# SOUNDPROOFING SYSTEMS

To combat impact noise

TECHNICAL MANUAL

**NOISE PROTECTION IN HOMES AND WORKPLACES IS A PRIMARY NEED IN THE BUILDING INDUSTRY.**

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# Soundproofing systems

## To combat impact noise

# Introduction

## Acoustics in the building industry

Intense urban development and our increasingly densely populated cities have led to an increase in potential sources of **acoustic disturbance** perceived in buildings, with noise coming both from outside, such as traffic and production activities, and from inside, such as noisy neighbours, lifts, heating and air-conditioning systems and hydraulic systems. The constant increase in the quality of life, and the diffusion of the concept of **living comfort**, have undoubtedly exacerbated the phenomenon and, in the most serious of cases, noise is even perceived as social discomfort. In fact, exposure to noise provokes psychological discomfort and can be an obstacle to a person's normal day to day activities, reducing their efficiency and ability to concentrate.

Nowadays, **protecting ourselves from noise** must be seen as a **primary requirement**.

To achieve this objective it is of fundamental importance that all those professional figures and companies operating in this sector become more committed to increasing the efficiency of buildings from an acoustics perspective, due also to the increasing awareness end users have of a building.

**Sound transmission** occurs according to two distinct propagation mechanisms:

- airborne transmission;
- transmission through the structure of the building.

Walls are generally subject to **airborne noise** (voices, televisions, etc.), unlike floors which, apart from airborne noise, are also subject to **impact noise** (footsteps, dropped objects, furniture being moved around, etc.).

# Introduction

## Reference standards

Each country has **specific domestic standards** regarding building acoustic requirements. The comparison of these requirements is not simple due to the different descriptors and frequency range used. For example, in Europe there are 15 descriptors for the airborne sound insulation and 6 descriptors for the impact sound insulation.

| EUROPEAN ACOUSTIC REQUIREMENTS FOR RESIDENTIAL BUILDING | | | | |
|---|---|---|---|---|
| **Country** | **Airborne sound isulation** | | **Impact sound insulation** | |
| | **Descriptor** | **Limit [dB]** | **Descriptor** | **Limit [dB]** |
| **Austria** | $D_{nT,w}$ | ≥ 55 | $L_{nT,w}$ | ≤ 48 |
| **Belgium** | $D_{nT,w}$ | ≥ 54 | $L_{nT,w}$ | ≤ 58 |
| **Czech Rep.** | $R_w$ | ≥ 52 | $L_{n,w}$ | ≤ 58 |
| **Denmark** | $R_w$ | ≥ 55 | $L_{n,w}$ | ≤ 53 |
| **Estonia** | $R_w$ | ≥ 55 | $L_{n,w}$ | ≤ 53 |
| **Finland** | $R_w$ | ≥ 55 | $L_{n,w}$ | ≤ 53 |
| **France** | $D_{nT,w} + C$ | ≥ 53 | $L_{nT,w}$ | ≤ 58 |
| **Germany** | $R_w$ | ≥ 53 | $L_{n,w}$ | ≤ 53 |
| **Hungary** | $R_w + C$ | ≥ 51 | $L_{n,w}$ | ≤ 55 |
| **Iceland** | $R_w$ | ≥ 52 | $L_{n,w}$ | ≤ 58 |
| **Ireland** | $D_{nT,w}$ | ≥ 53 | $L_{nT,w}$ | ≤ 62 |
| **Italy** | $R_w$ | ≥ 50 | $L_{n,w}$ | ≤ 63 |
| **Latvia** | $R_w$ | ≥ 54 | $L_{n,w}$ | ≤ 54 |
| **Lithuania** | $R_w$ | ≥ 55 | $L_{n,w}$ | ≤ 53 |
| **Netherlands** | $I_{lu,K}$ | ≥ 0 | ICO | ≥ + 5 |
| **Norway** | $R_w$ | ≥ 55 | $L_{n,w}$ | ≤ 53 |
| **Poland** | $R_w + C$ | ≥ 50 | $L_{n,w}$ | ≤ 58 |
| **Portugal** | $D_{nw}$ | ≥ 50 | $L_{n,w}$ | ≤ 60 |
| **Slovakia** | $R_w$ | ≥ 52 | $L_{n,w}$ | ≤ 58 |
| **Slovenia** | $R_w$ | ≥ 52 | $L_{n,w}$ | ≤ 58 |
| **Spain** | $D_{nTA}$ | ≥ 50 | $L_{nT,w}$ | ≤ 65 |
| **Sweden** | $R_w + C_{50\text{-}3150}$ | ≥ 53 | $L_{n,w} + CI,50\text{-}2500$ | ≤ 56 |
| **Switzerland** | $D_{nT,w} + C$ | ≥ 52 | $L_{nT,w} + C1$ | ≤ 53 |
| **UK** | $D_{nT,w} + C_{tr}$ | ≥ 45 | $L_{nT,w}$ | ≤ 62 |

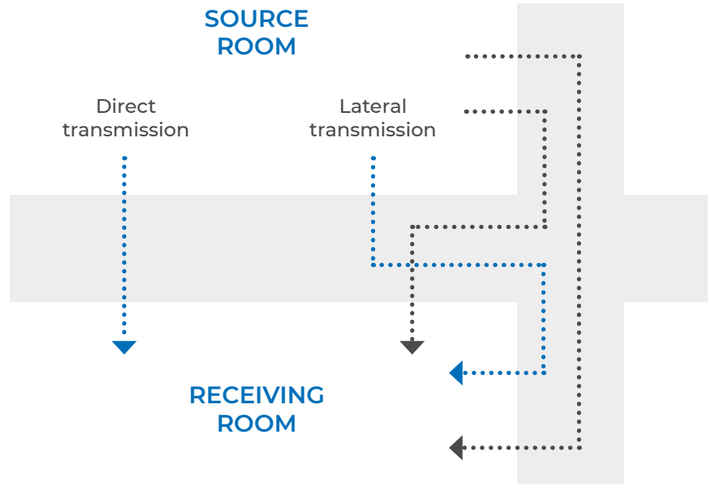
## Impact noise

**Impact noise** is disturbance generated by an object that strikes the surface of a floor, triggers vibrations in the load-bearing structure of the building and then propagates from one room to another across rigid elements or components.

This type of noise, which is often one of the most annoying, is generated by a person walking across a floor, but also by objects being dropped or dragged or by vibrations from domestic equipment and appliances (washing machines, dishwashers, etc.).

