

White Paper

# Public Spaces

**Acoustic Treatment  
Guidelines**  
Restaurants

White Paper

# Public Spaces

## Acoustic Treatment Guidelines Restaurants

**Credits**

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## Vicoustic

# Intro- duction

One of the major acoustic issues in restaurants is the high level of background noise.

Recently, a survey undertaken in UK\* found that **nearly 80% of people have left a restaurant, cafe or pub early because of noise.**

In addition, studies conducted by Zagat, an international dining guide, revealed that noise levels are the top complaint from those dining out. Excess noise is considered even more annoying than poor service!

Vicoustic has developed this new White Paper to help you find a solution to control the background noise levels in your restaurant.

\* Action On Hearing Loss - Speak Easy report 2016

 Reviewed 16 June 2018

## Hipster Central

...The ambient noise was deafening, and it wouldn't be an exaggeration to say that we pretty much had to shout at each other to be heard. I don't mind bustle and energy at a restaurant, but this took it to a new level. If you're... [More](#)

 Reviewed 30 January 2016  via mobile

## Bring your ear plugs

...Significant downside here is the ambient noise. It was quite unbearable at times with large party tables trying to shout across at each other making the ambience for a couples dinner quite impossible. Downstairs seemed a bit more bearable but we were on the mezzanine... [More](#)

 Reviewed 18 November 2017  via mobile

## Great food but super noisy

...Everything was excellent except for the noise. would be worthwhile looking at some noise dampening. I can't remember being in a louder restaurant. Probably not an ideal venue if you want to have a conversation. I'd go back but only if a table outside was... [More](#)



# Restaurants

## Acoustic treatment guidelines

**Why are restaurants so noisy?**  
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**How to control noise build-up in restaurants?**  
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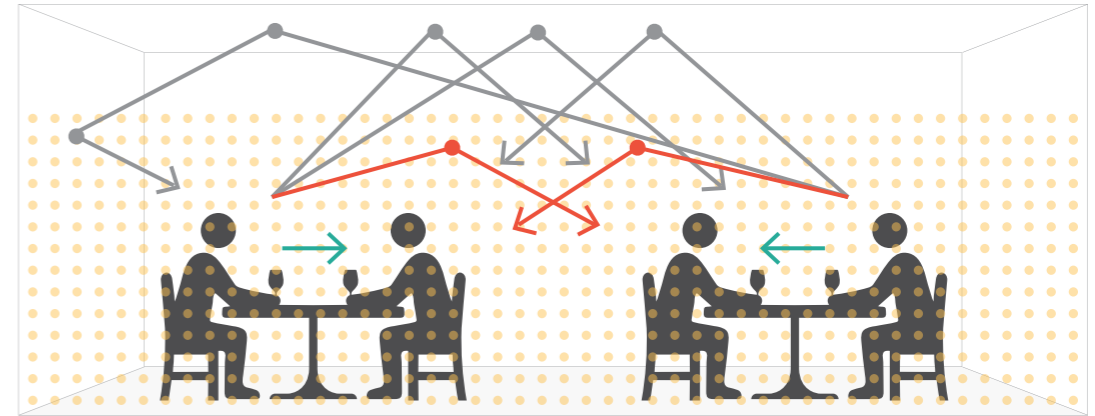
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# Why are restaurants so noisy?

Figure 1

- Direct sound
- Reflections from walls
- Reflections from Ceiling
- Background noise



**Typically, new Restaurants have very hard, reflective surfaces, such as glass, concrete, plasterboard, among others.**

In such environments, sound is strongly reflected many times around a room's surfaces taking a long time before it is finally absorbed. This leads to very reverberant rooms.

In such rooms, background noise created by multiple conversations will quickly build up, making it very hard for people to understand each other.

Consequently, people in such loud environments need to raise their voices above background noise levels to be able to understand each other, consequently increasing background noise. This build-up of sound, also known as the Lombard effect, causes discomfort to everyone, both clients and workers.

Figure 2

• Flat Panel VMT, World Collection, Spain Pattern 1



# How to control noise build-up in restaurants?

One of the major aspects to take into account when designing the acoustics of a restaurant, cafe or pub, is to develop solutions to control the room's reverberation time (RT). This will help minimize the noise 'build-up' process, making communication easier and will avoid people having to raise their voices to be heard and understood.

However, it should be noted that lack of background noise in a restaurant will also result in an environment that potentially lacks atmosphere and mood – no one wants to eat in a restaurant with no vibrancy and energy, which offers no speech privacy and where everyone can hear your talk. Therefore, there is a fine balance to strike in creating the perfect ambience in a restaurant and dining setting.

Best Practice Guidelines state maximum RTs between 0,8 to 1,0s (it is likely that very small restaurants would need RTs closer to 0,6s). This will create a balanced acoustic environment where those two extreme conditions are likely to be avoided.

