



FONOSTOPDuo

ACOUSTIC INSULATION FOR FOOT TRAFFIC NOISE REDUCTION, TWO LAYER, WITH HIGH PHONO-RESILIENCE, FOR INDOORS AND OUTDOORS FLOATING FLOORS

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GRANTS *LEED* CREDITS

CHARACTERISTICS		ENVIRONMENTAL		
				
ACOUSTIC INSULATION	REACTION TO FIRE	ECO GREEN	RECYCLABLE	SAFE WASTE

1 PROBLEM

The installation of resilient material between a floating screed, on which any type of flooring can be laid, and the load-bearing floor slab, reduces the spreading of impact noise or foot traffic noise (ΔL_w) and increases insulation against airborne noise (ΔR_w). It also represents the most flexible and effective insulation technique available. DPCM dated 5th December 1997 (Premier's Decree) imposes different levels of insulation based on what the building is to be used for, hence the need to avail of modular insulating materials that enable the assembly of systems proportioned with the different levels of insulation imposed by the decree and also of superior insulation systems for absolute comfort. The levels of insulation against foot traffic noise determine the need to avail of insulating materials of maximum efficiency but that are thin enough to be compatible with the parameters usually foreseen in the plans of the building. Furthermore, seeing as the acoustic specifications are measured on site, such insulation materials must also be compatible with the real situation of the building site; they consequently must be resistant to the noise of men and equipment and they must not move while the floorings are laid.

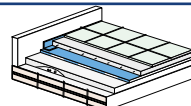
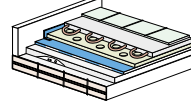
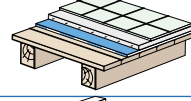
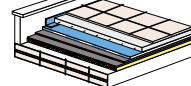
2 SOLUTION

To resolve the above-mentioned problems, INDEX has created **FONOSTOPDuo** and **FONOSTOPTrio**, which alone or combined together, are able to satisfy any insulation requirements against foot traffic noise.

FONOSTOPDuo and **FONOSTOPTrio** are designed for the building trade and are not made from recycled products nor do they derive from different fields of application.

FONOSTOPDuo. It is a thin yet highly effective acoustic insulation product against foot traffic noise, and represents the most efficient insulation method against foot traffic noise of the product range of INDEX. It is made up of a sound-resistant foil, coupled with a sound-resilient non-woven polyester fabric obtained with a special "elastic needling" procedure, being an exclusive INDEX project. The sound-resistant foil is a seamless waterproof and airtight element, which optimises acoustic performance by filling-in pores that may occur in the building work, through

which airborne noise would spread, consequently re-establishing continuity, being an appreciated feature especially in discontinuously laid floors. The foil also stops the fresh cement grout, spread over the insulation material when creating the screed, from encapsulating the fibres of the non-woven fabric, which would consequently eliminate its elastic properties. The non-woven fabric is an elastic separation layer between rigid elements, screed and floor slab, which reduces the transmission of vibrations caused by foot traffic on the paved floating screed and also vibrations of the screed induced by airborne noise deriving from various sound sources such as voices, radios, televisions, etc. The fibrous nature of the non-woven fabric, even if very thin, represents another element that favours the insulating capacities of the material also against airborne noise that closed cell insulating materials do not offer. The fibres are not irritant, they are flexible and do not crumble when compressed or folded. The special texture of the non-woven fabric determines the natural dry adherence of the fibres to the laying surfaces in cement or slightly rough surfaces on which they generally lie, similar to a "Velcro effect", which prevents the sheet from moving when subsequently laying the flooring. Even though **FONOSTOPDuo** is a relatively light product, once it is laid, it "sticks" to the foundations and does not move. **FONOSTOPDuo**, is also resistant to static and dynamic punching, therefore it is resistant to both building site traffic during laying and to the perforating action of rough parts of irregular foundations under the load of the floating screed in the work phase. The sound-resilient non-woven fabric acts as a spring in the physical "spring-mass" system model, in which a mass, being the floating screed, is loaded on a spring, being the sound-resilient fabric, resting on a rigid support, being the load-bearing floor slab. The relatively low unit load of the floating screed ($0.008 \pm 0.012 \text{ kg/cm}^2$) means that materials commonly defined to be elastic, such as rubber sheeting, in the specific case, have excessive dynamic stiffness, making them inadequate to absorb vibrations generated by foot traffic on the screeds whereas, within specifically defined limits of non-excessive compressibility, softer materials such as **FONOSTOPDuo** have the just dynamic stiffness which, proportioned with the low unit load of the screed, determine excellent insulation. **FONOSTOPDuo** has the best level of dynamic stiffness of the series of acoustic

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	Foot traffic acoustic insulation for heated floors – page 33
	Foot traffic acoustic insulation for wooden floors – page 41
	Thermal and acoustic insulation of terraces against foot-traffic noise – page 61

insulation against foot traffic noise produced by INDEX. **FONOSTOPDuo** is produced in rolls of 10x1.05 meters. The sound-resistant foil of the top face, which is lined with a light-blue non-woven polypropylene textile finish, is 5 cm longer than the white non-woven sound-resilient fabric of the bottom face; this is done to create an overlap wing, 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.