To contrast this type of noise, specific materials are employed that dampen and absorb vibrations generated by an impact. These materials may be placed in various points of the structure, such as between a load-bearing floor and the floor screed or between the floor screed and the flooring material, but also directly under the floor by creating a false ceiling.

The following schematic diagram is of a floor between two rooms, one above the other, and shows the different ways noise travels and propagates from the room where it is generated, the *source room*, to the room where the noise is actually perceived, the *receiving room*.




**Impact noise** follows the directions indicated by the blue arrows. The diagram shows the limits of soundproofing positioned in the false ceiling of the receiving room, which is effective in contrasting direct transmission of noise but not lateral transmission, which skirts round the obstacle.
This is why, if conditions allow, it is always preferable to intervene in the source room by installing a suitable soundproofing system.

# Introduction

## Dynamic stiffness

This is the main physical property taken into consideration when choosing soundproofing material to combat impact noise and determines the material's elastic deformation capacity under dynamic load within a mass-spring-mass system. It is defined as the **ratio between dynamic force and dynamic displacement**.
The standard that describes the test method is **EN 29052-1:1993** and its main scope is:

- to provide a test method to compare production samples of materials of a defined similar quality;
- to perform a provisional acoustic calculation of a structure in order to evaluate its potential performance characteristics in service.

**Dynamic stiffness** (S') is determined by calculating **apparent dynamic stiffness** per unit area of the sample ($S'_t$), using the following equation:

$$S'_t = 4\pi^2 m' f_R^2 \ [MN/m^3]$$

where:

- **m'** is the surface mass of the oscillating test table
- $\mathbf{f_R}$ is the resonance frequency measured for the material

According to the airflow resistance (r) of the material, dynamic stiffness (S') is calculated as follows:

- high airflow resistance — $\mathbf{S'} = \mathbf{S'_t}$
- medium airflow resistance — $\mathbf{S'} = \mathbf{S'_t} + \mathbf{S'_a}$
- low airflow resistance — $\mathbf{S'} = \mathbf{S'_t}$ (only if $\mathbf{S'_a}$ is negligible)

where:

- $\mathbf{S'_a}$ = 111/d represents the dynamic stiffness of the gas contained inside
- **d** is the thickness in mm of the layer with reduced airflow resistance only

The airflow resistance of the material (**r**) is measured using the procedure indicated in **EN 29053:1994**.

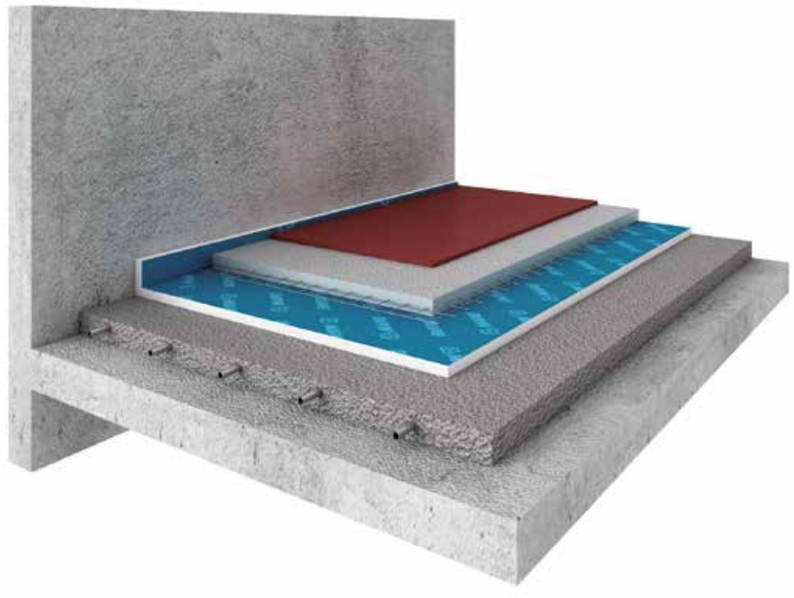
In the case of **multi-layered acoustic materials**, which are amongst the most common ones on the market in that, at the same thickness, they are claimed to be the best performing, airflow resistance of each single layer of the acoustic material must be calculated. If not, the tendency would be to overestimate the final value for **S'** and the resulting noise reduction of the soundproofing material.

# Under-screed acoustic solutions

## Floating screeds

In the previous section, we learned that impact noise propagates through rigid structures and that acoustic systems positioned in the source room are preferable to those positioned in the receiving room because, if correctly designed, they reduce both direct transmission and lateral transmission.

Amongst the various construction technologies available, the most widely adopted solution is the *floating screed*, created by positioning the elastic material between the load-bearing structure or the levelling layer and screed.



This solution is usually adopted in new builds and, more generally, when a self-supporting screed at least 4 cm thick is to be installed. A floating screed is generally considered the **best solution** to improve acoustic comfort and to meet the acoustic requirements of current legislation.

# Under-screed acoustic solutions

## Installation of floating screeds

The installation of a **floating screed** basically consists in the creation of a closed container made from elastic cushioning material, or soundproofing, in which the screed and flooring are inserted so they are isolated from the surrounding structure.
The elastic material, if correctly applied, acts as a spring which **dampens the vibrations** generated by impact on the screed and floor.
It is vitally important, therefore, that the following installation guidelines are followed.

- The **minimum thickness** of a floating screed is calculated by considering the intrinsic characteristics of the material used to make the screed and the mechanical stresses to which it will be subjected under normal conditions of use.
- Traditional **cementitious-based substrates** must be at least 4 cm thick, and their thickness must be increased accordingly if the loads are high when in service.
- **Electro-welded reinforcement mesh** (or an equivalent system) should always be inserted at the mid-point of the screed to distribute loads and prevent cracking, particularly in the case of thinner screeds.
- When a **floating screed** is installed, products from the **Mapesilent** range may be used to soundproof against impact noise.

# Mapesilent Comfort

DESCRIPTION

**The dry-applied rapid soundproofing system for floating screeds compliant with legal requirements.**

Dry-applied soundproofing system for floating screeds made from high-density, closed-cell foam **polyethylene membrane** sandwiched to a special **protective film**. Helps earn credits to achieve building environmental certifications according to **LEED** protocols.