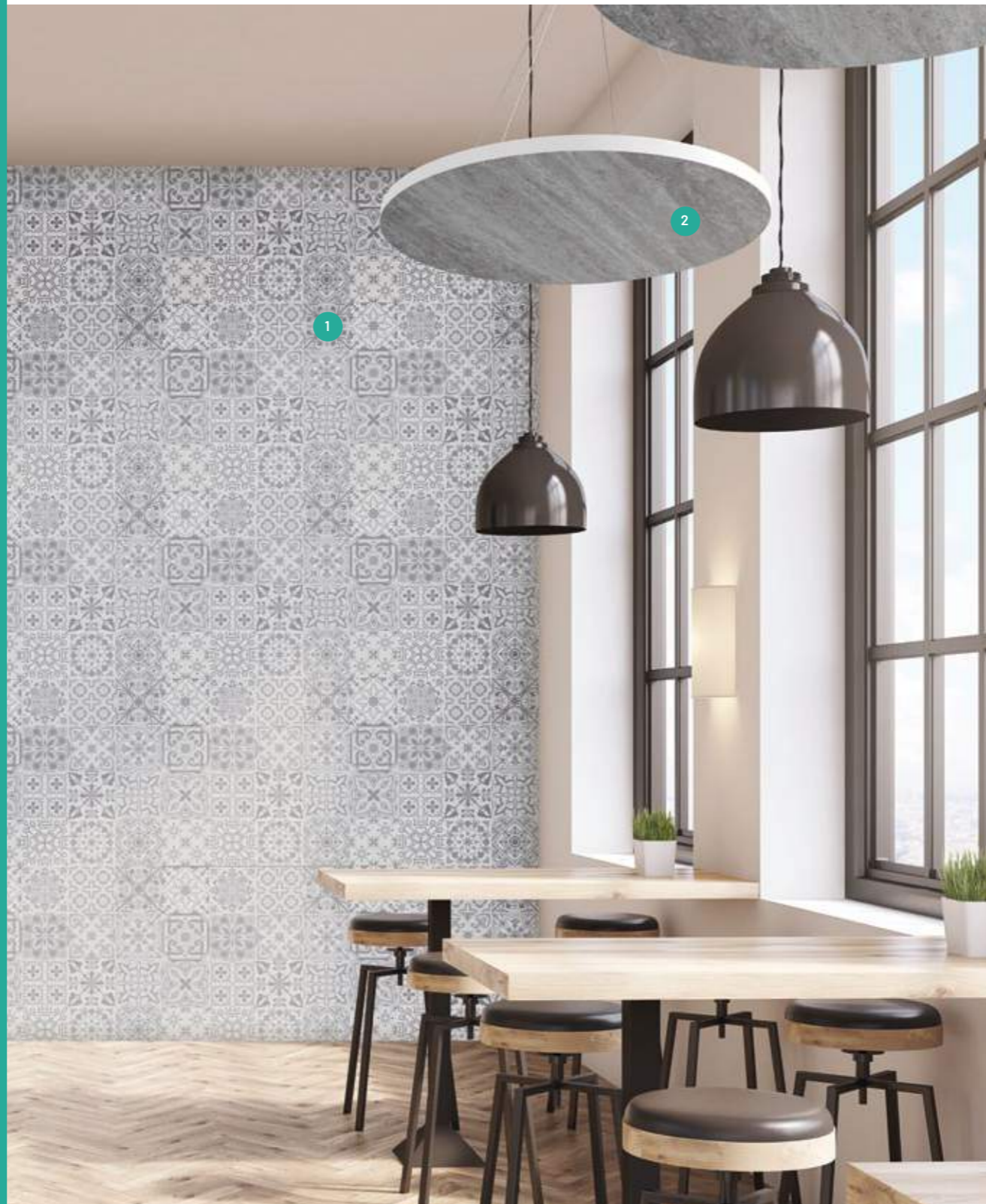


Figure 3

- Flat Panel VMT, Tiles Collection, Pattern 3 1
- ViCloud VMT Flat, Concrete Collection, Pattern 3 2

- **Ceiling Treatment** For the ceiling treatment, it is recommended that a restaurant uses absorptive ceiling product. This can be achieved using Flat Panel VMT, Vixagon VMT and ViCloud VMT in the Restaurant's ceiling.
- **Wall Treatment** To control strong sound reflection from walls, and in this way control both Reverberation Time and noise build up, we recommend the use of Flat Panel VMT and Vixagons VMT.

## Acoustic Treatment Location

In terms of positioning the acoustic treatment, it should ideally be distributed evenly over a room's surfaces; this will help create a more homogeneous acoustic environment and will control strong, specular reflections from all surfaces.

However, due to project constraints, for the most part, this is not feasible. In these situations, one should look for the best possible compromise. Ceiling treatment is usually preferential, since it is ordinarily the biggest surface available for acoustic treatment and it covers all of the restaurant's area.

# List of materials needed



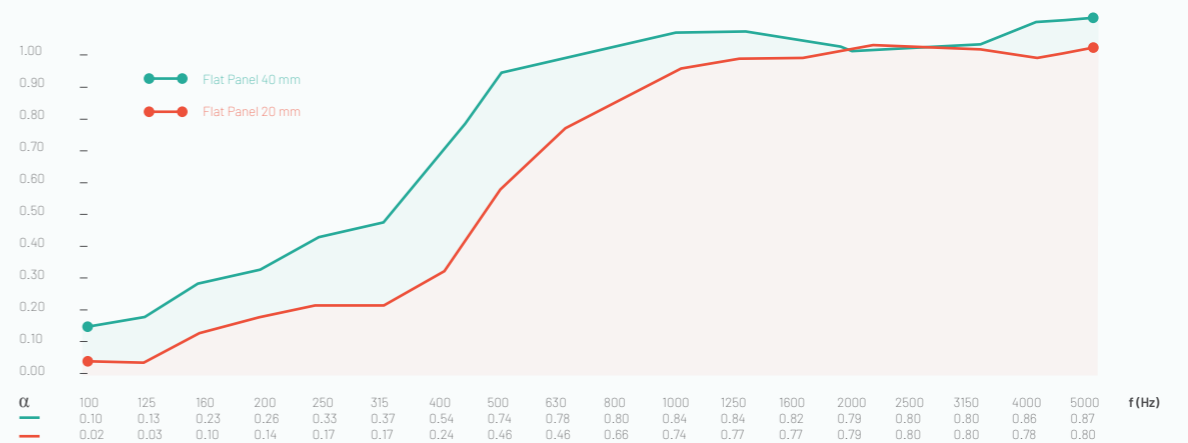
## Flat Panel VMT

**Flat Panel VMT** is a sound absorbing panel, extremely efficient in middle and high frequencies, where speech occurs, making it ideal for your restaurant. It can simulate real material such as concrete, marble, wood, any creative patterns or alternatively solid colors.