FONOSTOPTrio. It is a triple layer insulation product made up of the same elements as **FONOSTOPDuo** but in this case, the sound-resistant foil is also lined on the top face with the same non-woven fabric that lines the bottom face. **FONOSTOPTrio** completes the performance of the insulation product from which it derives because when it is combined with **FONOSTOPDuo**, it obtains an even higher dynamic stiffness of the system to be able to satisfy the insulation requirements of light floor slabs or for particular requirements that are higher than legal limits. **FONOSTOPTrio** is produced in rolls of 8x1.05 m. To obtain the seamless effect of the non-woven fabric after laying, it has two 5 cm overlap wings set opposite each other on both faces of the sheet.



MODULAR ACOUSTIC INSULATION AGAINST FOOT TRAFFIC NOISE

The table that follows indicates the foot traffic noise levels $L_{n,w}$ and the increase in soundproofing power ΔR_w for a floor slab of 20+4 in clay-cement mix of 237 kg/m², with 7 cm of lightened foundation with a density of 800 kg/m³ that starts from a level of foot traffic noise of $L_{n,w eq}=77.66$ dB and soundproofing power of $R_w=48.74$ dB (screed included) insulated with floating screed of 5 cm (d:2000Kg/m³) on the three afore-mentioned systems, which can be calculated with the simplified calculation method foreseen in standard EN 12354-2.

Dynamic rigidity and calculated performance of FONOSTOP systems

System	Laboratory characteristics	Performances according to EN 12354-2		
	Dynamic stiffness	ΔL_w	$L_{n,w}$ insulated floor (K=3 dB)	ΔR_w
 FONOSTOPDuo	21 MN/m ³ Certificate ITC No. 3402/RP/01	28.0 dB	53 dB	7 dB
 FONOSTOPDuo + FONOSTOPDuo	11 MN/m ³ Certificate ITC No. 3403/RP/01	32.0 dB	48 dB	10 dB
 FONOSTOPDuo + FONOSTOPTrio	9 MN/m ³ Certificate ITC No. 3404/RP/01	33.5 dB	47 dB	10 dB

METHOD OF USE AND PRECAUTIONS

SYSTEM FONOSTOPDuo

The rolls of **FONOSTOPDuo** are to be unrolled in their natural unrolling direction with the top light-blue face facing upwards and are to be overlapped at the sides by arranging the overlap wing on the adjacent sheet and carefully matching-up the non-woven fabric of the faces underneath. On the short side, the sheets are not overlapped but carefully brought together end-to-end.

The sheets 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 overlapping lines and the transversal joining lines of the sheets are then to be carefully sealed with the special adhesive SIGILTAPPE, stuck over the same.

To insulate the floating screed from perimeter walls, the latter are to be lined with 10 cm of the extruded polyethylene separation self-adhesive **FONOCELL** strip, to limit the thickness of the screed, which will be turned over by 5 cm and glued on the insulation material laid on the floor slab where it will be further secured with adhesive SIGILTAPPE.

Note. Make sure you lay FONOCELL on terraces only after the waterproof coat has been protected by a layer of plaster mortar reinforced with a metal net and make sure to seal the gap between the flooring and the skirting board with a flexible sealant.

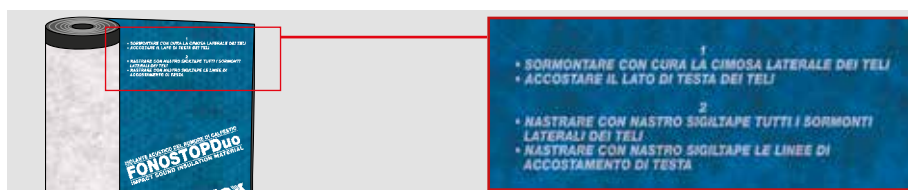
SYSTEM

FONOSTOPDuo+FONOSTOPDuo

If you are installing **FONOSTOPDuo** in a double layer, the first layer will be laid on site in the opposite direction to the natural unrolling direction of the roll, with the top light-blue face facing the floor slab and the white face facing upwards. Overlap the sheets lengthwise along the overlap strip and bring the ends of the sheets together without overlapping them; the sheets of the first layer 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 but not sealed. The second layer will then be unrolled parallel with the first layer, in its natural unrolling direction, with the top light-blue face facing upwards, making sure to offset it to lay it over the joining lines of the first layer. The second layer will be installed and sealed in the same way as for the **FONOSTOPDuo system** installed as a single layer.