TECHNICAL DATA

| TEST METHOD | TECHNICAL CHARACTERISTICS | UOM | VALUES |
|---|---|---|---|
| **EN 823** | Thickness | mm | 6 |
| **EN 12431** | Compressibility | - | < 8% |
| **EN 12667** | Thermal conductivity - λ | W/mK | 0.04 |
| **EN 12086** | Water vapour diffusion resistance factor - μ | - | > 2000 |
| **EN 29052-1** | Dynamic stiffness for calculation purposes - S' | MN/m³ | 50 |
| **EN ISO 12354-2** | Measured reduction of impact noise - $\Delta L_w$ | dB | 23.5 |
| **Field measurements** | Measured noise level index of impact noise - $L_{n,w}$ | dB | 57 * |
| **Field measurements** | Measured noise level index of impact noise - $L_{n,w}$ | dB | 53 ** |
| **EMICODE** | Emission of volatile organic compounds (VOC) | - | EC1 Plus |

(*) Measurement and testing carried out on brick-cement bare floor (20+4 cm), lightweight screed (10 cm), cementitious screed (5 cm) and ceramic tiles.
(**) Measurement and testing carried out on concrete bare floor (20 cm), lightweight screed (10 cm), heated screed, cementitious screed (5 cm) and ceramic tiles.

ADVANTAGES

- Light and compact
- Quick and simple installation
- Suitable for any type of flooring
- Suitable for heated floors
- Systems may be designed using **DataMapesilent®**

CHECK THE TECHNICAL DATASHEET on **mapei.com**

CHARACTERISTICS

Quick and simple installation

Ideal for new builds

Systems may be designed using DataMapesilent®

Suitable for any type of flooring

# Mapesilent Roll

DESCRIPTION

**The high-performance soundproofing system for floating screeds compliant with legal requirements.**

Dry-applied soundproofing system for floating screeds made from an **elastic-plastomeric membrane** sandwiched to a layer of **polyester fibre** characterised by its high soundproofing capacity and resistance to tears and impacts, properties that help prevent potential damage during site activities.
Helps earn credits to achieve building environmental certifications according to **LEED** protocols.

TECHNICAL DATA

| TEST METHOD | TECHNICAL CHARACTERISTICS | UOM | VALUES |
|---|---|---|---|
| **EN 29073-2** | Thickness | mm | 8 |
| **EN 12431** | Compressibility | - | CP2 |
| **EN 12691** | Resistance to impact | mm | 900 |
| **EN 12730** | Resistance to static loading | kg | 15 |
| **EN 1928** | Watertightness | kPa | ≥ 100 |
| **EN 29052-1** | Apparent dynamic stiffness - $S'_t$ | $MN/m^3$ | 9 |
| | Dynamic stiffness for calculation purposes - S' | $MN/m^3$ | 21 |
| **Field measurements** | Reduction of impact noise measured on site - $\Delta L_w$ | dB | 37 |
| **EMICODE** | Emission of volatile organic compounds (VOC) | - | EC1 Plus |

ADVANTAGES

- Excellent soundproofing properties
- Tear resistant
- Quick and simple installation
- Suitable for any type of flooring
- Suitable for heated floors
- Systems may be designed using **DataMapesilent®**

CHECK THE TECHNICAL DATASHEET on **mapei.com**

CHARACTERISTICS

Excellent soundproofing properties

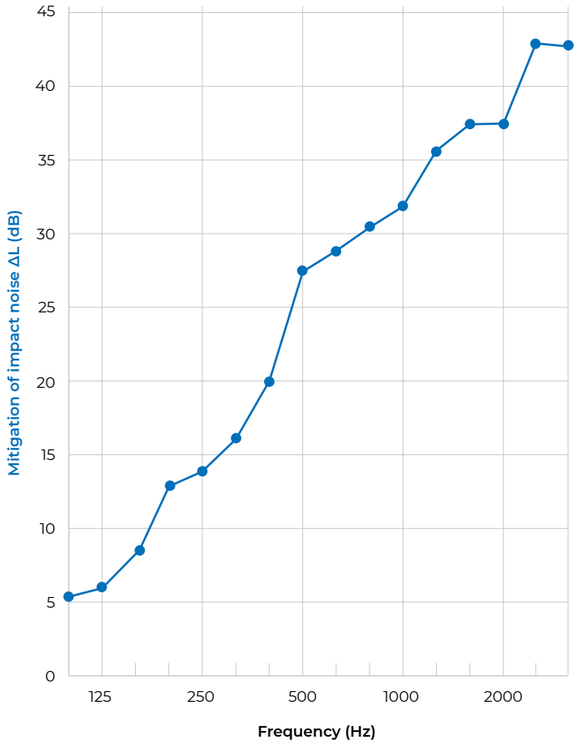
Ideal for new builds

Systems may be designed using DataMapesilent®

Suitable for any type of flooring

GRAPHIC

**Mitigating impact noise on site according to EN ISO 717-2**




| FREQUENCY HZ | ΔL dB |
|---|---|
| **100** | 5.5 |
| **125** | 6.0 |
| **160** | 8.6 |
| **200** | 12.9 |
| **250** | 14.0 |
| **315** | 16.2 |
| **400** | 20.0 |
| **500** | 27.5 |
| **630** | 28.8 |
| **800** | 30.3 |
| **1000** | 31.9 |
| **1250** | 35.6 |
| **1600** | 37.4 |
| **2000** | 37.4 |
| **2500** | 42.8 |
| **3150** | 42.7 |
| **4000** | |
| **5000** | |

## $\Delta L_w$ = 37 dB

The above values refer to readings taken on site to measure the soundproofing capacity of a slab with the following layout:

- Brick-concrete floor structure (24+5 cm)
- **Mapesilent Roll** acoustic mat
- Sand/cement screed (5 cm)

# Mapesilent Panel

DESCRIPTION

**Soundproofing panels for floating screeds compliant with legal requirements.**

Dry-applied soundproofing system for floating screeds made from an **elastic-plastomeric membrane** sandwiched to a layer of **polyester fibre** characterised by its high soundproofing capacity and resistance to tears and impacts, properties that help prevent potential damage during site activities. Improves **thermal insulation** of floors.
Helps earn credits to achieve building environmental certifications according to **LEED** protocols.