**Figure 4**  
• Flat Panel VMT, Concrete Collection, Pattern 1

### Performance





## ViCloud VMT

**ViCloud VMT** is a simple and lightweight suspended acoustic solution. Being a suspended acoustic element, it presents twice the area of absorbing material exposed than a common acoustic panel, making it a very effective solution and ideal for big restaurants with high ceilings.

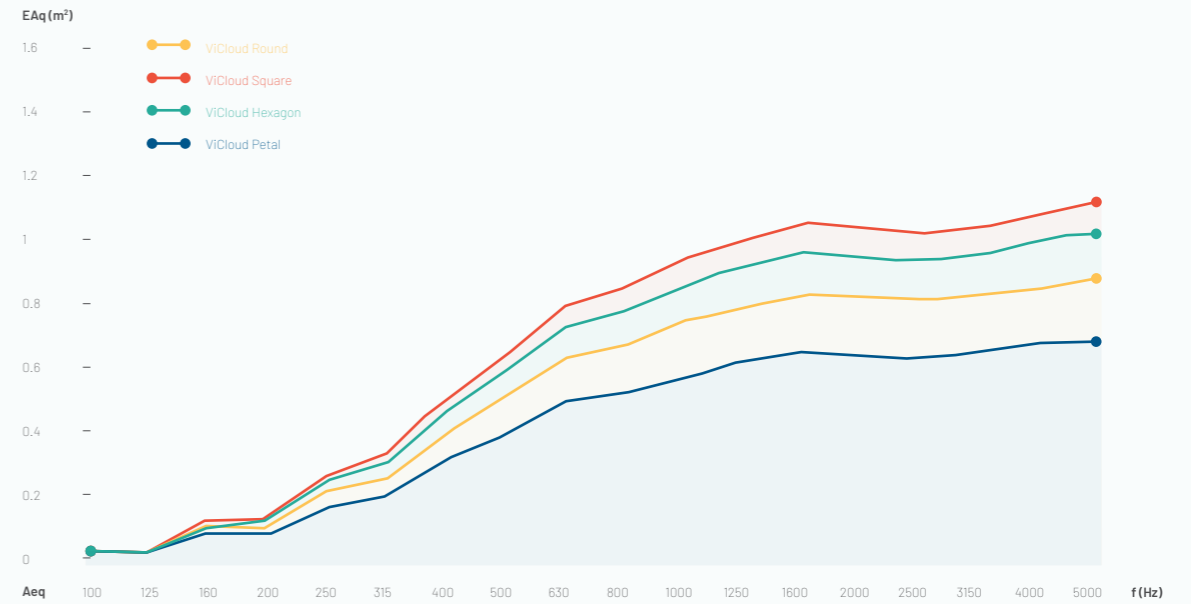


Figure 5

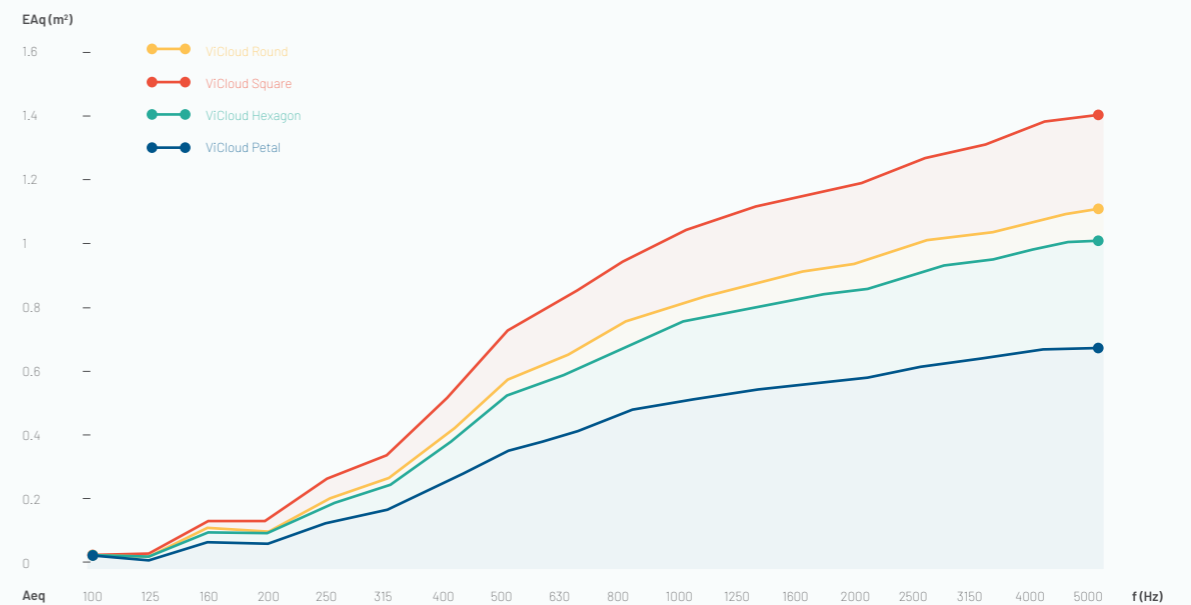
- ViCloud Flat VMT 1
- Flat Panel VMT customized 2



