Approval
Z-23.21-1741

Regufoam® sound 10



Material
Mixed-cell polyurethane foam

Impact noise reduction
$\Delta L_w \geq 34$ dB

Maximum traffic load
2,500 kg/m²

Dynamic rigidity
s' ≈ 10 MN/m³

General Technical Approval
Z-23.21.1905

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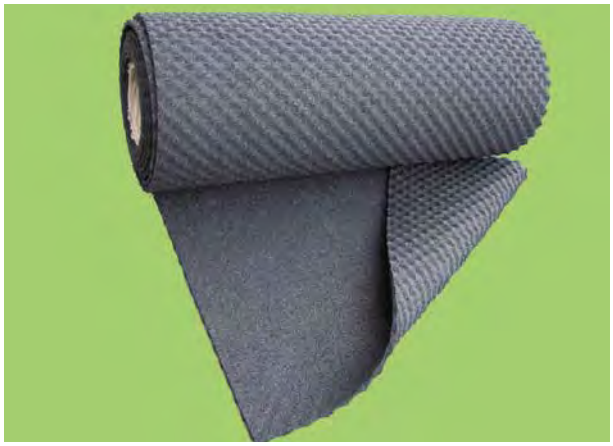
Regupol® Screed Insulation in Brief

Many floor constructions have to withstand extreme loads while at the same time providing good sound insulation. BSW has developed **Regupol®** and **Regufoam®** screed insulation for these divergent objectives. Constant area loads of 25, 30 and 50 kN/m² are possible. **Regupol®** and **Regufoam®** screed insulation have a low compressibility in accordance with DIN EN 12431, i.e. c ≤1.0 mm or ≤ 2.0 mm. Moreover, the **Regupol®** and **Regufoam®** impact sound insulation mats return to nearly their original thickness.

Regupol® and **Regufoam®** have remarkable stability under great static and dynamic loads. **Regupol®** and **Regufoam®** are among the products with the best performance in the area of impact sound insulation under high loads, with great dimensional stability as well as durability.



The Benefits

maximum traffic load of up to 2.5 and 5 t/m² respectively

technically approved

excellent ratio between impact sound improvement and structural height

negligible creep behaviour, even under high static or dynamic continuous loads

highly suitable for vibrated floor systems (no voids, etc.)

suitable for high point loads

unproblematic under rolling loads

permanent elastic, rot-resistant

high resilience level

long service life

quick and easy installation

internal and external production and quality monitoring

not harmful to health

approved for any type of recreation room

quality monitored by material testing agencies

Application Areas

Over the entire heavy-duty under-screed surface, e.g. in:

- Production halls, warehouses and dispatch stations
- Supermarkets in shopping centres
- Concert halls, auditoriums, cinemas, sound studios
- Gyms
- Hospitals, care homes
- Industrial kitchens and other floors frequently exposed to moisture
- Foyers of hotels and administrative buildings
- Libraries, universities, schools
- Workshops
- Test laboratories
- Under vibration floors

Made in Germany

- best quality
- fair pay
- secure jobs
- high environmental standards

BSW

Heavy-Duty

Impact Noise Insulation under High Load

DIN 4109 defines the requirements for noise protection in building construction. In addition to protection against airborne noise, installation noise, noise of building service systems, noise of companies and external noise, it also provides guidelines for protection against impact noise. The standard therefore defines the minimum requirements for protecting people in common rooms from unacceptable interference.

DIN 4109 further regulates the method for proving the noise protection required. The specific noise protection level is currently not clearly regulated and must be agreed upon on a case-by-case basis. The values in the DIN 4109 Addendum 2 “Enhanced noise protection” may, for example, be used as reference values.

Addendum 2 of the standard recommends an impact noise level of at most 46 dB in the room to be protected as “enhanced noise protection”. Attempts to remain within these limit values show that quite a few noise protection measures are insufficient, particularly in rooms with a high floor load. Conventional, standard impact noise insulation materials must be very stiff to withstand high loads. Impact noise insulation therefore decreases with carrying capacity.

Effective impact noise insulation for such applications should therefore have two characteristics that may be in conflict with each other:

- high compressive strength to ensure lasting stability
- and at the same time high impact sound improvement coefficients

The progressive spring characteristics of **Regupol® sound** minimize the risk of tearing joints, as the material becomes stiff under high load.

The screed or the concrete base must be appropriately reinforced to counter these high loads, in particular in the rim and corner areas. Consistent technical data, verified by continuous in-house production control, are very important for the specialist planner, as they are the basis for dimensioning. BSW provides these data and guarantees them!

Floor constructions of rooms in which forklifts and lifting carts move are usually exposed to high static and dynamic loads. Only impact insulation mats which were specifically built to handle these loads can guarantee the necessary floor stability and sound insulation.

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Regupol® and **Regufoam®** Screed Insulation

The maximum compressibility of **Regufoam® sound** and **Regupol® sound** in accordance with general construction guidelines is between ≤ 1.0 and ≤ 2.0 mm, depending on the type.

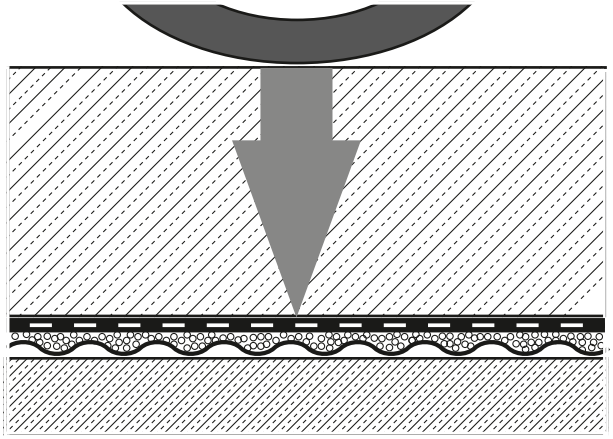
With a load of 30 kN/m², the deflection of the insulating material Regupol® sound 47 is only 1.6 mm.

The loads on floor surfaces which have been impact-insulated with **Regufoam® sound** and **Regupol® sound** can be accordingly high without the danger of causing damage to the screed or connection joints which have the proper dimensions. Thanks to the outstanding long-term behaviour of the material, which was demonstrated by a long-term creep test with 12 million stress cycles, among other tests, its properties, such as resilience level and impact sound improvement, remained constant over a very long time period (approx. 50 years).

