FONOSTOPAlu

DOUBLE-LAYER HIGHLY RESILIENT ACOUSTIC INSULATION AGAINST FOOT TRAFFIC NOISE, LINED WITH ALUMINIUM FOIL, FOR INSULATING SLABS WITH UNDERFLOOR HEATING

GRANTS *LEED* CREDITS

CHARACTERISTICS		ENVIRONMENTAL		
ACOUSTIC INSULATION	THERMAL INSULATION	ECO GREEN	RECYCLABLE	SAFE WASTE

1 PROBLEM

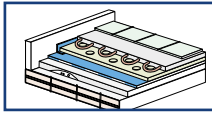
Insulation panels normally used in heated floors act as thermal insulators but not as sufficient acoustic insulators against foot traffic noise according to the levels imposed by DPCM 05/12/1997.
What's more, the parameters usually foreseen in the building plans often impose the simultaneous reduction in the screed that incorporates the piping network, which could cause uneven heating of the floor, creating "strips of heat".

2 SOLUTION

It is a multi-purpose acoustic insulation against foot traffic noise made up of a soundproof foil with top face lined with reflecting aluminium foil protected by a plastic film (reflectance ~ 90%) with high thermal conductivity (λ ~ 236 W/mK) and very high heat diffusion rate (diffusivityα = 8,2 · 10-5 m²/s). It is consequently a specific insulation product designed for floor slabs with underfloor heating, where the top aluminium coated face distributes the heat in the floating floor evenly by conduction, consequently distributing the temperature of the floor surface and eliminating the problem of "strips of heat", even in rather thin screeds. The foil is impermeable to water, gas and water vapour, it protects the underlying layers while laying the screed and protects the thermal insulation against water vapour, which starting from the warm face of the same, tends to dampen it and reduce its insulation capacities. The soundproof foil on the bottom face is coupled with non-woven polyester sound-resilient fabric obtained through a special "elastic needling" process, being an exclusive INDEX project. The fibres are elastic and do not crumble when compressed or bent. **FONOSTOPAlu**, unlike many plastic cellular insulation materials, even if it is light, has sufficient weight and has such a strong "grip" (adherence to laying surface) that it does not move under site traffic. **FONOSTOPAlu** is the outcome of research activities of INDEX in the field of acoustic insulation. It is designed meticulously for the specific purpose for which it is to be used and does not derive from rejects of other production cycles or from the adaptation of materials conceived for other applications. **FONOSTOPAlu** is produced in rolls of 15×1.05 meters. The top aluminium coated face has a textile overlap wing of 5 cm, which protects the side joining line of the sheets against the intrusion of cement mortar of the screed, which would otherwise create an acoustic bridge once it sets hard.

APPLICATION FIELDS

It is used to insulate inter-floor heated floors against foot traffic noise, and is generally installed over standard flat smooth insulation panels prior to installation of the heating pipes. When there is not enough room for the thermal insulation, **FONOSTOPAlu** can be used on its own, laying it on the cement-based foundations before laying the pipes.



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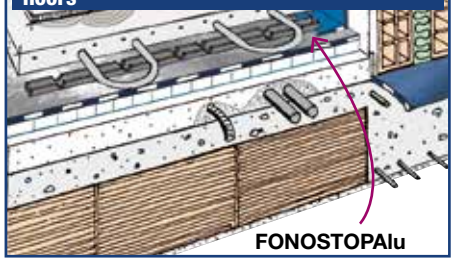