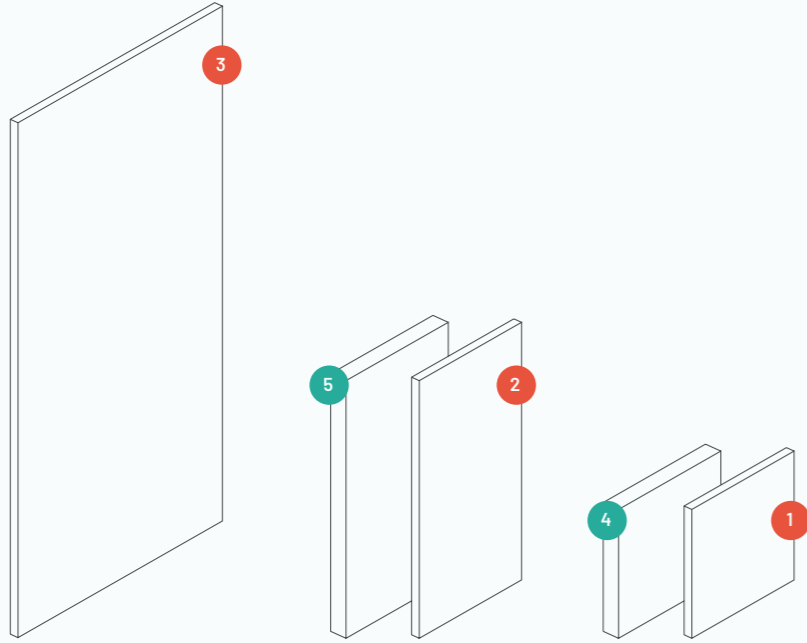
### Performance Over Rigid Surface



### Performance 1m from soffit



## Flat Panel VMT



### Dimensions\*

- 1 595 x 595 x 20 mm / 23.4" x 23.4" x 0.8"
- 2 1190 x 595 x 20 mm / 46.8" x 23.4" x 0.8"
- 3 2380 x 1190 x 20 mm / 93.7" x 46.8" x 0.8"
- 4 595 x 595 x 40 mm / 46.8" x 23.4" x 1.6"
- 5 1190 x 595 x 40 mm / 23.4" x 46.8" x 1.6"

### Package Information

- 1 2 3 8 units/box
- 4 5 8 units/box

### Box Dimensions

- 1 665 x 675 x 195 mm / 26.2" x 26.6" x 7.8"
- 2 1260 x 675 x 190 mm / 49.6" x 26.6" x 7.5"
- 3 2470 x 1275 x 170 mm / 97.2" x 50.2" x 6.7"
- 4 665 x 675 x 355 mm / 26.2" x 26.6" x 14"
- 5 1260 x 675 x 355 mm / 49.6" x 26.6" x 14"

\* Please notice that the dimensions of this panel have a tolerance of +/- 2 mm

\*\* Flat Panel VMT 20 mm

### Features

- Light weight
- Easy to Install
- Easy to clean and maintain
- High Performance in medium and high frequencies

### Technical Information

**Raw Material**  
VicPET Wool

### Fire Rate\*\*

Europe: Euroclass B -s2, d0  
USA: Class A (ASTM-E84)  
Canada: CAN/ULC S102, Flame Spread Rating: 5, Smoke Developed Classification: 115

### Installation

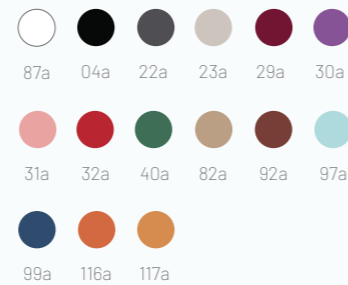
Velcro (included), Flexi Glue Ultra, VicFix Magnetic, VicFix Frame, AluFrame Single, AluFrame Double

### Available Finishes

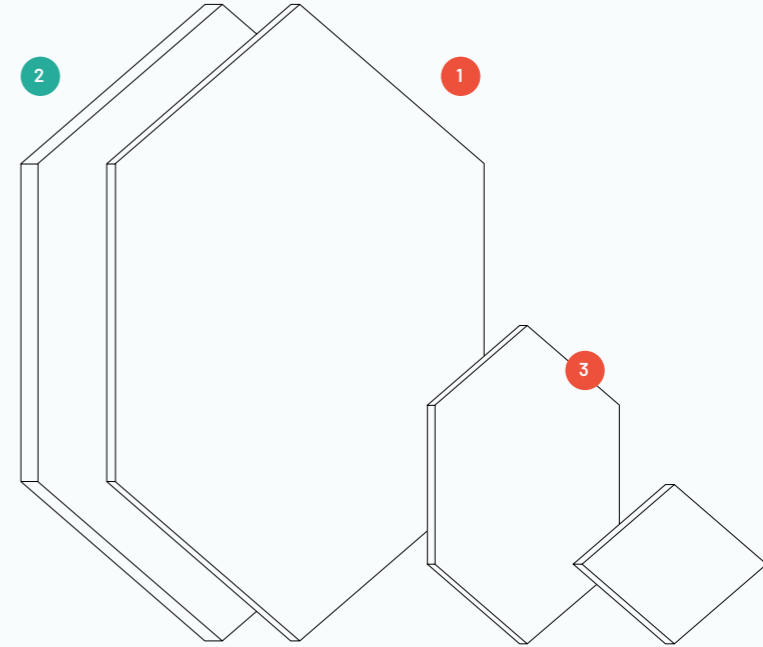
#### Collections

- Natural Stones **NEW**
- 3D
- Brick
- Concrete
- Doodle
- Floral
- Geometric
- Nature
- Tiles
- World

#### Solid colors



## Vixagon VMT



### Dimensions\*

- 1 700 x 606 x 20 mm / 27.56" x 23.86" x 0.8"
- 2 700 x 606 x 40 mm / 27.56" x 23.86" x 1.6"
- 3 350 x 303 x 20 mm / 13.78" x 11.93" x 0.8"

### Package Information

- 1 6 units/box
- 2 12 units/box
- 3 36 + 36 units/box \*\*

### Box Dimensions

745 x 650 x 390 mm / 29.3" x 25.6" x 15.3"

\* Please notice that the dimensions of these panels have a tolerance of +/- 2 mm.

\*\*The Vixagons Mini are packed in a really innovative way: we are using the same material as the product itself as packaging material. This will give the bonus of having extra Diamond shapes that can be used in conjunction with your Vixagon to create your art-work.