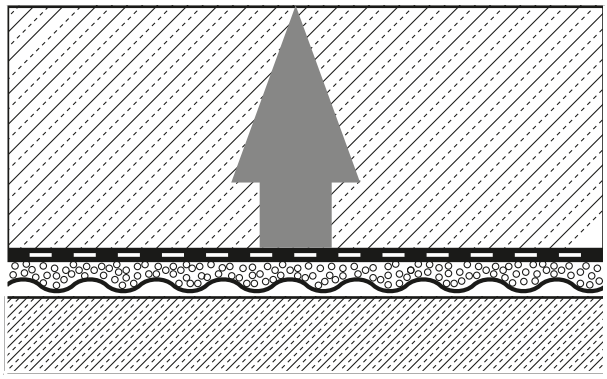
Resilience is at least 95%. The General Technical Approval ensures that the measured impact sound insulation values remain permanently constant.

The elastic behaviour of **Regupol®** and **Regufoam®** screed insulation demonstrates that the material retains its properties and is not damaged by high loads. These enormously important material properties can only be achieved with comprehensive quality assurance, from incoming goods inspection of the raw materials through to the impact sound improvement tests in the laboratory of the Testing and Certification Agency. For this reason it does not make sense and is even dangerous to use products that have not been specifically developed for impact sound insulation.

In addition to outstanding physical properties, **Regupol®** and **Regufoam®** screed insulation also possesses highly important chemical properties. The applications of industrial floors very frequently also require resistance to moisture and hydrolysis as well as resistance to lactic and fatty acids. What is more, resistance to the standard industrial and cleaning agents is an absolute must.



Even with a heavy load, **Regupol®** and **Regufoam®** screed installation sinks in without the structure of the material being destroyed (the deflection shown here is exaggerated).



When the load is removed, the material returns almost to its original thickness. The impact sound insulation remains constant for the long term.

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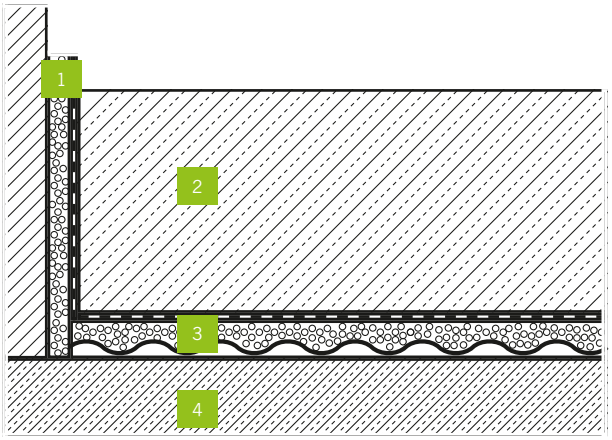
Different Installations of **Regupol®** and **Regufoam®** Screed Insulation

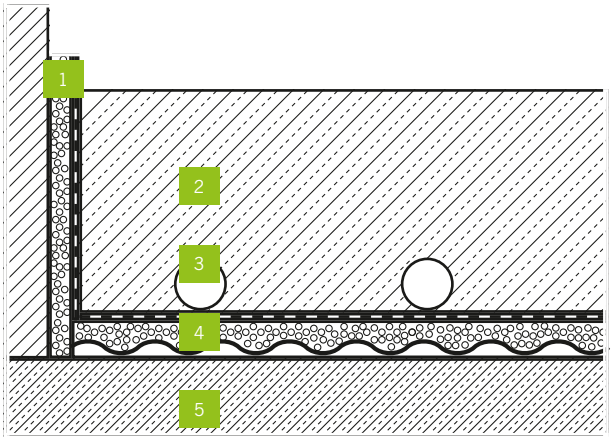
The types of installations of screed insulation that are actually used most frequently are shown in the drawings below. Generally speaking, it has to be ensured that any acoustic bridges are avoided. If there is a conflict between heat insulation and impact sound dampening, impact sound damp-ening must be given preference for the sake of the immediate protection of people's health.

a) Floating Screed:



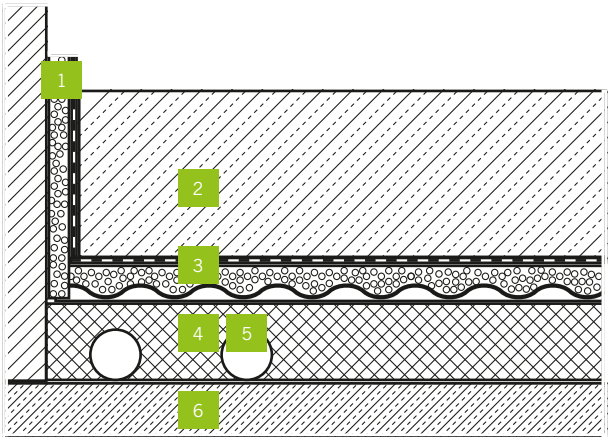
Standard installation of **Regupol®** and **Regufoam®** screed insulation: 1 perimeter insulation strip with PE foil • 2 floating screed • 3 **Regupol®** or **Regufoam®** screed insulation with PE foil on top • 4 concrete floor

b) Floating Screed with Underfloor Heating:



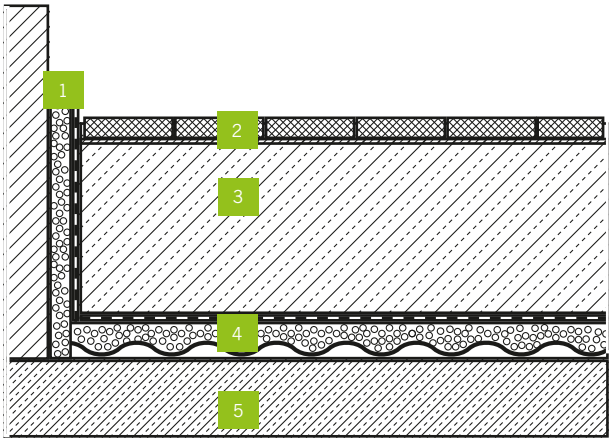
Installation of **Regupol®** and **Regufoam®** screed insulation with underfloor heating: 1 perimeter insulation strip with PE foil • 2 floating screed • 3 underfloor heating pipe • 4 **Regupol®** or **Regufoam®** screed insulation with PE foil on top • 5 concrete floor

c) Black Screed with Heat Insulation and Pipe Feed-through:



Installation of **Regupol®** and **Regufoam®** under-screed impact sound insulation on heat insulation with pipelines: 1 perimeter insulation strip with PE foil • 2 floating screed • 3 **Regupol®** or **Regufoam®** screed insulation with PE foil on top • 4 heat insulation • 5 pipelines • 6 concrete floor

d) Vibrated Clinker Layer:



Installation of **Regupol®** and **Regufoam®** under-screed impact sound insulation under vibrated floors: 1 perimeter insulation strip with PE foil • 2 floor tiles with bonding agent • 3 floating screed • 4 **Regupol®** or **Regufoam®** screed insulation with PE foil on top • 5 concrete floor

Planning the Screed Insulation

During the planning of the construction project, a noise protection certificate is required in addition to a statics and heating certificate. Architects usually receive the assistance of expert consultants in this who can achieve the correct relationship between the sound properties of the different elements to one another.

