

CUSTOM SOUND ABSORBERS



isolmant
rooms acoustic correction

isol**space**

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SOUND ABSORPTION

Noise: an old problem

Noise has always been a problem since the ancient past. Reference to this problem can be found in Marziale's "epistolae". Marziale craves his country house because *"for a poor there is no place to think or to rest in Rome"* due to the incessant noise of the city. Also Seneca complains about his house above the thermal baths and underlines that *"during study, silence is as necessary as sight"*.

Certainly ancient Romans, who complain about the noise of carriage wheels or street vendors disturbing the public peace with their loudness, they never could have imagined to what level noise would have increased two thousand years later.

Noise and quality of life

Noise is undoubtedly an element that affects the quality of life. Today, several scientific studies have shown that being exposed to excessive noise can cause damage to the health and in particular to the general condition of the auditory system.

When establishing the negative effects that excessive noise can cause to our life, three are the levels of severity: at a first level, noise causes a general annoyance, without being consciously perceived. That discomfort can

turn into real disorders (second level), up to determine a physical injury (third level).

An acoustic environment falls into one or another category, depending on several factors: physical characteristics of the noise to which one is exposed (intensity, duration of noise, noise quality, the type of source, etc.), environmental conditions in which one is exposed to the same noise (duration of exposure, type of environment, distance from the source etc) and finally by the physical and mental conditions of the person exposed.

Even the first level of noise, which is generic, could modify the environment and cause a very negative impact on life.

That inconvenience is consciously perceived when it is difficult to concentrate, as the activity that is taking place is particularly challenging from the mental point of view (e.g.: studying), or when it is difficult to talk inside a room. The noise, however, is able to create discomfort even when one does not realise it, for example, considerably decreasing quality and quantity of sleep (if, for example, the bedroom is exposed on a busy street).



REVERBERANT NOISE

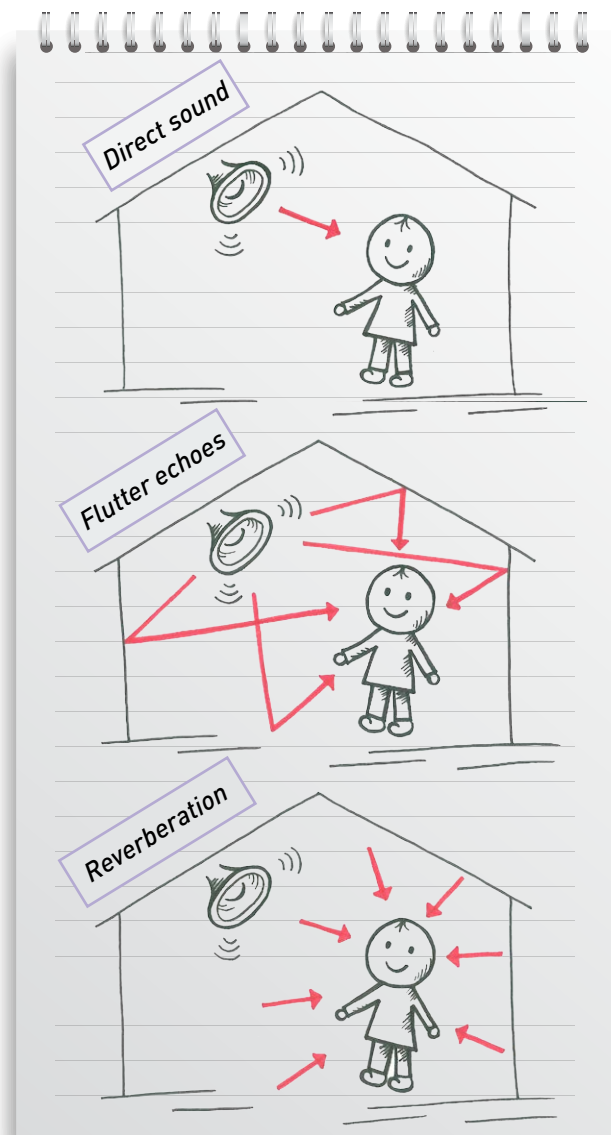
The acoustic environment

The acoustic environment is experienced on a daily basis, because every person spends a lot of time inside buildings – office, home, school, restaurant or cafeteria, gym, etc... It is possible that the phenomenon is not directly related to the effect but surely, if the environment is not acoustically suitable to live, those who remain inside a noisy room will suffer the consequences in terms of decreasing comfort or even a real sound annoyance.