TECHNICAL DATA

| TEST METHOD | TECHNICAL CHARACTERISTICS | UOM | VALUES |
|---|---|---|---|
| **EN 29073-2** | Thickness | mm | 13 |
| **EN 12431** | Compressibility | - | CP2 |
| **EN 12667** | Thermal resistance | $m^2K/W$ | 0.313 |
| **EN 12691** | Resistance to impact | mm | 900 |
| **EN 12730** | Resistance to static loading | kg | 15 |
| **EN 1928** | Watertightness | kPa | ≥ 100 |
| **EN 29052-1** | Dynamic stiffness for calculation purposes - S' | $MN/m^3$ | 13 |
| **Field measurements** | Reduction of impact noise measured on site - $\Delta L_w$ | dB | 42 |
| **EMICODE** | Emission of volatile organic compounds (VOC) | - | EC1 Plus |

ADVANTAGES

- Excellent soundproofing properties
- Tear resistant
- Improves thermal insulation
- Suitable for any type of flooring
- Suitable for heated floors
- Systems may be designed using **DataMapesilent®**

CHECK THE TECHNICAL DATASHEET on **mapei.com**

CHARACTERISTICS

Excellent soundproofing properties

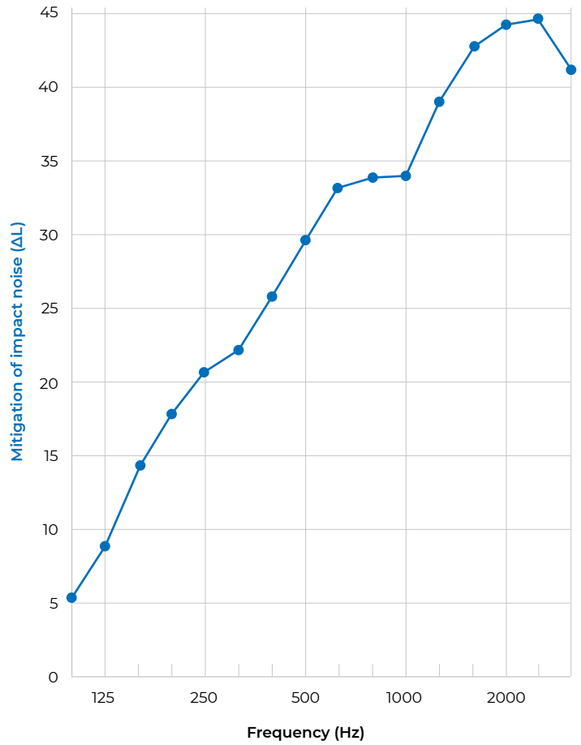
Improves the thermal insulation and soundproofing capacity of floors

Ideal for new builds

Suitable for any type of flooring

GRAPHIC

**Mitigating impact noise on site according to EN ISO 717-2**




| FREQUENCY HZ | ΔL dB |
|---|---|
| **100** | 5.1 |
| **125** | 8.8 |
| **160** | 14.5 |
| **200** | 17.9 |
| **250** | 20.5 |
| **315** | 21.9 |
| **400** | 25.8 |
| **500** | 29.4 |
| **630** | 33.1 |
| **800** | 33.6 |
| **1000** | 33.9 |
| **1250** | 38.7 |
| **1600** | 42.5 |
| **2000** | 44.0 |
| **2500** | 44.5 |
| **3150** | 41.2 |
| **4000** | |
| **5000** | |

## $\Delta L_w$ = 42 dB

The above values refer to readings taken on site to measure the soundproofing capacity of a floor with the following layout:

- Brick-concrete floor structure (24+5 cm)
- **Mapesilent Panel** acoustic mat
- Sand/cement screed (5 cm)

# Under-screed acoustic solutions

## Complementary products

To complete the soundproofing system it is very important to include other elements and items when applying the membrane to guarantee continuity in the acoustic layer and completely isolate the screed from walls and any other element rigidly connected to the load-bearing structure.

### Mapesilent Band R

Closed-cell, **expanded polyethylene adhesive band** applied to perimeter walls and around the edges of elements which pass through screeds to avoid the formation of acoustic bridges. The product is available in 100 mm and 160 mm wide rolls; the 160 mm version is mainly used for particularly thick screeds and heated floors.


### Mapesilent Tape

Closed-cell, **expanded polyethylene adhesive tape** for sealing overlaps and joints between the items that make up the system.

# Under-screed acoustic solutions

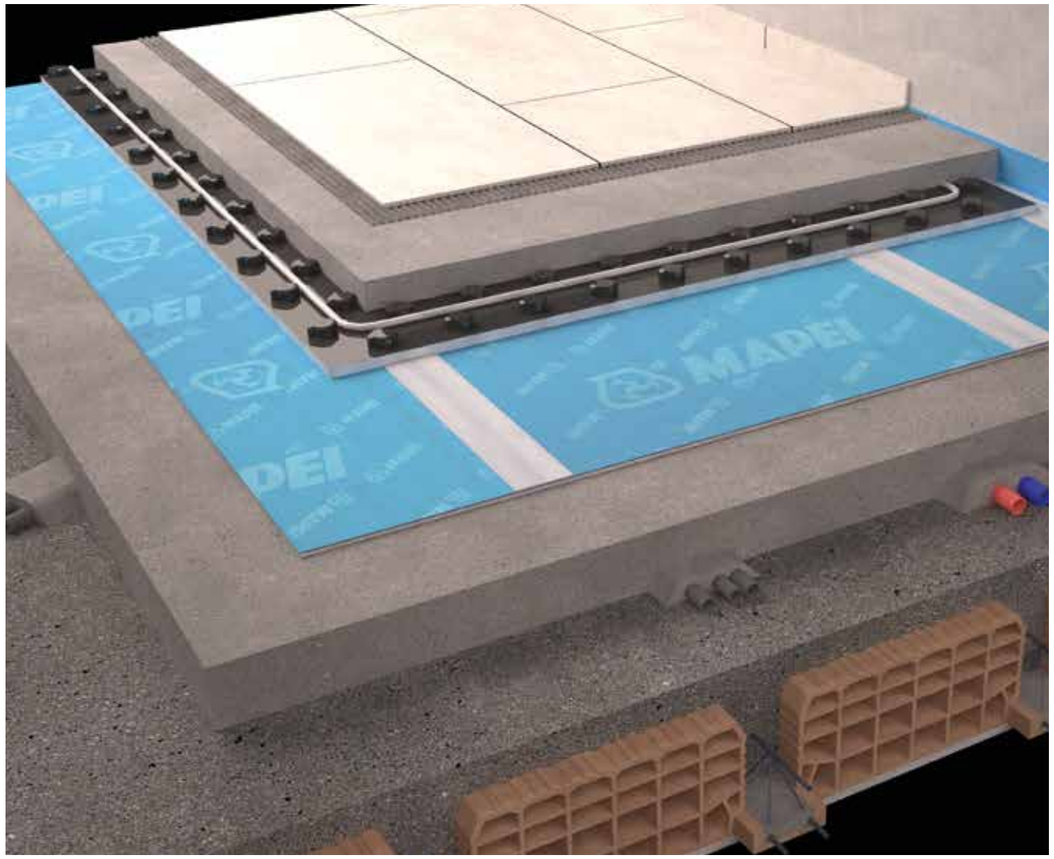

## System for installation in combination with a heated floor and anti-fracture membrane

1. Substrate
2. Uncoupling membrane
3. **Mapesilent Roll** soundproofing membrane
4. **Mapesilent Band R** perimeter strip
5. **Mapesilent Tape** sealing tape
6. Heating system
7. Screed
8. **Ultralite S1 Flex/Ultralite S1 Flex Zero** adhesive
9. **Mapeguard UM 35** anti-fracture membrane
10. **Ultralite S1 Flex/ Ultralite S1 Flex Zero** adhesive
11. Large-format porcelain floor tiles
12. **Ultracolor Plus** grout
13. **Mapesil AC** sealant