SYSTEM FONOSTOPDuo+FONOSTOPTrio

In the system made up of **FONOSTOPTrio + FONOSTOPDuo**, the first layer to be laid will be the **Trio** type. The rolls will be unrolled on the laying surface, overlapping them lengthwise along the dedicated overlap strips while the ends of the sheets will be brought together without overlapping them. The sheets of the first layer 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 but not sealed. The second layer, made up of the **Duo** type, will be unrolled parallel with the first layer, in its natural unrolling direction, with the top light-blue face facing upwards, making sure to offset it to lay it over the joining lines of the first layer. The second layer will be installed and sealed in the same way as for the **FONOSTOPDuo system** installed as a single layer.

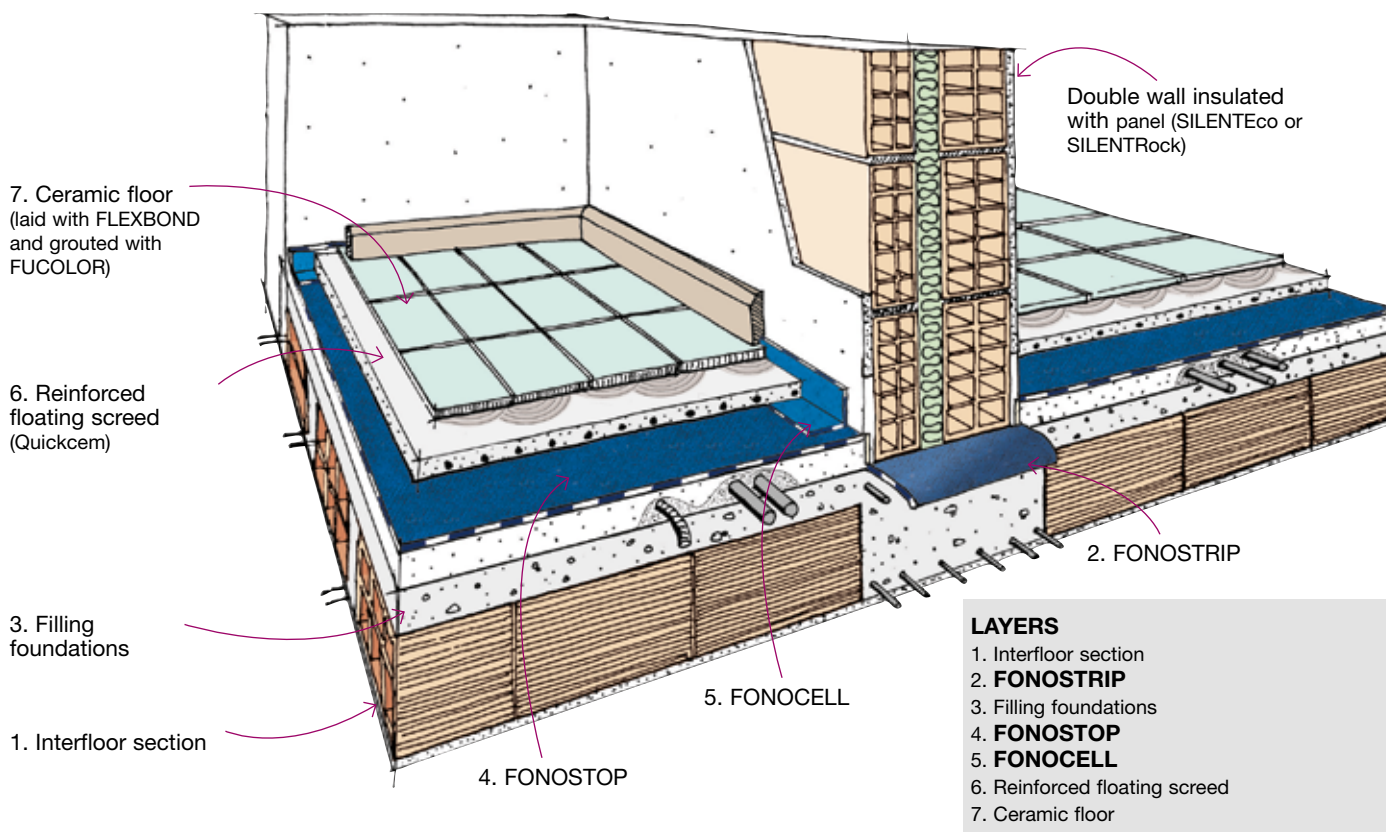


INDEX has customised the top surface finish of **FONOSTOPDuo**, by printing some important laying instructions on it in order to help the builder when preparing the floating screed to insulate against foot traffic noise.