Reverberation

The phenomenon of reverberation describes the increase in sound level from an active source in an enclosed environment. This phenomenon is due to the reflection of sound waves generated by the source on the surfaces such as walls, ceiling and furniture. In schools, restaurants, music halls or theatres, the voices of the people inside are sources of the noise.

Those who are inside such places receive both the direct beam emitted by the source, which is essential to define the type and the spatial location, and the following first echoes that, even with lesser energy, help the listener create a spatial image of the environment's volume and type. But, in case the reflections continue, as the sound energy does not end on the listener, a set of reflected rays are generated that are no longer individually distinguishable but are perceived as a general reverberation that leads to background noise.



REVERBERATION

This phenomenon, called “reverberation”, is often and generally perceived as disturbing or annoying in many environments. For instance, consider school canteens, restaurants, open-space office and all those environments in which reverberating sound, which does not diminish with distance but only with multiple reflections, generates a very noisy background that covers new sound sources. Those are the condition in which the voice volume must be raised to cover the noise and be heard by the listener. And, this problem increases exponentially as a result.

The reverberation time

Successive reflections generate a sound tail end, whose extent is measured by a physical descriptor: the reverberation time, i.e. the time in which the direct sound persists through reflections in the environment, and gradually weakens, after the source has been turned off.

A high reverberation time is not always a negative phenomenon: in concert halls, an extension of the sound tail is desirable to make the sound less dry. On the contrary, in classrooms, conference rooms or offices, the persistence of the sound tail can mask the words of the speaker, generating confused speech and therefore confusion and disorder to the comprehension.

Proper acoustic design must be applied to any type of environment in specific ways, in order to allow the best use of it and of the activities taking

place there. Optimal reverberation conditions are defined in function of the intended use of the environment itself.



In a church, a high reverberation time can contribute to make the space more evocative



In a classroom reverberation time must necessarily be very low to ensure a proper tuition



According to UNI EN ISO 3382-2 the reverberation time T60 is measured in seconds, as the time it takes for the sound signal to decay by 60 dB once the source is off.

The reverberation time depends on the ability of the surface to absorb sound energy. Reflective materials such as glass or mirrored surfaces, and irregular geometries such as vaulted ceilings, can make the interior acoustics particularly unfavourable for certain intended uses.

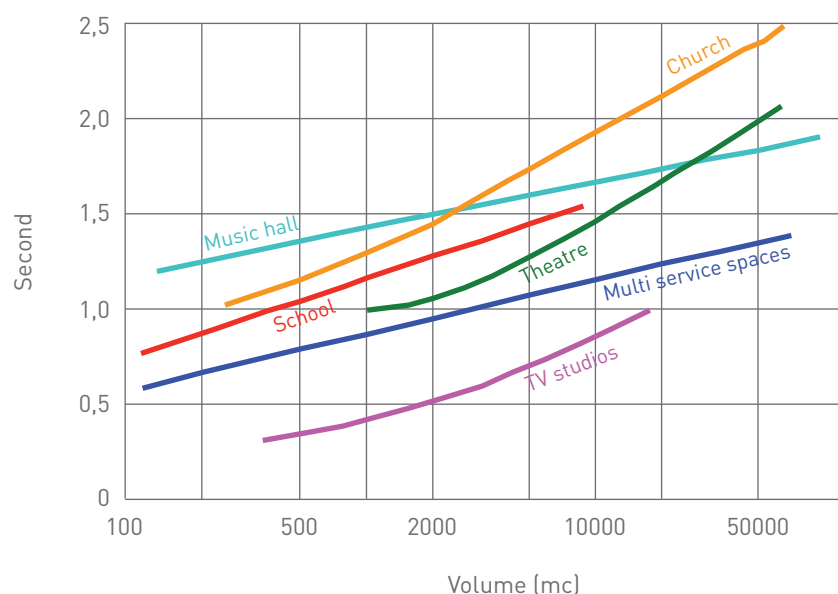
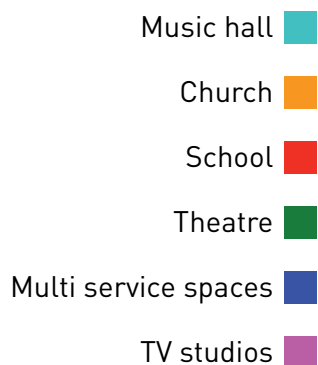
As mentioned, a high reverberation time is not always perceived as annoying. In some cases it may be pleasant, such as inside an ancient

church. There the persistence of the tail sound is an essential component of the suggestion created by the place.