The **BSW specialist planning service** is available to any architect who designs with **Regupol®** and **Regufoam®**.

Recommendation and coordination of specialist planners for building acoustics. Learn more at www.bsw-vibration-technology.com.

BSW specialist planning service

The most important factors which must be included in the dimensioning of the screed insulation are:

required noise protection

necessary impact sound improvement

static and dynamic loads to be borne

These basic parameters determine all other key values such as quality and thickness of the screed and the impact sound insulation to be applied.

Insulation of Adjacent Components

Generally speaking, in concrete construction, impact sound insulation that is incorporated into the building structure is only possible under floating screeds or the installation mortar of vibrated floors. Should other floor constructions be necessary such as bonded screed or screed on a separating layer, mandatory sound-insulating measures must be taken elsewhere. Feasible alternatives are the decoupling of individual parts of the building such as wall beddings and stair flights, under-floor impact sound insulation, entire room-in-room constructions or measures to reduce the airborne sound due to structure-borne noise in the reception room. As a general rule, however, the transfer of sound should be interrupted at the place where it is generated.

The following operation applies to the determination of the impact noise level to be expected in the room that must be protected:

$$L'_{n,w} = L'_{n,w,eq} - \Delta L_w$$

$L'_{n,w}$ = weighted standard impact noise level in the reception room (calculation value)

$L'_{n,w,eq}$ = equivalent weighted standard impact noise level of the solid floor without floor covering (calculation value)

ΔL_w = impact noise level reduction (calculation value)

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Planning the Screed Insulation

When planning the screed insulation, the planner must be able to rely on the technical data supplied by the manufacturer of the impact sound insulation layer. It must therefore be checked carefully whether the specifications are feasible and whether they adhere to the applicable standards. If there are any doubts about the specifications, a test certificate should be produced on request (concerning the applicability of impact sound tests and their adherence to standards, see page 13). BSW states reliable and verifiable values as per ISO 140-8.

In actuality, even these test results only provide a benchmark, as they are based on a standardised test set-up. In real life, however, thickness and material consistency of the concrete floor and screed often deviate from them. How this impacts the impact noise level that can actually be achieved depends on the calculation performed by the expert consultant / acoustic engineer.

An essential key value for installing screed insulation is the dynamic rigidity of the impact sound insulation layer.

As a rule, the following applies to conventional, standardised insulation materials:

Dynamic rigidity	Sound insulation	Load-bearing capacity	Compression
high	low	high	low
low	high	low	high

By contrast, the screed insulation materials **Regufoam® sound** and **Regupol® sound** can withstand high loads and insulate impact sound very well, which distinguishes them enormously from conventional insulation materials. With a maximum traffic load of 3,000 kg/m², for instance, a maximum impact noise level reduction of 33 dB can be achieved with **Regupol® sound 12**.

Random layers of materials which may be similar in their physical appearance but are made of bonded rubber granulate, can cause tremendous problems regarding the required load-bearing capacity of the floor construction, as their physical behaviour may be utterly unsuitable. Impact sound insulation materials must be standardised or approved. When alternative products are used which look the same on the outside, it is doubtful if they can achieve equally good impact sound insulation.

The following sample calculation as per DIN 4109 for **Regupol® sound 17** already contains the required values of the screed and the concrete floor.

20 cm reinforced concrete floor
$L'_{n,w,eq}$ = 71 dB

– 17 mm screed insulation mat **Regupol® sound 17** under 90 mm screed plus tiles or under 120 mm screed / reinforced concrete base plate
ΔL_w = 26 dB

– $L'_{n,w}$ = 49 dB

With this impact sound insulation and proper dimensioning, the total construction would be able to bear loads of up to 5,000 kg/m². The different concrete floors have different initial sound technology values.
Here is an example:

Reinforced concrete Thickness in cm	Mass kg/m²	Equivalent weighted standard impact noise level $L'_{n,w,eq}$
17	391	74
18	414	73
19	437	72
20	460	71
21	483	70
22	506	69
etc.	etc.	etc.

Taking Sources of Error into Account

When planning the sound technology of a floor construction, numerous sources of errors must be taken into account. These are mainly various acoustic bridges, typically other construction elements which transfer the sound without insulation to other areas of the building by avoiding or interrupting the impact sound insulation. They may considerably impair the effect of an impact sound insulation measure.

As a rule, the following applies:

The impact sound insulation must be complete. Even minute structural parts such as connection and fastening elements, but especially pipelines and constructions made of concrete or other materials which are on top or adjacent, must be excluded as transmitters of impact sound.

Planning the Screed Insulation

The most frequent mistake in the planning and installation of screed insulation is the lack of or insufficient consideration of pipelines. Pipelines are often directly on top of the concrete floor and can form acoustic bridges unless they are decoupled from the sound-emitting room.

DIN 18560-2 specifies two versions of pipelines under floating screeds and on load-bearing subfloors:

- levelling screed or another levelling layer in bonded form

- screed pipe height compensation with heat insulation boards

for achieving a level surface that can receive the insulating layer of the impact sound insulation. The pipes which are on the load-bearing concrete floor must be fixed. The construction height of the levelling layer must be determined in the plan.

Other sources of flaws are:

- stairways and landing platforms which are connected with the sound-transmitting surface must be decoupled from it
- radiator supports
- built-in components anchored in the screed and the wall
- pipelines which are fed into the walls
- joint dowels to interrupt horizontal sound waves
- support columns and partition walls

Checking the Technical Specifications for Impact Sound Insulation Mats

A proper check of the impact noise reduction for screed insulation mats is therefore testing category II as per EN ISO 140-8. Accordingly, the tested area is at least 10 m² in size. The values measured in this test form the basis of the calculation value for impact noise reduction with screed insulation mats. It is considerably lower than the dB values measured according to testing category I.

The reason is that testing according to category I is conducted on an area of, say, merely 1 x 0.4 m and is admissible for compliant covering which was installed loose or sticking to the floor covering, but not for screed insulation mats in floor coverings where at least one component is solid (e.g. screed) as described in category II.

Only testing as per DIN EN ISO 140-8, testing category II, determines practice-oriented dB values for screed insulation.