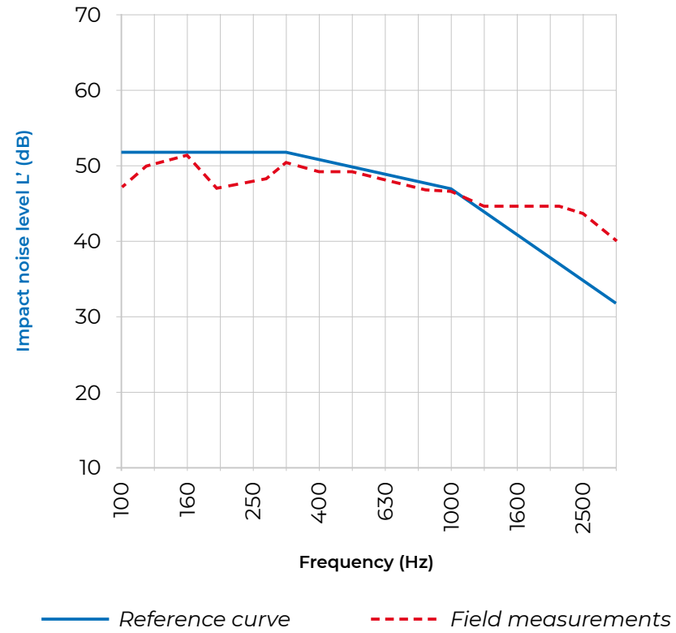
# Under-screed acoustic solutions

## Field testing

Residential building in the Province of Rimini (Italy).




| N° | LAYER | MATERIAL | THICKNESS m | SURFACE MASS kg/m² |
|---|---|---|---|---|
| 1 | Flooring | Ceramic tiles | 0.01 | 20 |
| 2 | Screed | Sand and cement | 0.06 | 108 |
| 3 | Heating system | EPS | 0.04 | 1 |
| 4 | Soundproofing | **Mapesilent Roll** | 0.008 | - |
| 5 | Levelling substrate | Cellular concrete | 0.11 | 44 |
| 6 | Floor structure | Brick/cement | 0.25 | 290 |
| 7 | Render | Lime and cement | 0.01 | 14 |




Volume of receiving room 39.8 m³

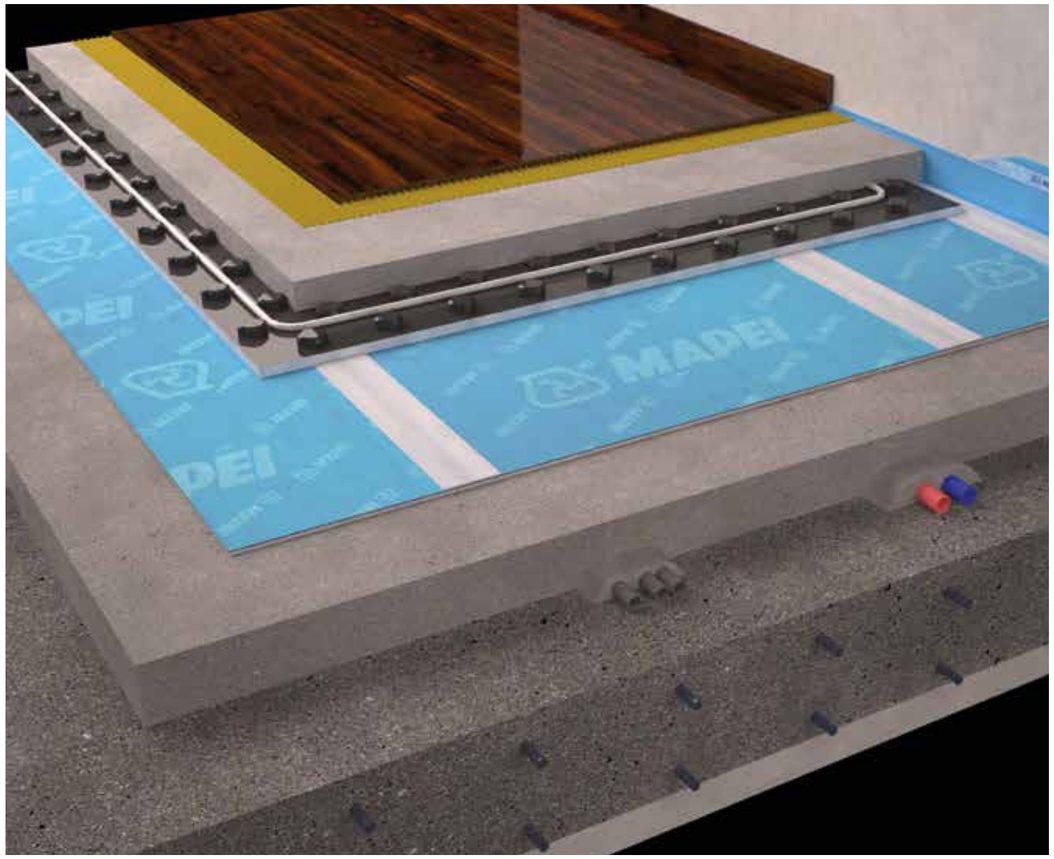
**$L'_{n,w}$ = 50 dB ($C_1$ = -5 dB)**

Analysis based on measurements taken on site according to EN ISO 717-2.
Tests carried out by a qualified Environmental Acoustics technician.

