TROCELLEN
INSULATION

ISOLMASS®

Multi-Layered products with a heavy layer

Sound Insulation

Acoustic Insulation: how to block noise

WHAT IS A SOUND OR A NOISE?

The sound is composed by longitudinal mechanical waves, characterized by a pressure deviation (+Δpt compression phase, -Δpt rarefaction phase) from an equilibrium point. In case the sound transmits in the air, the equilibrium point is represented by air atmospheric pressure. Like every waves, the sound waves are defined by physical parameters such as frequency, speed, wave length, amplitude.

The acoustic pressure is the most distinctive parameter of a sound/noise, basically defining its volume. Unit measure of pressure is Pascal, but, since the sound pressure variation is very low, the standard measure scale is the Decibel logarithmic scale:

$L_p = 20 * \text{Log}\left(\frac{P}{P_0}\right)$ [dB]

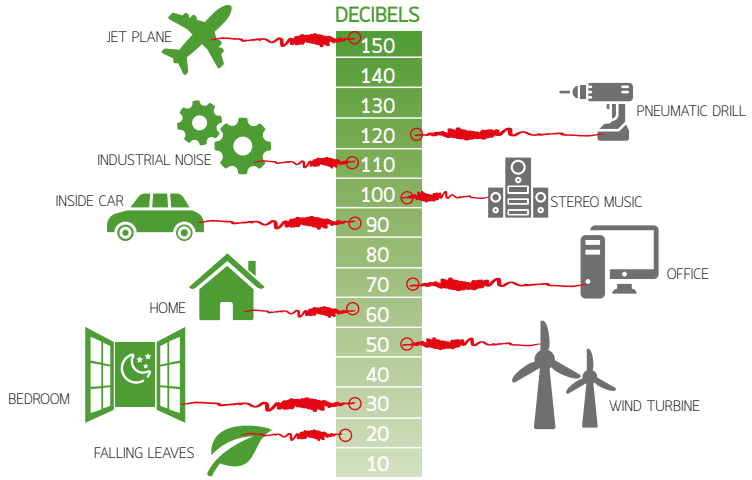
Where $P_0 = 2 * 10^{(-5)}$ is the lowest limit (threshold of hearing).

The pressure level are commonly used to define, measure, and test all the products/systems related to acoustic insulation in buildings.
The Logarithmic scale means that the doubling of noise power/source results in an increase of + 3 dB.
One speaking person is about 60 dB of sound pressure, two speaking people correspond to 63 dB, not to 120 dB!

NOISE PROPAGATION

The noise propagation can occur mainly in two ways:
- Airborne propagation: the sound transmits through the air
- Structure-borne propagation: the sound is connected to vibration of solid elements.

In terms of acoustic insulation, the first propagation mode is linked to airborne sound insulation, façade insulation and partly to service equipment acoustic insulation. The second is related mainly to impact sound insulation. The service equipment sound propagates in both modalities, therefore it is discussed in separated paragraph.



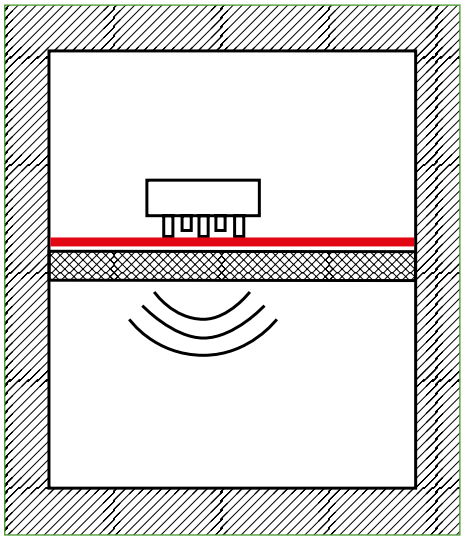
AIRBORNE SOUND

The airborne sound is transmitted through the air. Sound waves propagate firstly in the area/room where they are originated. Then, when the waves reach another surface and/or obstacle (i.e. separation wall), the sound energy is partly reflected and absorbed, and partly transmitted through separation elements. The aim of acoustic insulation system is to decrease as much as possible the transmitted part and, furthermore, avoid too much reflected noise. In building sector, the airborne sound is related to the following situations:

- External noise, such as façade insulation (external walls and roofs). The measurement parameter can be different country by country according to national regulation, but it is generally indicated with the descriptor $\mathbf{D_{nt,w}}$ "weighted standardized level difference". The higher is the value of the descriptor, the better the façade is acoustic insulated.
- Internal noise (between different rooms). In this case the most common descriptors are $\mathbf{D_{nt,w}}$ (the same as above); $\mathbf{R'_w}$ (in-situ) and $\mathbf{R_w}$ (laboratory), "weighted sound reduction index". The latter is commonly used to characterize products and systems in terms of sound insulation, with laboratory and in-situ tests. Also in this case, the descriptors value needs to be as high as possible for products and systems.

Part of the airborne sound is reflected in the same area where it is originated: this fraction is known as Reflected sound. It is commonly described as "echo or reverberation effect" in the field of room acoustic and it can be source of disturbance especially where good level of room acoustic is required (conference rooms, offices, theatres, etc.). In order to decrease the reflected sound, it is necessary to apply sound absorption materials over the surfaces hit by the sound waves. The most common descriptor for sound absoprtion is the α **Sabine** coefficient, while the quality descriptor of an entire room/space is given by reverberation time **T**. the two parameters are linked by inverse proportionality: the higher is the α Sabine coefficient of the materials, the lower is the reverberation time T and the better is the internal acoustic quality of the room.

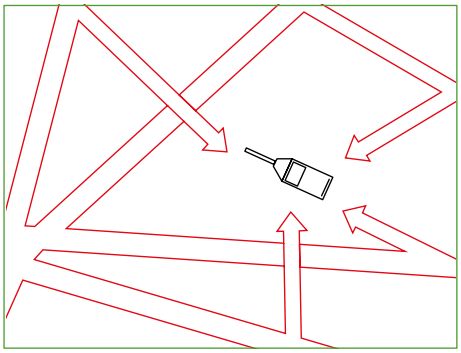
Airborne sound laboratory test
Trocellen false wall



Example of impact sound in-situ test
(Source: ANIT: www.anit.it)

STRUCTURE-BORNE/IMPACT SOUND

This kind of noise is typically generated by direct impact (i.e. falling objects) or structures vibration. It is known as **Impact sound**: the noise caused by steps, falling objects, etc. and propagated through floors and lateral structure in different rooms of buildings. The most common descriptor is $\mathbf{L'_{n,w}}$ (in-situ) or $\mathbf{L_{n,r,w}}$ [1] laboratory tests), which are weighted standardized sound pressure levels. As the descriptor is a "sound level", it is recommendable to reduce it as much as possible. Detailed information are provided in the dedicated Trocellen brochures.



Reflected sound (Source: ANIT: www.anit.it)

SERVICE EQUIPMENT SOUND

The service equipment in buildings generate both airborne and structure-borne sound, according to the system type and installation. The first kind of propagation comes from the equipment through air directly, while the second is propagated through structures vibration, and it is mainly generated by rigid connection of the equipment with building elements (walls, floors, etc.).

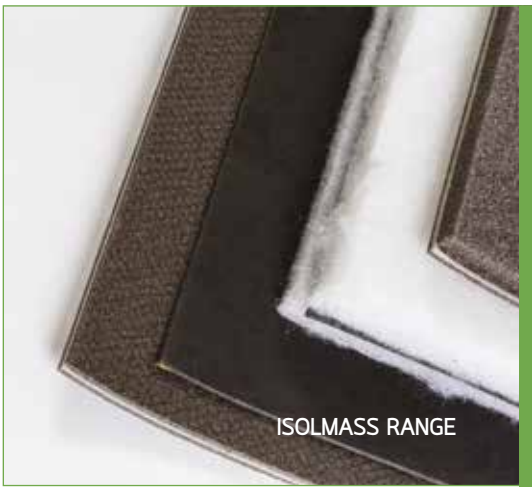
Among the several service equipment, waste water pipes can be the most disturbing: the technical standard EN 14366 defines a complete procedure to test and evaluate the result of insulation products application on waste water tubes.

[1] For laboratory tests, it is usually reported the difference between sound pressure level ΔL_w

TROCELLEN: THE COMPLETE ACOUSTIC INSULATION

Trocellen has a complete product range in the acoustic insulation field. With our products, you can provide acoustic comfort in residential, commercial and industrial buildings for any kind of noises. The expertise in acoustic insulation has led us to the creation of a comprehensive and versatile product range.