How much the impact sound insulation values of a test according to category I can deviate from those of the practice-oriented tests for screed insulation mats is demonstrated in the following example with **Regupol®** screed insulation.

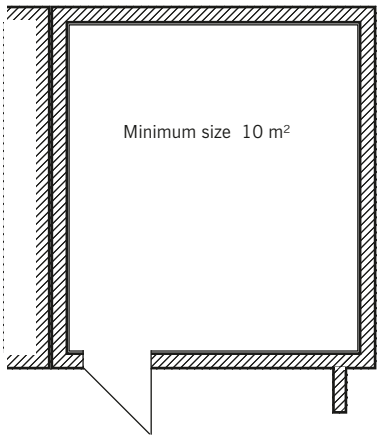
In the benchmark test for **Regupol®** screed insulation as per testing category I, a sound reduction value was achieved of

ΔL_w = 33 dB.

The practice-oriented test in category II, on the other hand, showed a sound reduction value of

ΔL_w = 20 dB.

For this reason attention must be paid to the testing category when assessing the indicated impact noise reduction values. If necessary, you should request to see the test certificate.



Floor plan of 1st floor, floor test rig with suppressed flanking transmission as per DIN EN ISO 140-1 with standard concrete floor, 15 cm thick.

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Regupol® sound 47

Impact Sound Insulation Under Screed

Largely rot-, moisture-, age- and deformation-resistant, permanently elastic

Material
PU-bonded rubber fibres

Standard delivery form
in rolls of 15 m² each, 13,040 x 1,150 x 8 mm

Temperature resistance
from –20 °C to +80 °C

Colour
Anthracite

Regupol® sound 47, dimpled on underside

Physical Data

weighted impact noise reduction as per ISO 717-2
$\Delta L_w \geq 20$ dB

Mean value for dynamic rigidity as per DIN EN 29052-1
s' ≈ 47 MN/m³

Thermal conductivity
λ = 0.075 W/mK

Thermal resistance
R = 0.1031 m²K/W

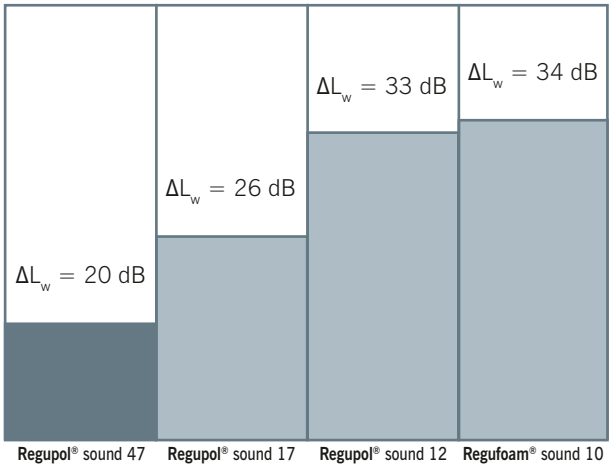
Fire classification according to DIN 4102/DIN EN 13501-1
B2 / Class E

Maximum traffic load
up to 3,000 kg/m²

Compressibility as per DIN EN 12431
c ≤ 1.0 mm

Compressive stress (N/mm²)	Settlement (mm)	Bedding modulus (MN/m³)
0.0015	0	
0.0059	0.476	12.0
0.0118	0.863	14.0
0.0206	1.284	16.0
0.0294	1.605	18.0
0.0118	1.066	11.0

Performance and evaluation of test as per DIN 18134, sample measurements and testing facility as per DIN EN 826. Tested by Technical University Dresden.



General Technical Approval: Z-23.21-1694

Impact Noise Reduction **Regupol®** sound 47 as per ISO 140-8

Measurement of the impact noise reduction, provided by a floor covering on a solid standard floor under test conditions

Description of the test object

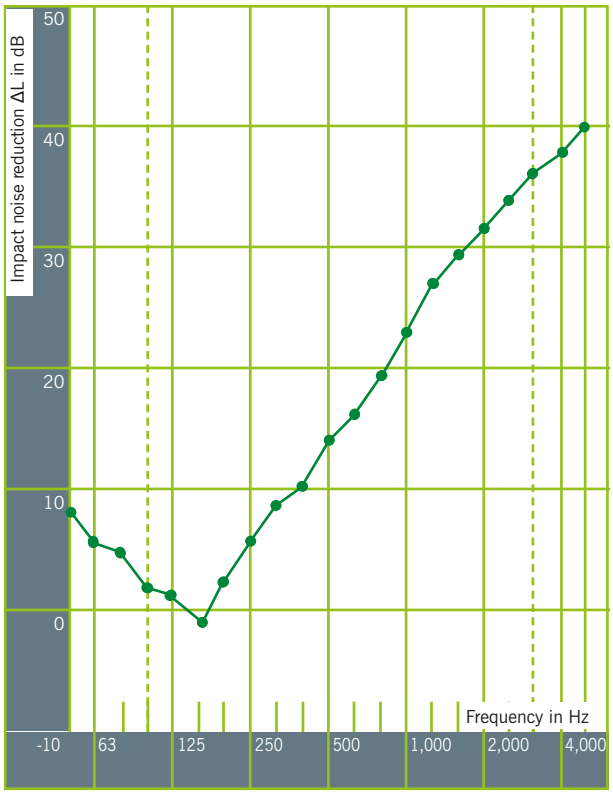
– 68 mm concrete screed
– 0.20 mm PE foil
– 8 mm screed insulation mat, **Regupol® sound 47** (dimpled on one side)
– mean value of dynamic rigidity as per DIN EN 29052-1, s' ≈ 47 MN/m³
– 8 mm perimeter screed strip (foamed PE foil)
– 140 mm raw ceiling

Basis weight	approx. 135 kg/m²
Setting time	552 h
Air temperature in the test rooms	21 °C
Humidity in the test rooms	56 %
Volume of reception room	54.2 m³

Impact noise reduction improvement as per ISO 717-2

$\Delta L_w \geq 20$ dB $\quad C_{I,\Delta} = -12$ dB $\quad C_{I,r} = 1$ dB

The results refer only to the tested structure.



MPA NRW
Materialprüfungsamt Nordrhein-Westfalen
geprüft
Nr.: 420001705

Tested by the MPA (German materials testing agency).

Test for obtaining the national technical approval

on 05.12.2005
MPA NRW
44285 Dortmund
Germany
Phone +49 (0)231 45020
Fax +49 (0)231 458 549

We will be pleased to send you the complete test report no. 420001705 upon request.