### Features

- Light weight
- Easy to Install
- Easy to clean and maintain
- High Performance in medium and high frequencies

### Technical Information

**Raw Material**  
VicPET Wool

### Fire Rate

Euroclass B -s2, d0

### Installation

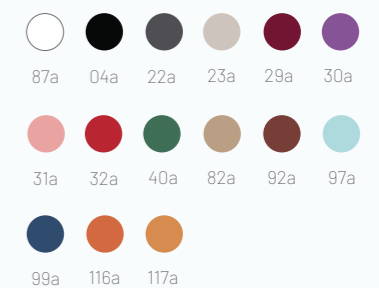
Velcro (included), Flexi Glue Ultra

### Available Finishes

#### Collections

- Natural Stones **NEW**
- Concrete
- Doodle
- Floral
- World
- Nature

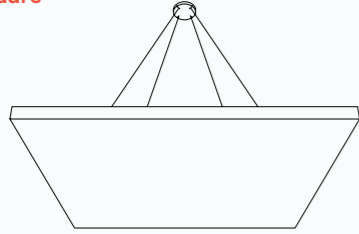
#### Solid colors



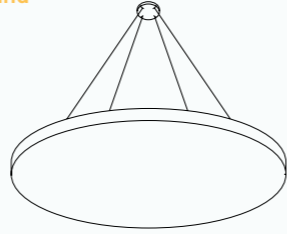


## ViCloud VMT

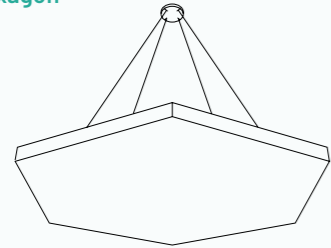
1 Square



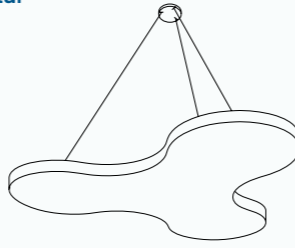
3 Round



2 Hexagon



4 Petal



### Dimensions\*

1 1160 x 1160 x 40 mm / 45.7" x 45.7" x 1.6"

3 Ø 1160 x 40 mm / Ø 45.7" x 1.6"

\*Please notice that the dimensions of this panel have a tolerance of +/- 2 mm

2 1160 x 1005 x 40 mm / 45.7" x 39.6" x 1.6"

4 1160 x 1068 x 40 mm / 45.7" x 42" x 1.6"

### Package Information

4 units/box

### Box Dimensions

1267 x 1267 x 170 mm / 49.9" x 49.7" x 6.7"

### Features

- Premium high density VicPET Wool
- High Performance in medium and high frequencies
- Light weight
- Easy to install
- Easy to clean and maintain

### Technical Information

#### Raw Material

VicPET Wool

#### Accessories

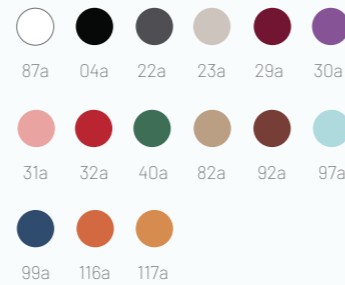
Magnetic and Mechanical Suspended Fixation (Included)

#### Available Finishes

##### Collections

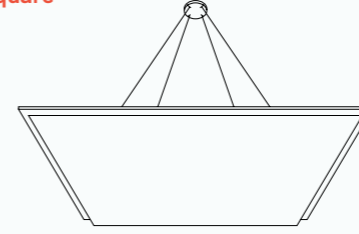
- Natural Stones NEW
- Concrete
- Doodle
- Floral
- Geometric
- Nature
- World

#### Solid colors

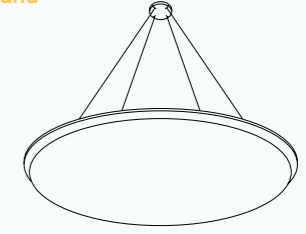


## VMT ViCloud 3D

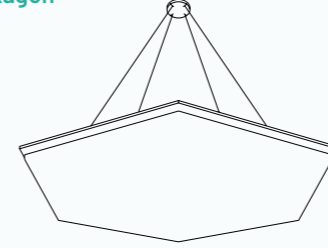
1 Square



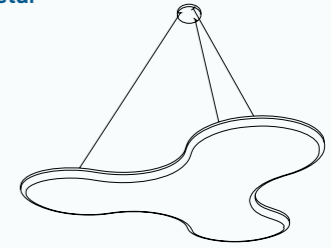
3 Round



2 Hexagon



4 Petal



### Dimensions\*

1 1160 x 1160 x 40 mm / 45.7" x 45.7" x 1.6"

3 Ø 1160 x 40 mm / Ø 45.7" x 1.6"

\*Please notice that the dimensions of this panel have a tolerance of +/- 2 mm

2 1160 x 1005 x 40 mm / 45.7" x 39.6" x 1.6"

4 1160 x 1068 x 40 mm / 45.7" x 42" x 1.6"

### Package Information

4 units/box

### Box Dimensions

1015 x 1015 x 195 mm / 40"x40" x 7.7"

### Box Gross Weight

8,5 kg

### Features

- Premium high density PET Wool
- High Performance in medium and high frequencies
- Light weight
- Easy to install
- Easy to clean and maintain

### Technical Information

#### Raw Material

VicPET Wool

#### Fire Rate

Euro Class B S1, d0 (EM 13501-1)

#### Accessories

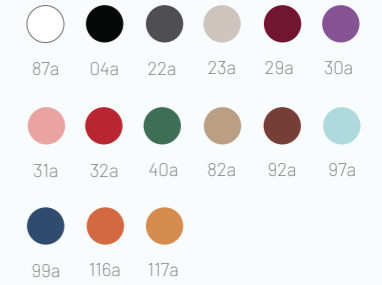
Mechanical and Magnetic Suspended Fixation (Included)

#### Available Finishes

##### Collections

- Natural Stones NEW
- Concrete
- Doodle
- Floral
- Geometric
- Nature
- World

#### Solid colors



The VMT Product Line is very easy to install, not requiring any specialized and expensive labor.