PRODUCT/NOISE APPLICATION	AIRBORNE SOUND FAÇADE INSULATION	AIRBORNE SOUND PARTITIONS	IMPACT SOUND	TECHNICAL EQUIPMENT	SOUND ABSORPTION
Trocellen XLPE Foam			X	X	
Airsilent				X	X
Aplomb	X	X		X	
Isolmass	X	X		X	
Trosil			X		


ISOLMASS RANGE

Further detailed information are available in the related product data sheets and brochures.

AIRSILENT

APLOMB 11

TROSIL

TROCELLEN N

ISOLMASS

HEAVY LAYER PRODUCT: THE ALTERNATIVE TO LEAD

Under the APLOMB brand, TROCELLEN has been commercializing for many years a multi-layer product, with one or more sheets of lead, laminated with flexible insulating materials. Lead is not always readily accepted by installers and designers; which is why we have developed an alternative with a polyolefin heavy layer.

BENEFITS

FINISHING **Polyolefin-based multilayered products**
COMFORT **Noise reduction**
SAFE **Lead free**
VALUE FOR MONEY **High performance at low thickness**
APPLICATIONS **Suitable for walls, pipes and technical equipment**

ISOLMASS PRODUCT LINE

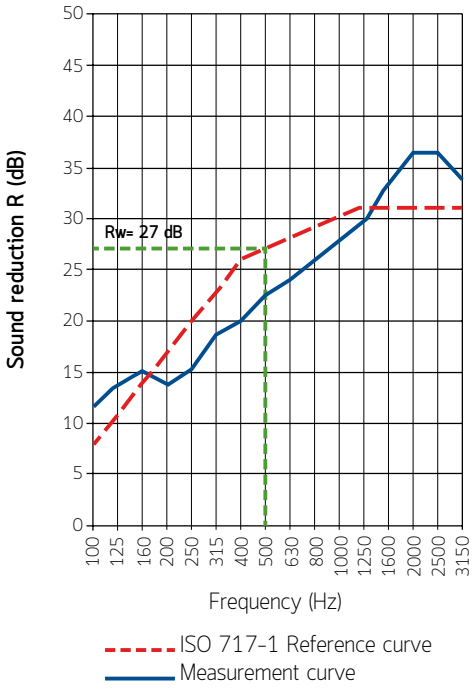
A multi-layered product range, with heavy sleeve, laminated with flexible, resilient and sound absorbing materials.

ISOLMASS 11

- **Composition:**
  - layer of polyethylene foam (anti-vibration), thickness **3 mm**
  - heavy layer weighing **4 kg/m²**, thickness **2 mm**
  - layer of open cell polyurethane (sound absorption), thickness **12 mm**
- **Size:** sheets **1,20 x 3,00 m**
- **Packaging:** rolled in cardboard box (0,25 x 0,25 x 1,20 m)
- **Applications:**
  Sound insulation of waste water pipes in polyethylene or PVC. The product must be installed with the polyurethane in contact with the pipe. Wrap it around the pipe, apply adhesive tapes at the joints, and finally secure it mechanically with straps or metal wire.
- **Acoustic properties**
  Airborne sound insulation - single material - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 27 dB**

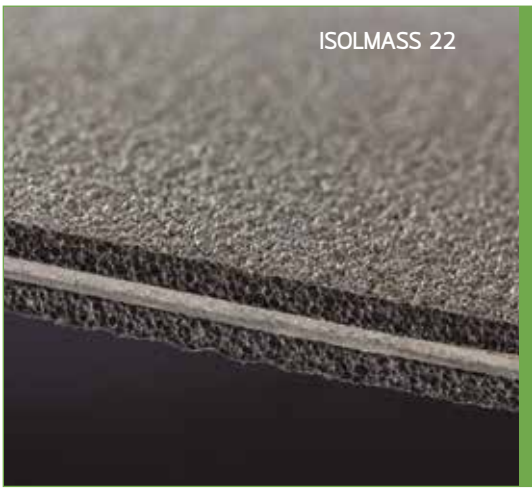
Airborne sound and structure-borne sound insulation on waste water installations.
Reduction of normalized airborne sound pressure level L_{an} (EN 14366), according different water flows:

ISOLMASS 11 - INSTALLATION ON PVC PIPE	WATER FLOW			
	0,5 l/s	1 l/s	2 l/s	4 l/s
ΔLan - Airborne sound insertion loss [dB(A)]	**15,2**	**13,6**	**11,4**	**10,9**
ΔLsc - Structure-borne sound insertion loss [dB(A)]	**3,5**	**4,0**	**3,0**	**2,9**

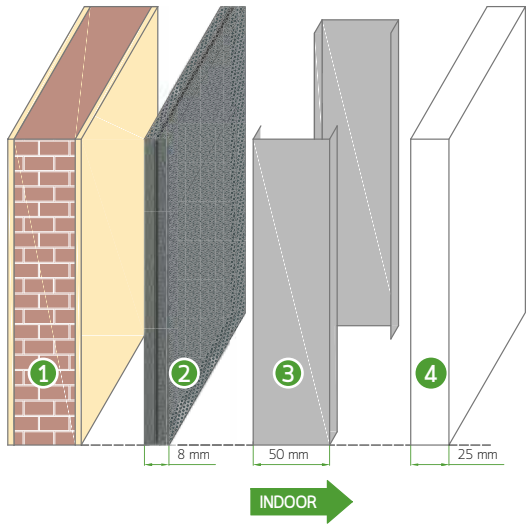


ISOLMASS 22

- **Composition:**
  - layer of polyethylene foam (anti-vibration), thickness **3 mm**
  - heavy layer weighing **4 kg/m²**, thickness **2 mm**
  - layer of polyethylene foam (anti-vibration), thickness **3 mm**
- **Size:** sheets **1,20 x 3,00 m**
- **Packaging:** rolled in cardboard box (0,25 x 0,25 x 1,20 m)
- **Applications:**
  Civil construction walls, flooring and technical equipment. It is used to reduce low frequency sound waves, supplying mass to the partition.
  For application in buildings, it can be applied in false walls in combination with plasterboard. It can be self-adhesive for temporary application, then it must be secured with mechanical fixings.
  For pipes, wrap the product around the tubes and secure it with straps or metal wires. In any case, apply adhesive tapes at the joint, overlapping the product when possible.
- **Acoustic properties**:
  Airborne sound insulation -single material - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 26 dB**
  Airborne sound insulation - complete drywall partition - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 55 dB**



ISOLMASS 22 ACOUSTIC FALSE WALL



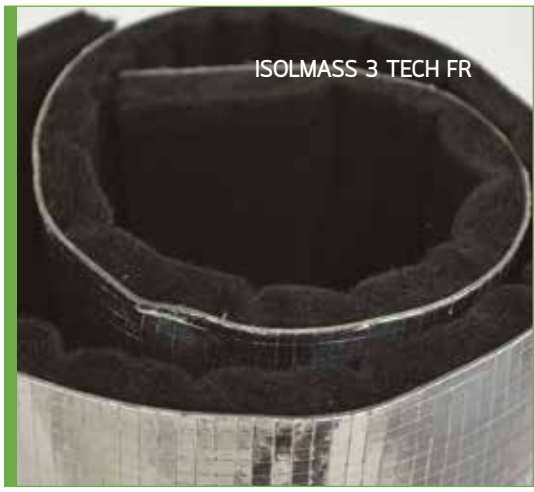
Product size:
Height 3000 m
Width 1200 mm

1. Existing wall with mortar
2. ISOLMASS 22
3. Metal profiles (+optional thermal insulation) 50 mm
4. Double plasterboard 25 mm

ISOLMASS 1 TECH

- **Composition:**
  - layer of polyester fiber (PET), thickness **10 mm**
  - heavy layer weighing **4 kg/m²**, thickness **2 mm**
  - layer of polyester fiber (PET), thickness **20 mm**
- **Size:** sheets **1,20 x 1,50 m**
- **Applications:**
  Sound insulation of civil construction walls, air-ducting, metal panels, drywall partitions. For application in buildings, it can be applied in false walls in combination with plasterboard. It can be self-adhesive for temporary application, then it must be secured with mechanical fixings.
- **Acoustic properties:**
  Airborne sound insulation-single material - Weighted sound reduction index (ISO 10140-2, ISO 717-1): **Rw = 27 dB**