	Frequency Hz	$L_{n,}$ raw ceiling without test set-up ⅓ octave dB	$L_{n,}$ raw ceiling with test set-up ⅓ octave dB	ΔL ⅓ octave dB
	50	70.2	61.7	8.5
	63	64.2	58.7	5.5
	80	66.4	61.7	4.7
Frequency range for the rating as per ISO 717-2	100	58.9	57.4	1.5
	125	64.3	63.2	1.1
	160	66.5	67.5	-1.0
	200	68.8	66.1	2.7
	250	69.0	63.0	6.0
	315	68.9	60.0	8.9
	400	69.5	59.4	10.1
	500	70.1	55.8	14.3
	630	69.9	53.5	16.4
	800	69.7	50.3	19.4
	1,000	70.8	47.5	23.3
	1,250	71.3	43.9	27.4
	1,600	71.4	41.7	29.7
	2,000	71.0	39.3	31.7
	2,500	70.9	36.8	34.1
	3,150	70.0	33.7	36.3
	4,000	68.6	30.6	38.0
	5,000	65.9	25.9	40.0

Impact Sound Insulation Under Screed

Largely rot-, moisture-, age- and deformation-resistant, permanently elastic

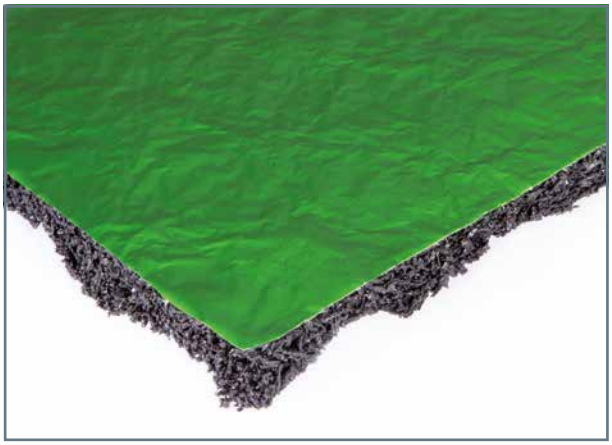
Material
PU-bonded rubber fibres

Standard delivery form
1,200 x 1,000 x 17 mm, 60 m² per pallet

Temperature resistance
from –20 °C to +80 °C

Colour
Anthracite

Upper side laminated with green aluminium foil.



Regupol® sound 17, dimpled on underside

Physical Data

weighted impact noise reduction as per ISO 717-2
$\Delta L_w \geq 26$ dB

Mean value for dynamic rigidity as per DIN EN 29052-1
s' ≈ 17 MN/m³

Thermal conductivity
λ = 0.08 W/mK

Thermal resistance
R = 0.2162 m²K/W

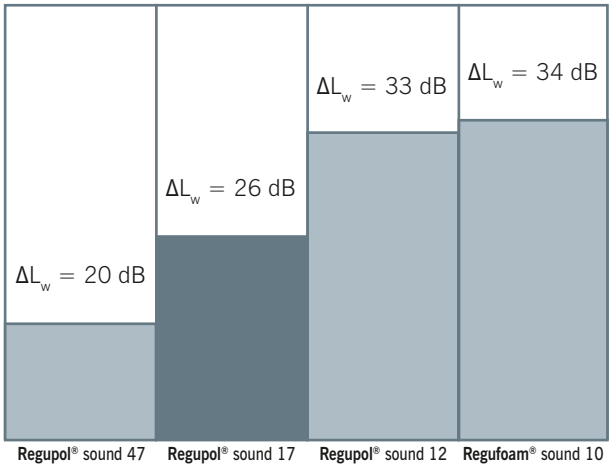
Fire classification according to DIN 4102/DIN EN 13501-1
B2 / Class E

Maximum traffic load
up to 5,000 kg/m²

Compressibility as per DIN EN 12431
c ≤ 2.0 mm

Compressive stress (N/mm²)	Settlement (mm)	Bedding modulus (MN/m³)
0.0025	0	0
0.0098	1.4	7.0
0.0196	2.6	8.0
0.0343	3.9	9.0
0.0490	4.7	10.0
0.0196	3.2	6.0

Performance and evaluation of test as per DIN 18134, sample measurements and testing facility as per DIN EN 826. Tested by Technical University Dresden.



General Technical Approval: Z-23.21-1741

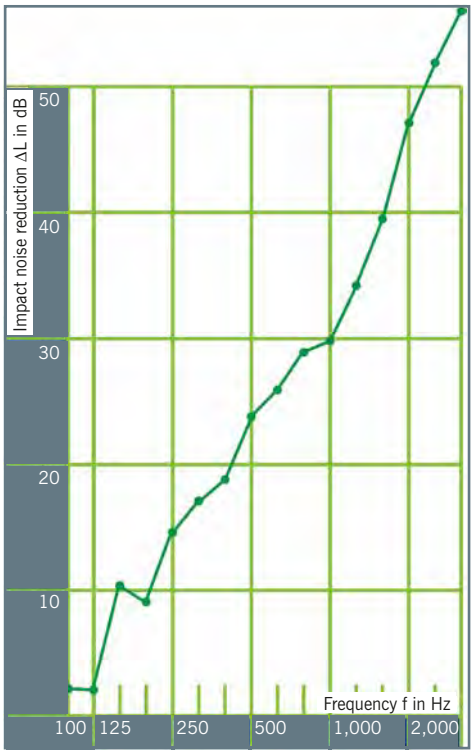
Impact Noise Reduction **Regupol®** sound 17 as per ISO 140-8

Measurement of the impact noise reduction, provided by a floor covering on a solid standard floor under test conditions

Description of the test object

– 28 mm cast stone
– approx. 4 mm thin-set mortar
– approx. 90 mm screed
– 0.25 mm PE foil
– 17 mm screed insulation mat, **Regupol® sound 17**, single layer
– mean value of dynamic rigidity as per DIN EN 29052-1, s' ≈ 17 MN/m³
– length-related flow resistance as per EN 29053:
– r = 8088 Pa s/m²
– 150 mm reinforced concrete
– perimeter strip made of mineral fibreboards, 15 mm thick
– mass per unit area of the floor covering 240 kg/m²

Mass per unit area:	600 kg/m²
Test surface area:	16.9 m²
Test rooms – volume of reception room:	V_e = 51.3 m³
Condition:	empty
Type:	laboratory



Impact noise reduction improvement as per ISO 717-2

$\Delta L_w \geq 26$ dB $C_{I,\Delta} = -13$ dB $\Delta L_{lin} = 13$ dB

The results refer only to the tested structure.