METHOD OF USE AND PRECAUTIONS

FONOSTOPAlu must be installed prior to the thermal insulation panels. The rolls of **FONOSTOPAlu** are to be unrolled in their natural unrolling direction with the top aluminium-coated face facing upwards and are to be overlapped at the sides by arranging the overlap wing on the adjacent sheet and carefully matching the elements up. On the short side, neither materials are overlapped but are carefully brought together end-to-end. They will cover the whole floor slab and are to be blocked and trimmed-off at the foot of the perimeter walls of the room to be insulated. All the longitudinal overlap lines and the transversal joining lines of the sheets are then to be carefully sealed with the special adhesive SIGILTAPE, stuck over the same. The floating screed must be completely detached not just from the floor slab but also from the walls and from anything coming out of the slab that should cross it. To do this, starting from the insulation material laid on the slab surface, the perimeter walls are to be lined by 15 cm with the special FONOCELL angular self-adhesive elements in expanded polyethylene, which will be turned up and over the surface by 5 cm to glue them to the insulation layer on which they will be further blocked with the adhesive SIGILTAPE. Any parts or pipes that should cross the insulation sheet and the floating screed vertically shall be lined carefully with FONOCELL. The heating pipes will then be laid, which will be held in position by special modular plastic bars in which the seats for the pipes are arranged, every 5 cm, and which will be glued in advance to the aluminium-coated face with a strip of hot extruded glue using the special electrical glue gun. The heating pipes, in the case of reinforced cement-based screeds, can be bound or secured with appropriate devices to the electrically welded metal reinforcement but for both systems, what's most important is never to perforate or secure the pipes across the insulation material, otherwise its insulating properties will be jeopardised. The screed is then laid without perforating the insulation or moving the overlaps. The screed will be prepared and sized according to the instructions of the designer of the heating system. The preparation and sizing of the screen must follow the prescriptions of the heating system designer.

FONOSTOPAlu

Thickness (2)	UNI 9947	approx. 6.5 mm	
Alu foil thickness		0,012 mm	
Roll size		1.05 x 15.0 m	
Mass per unit area		1.6 kg/m²	
Impermeability	EN 1928	1 KPa	
Aqueous vapour diffusion coefficient (phonoresilient foil)		μ 1 500 000	
Thermal conductivity λ – of the non-woven fabric – of the aluminium foil		0.045 W/mK 236 W/mK	
Specific heat.		1.30 KJ/kgK	
Thermal resistance R (1)		0.135 m² K/W	
Thermal diffusion - of the aluminium foil		α = 8.2 · 10-5 m²/s	
Dynamic stiffness under a load of 200 kg/m² • FONOSTOPAlu single layer	UNI EN 29052 p. 1°	Apparent dynamic stiffness s't = 4 MN/m³	Dynamic stiffness s' = 21 MN/m³
Compression tests under constant load of 200 kg/m² • FONOSTOPAlu single layer	EN 1606	Reduced thickness ≤ approx. 1 mm	
Compressibility (determination of the thickness) • FONOSTOPAlu single layer	EN 12431:2000	≤ 2 mm	
Resistance to static loading	EN 13501-1	35 kg	
Resistance to impact		20 cm	

(1) Value established on the material subjected to a load of 1 kPa (100 kg/m²).
(2) Any variations in the thickness of the rolled product have no effect on its performance when installed.
✱ ***ATTENTION.*** Only the dynamic rigidity values marked in red are of value in making the calculation pursuant to EN 12354-2 and solely the transparent expression of both the apparent dynamic rigidity s't and the dynamic rigidity s' allow the designer to make a proper evaluation.

THEORETICAL ESTIMATE OF THE REDUCTION LEVEL IN FOOT TRAFFIC NOISE

Example of simplified calculation method TR UNI 11175 - (Guide to the UNI EN 12354 standards for predicting the acoustic performance of buildings) for 20+4 FLOOR SLAB IN CLAY CEMENT 300 kg/m² + LIGHTWEIGHT SCREED OF DENSITY 300 kg/m³ (thickness 10 cm): Total mass per unit area m'=330 kg/m²

$L_{n,w\,eq}$ = 164 - 35 log m = 76 dB

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SCREEDS WITH SURFACE DENSITY m'=100 kg/m²

$$f_o = 160\sqrt{\frac{s'}{m'}} = 73\ \text{Hz}$$

Calculation of the f_o resonance frequency of the floating screed system, resilient layer:

$$\Delta L_w = 30\ \text{Log}\left(\frac{f}{f_o}\right) + 3 \quad \text{where } f = 500\ \text{Hz (of reference)} = 28.0\ \text{dB}$$

$$L_{n,w} = L_{n,w\,eq} - \Delta L_w + K \quad \text{where } K = 3 \quad L_{n,w} = \mathbf{51\ dB}$$

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