ISOLMASS 3 TECH FR



- **Composition:**
  - (optional) ALUNET®: aluminium reinforced foil
  - heavy layer weighing **3 kg/m²**, thickness **1,5 mm**
  - layer of polyester fiber (PET), thickness **12 mm**
- **Size:** sheets **1,00 x 2,00 m**

  Applications:

  Sound insulation of drain pipes. The product must be installed with the polyester fiber in contact with the pipe. Wrap it around the pipe, apply adhesive tapes at the joints, and finally secure it mechanically with straps or plastic/metal clamps.
- **Acoustic properties:**

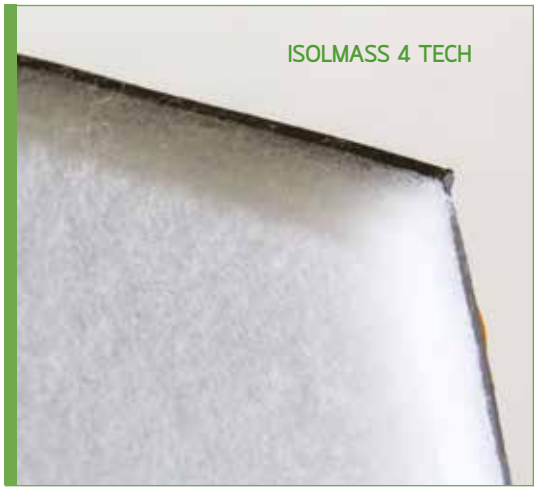
  Airborne sound and structure-borne sound insulation on waste water installations - Reduction of normalized airborne sound pressure level L_{an} (EN 14366), according different water flows:

ISOLMASS 3 TECH FR - INSTALLATION ON PIPE	WATER FLOW			
	0,5 l/s	1 l/s	2 l/s	4 l/s
ΔLan - Airborne sound insertion loss[dB(A)]	**12,8**	**11,3**	**10,6**	**10,2**

- **Fire reaction:**

  EN 13501-1 Euroclass: B-s2,d0 / B_L-s1,d0
  ISO 3575 100mm/min : Pass
  DIN 4102 Class B2: Pass

ISOLMASS 4 TECH



- **Composition:**
  - layer of polyester fiber (PET), thickness **20 mm**
  - heavy layer weighing **4 kg/m²**, thickness **2 mm**
- **Size:** sheets **1,20 x 1,50 m**
- **Applications:**

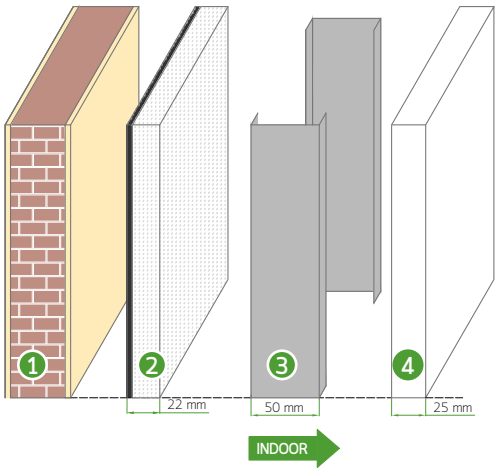
  Sound insulation of civil construction walls, air-ducting, metal panels, drywall partitions. For application in buildings, it can be applied in false walls in combination with plasterboard. It can be self-adhesive for temporary application, then it must be secured with mechanical fixings.

  For pipes, wrap the product around the tubes and secure it with straps or metal wires. In any case, apply adhesive tapes at the joint, overlapping the product when possible.
- **Acoustic properties:**

  Airborne sound insulation - single material - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 27 dB**

  Airborne sound insulation - complete drywall partition - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 61 dB**

ISOLMASS 4 TECH ACOUSTIC FALSE WALL



Product size:
Height 1500 m
Width 1200 mm

1. Existing wall with mortar
2. ISOLMASS 4 TECH
3. Metal profiles (+optional thermal insulation) 50 mm
4. Double plasterboard 25 mm