Figure 6

• Flat Panel VMT Customized 1

## Customization

VMT stands for Virtual Material Technology. These are panels developed exclusively by Vicoustic using an innovative dyeing technology.

You can simulate concrete, marble, wood and other materials, achieving an amazing and realistic look in any setting with the added benefit of having the acoustics controlled. In this way, you can play with the customers' perception by having, for example, a restaurant full of marble but that doesn't sound too reverberant!

You can dye your preferred art/design/color, include the Logo of your restaurant or have VMT panels with just solid colors. There are several existing collections in Vicoustic's catalogue. The size and shape of your panels are also customizable. Imagination is the limit for the appearance and for the environment you want to achieve.



## Installation

**Installing VMT Products is so easy that you don't need to close your restaurant for the installation. The installation can be done overnight avoiding disrupting your business.**

In terms of installation, **Flat Panel VMT** is compatible with T-Bar systems or, like Vixagon VMT can simply be glued or applied using Velcro to any surface.

**ViCloud Flat VMT and ViCloud 3D** come with its own mechanical/magnetic fixation system and can be fixed with a screw or using its magnet if installed onto a metal surface. The magnet works on most of T-Bars systems making installation really easy - when the T-Bar is not strong enough to sustain ViCloud VMT we advise the use of a metal accessory compatible with T-Frames.

## Maintenance

**All VMT Products can be easily cleaned with water.**

They can be removed and cleaned under running water or directly by using a wet wipe.

Please note: Do not use products or cleaning methods with temperatures above 80° C since these may damage the panels.



## Quantities Needed

The table below gives you an idea of the quantity of acoustic treatment you will need to treat your restaurant.

The values presented are based on a room's dimensions and consider standard restaurant finishes for floors, walls and ceilings. You can use these values as a guideline and scale them according to your room's size.

For more complex rooms or if you need help with your project please contact Vicoustic's Team.

Figure 7

- ViCloud 3D, Natural Stones Collection, Emperador Dark Pattern 1
- Flat Panel VMT, Natural Stones Collection, Invisible Grey Pattern 2



### Estimated m<sup>2</sup> of Panels Needed

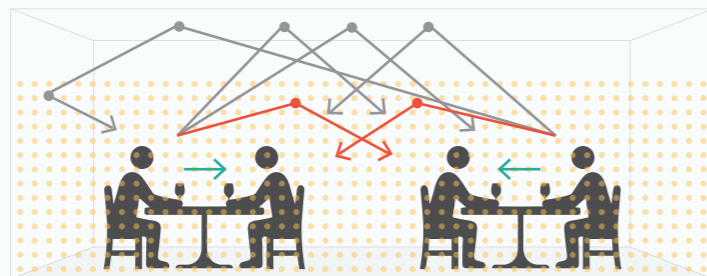
| Height<br>(m / ft) | Floor Area<br>(m <sup>2</sup> / sq ft) | Volume<br>(m <sup>3</sup> ) | Vicoustic's Proposed<br>Target RT (s) | Wall Installation | Ceiling Installation | Using a Mix Solution |                        |
|--------------------|--|-----------------------------|---------------------------------------|-------------------|----------------------|----------------------|------------------------|
|                    |  |                             |                                       |                   |                      | Direct Installation  | Suspended installation |
| 3 / 10             | 20 / 215                               | 60                          | 0,8                                   | 7.1               | 8                    | 2.8                  | 5.4                    |
| 3 / 10             | 30 / 320                               | 90                          | 0,8                                   | 11.4              | 13.5                 | 5.7                  | 8.1                    |
| 3 / 10             | 50 / 430                               | 150                         | 0,8                                   | 22.7              | 26.9                 | 11.4                 | 16.1                   |
| 3 / 10             | 100 / 1075                             | 300                         | < 0,9                                 | 42.6              | 48.4                 | 17                   | 29.6                   |
| 3 / 10             | 200 / 2150                             | 600                         | < 1,0                                 | 76                | 86.1                 | 28.4                 | 53,8                   |

Box of Flat Panel VMT (1190 X 595 mm) - 5,66 m<sup>2</sup>  
 Box of Vixagon VMT - 3,80 m<sup>2</sup>  
 Box of ViCloud VMT Square - 5,40 m<sup>2</sup>

# Acoustic Treatment Results

## No acoustic treatment

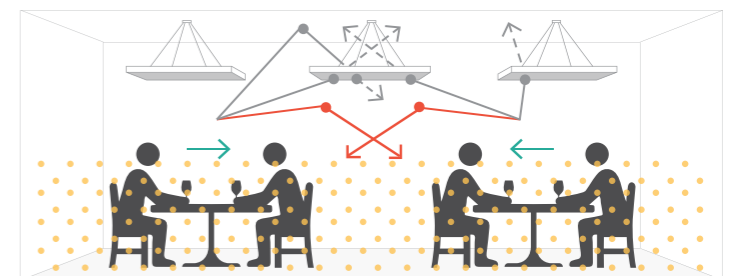
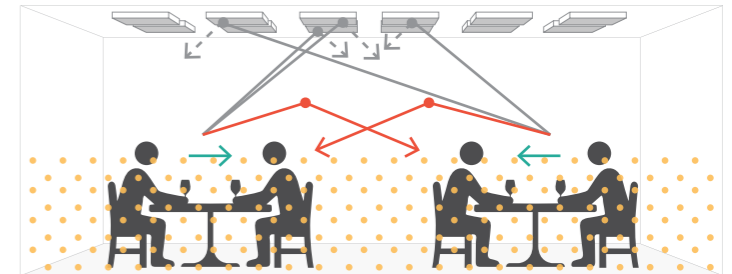
Without any acoustic treatment, restaurant noise may quickly build-up due to strong reflections from the ceiling and walls.