Frequency Hz	$L_{n,}$ raw ceiling ⅓ octave dB	ΔL ⅓ octave dB
100	57.5	2.2
125	60.3	2.1
160	60.7	10.1
200	61.6	9.1
250	61.5	14.6
315	63.8	17.1
400	62.1	18.8
500	63.3	23.8
630	63.3	25.9
800	64.4	28.9
1,000	65.6	29.8
1,250	66.4	34.2
1,600	66.7	39.5
2,000	66.7	47.1
2,500	66.6	51.9
3,150	67.2	56.0

Qualification test I for DIN 4109 on 05.05.1999

Publication of the results is authorised by the Ingenieurgesellschaft für Technische Akustik mbH
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Fax +49 (0)6122 956 161

We will be pleased to send you the complete test report no. 0070.99-P 57 upon request.

Regupol® sound 12

Impact Sound Insulation Under Screed

Largely moisture-, age- and deformation-resistant, permanently elastic, but protect permanently against moisture.

Material
PU-bonded elastomers

Standard delivery form
1,200 x 1,000 x 17 mm, 60 m^2 per pallet

Temperature resistance
from –20 °C to +80 °C

Colour
brown-beige, dark particles

Upper side laminated with green aluminium foil.

Regupol® sound 12, dimpled on underside

Physical Data

weighted impact noise reduction as per ISO 717-2
$\Delta L_w \geq 33$ dB

Mean value for dynamic rigidity as per DIN EN 29052-1
s' ≈ 12 MN/m^3

Thermal conductivity
λ = 0.063 W/mK

Thermal resistance
R = 0.289 m^2K/W

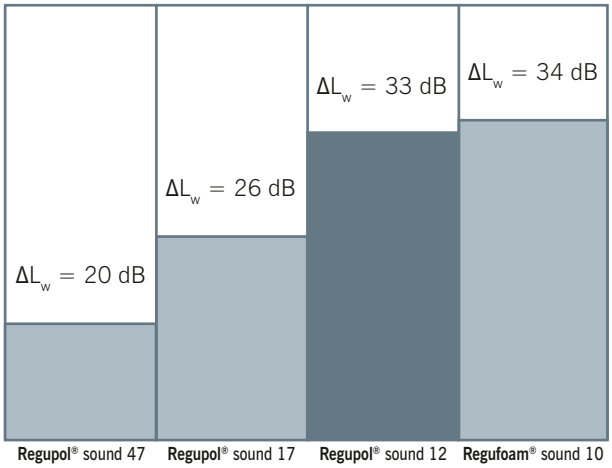
Fire classification according to DIN 4102/DIN EN 13501-1
B 2 / Class E

Maximum traffic load
up to 3,000 kg/m^2

Compressibility as per DIN EN 12431
c ≤ 2.0 mm

Compressive stress (N/mm^2)	Settlement (mm)	Bedding modulus (MN/m^3)
0.005	2.1	2.8
0.010	3.2	3.1
0.020	4.5	4.5
0.025	4.9	5.1
0.030	5.3	5.7
0.020	4.7	4.3

Performance and evaluation of test as per DIN 18134, sample measurements and testing facility as per DIN EN 826.



General Technical Approval: Z-23.21-1935

Impact Noise Reduction **Regupol®** sound 12 as per ISO 10140-3

Measurement of the impact noise reduction, provided by a floor covering on a solid standard floor under test conditions

Description of the test object

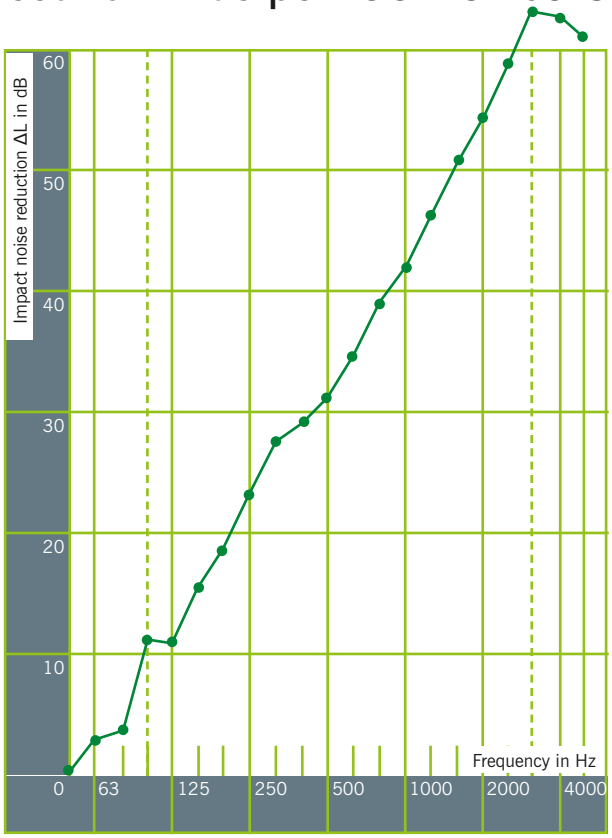
– 160 mm raw ceiling
– 17 mm **Regupol® sound 12** screed insulation mat
– 0.25 mm PE-foil
– 80 mm screed
– total thickness 255 mm
– mean value of dynamic rigidity as per DIN EN 29052-1, s' ≈ 12 MN/m³

Mass per unit area :	581.6 kg/m²
Test surface area:	4.0 x 5.0 = 20.0 m²
Volume of test rooms:	V_S = 54 m³, V_E = 62 m³
Air temperature in test rooms:	21 °C
Water curing:	> 21 days

Impact noise reduction improvement as per ISO 717-2

$\Delta L_w \geq 33$ dB $\quad C_{I,\Delta} = -12$ dB

The results refer only to the tested structure.



Frequency Hz	$L_{n,}$ raw ceiling ⅓ octave dB	ΔL ⅓ octave dB
100	66.1	11.7
125	62.8	11.5
160	68.1	15.3
200	69.0	18.5
250	70.0	23.3
315	71.4	27.0
400	70.4	29.0
500	71.4	31.6
630	71.2	34.6
800	72.4	39.0
1000	72.0	42.3
1250	72.6	46.9
1600	72.9	50.5
2000	72.0	54.8
2500	71.6	58.7
3150	70.9	63.0

ift ROSENHEIM

Qualification test for DIN 4109 on 02.08.2012

Publication of the results is authorised by ift Rosenheim GmbH
Theodor-Gietl-Str. 7-9
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Germany
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Fax +49 (0)8031 261-290

We will be pleased to send you the complete test report no. 12-001691-PR01 (PBX5.1-F03-04-de-01) upon request.