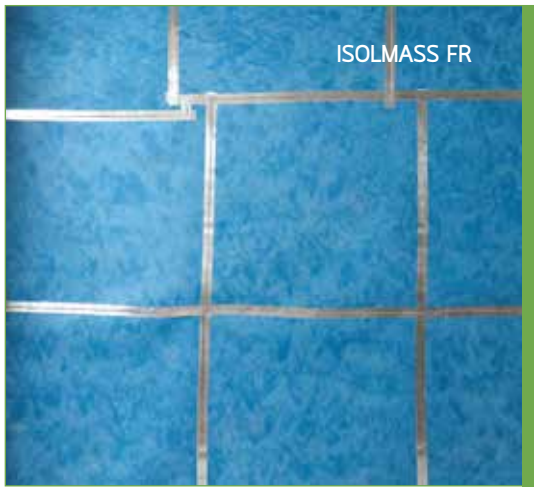
ISOLMASS 4

- **Composition:**
  – heavy layer weighing **4 kg/m²**, thickness **2 mm**
  Further basic weights available on requests.
- **Size:** sheets **1,20 x 2,00 m**
- **Applications:**
  Sound insulation of civil construction walls, air-ducting, metal panels, drywall partitions. High performance of vibration damping.
  For application in buildings, it can be applied in false walls in combination with plasterboard. It can be self-adhesive for temporary application, then it must be secured with mechanical fixings.
  For pipes, wrap the product around the tubes and secure it with straps or metal wires. In any case, apply adhesive tapes at the joint, overlapping the product when possible.
- **Acoustic properties:**
  Airborne sound insulation - single material - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 26 dB**
  Airborne sound insulation - complete drywall partition - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 54 dB**
  In-situ test – Airborne sound insulation - complete drywall partition (single metal profile and double plasterboard) - Weighted sound reduction index (EN ISO 140-4, EN ISO 717-1): **R'w = 52 dB**
  Increase of airborne sound insulation by single layer Isolmass 4 product: **+ 3 dB**

ISOLMASS FR

- **Composition:**
  – heavy layer weighing **4 to 10 kg/m²**, thickness **2-5 mm**
- **Size:** sheets **1,20 x 2,00 m**
- **Applications:**
  Sound insulation of civil construction walls, air-ducting, metal panels, drywall partitions. For applications that requires high levels of fire reaction in addition to high performance of vibration damping.
  For application in buildings, it can be applied in false walls in combination with plasterboard. It can be self-adhesive for temporary application, then it must be secured with mechanical fixings.
  For pipes, wrap the product around the tubes and secure it with straps or metal wires. In any case, apply adhesive tapes at the joint, overlapping the product when possible.
- **Acoustic properties:**
  Airborne sound insulation - single material 4 kg/sqm - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 26 dB**
  Airborne sound insulation - single material 5 kg/sqm - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 29 dB**
  Airborne sound insulation - single material 10 kg/sqm - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 35 dB**

  Airborne sound insulation - complete drywall partition (version 4 kg/sqm) - Weighted sound reduction index (EN ISO 10140-2, EN ISO 717-1): **Rw = 54 dB**
- **Fire reaction:** EN 13501-1 Euroclass for all the basic weights:



VERSION/COLOR	BLUE	BLACK
Adhesive	B-s2,d0	B-s2,d0
Not adhesive	B-s2,d0	B-s2,d2

ITEM SPECIFICATIONS

TROCELLEN ISOLMASS 11

A three-layer composite product for airborne sound insulation of waste water pipes in plastic and partitions in general. Composed of a heavy polyolefin layer with mineral fillers, laminated on one side with **TROCELLEN** cross-linked PE foam with a thickness of 3 mm, and on the other side with open cell PU with a thickness of 12 mm.
Net weight: 4,4 kg/m.

TROCELLEN ISOLMASS 22

A three-layer composite product for impact and airborne sound insulation of floors and walls. Composed of a heavy polyolefin layer with mineral fillers, laminated on both sides with **TROCELLEN** cross-linked PE foam with a thickness of 3 mm.
Net weight: 4,2 kg/m^2.

TROCELLEN ISOLMASS 1 TECH

A three-layer composite product for airborne sound insulation partitions in general.
Composed of a heavy polyolefin layer with mineral fillers, laminated on both sides with polyester fiber (PET) with a thickness of 10 and 20 mm.
Net weight: 5,2 kg/m^2.

TROCELLEN ISOLMASS 3 TECH FR

A two-layer composite product for airborne sound insulation of waste water pipes. Composed of a heavy polyolefin layer with mineral fillers, laminated on one side with polyester fiber (PET) with a thickness of 12 mm. Net weight: 3,3 kg/m^2.