- Direct Sound
- Reflections from walls
- Reflections from Ceiling
- Background noise

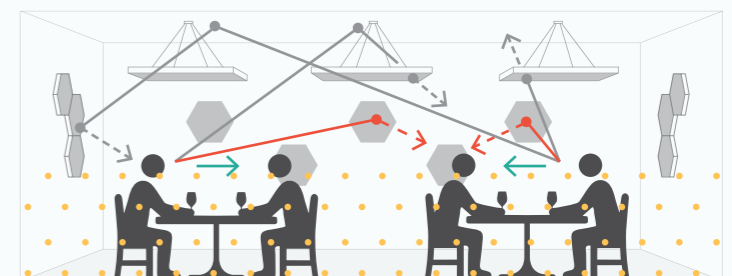
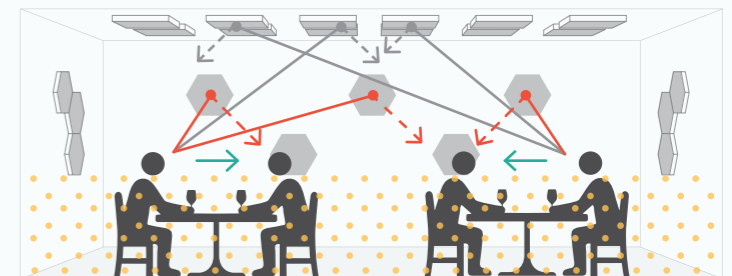
## Only on the ceiling

With acoustic treatments implemented at ceiling level, strong reflections are now being controlled. Noise build-up is therefore being minimized. However, there may still be some strong reflections from the walls.



## On the ceiling and walls

Distributing the acoustic treatment more evenly across all room surfaces will better control strong reflections. This ultimately means that less material needs to be used in the ceiling.





# Glossary

**dB (decibel)** – The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the root mean-square pressure of the sound field and reference pressure ( $2 \times 10^{-5}$  Pa).

**Direct Sound** – Sound that arrives at the listener's position directly from the sound source, i.e. without being reflected from any objects or surface.

**First Reflections** – Usually defined as the sound reflections that reach the listening position up to approximately 20ms after the direct sound.

**Lombard Effect** – Psychoacoustic Effect named after the French otolaryngologist Étienne Lombard observed and reported that people with normal hearing raised their voice when subject to noise.

**Reverberation** – An acoustical phenomenon that occurs in enclosed spaces, when sound persists in that space as a result of repeated reflection or scattering from surfaces enclosing the space or objects within it.

**Reverberation Time (s)** – A measure of the degree of reverberation in a space. It is equal to the time required for the level of a steady sound to decay by 60 dB after it has been turned off.

**Sound Absorption** – The portion of the sound energy that is absorbed and not returned when a sound wave hits a surface.

**Sound Reflection** – The portion of the sound energy that is returned when a sound wave hits a surface.

**Speech Privacy** – It is the inability of an unintentional listener to understand another person's conversation. Lack of Speech privacy is frequently related with acoustic dissatisfaction within offices – e.g. overhearing unwanted conversations, or feeling overheard.

# Vicoustic

## Provides innovative acoustic solutions

**Vicoustic is a company in constant evolution with strong international expression, represented in more than 80 countries**

Vicoustic understands sound – and we know what makes a truly exceptional acoustic and audio experience. Being at the forefront of acoustic technology, we combine engineered systems with stunning design to bring you sound that is free of compromises, but full of high quality performance.

A leading force in the industry, founded in 2007, Vicoustic is found in over 80 countries around the world. We understand the unique sound dynamics of a room or venue. So whether it's a Home Cinema, Hi-Fi room to a professional sound system for radio and television, our expertise for peak acoustic performance is second-to-none.

The products from Vicoustic deliver clever and innovative solutions to meet the demands of spaces which require a sophisticated soundscape. Taking on board the high standards of our customers, we continuously strive to manufacture products of superior functionality, adaptability, but all the while with a sustainable and environmentally conscious mind-set.

**Quality at the heart of sound**

Vicoustic is concerned with design, leading technology and sound solutions. And alongside this vision, our work is always underpinned by producing sound with materials and systems of the highest quality. We listen to our customers and take on board their acoustic needs, what we do is very personal. We are proud of our work and Vicoustic would never create something that we wouldn't use ourselves. Designed and manufactured in Portugal, our facilities underwent great transformation in 2015 to incorporate state of the art equipment and new production and coating systems. This ensured that Vicoustic was able to maintain the high quality standards expected of its products, increase production volumes, but also create those bespoke products for our custom projects. This is led by our own 'in-house' Quality Department, who oversee all aspects of quality from the company. The ability of Vicoustic to create individually designed items at a premium quality means that our products can meet the needs of most spaces (no matter how unusual) to ensure the best acoustics and environment to enjoy sound...we have it covered.



# Vicooustic Team

**From conception through to completion, we work closely with architects, engineers and designers to deliver a project successfully irrespective of complexity.**

Our project team includes senior acoustic engineers and designers that are experts in taking you on your acoustic and design needs.

The pioneering hardware and software tools we have engineered have proved to be very reliable to support the integration of acoustic treatment and sound insulation solutions through a new-build or a refurbishing project.

Our Research and Development Team is also available to develop customized products to satisfy your needs.

Our customers will also be supported by our Sales, Marketing and Logistics teams to assist with transportation, communication and all information that may be required: pricing; installation guides; catalogues; etc.



Together we have proven that we can provide high levels of value to see our customers through the whole process of installing acoustic solutions.

This includes reliable and effective recommendations of products and support services throughout your whole project process from conception through to completion.