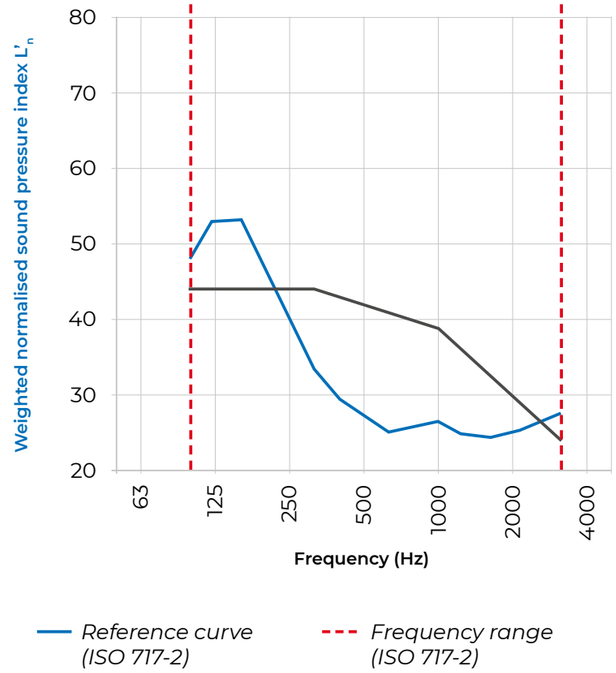
# Under-screed acoustic solutions

## Field testing

Residential building in the Province of Milan (Italy).




| N° | LAYER | MATERIAL | THICKNESS m | SURFACE MASS kg/m² |
|---|---|---|---|---|
| 1 | Flooring | Wood | - | - |
| 2 | Screed | Sand and cement | 0.05 | 90 |
| 3 | Heating system | XPS | 0.04 | 1 |
| 4 | Soundproofing | **Mapesilent Roll** | 0.008 | 32 |
| 5 | Levelling substrate | Cellular concrete | 0.08 | 44 |
| 6 | Floor structure | Reinforced concrete | 0.24 | 576 |
| 7 | Render | Lime and cement | 0.01 | 14 |




Volume of receiving room 40.0 m³

**$L'_{n,w}$ = 42 dB ($C_1$ = 0 dB)**

Analysis based on measurements taken on site according to EN ISO 717-2.
Tests carried out by a qualified Environmental Acoustics technician.

# Under-screed acoustic solutions

## Field testing

The table below shows the results of sound measurement tests carried out on site by an independent qualified Environmental Acoustics technician.

| FLOOR STRUCTURE | SCREED THICKNESS | FLOOR | SOUNDPROOFING | $L'_{n,w}$ | SITE |
|---|---|---|---|---|---|
| Brick/cement 20+4 cm | 5 cm | Ceramic | **Mapesilent Comfort** | 57 dB | Cesena |
| Reinforced concrete 20 cm | 5 cm | Ceramic | **Mapesilent Comfort** | 53 dB | Trieste |
| Brick/cement 20+5 cm | 6 cm | Ceramic | **Mapesilent Roll** | 50 dB | Rimini |
| Brick/cement 24+6 cm | 5 cm | Parquet | **Mapesilent Roll** | 48 dB | Milan |
| Reinforced concrete 12 cm | 4 cm | Parquet | **Mapesilent Roll** | 54 dB | Milan |
| Reinforced concrete 24 cm | 5 cm | Parquet | **Mapesilent Roll** | 42 dB | Milan |
| Reinforced concrete 25 cm | 4 cm | On screed | **Mapesilent Roll** | 36 dB | Milan |

Measurements taken according to the method proposed by EN ISO 717-2.

## Design

The methods described in EN 12354 “Building acoustics – Estimation of acoustic performance of buildings from the performance of elements” are adopted for design purposes.

By applying **simplified calculation models**, these methods are used to carry out a provisional assessment of the performance properties that could be achieved by the various technological features and elements of a whole building.

As further support for design engineers, to help choose the most appropriate soundproofing system according to the type of structure and the final use of the structure or building, **Mapei** has developed **DataMapesilent®**, a versatile, simple software program to verify the thermal and acoustic performance of floors.



With **DataMapesilent®** it is possible to analyse:

- the normalised impact noise index of floors on site ($L'_{n,w}$);
- compliance with acoustic requirements of floors;
- the soundproofing capacity of floors ($R_w$);
- compliance with thermal requirements specified by law.

**DataMapesilent®** includes a comprehensive database of around 400 entries containing performance figures from reports published by the most important research institutes. Users are also able to constantly enhance the database by inserting the characteristics of new materials.
The procedures used for the calculations enable users to obtain a reliable estimate of the performance properties that could be achieved in service.

# Under-screed acoustic solutions

## Installation

1

### Prepare the substrate

Make sure the substrate is flat and that there are no rough spots.
Pipe and cable chases must be levelled off with material suitable to receive the next layers.

2

### Apply the membrane

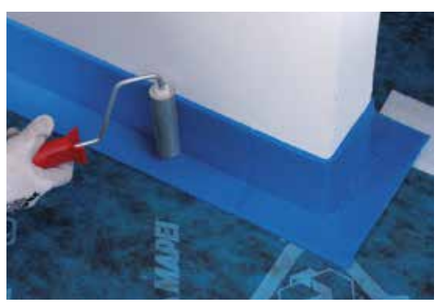
Apply the membrane, starting from the base of the wall and following the longest side of the room. When applying **Mapesilent Comfort** or **Mapesilent Roll**, create an overlap of 5 cm between each piece. When applying **Mapesilent Panel**, the various pieces should be butted against one another.

3

### Seal all overlaps

Check the membrane to make sure it has been applied correctly and seal all the overlaps between the various pieces with self-adhesive **Mapesilent Tape**.

4



### Apply perimeter strips

Along the perimeter walls of the room and in correspondence with elements passing through the screed, apply **Mapesilent Band R** by removing the protective film on the back.

5

### Seal the corners

Cut and apply **Mapesilent Tape** in the corners and on the fillets between the various pieces of **Mapesilent Band R** to guarantee perfect continuity in the soundproofing layer.

6

### Seal the perimeter

Apply **Mapesilent Tape** also on the overlaps between the membrane and perimeter strip.

7

### Install the screed

Once the soundproofing system has been applied as specified, install a screed thick enough for its final type of use. To make the screed, use a special binder or pre-blended mortar from the **Mapei** range.

8

### Install the flooring

Once the screed is fully cured, bond and grout the flooring material using products from the **Mapei** range suitable for the type and format of the flooring.

# Under-screed acoustic solutions

9

## Trim the perimeter strips

Once the adhesive and grout have dried, trim off all excess pieces of **Mapesilent Band R**.

10

## Position the skirting

Apply the skirting boards around the perimeter of the room, leaving a gap of a few millimetres between the skirting board and the floor to prevent them from coming into direct contact.