Technical intervention solutions

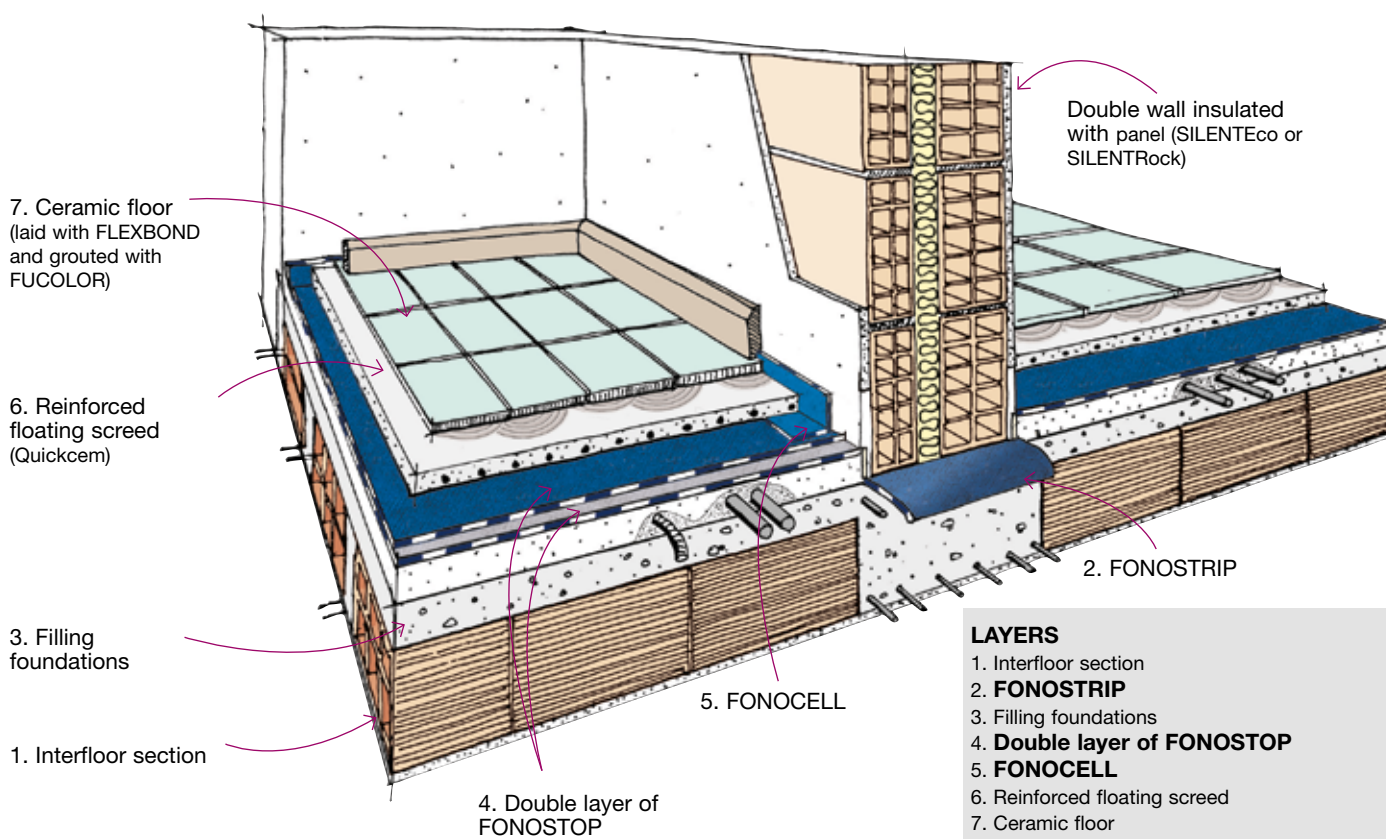
Acoustic insulation with floating floor technique

[New buildings or full refurbishments]



Top quality acoustic insulation consisting of a dual layer floating floor

[New buildings or full refurbishments]