BSW

Regufoam® sound 10

Impact Sound Insulation Under Screed

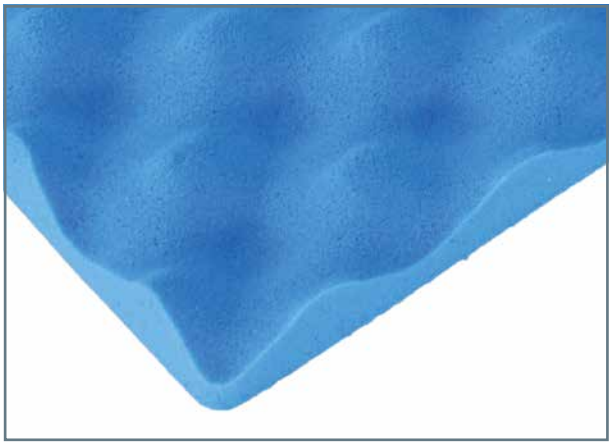
Largely rot-, moisture-, age- and deformation-resistant, permanentley elastic, but protect against large volumes of water. For installation with underfloor heating please contact us for further information.

Material
Mixed-cell polyurethane foam

Standard delivery form
1,500 x 1,100 x 17 mm, 198 m^2 per pallet

Temperature resistance
from –20 °C to +80 °C

Colour
light blue



Regufoam® sound 10, dimpled on underside

Physical Data

weighted impact noise reduction as per ISO 717-2
$\Delta L_w \geq 34$ dB

Mean value for dynamic rigidity as per DIN EN 29052-1
s' ≈ 10 MN/m^3

Thermal conductivity
λ = 0.046 W/mK

Thermal resistance
R = 0.331 m^2K/W

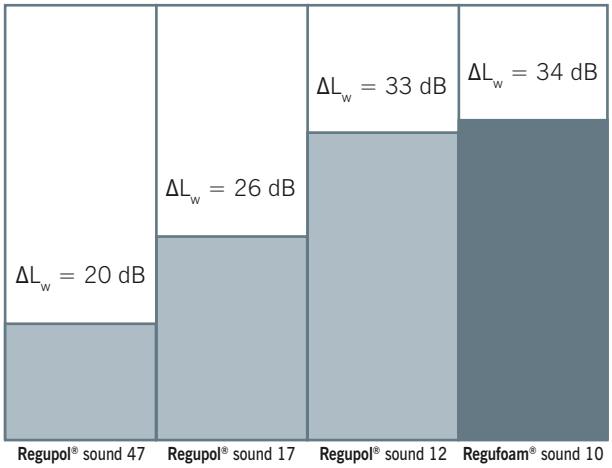
Fire classification according to DIN 4102/DIN EN 13501-1
B 2 / Class E

Maximum traffic load
up to 2,500 kg/m^2

Compressibility as per DIN EN 12431
c ≤ 2.0 mm, deformation-resistant, compressible volume

Compressive stress (N/mm^2)	Settlement (mm)	Bedding modulus (MN/m^3)
0.005	3.4	1.5
0.010	4.9	2.1
0.015	5.9	2.5
0.020	7.0	2.8
0.025	8.1	3.1
0.015	6.2	2.4

Performance and evaluation of test as per DIN 18134, sample measurements and testing facility as per DIN EN 826.



General Technical Approval: Z-23.21.1905

Impact Noise Reduction **Regufoam®** sound 10 as per ISO 10140-3

Measurement of the impact noise reduction, provided by a floor covering on a solid standard floor under test conditions

Description of the test object

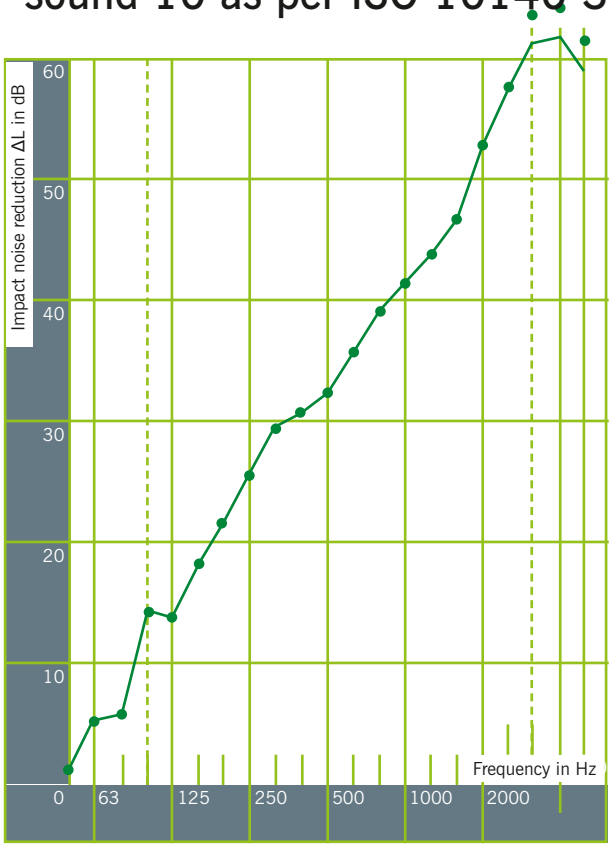
– 160 mm raw ceiling
– 17 mm **Regufoam® sound 10** screed insulation mat
– 0.25 mm PE-foil
– 80 mm screed
– total thickness 257 mm
– mean value of dynamic rigidity as per DIN EN 29052-1, s' ≈ 10 MN/m³

Mass per unit area:	581.6 kg/m²
Test surface area S:	4.0 x 5.0 = 20.0 m²
Volume of test rooms:	V_S = 54 m³, V_E = 62 m³
Air temperature in test rooms:	21 °C
Water curing:	> 21 days

Impact noise reduction improvement as per ISO 717-2

$\Delta L_w \geq 34$ dB $\quad C_{I,\Delta} = -13$ dB

The results refer only to the tested structure.



Frequency Hz	$L_{n,}$ raw ceiling ⅓ octave dB	ΔL ⅓ octave dB
100	66.1	14.3
125	62.8	13.9
160	68.1	18.6
200	69.0	21.7
250	70.0	25.7
315	71.4	29.4
400	70.4	30.5
500	71.4	32.6
630	71.2	35.6
800	72.4	39.2
1000	72.0	41.0
1250	72.6	43.9
1600	72.9	47.5
2000	72.0	52.4
2500	71.6	56.9
3150	70.9	60.8

ROSENHEIM

Qualification test for DIN 4109 on 01.08.2012

Publication of the results is authorised by ift Rosenheim GmbH
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Fax +49 (0)8031 261-290

We will be pleased to send you the complete test report no. 12-001691-PR01 (PBX3.1-F03-04-de-01) upon request.