11

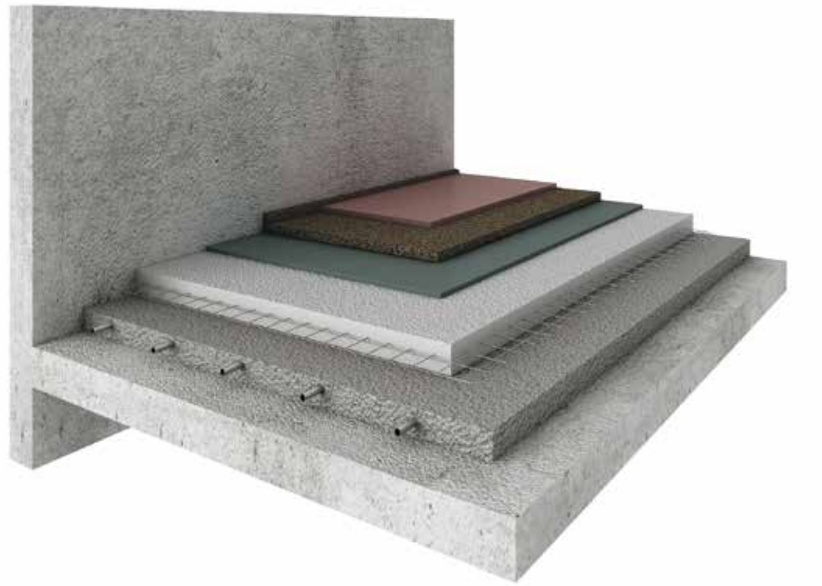
## Seal the skirting

Seal the gap between the skirting board and the floor with an elastic sealant from the **Mapei** range.

# Under-floor acoustic solutions

It is not always possible to create a floating screed because, in certain cases, the thickness available would not be sufficient to create a self-supporting screed over a soundproofing layer.

In such circumstances it is still possible to improve acoustic comfort and combat impact noise by using special **acoustic mats** installed directly **under the flooring material**.



This solution is typically adopted in **buildings being renovated** where work needs to be carried out without having to remove the underlying layers and to avoid adding extra burden to the weight and thickness of the floor, or in those cases where, because of a design or installation error, **the performance of an under-screed soundproofing system needs to be improved** so that it complies with current legislation or project specifications.

Since these types of acoustic systems are applied close to the flooring material, they are directly affected by concentrated loads acting on the flooring material and there is a risk of excessive deformation due to the compressibility of the soundproofing material. This is why a lot of thought has to go into choosing the most appropriate acoustic system and the specific context should also be taken into consideration, such as the area of use of the room or rooms and the type and format of flooring material to be installed.

# Mapesonic CR

DESCRIPTION

## The solution to counteract impact and footstep noise.

**Compact** uncoupling and anti-fracture **soundproofing membrane** applied under ceramic, stone, resilient and laminated wood flooring in residential, hospitality, educational and commercial buildings.
Helps earn credits to achieve building environmental certifications according to **LEED** protocols.

TECHNICAL DATA

| TECHNICAL CHARACTERISTICS | UOM | VALUES | |
|---|---|---|---|
| Thickness | mm | 2 | 4 |
| Length | m | 20 | 10 |
| Width | m | 1 | 1 |
| Thermal resistance | m²K/W | 0.024 | 0.048 |
| Material | - | Cork and recycled rubber | |
| Elongation at break according to EN ISO 1798 | % | 20 | |
| Tensile strength according to EN ISO 1798 | N/mm² | 0.6 | |
| EMICODE - Emission of volatile organic compounds (VOC) | - | EC1 Plus | |
| Reduction of impact noise with bonded flooring - $\Delta L_w$ | dB | up to 18 * | |

(*) Test report No. 400979 - Istituto Giordano

ADVANTAGES

- Excellent soundproofing properties
- Uncoupling system with anti-fracture properties
- Maye be applied without removing existing floors
- Compact (2 or 4 mm thick)
- May be combined with heated floors (low thermal inertia)
- Suitable for all the main flooring materials
- No special adhesive required
- Eco-compatible (contains recycled and recyclable raw materials)
- Very low emission of volatile organic compounds (VOC)

CHECK THE TECHNICAL DATASHEET on **mapei.com**

CHARACTERISTICS

Excellent soundproofing properties

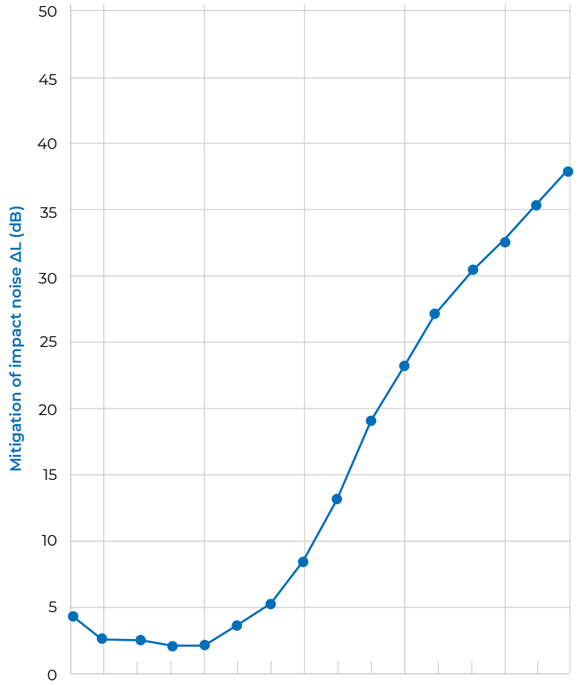
May be combined with heated floors

Ideal for renovation work

Suitable for any type of flooring

GRAPHIC

## Mitigating impact noise on site according to EN ISO 717-2




| FREQUENCY HZ | ΔL dB |
|---|---|
| 100 | 4.2 |
| 125 | 2.5 |
| 160 | 2.4 |
| 200 | 1.9 |
| 250 | 2.1 |
| 315 | 3.5 |
| 400 | 5.2 |
| 500 | 8.3 |
| 630 | 13.2 |
| 800 | 19.0 |
| 1000 | 23.1 |
| 1250 | 27.1 |
| 1600 | 30.3 |
| 2000 | 32.8 |
| 2500 | 35.4 |
| 3150 | 38.0 |
| 4000 | 41.5 |
| 5000 | 44.0 |

## $\Delta L_w$ = 18 dB

The above values refer to readings taken on site to measure the soundproofing capacity of a floor with the following layout:

- Reinforced concrete floor structure 14 cm
- **Mapesonic CR** acoustic mat (2 mm)
- Flooring material bonded with adhesive

# Under-floor acoustic solutions


## System for overlaying an existing floor

1. Existing flooring
2. **Ultrabond Eco S955 1K** adhesive
3. **Mapesonic CR** soundproofing membrane + **Mapesonic Strip** perimeter strip
4. **Keraflex Maxi S1 Zero** adhesive
5. New ceramic flooring
6. **Ultracolor Plus** grouting
7. **Mapesil AC** sealant

# Under-floor acoustic solutions

## Installation

1

### Prepare the substrate

Make sure the substrate is flat and that there are no rough spots.
If necessary, level off the surface with a skimming product from the **Mapei** range.

