**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 ($\Delta L_{w}$) and increases insulation against airborne noise ($\Delta L_{w}$). It also represents the most flexible and effective insulation technique available.

The levels of insulation against foot traffic noise imposed by DPCM dated 5th December 1997 (Premier's Decree) 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 not move while laying the floorings. If these are then laid on rough supports or lightened yielding foundations, they must also be particularly resistant to the typical situations of major building sites where the material is subject to heavy traffic with little attention paid by the various builders.

**SOLUTION**

The need to increase perforation resistance of materials for insulating floor slabs against foot traffic noise with the “floating floor technique” is particularly strong in major work sites, but this often translates into an increase of the material’s dynamic stiffness, which consequently leads to a reduction in the insulating properties.

INDEX has designed a new insulation product against foot traffic noise, named FONOSTOPBar. It is light (about 1 kg/m²), but offers high mechanical resistance, privileging resistance to punching. Moreover, in addition to increasing resistance to static punching, in order also to increase resistance to dynamic punching, the elasticity of the material had to be increased. This simultaneously resulted in the beneficial effect of achieving an optimum dynamic stiffness to such an extent to also obtain high acoustic insulation performance, superior to most of the rival materials on the same market section.

**METHOD OF USE AND PRECAUTIONS**

**SINGLE LAYER APPLICATIONS.** The rolls of FONOSTOPBar are to be unrolled in their natural unrolling direction with the bottom face covered with softer non-woven fabric facing the laying surface. The FONOSTOPBar sheets should not be overlapped, but should be brought close to each other and the joining lines must always be sealed with adhesive SIGILTAPE.

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.

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 SIGILTAPE.

Note. Make sure you lay FONOCELL on terraces only after the waterproof coat has been brought close to each other and the joining lines must always be sealed with adhesive SIGILTAPE.

**DOUBLE LAYER APPLICATIONS.** If you are installing FONOSTOPBar 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 bottom face covered with softer non-woven fabric facing upwards. The FONOSTOPBar sheets should not be overlapped, but should be brought close to each other. 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, making sure to offset it to lay over the joining lines of the first layer. The laying and sealing methods of the second sheet will be those already explained for single layer applications.
### FONOSTOPBar

<table>
<thead>
<tr>
<th>Thickness</th>
<th>6.5 mm approx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Roll size</td>
<td>1,00x15,00 m</td>
</tr>
<tr>
<td>Mass per unit area</td>
<td>1,0 kg/m² approx</td>
</tr>
<tr>
<td>Heat capacity per unit area (°)</td>
<td>1,650 KJ/m²K</td>
</tr>
<tr>
<td>Thermal resistance R</td>
<td>0,115 m² K/W (°)</td>
</tr>
</tbody>
</table>

#### Dynamic stiffness
- **FONOSTOPBar single layer**
  - Apparent dynamic stiffness: $s'_1 = 9 \text{ MN/m}^2$
  - Dynamic stiffness: $s'_1 = 5 \text{ MN/m}^2$
- **FONOSTOPBar double layer**
  - Dynamic stiffness: $s'_1 = 29 \text{ MN/m}^2$
  - Dynamic stiffness: $s'_2 = 18 \text{ MN/m}^2$

#### Theoretical estimate of the reduction level in foot traffic noise (°)
- **FONOSTOPBar single-layer**
  - $\Delta L_{w} = 26 \text{ dB}$
- **FONOSTOPBar double layer**
  - $\Delta L_{w} = 29 \text{ dB}$

#### Compression tests under constant load of 200 kg/m² (EN 1608)
- **FONOSTOPBar single-layer**
  - $s' = 1 \text{ mm approx}$
- **FONOSTOPBar double layer**
  - $s' = 1 \text{ mm approx}$

#### Compression capability (EN 12431:2000 - Determination of thickness)
- **FONOSTOPBar single-layer**
  - $s' = 2 \text{ mm}$
- **FONOSTOPBar double layer**
  - $s' = 3 \text{ mm}$

#### Imperméability (UNI-EN 13111)
- **FONOSTOPBar**
  - Waterproof

#### Aqueous vapour diffusion coefficient
- $\mu = 8,000$

#### Thermal conductivity coefficient $\lambda$
- $0,045 \text{ W/mK}$

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**MODULAR ACOUSTIC INSULATION AGAINST FOOT TRAFFIC NOISE**

With rigid cement floor slabs, in the most frequently encountered cases, just one layer of **FONOSTOPBar** is sufficient to respect the limits imposed by the decree for residential buildings and hotels, whereas for superior requirements, the insulation effectiveness can be increased by laying two layers of **FONOSTOPBar**.

#### THEORETICAL ESTIMATE OF THE REDUCTION LEVEL IN FOOT TRAFFIC NOISE

**Example of simplified calculation method**

TR UNI 11175 - (Guide to the Standards of the UNI-EN 12354 series for predicting the acoustic performance of buildings) for screeds with surface density of 100 kg/m².

- Theoretical resonance frequency of the floating screed $f_o$.
- $f_o = 160 \sqrt{\frac{s'}{m'}} = 160 \sqrt{\frac{29}{100}} = 86 \text{ Hz}$
- $\Delta L_w = 30 \log \left( \frac{f}{f_o} \right) + 3 = 26 \text{ dB}$
- $L_{eq} = L_{w,eq} - \Delta L_w + K$
  - where $K = 3$
  - $L_{eq} = 53 \text{ dB}$

- **FONOSTOPBar double-layer**
  - $f_o = 160 \sqrt{\frac{s'}{m'}} = 160 \sqrt{\frac{18}{68}} = 68 \text{ Hz}$
  - $\Delta L_w = 30 \log \left( \frac{f}{f_o} \right) + 3 = 29 \text{ dB}$
  - $L_{eq} = L_{w,eq} - \Delta L_w + K$
    - where $K = 3$
    - $L_{eq} = 50 \text{ dB}$

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**ANIT Associated**

The data in this publication is the result of laboratory tests or observations on site and this does not guarantee the repeatability of the results in equivalent systems.