TROCELLEN ISOLMASS 3 TECH FR ALUNET®

A three-layer composite product for airborne sound insulation of waste water pipes. Composed of a heavy polyolefin layer with mineral fillers, protected by Aluminium foil ALUNET® and laminated on one side with polyester fiber (PET) with a thickness of 12 mm. Net weight: 3,3 kg/m^2.

TROCELLEN ISOLMASS 4 TECH

A two-layer composite product for airborne sound insulation partitions in general.
Composed of a heavy polyolefin layer with mineral fillers, laminated on one side with polyester fiber (PET) with a thickness of 20 mm.
Net weight: 4,8 kg/m^2.

TROCELLEN ISOLMASS 4

A single layer product, used as vibration damping for airborne sound insulation of partitions. Composed only of heavy polyolefin layer with mineral fillers, thickness 2 mm.
Net weight: 4 kg/m^2.

TROCELLEN ISOLMASS FR

A single layer product, used as vibration damping for airborne sound insulation of partitions. For applications where it is required high performance of fire reaction (Euroclass). Composed of self-extinguish heavy polyolefin layer with mineral fillers, thickness 2 ÷ 5 mm.
Net weight: 4-10 kg/m^2.

INTERNATIONAL LOCATIONS

Lead Plant

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TROCELLEN*

Trocellen is the first choice European polyolefin foam-solution provider. Through continuous innovations and successful partnerships we dedicate ourselves to one goal: protecting and providing comfort for people.

After more than 40 years, with 600 employees at seven sites and many cooperating companies, various partner universities, institutes and designers we offer solutions for our business partners in various industries such as construction and insulation, automotive, leisure and professional sport, adhesive tapes, footwear and packaging.

*Trocellen is the member of Furukawa Group.

www.trocellen.com

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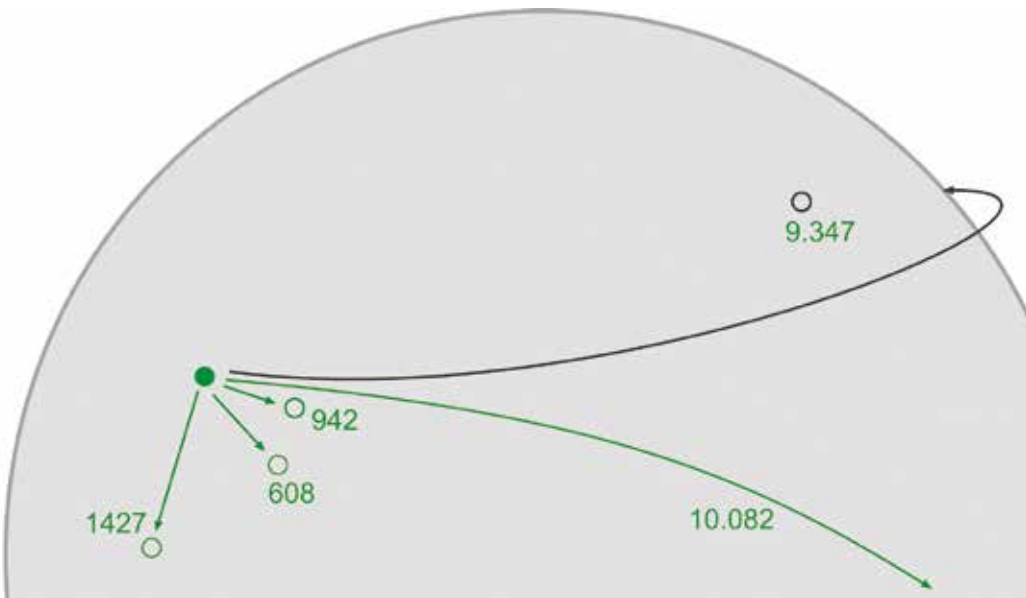
50° 49′ N	07° 09′ O	Germany
40° 28′ N	03° 21′ O	Spain
41° 53′ N	12° 28′ O	Italy
47° 30′ N	19° 02′ O	Hungary
02° 54′ N	101° 28′ O	Malaysia
35° 40′ N	139° 49′ O	Japan FURUKAWA



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