

Impact noise insulations – comparison of materials

Impact noise insulations		EKM	PE	Acoustic EPS	Mineral wool
Material properties and parameters	Material	Strips in packages Polyurethane sawdust+binder	Strips of approx. 50 metres Foamed polyethylene	Polystyrene panels Foamed kopolen, styropor, etc.	Mineral fibre panels Stone or glass fibre
	Production of the material	In factory	In factory	In factory	In factory
	Technology ownership	SIRCONTEC	Various producers	Various producers	Various producers
	Dry density [kg/m ³]	145	20 - 35	from 10	from 100
	Thermal conductivity λ [W/mK]	0.045	from 0.038	from 0.036	from 0.033
	Resistance to solvents	High	High	None	High
	Impact noise reduction	Excellent in all respects	Very good, but damping can decrease with time	Excellent, if installed without defects	Excellent, if installed without defects
	Loss of insulation properties	Extremely low	Loading may lead to permanent deformation	Loading may lead to permanent deformation	Loading may lead to permanent deformation
	Size and shape of element [mm]	Strip 2000x500xthickness	Strip 5000x1000xthickness	Panel 1000x500xthickness	Panel 1000/1200x500/600xthickness
Application of the material and layer properties	Application processing	Adheres well to the base, placement with cutting to size	Does not adhere to the base, placement with cutting to size	Good for flat bases, placement with cutting to size	Good for flat bases, placement with cutting to size
	Application labour intensity	Medium	Medium	Very high	Very high
	Adhesion to base	Excellent	Insufficient, it has rolling shape retention	Good, although air gaps arise on uneven surfaces	Good
	Effect of load on acoustic properties	Permanent properties even at long-term loading	Insulation capability may significantly decrease at long-term loading	Insulation capability may decrease at long-term loading	Insulation capability may decrease at long-term loading
	Influence of screed placement operations	Without damage and without change of acoustic properties	Without damage and without change of acoustic properties	Structure degradation and change of acoustic properties may occur	Structure degradation and change of acoustic properties may occur
	Resistance of the layer to fire	Medium, E	Medium, E	Medium, E	High, A1-A2
	Resistance of the layer to flooding	High, easily releases absorbed water	Very high	High, hardly releases absorbed water	None
	ECO consideration	Waste formation	Waste formation	Waste formation	Waste formation
	Suitability for impact insulation	Extremely suitable	Conditionally suitable	Suitable	Conditionally suitable

Impact noise insulations – comparison of materials with marking **the best** and **the worst** evaluations

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Comparison of materials with respect to impact noise reduction for civic buildings

Layer composition:

35 mm	anhydrite screed
0.1 mm	separating PE-foil
x mm	acoustic insulation
50 mm	levelling layer
150 mm	monolithic steel-concrete floor

Additional information:

uniform load of 141 kg/m² on the surface
 joints sealed with tape
 various types and thicknesses
 various types at constant thickness
 floor type and thickness has strong influence on impact noise penetration

Impact noise insulations	EKM (PUR)	PE (polyethylene foam)		Acoustic EPS
Thickness [mm]	6	5	10	15

1. After installation

Levelling layer	Damping in dB (ΔL_w)				
	SIRCONTEC PBG 40	26,2	24,2	24,5	27,5
	Floor EPS	25,0	22,2		24,2
	Comparison of damping in %				
	SIRCONTEC PBG 40	100%	92%	94%	105%
	Floor EPS	95%	85%		92%

2. After 7 days

Levelling layer	Damping in dB (ΔL_w)				
	SIRCONTEC PBG 40	25,1	18,6	21,6	
	Comparison of damping in %				
	SIRCONTEC PBG 40	96%	71%	82%	

Notes:

- Measurement were carried out on floor section of 1100 x 1300 mm
- Values shown in dB were determined in more than 110 comparison measurements
- Missing measurements will be carried out subsequently and the table completed after evaluation

Comparison of materials with respect to reduction of low frequencies, 100-315 Hz, and impact noise

Layer composition:

35 mm	anhydrite screed
0.1 mm	separating PE-foil
x mm	acoustic insulation
50 mm	levelling layer
150 mm	monolithic steel-concrete floor

Additional information:

uniform load of 141 kg/m² on the surface
 joints sealed with tape
 various types and thicknesses
 various types at constant thickness
 floor type and thickness has strong influence on impact noise penetration

Impact noise insulations	EKM (PUR)	PE (polyethylene foam)		Acoustic EPS
Thickness [mm]	6	5	10	15

1. After installation

Levelling layer	Damping in dB (ΔL_w for 100-315Hz)				
	SIRCONTEC PBG 40	9,5	8,4	7,9	10,9
	Floor EPS	8,8	5,2		7,2
	Comparison of damping in %				
	SIRCONTEC PBG 40	100%	88%	83%	115%
	Floor EPS	93%	55%		76%

2. After 7 days

Levelling layer	Damping in dB (ΔL_w for 100-315Hz)				
	SIRCONTEC PBG 40	8,6	1,6	4,9	
	Comparison of damping in %				
	SIRCONTEC PBG 40	91%	17%	52%	

Notes:

- Measurement were carried out on floor section of 1100 x 1300 mm
- Values shown in dB were determined in more than 110 comparison measurements
- Missing measurements will be carried out subsequently and the table completed after evaluation

Notes to the comparison table of the impact noise insulations:

- Impact noise damping effect of a floor composition is higher, if the insulation is placed on PBG 40 levelling layer, than on EPS 100 levelling layer. This applies to the whole measured range of frequencies and it especially clearly holds true for low frequency insulation.
- Lower damping effect of a floor with EPS 100 levelling layer in contrast to PBG levelling layer was detected in all insulations under study. The worst appears to be combination of EPS 100 with PE foam being evaluated. Even application of 15 mm thick acoustic EPS on EPS 100 proved lower damping than EKM 1006 (only 6 mm thickness) on EPS 100.
- Impact noise reduction of a floor decreases variously after a time of use. For some materials, though, the decrease of insulation properties is alarming – see for example evaluated PE foam.
- After a time interval, some impact noise insulations, especially in low frequency range, may be functional only to a limited extent.
- EKM, or a floor with EKM does not change its impact noise insulation capacity even after a long time interval in contrast to some other materials.
- EKM floor is excellent also for insulation of low frequencies.

Benefits of EKM insulation:

- Simpler and faster implementation
- There is no loss of impact noise reduction due to subsequent layer installation or floor use
- Ensures the highest impact noise reduction on mm of thickness