2

### Apply perimeter strips

Along the perimeter walls of the room and in correspondence with elements passing through the floor, apply self-adhesive **Mapesonic Strip** by removing the protective film on the back.

3

### Bond the membrane

Bond the membrane using a suitable adhesive from the **Mapei** range, starting from the base of the wall and following the longest side of the room and butting the various lengths of roll against one another.

4

### Massage the membrane

Massage the surface with a firm roller or trowel, starting from the centre of each roll and working towards the edges, to maximise contact between the adhesive and the membrane and eliminate excess air.

5

### Install the flooring

Wait at least 24 hours after applying the membrane, then bond and grout the flooring using products from the **Mapei** range suitable for the type and format of flooring.

6

### Trim the perimeter strips

Once the adhesive and grout have dried, trim off all excess pieces of **Mapesonic Strip**.

7

### Position the skirting

Apply the skirting boards around the perimeter of the room, leaving a gap of a few millimetres between the skirting board and the floor to prevent them from coming into direct contact.

8

### Seal the skirting

Seal the gap between the skirting board and the floor with an elastic sealant from the **Mapei** range.

# Technical specifications

## Mapesilent Comfort

Supply and application of a soundproofing system to combat impact noise on floors comprising a 6 mm thick closed-cell foam polyethylene membrane (such as **Mapesilent Comfort** by **Mapei** S.p.A.); Dynamic Stiffness S'=50 MN/m³.
The system includes the supply and application of the following special items required to complete the system:

- closed-cell expanded polyethylene perimeter profiles (such as **Mapesilent Band R** by **Mapei** S.p.A.)
- closed-cell expanded polyethylene sealing tape (such as **Mapesilent Tape** by **Mapei** S.p.A.).

**The system must have the following technical and performance characteristics**

| | | |
|---|---|---|
| **Measured noise level index of impact noise on site $L'_{n,w}$** | 53 | dB |
| **Dynamic stiffness S'** | 50 | MN/m³ |
| **Compressibility (reduction in thickness over time)** | < 8 | % |
| **Thermal conductivity λ** | 0.04 | W/mK |
| **Water vapour diffusion resistance factor μ** | > 2000 | - |
| **Emission of volatile organic compounds (VOC) - EMICODE®** | EC1 Plus | very low emission |


## Mapesilent Roll

Supply and application of a soundproofing system to combat impact noise on floors comprising an 8 mm thick elastic-plastomeric tear-resistant membrane sandwiched to a layer of polyester fibre (such as **Mapesilent Roll** by **Mapei** S.p.A.); Dynamic Stiffness S'=21 MN/m³ and noise reduction ion site $\Delta L_w$=37 dB.
The system includes the supply and application of the following special items required to complete the system:

- closed-cell expanded polyethylene perimeter profiles (such as **Mapesilent Band R** by **Mapei** S.p.A.)
- closed-cell expanded polyethylene sealing tape (such as **Mapesilent Tape** by **Mapei** S.p.A.).

**The system must have the following technical and performance characteristics**

| | | |
|---|---|---|
| **Reduction of impact noise measured on site $\Delta L_w$** | 37 | dB |
| **Apparent dynamic stiffness $S'_t$** | 9 | MN/m³ |
| **Dynamic stiffness S'** | 21 | MN/m³ |
| **Longitudinal tensile strength** | 700 | N/50 mm |
| **Transversal tensile strength** | 500 | N/50 mm |
| **Impact strength** | 900 | mm |
| **Resistance to static loading** | 15 | kg |
| **Watertightness** | > 100 | Kpa |
| **Thermal resistance** | 0.145 | m²K/W |
| **Emission of volatile organic compounds (VOC) - EMICODE®** | EC1 Plus | very low emission |

# Technical specifications


## Mapesilent Panel

Supply and application of a soundproofing system to combat impact noise on floors comprising a 13 mm thick tear-resistant elastic-plastomeric membrane sandwiched to a layer of high-density polyester fibre (such as **Mapesilent Panel** by **Mapei** S.p.A.); Dynamic Stiffness S'=13 MN/m³ and noise reduction on site $\Delta L_w$=42 dB. The system includes the supply and application of the following special items required to complete the system:

- closed-cell expanded polyethylene perimeter profiles (such as **Mapesilent Band R** by **Mapei** S.p.A.)
- closed-cell expanded polyethylene sealing tape (such as **Mapesilent Tape** by **Mapei** S.p.A.).

**The system must have the following technical and performance characteristics**

| | | |
|---|---|---|
| **Reduction of impact noise measured on site $\Delta L_w$** | 42 | dB |
| **Dynamic stiffness S'** | 13 | MN/m³ |
| **Longitudinal tensile strength** | 700 | N/50 mm |
| **Transversal tensile strength** | 500 | N/50 mm |
| **Impact strength** | 900 | mm |
| **Resistance to static loading** | 15 | kg |
| **Watertightness** | > 100 | Kpa |
| **Thermal resistance** | 0.313 | m²K/W |
| **Emission of volatile organic compounds (VOC) - EMICODE®** | EC1 Plus | very low emission |

## Mapesonic CR

Supply and application of a compact under-floor soundproofing system to combat impact noise on floors comprising a 2-4 mm thick cork and rubber membrane (such as **Mapesonic CR** by **Mapei** S.p.A.); noise reduction with bonded flooring $\Delta L_w$=18 dB.
The system includes the supply and application of adhesive to bond the membrane and self-adhesive perimeter uncoupling tape (such as **Mapesonic Strip** by **Mapei** S.p.A.).

**The system must have the following technical and performance characteristics**

| | | |
|---|---|---|
| **Reduction of impact noise with bonded flooring (ISO 10140-3)** | 18 | dB |
| **Density** | 700 | kg/m³ |
| **Cohesion of material subjected to pull off tests** | > 0.5 | N/mm² |
| **Tensile strength according to EN ISO 1798** | 0.6 | N/mm² |
| **Elongation at break according to EN ISO 1798** | 20 | % |
| **Emission of volatile organic compounds (VOC) - EMICODE®** | EC1 Plus | very low emission |

C.P. MK8398030 (GB) 5/23

# EVERYTHING'S OK WITH MAPEI

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