## We do

- Custom Designed Products
- Room Design Recommendations
- Technical Support

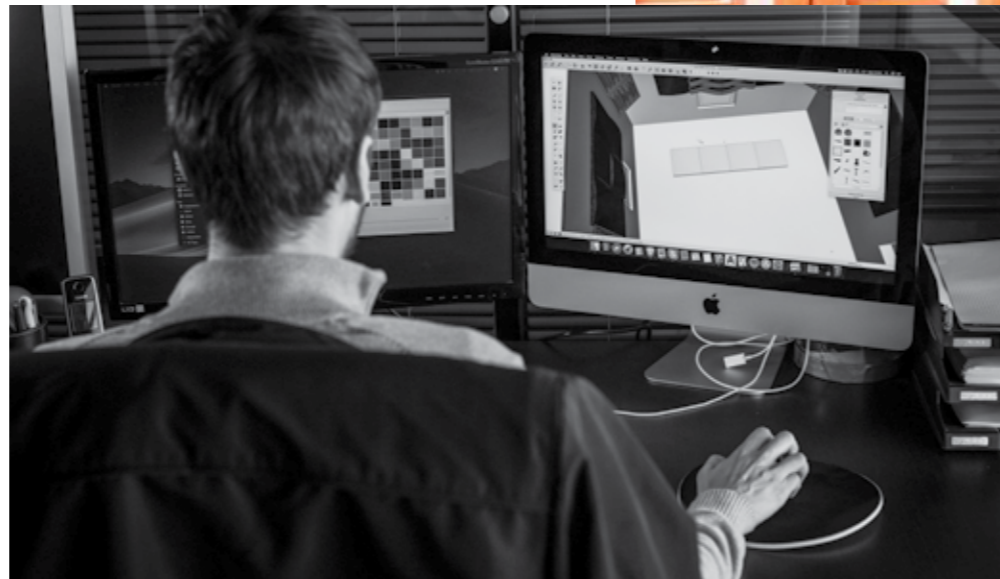


# Technology and rigorous in-house testing are the foundations for every Vicoustic Product

## This is what makes Vicoustic a distinguished brand and leader in its sector

We believe that Vicoustic should constantly be paving the way, innovating and driving sound technologies to ensure that we are not only leading the field, but producing the best acoustics in every space we are acoustically curating. What makes us outliers in the industry is our 'Vicoustic Research Centre', inaugurated in 2012 alongside the Vicoustic HQ. We pride ourselves on developing and continuously advancing our technologies and ways of working to deliver the best product to our customers.

The Research Centre operates on a multidisciplinary platform: the 'Multifunctional Room' and the 'Innovative Acoustic Chamber'. We have a brilliant (and fun!) time using this centre to test our products and investigate and challenge the way we use audio and acoustic technologies.



**The 'Multifunctional Room', lined with magnetic walls, allows us to assemble, mount and test different combinations of acoustic products quickly and efficiently.** Not only does this allow us to analyse performance, quality and design, it also gives us the opportunity to share this learning with our Vicoustic partners across the world

**The 'Innovative Acoustic Chamber' is a world leading testing facility.** 4-ton mechanical walls allow us to adapt the size of the space to the bespoke requirements of our customer. With a specialized sound insulation system, we can develop product and test resonance, sound frequency and, best of all, curate that beautiful acoustic ambiance only made possible by emulating the space the system will eventually call home. The sound behaviour is captured using B&K microphones and each element of the acoustic can then be identified and tested so nothing is missed and everything can be fine-tuned. Our aim is to invest in programmes to optimise acoustic performance within specific architecture and interior spaces. This means we can produce aesthetically pleasing products, whilst also upholding key safety and environmental regulations.



# Vicoustic Sustainability Approach

## In the past decade, Vicoustic has been developing a strong concern in terms of creating new sustainable acoustic solutions

We are committed to making products in an environmentally friendly way. This is important to Vicoustic and an integral part of our product development. Following an extensive project looking into the sustainability of our creations, a substantial part of our products are now made using recycled or recyclable materials. Most notably, Vicoustic has increased the use of VicPET Wool. A non-woven textile with superb acoustic performance, but predominantly made from recycled plastic bottles. 2018 sees a 3rd Vicoustic factory opening, meaning we are more determined than ever to use eco-friendly products in our lines. But sustainability is not limited to manufacturing. Our aim for a greener product is also in the quality and durability of our creations and we aim for these to have a great, long and lasting life.



## Vicoustic's continuing research and innovation in acoustic solutions, in its pursuit of new materials, led to the development of VicPET Wool

Instead of using commonplace raw materials, the latest Vicoustic line of products uses new and responsible raw materials that are predominantly made of recycled PET Bottles (65%), which are recyclable and low emitting materials (low VOC emissions).

Alongside being made of sustainable materials, these products maintain all necessary fire safety regulations and are classified as Class 1 according to OEKO-TEX 100 Standard, i.e. meeting the human-ecological requirements presently established for baby articles.

We, at Vicoustic, are doing all this in an innovative way, without compromising the acoustic performance or the design and quality of our products. Installing our new line of products not only will ensure you meet your acoustic needs, but can also promote the sustainable ambitions of your company and helps you earn the credits normally available in the Green Building Certification Schemes such as LEED (USA); WELL (UK); HQE (France); etc.



# VicPET Wool

### Properties

- Does not irritate skin or eyes
- Recyclable (100% PET)
- Good indoor air quality - zero emission of VOC's or formaldehyde
- No chemicals used
- Humidity resistant
- No dust generation during handling
- Class I acc. to Oeko-Tex 100 Standard

### Description

- Non-woven product
- 100% polyester fibres
- Thermally bonded
- Colour: White or Black

### Other features

- **Flammability:** Euroclass B, s1 d0
- **Thickness (range):** 20 to 80 mm
- **Weight:** 800 to 1600 grams/m<sup>2</sup>



### Production

Strategically located in the largest industrial cluster in Portugal



### Packaging

Each individual panel is inspected, placed in plastic casing and boxed. Production and Logistic enhancements guarantee high quality control and fast expedition



### Shipping

Vicoustic Acoustic Solutions are currently being shipped over 80 different countries worldwide



### Installation

"Out of the box" solutions, easy to install



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INNOVATIVE ACOUSTIC SOLUTIONS