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Installation Guidelines

Concrete Floor

Before the **Regupol**® and **Regufoam**® screed insulation is installed, make sure the concrete floor is swept clean and dry. Protruding pieces, stones and chunks of concrete must be removed. Any slight unevenness may be ignored, as it will be levelled by **Regupol**® and **Regufoam**® screed insulation.

Perimeter Insulation

Prior to the installation of the **Regupol**® and **Regufoam**® **Perimeter Insulation Strips**, **Regupol**® and **Regufoam**® **Perimeter Insulation Strips** must be installed in all adjoining vertical structural elements such as walls, columns, pipes, etc. Their width equals approximately the entire structural height of the floor construction from the top edge of the concrete floor including the floor covering with possible additional impact sound insulation.

Unrolling the Screed Insulation Mats

The **Regupol**® and **Regufoam**® **Screed Insulation Mats** are unrolled parallel to one another, butt to butt, on the concrete floor with the dimpled side down.

Coil tension may cause roll material to shrink slightly in the direction in which it was rolled. We therefore recommend that you pull up the insulation mat a few centimetres lengthwise in front of the perimeter insulation strip. After a few hours the roll can be cut to the exact required length. Sheet material can be cut immediately after laying to the required length.

The material is butt-joined and taped down on the top side with a suitable adhesive tape in order to avoid acoustic bridges.

Installation Guidelines

Covering with PE Foil

Once the **Regupol**® and **Regufoam**® **Screed Insulation Mats** have been installed and cut to the required length, they are covered with PE foil which has a minimum thickness of 0.2 mm, and the perimeter insulation strips are pulled up on the outer sides. The butts and overlaps of the foil strips are taped together with a suitable adhesive tape. The foil should cover the entire screed insulation in order to avoid acoustic bridges.

The upper sides of **Regupol**® **sound 12** and **Regupol**® **sound 17** are laminated with aluminium foil so that an additional covering with PE foil is not necessary. The butts of the sheets are taped together with a suitable adhesive tape in order to avoid structure-borne sound bridges.

1 tiles or other floor coverings • 2 glue • 3 screed • 4 PE foil • 5 **Regupol**® or **Regufoam**® screed insulation • 6 raw ceiling • 7 perimeter insulation strips made of **Regupol**®, **Regufoam**® or another material

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References

These references constitute only a small selection of all buildings which have been equipped with **Regupol**® under-screed impact sound insulation.

ADAC Headquarters
Place: Munich, Germany
Insulated building part: print shop

Elbphilharmonie
Place: Hamburg, Germany
Insulated building part: concert halls and studios

Cinemagnum
Place: Nuremberg, Germany
Insulated building part: underground car park

Other buildings insulated with **Regupol**® are:

RTL Studios, Cologne, Germany

Hesse State Parliament, Wiesbaden, Germany

Frankfurt Airport, Frankfurt, Germany

Nuremberg Trade Fair Centre, Nuremberg, Germany

Scandic Hotel, Berlin, Germany

University Clinic, Regensburg, Germany

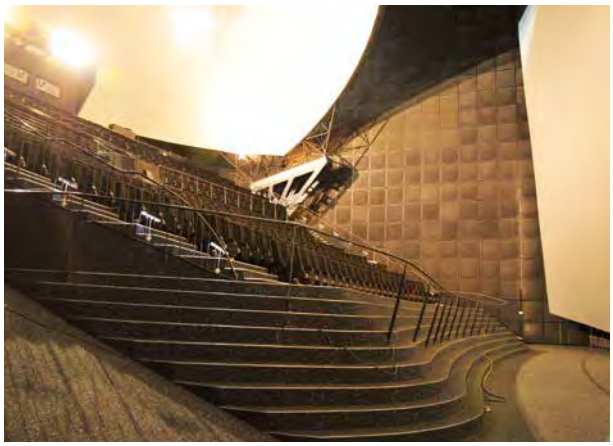
Clinical Centre, Minden, Germany

Deutsche Bank Building, Frankfurt, Germany

Commercial Park Laim, Munich, Germany

Commerzbank Tower, Frankfurt, Germany

Musiktheater, Linz, Austria



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References

These references constitute only a small selection of all buildings which have been equipped with **Regupol**® under-screed impact sound insulation.

The Shard
Place: London, United Kingdom
Insulated building part: 42 floors of Shangri-La Hotel

Central Bus Terminal
Place: Munich, Germany
Insulated building part: floor plates in the service and trade areas

Audi plant
Place: Györ, Hungary
Insulated building part: plant

Other buildings insulated with **Regupol**® are:

Opera House, Frankfurt, Germany

Doha Exhibition and Convention Centre, Doha, Qatar

One Hyde Park, London, United Kingdom

DFS Deutsche Flugsicherung GmbH, Langen, Germany

Wisseloord Studios, Hilversum, Netherlands

BSW

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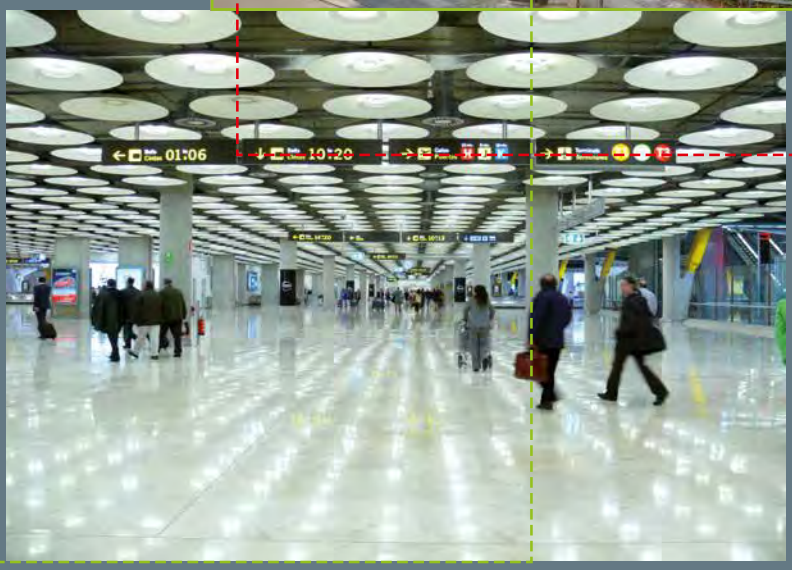

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