		FONOSTOPDuo	FONOSTOPTrio
Average thickness under load of 200 kg/m ² (*)	UNI 9947	approx. 5 mm	approx. 9 mm
Roll size		1.05 x 10.0 m	1.05 x 8.0 m
Mass per unit area		1.6 kg/m ²	3.0 kg/m ²
Impermeability	EN 1928	Water proof	-
Aqueous vapour diffusion coefficient (phonoresilient foil)		μ 100 000	μ 100 000
Thermal conductivity λ		0.039 W/mK (?)	0.039 W/mK (?)
Specific heat		1.30 KJ/kgK	1.30 KJ/kgK
Thermal resistance R		0.135 m ² K/W (?)	0.230 m ² K/W (?)
Foot traffic acoustic insulation	ISO 717/82, UNI 8270/7		
ISO index at 500 Hz for bare floor (thickness 240 mm)		I: 74.0 dB	-
ISO index at 500 Hz for floating floor		Ii: 40.5 dB	-
Improvement as a difference between the two indices (6)		ΔIr: 33.5 dB	-
Dynamic rigidity (ITC certification) load of 200 kg/m ²	UNI EN 29052 p. 1*	Apparent dynamic stiffness s't = 4 MN/m ³ s't = 2 MN/m ³	Apparent dynamic stiffness - - s't = 2 MN/m ³
• FONOSTOPDuo single layer • FONOSTOPDuo double layer (4) • FONOSTOPTrio single layer • FONOSTOPTrio+FONOSTOPDuo		Dynamic stiffness s' = 21 MN/m ³ (1) s' = 11 MN/m ³ (2)	Dynamic stiffness - - s' = 14 MN/m ³ s' = 9 MN/m ³ (3)
Compression tests under constant load of 200 kg/m ²	EN 1606	Reduced thickness ≤1 mm ≤1 mm ≤1 mm	Reduced thickness - - -
• FONOSTOPDuo single layer • FONOSTOPDuo double layer (4) • FONOSTOPTrio+FONOSTOPDuo			
Compressibility (determination of the thickness)	EN 12431:2000	≤2 mm ≤3 mm	- -
• FONOSTOPDuo single layer • FONOSTOPDuo double layer (4)			
Volatile organic compound emissions	EN ISO 16000-9	<< limits declared in prEN 12052 (6) << limits declared in prEN 12052 (6)	- -
- after 48 hours - after 28 days			
Fire reaction class	EN 13501-1	Euroclass B _{fl} -s1 (5)	-
Certification		ITC CSI CATAS LAPI	ITC

(*) Certificate ITC-CNR n. 3402/RP/01. (1) Certificate ITC-CNR n. 3403/RP/01. (2) Certificate ITC-CNR n. 3404/RP/01. (3) FONOSTOPDuo laid in double layer with opposing white faces.
 (4) LAPI certificate n. 331.0DC0050/15 equivalent to Class 1 pursuant to Ministerial Decree 10-03-2005 latest edition, dated 16-02-2009. - (5) Certificate CSI n. ME06/060/98. (6) Value established on the material subjected to a load of 1 kPa (100 kg/m²). (6) "CATAS" (Centro ricerche e sviluppo laboratorio prove settore legno-arredo - Wooden furnishings test laboratory, R&D centre) certification n. 109570/1. (7) 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.

The numerous possible uses and the possible interference of conditions or elements beyond our control, we assume no responsibility regarding the results which are obtained. The purchasers, of their own accord and under their own responsibility, must establish the suitability of the product for the envisaged use.

The figures shown are average indicative figures relevant to current production and may be changed or updated by INDEX at any time without previous warning. The advice and technical information provided, is what results from our best knowledge regarding the properties and the use of the product. Considering

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'²=330 kg/m²

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

SCREEDS WITH SURFACE DENSITY m' ² =100 kg/m ²	$f_0 = 160 \sqrt{\frac{s'}{m'}}$	FONOSTOPDuo single layer	FONOSTOPDuo double layer	FONOSTOPDuo+ FONOSTOPTrio
		= 73 Hz	= 53 Hz	= 48 Hz
Calculation of the f ₀ resonance frequency of the floating screed system, resilient layer:	$\Delta L_w = 30 \log \left(\frac{f}{f_0}\right) + 3$ where f = 500 Hz (of reference)	= 28 dB	= 32 dB	= 33.5 dB
	$L_{n,w} = L_{n,w eq} - \Delta L_w + K$ where K = 3	L_{n,w} = 51 dB	L_{n,w} = 47 dB	L_{n,w} = 45.5 dB

• THE TECHNICAL SPECIFICATIONS MAY BE VIEWED AND DOWNLOADED ON THE RELEVANT PRODUCT DATA SHEET AT www.indexspa.it •

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