Vice versa, in most cases it must be reduced, as in canteens, gyms and classrooms. In those rooms a good acoustic design must provide for an appropriate T60, to avoid the generation of annoying echo-reverberating effects.

Thus, an optimal reverberation time is not an absolute value but depends on the intended use of the room.

Optimum time of reverberation at 500 Hz depending on volume and final use of the room

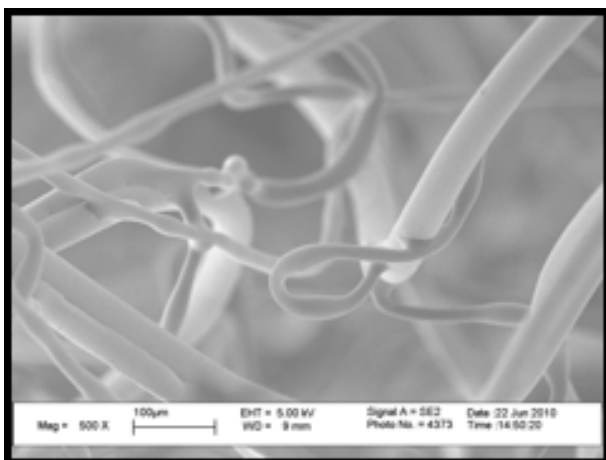


SOUND ABSORPTION

When the sound waves propagating in a enclosed environment reach the surfaces delimiting the volume, they meet an obstacle to their transmission and leave energy inside the material on which they crash.

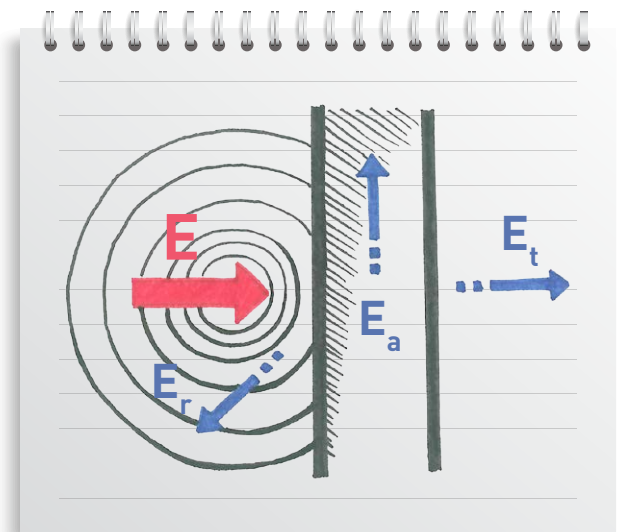
The amount of energy that remains trapped in the material depends on the physical and morphological characteristics of the material itself.

In this sense, a material is as more sound absorbing as it can keep the sound. This is the typical behaviour of porous and fibrous materials that dissipate sound energy into heat energy by friction, but also of vibrating panels that dissipate sound in mechanical energy by damping, or panels with small cavities and hollow space which work as resonators.



When a sound wave touches a surface, its energy is partly reflected, partly transmitted,

and partly absorbed. The sum of the three components is equal to the total incident energy, according to the formula $E = E_r + E_a + E_t$. The energy consumption depends on the “coefficient of absorption” of the material, i.e. on its ability to retain sound energy within itself by dissipating it: the greater the component of energy absorbed, the less the component of reflected energy.



The sound absorption coefficient α is defined as the ratio of energy absorbed and incident energy: $\alpha = E_a/E$. With regard to porous or fibrous materials, the coefficient of absorption depends on the morphology and the composition of the material itself: it is generally greater, the greater is the porosity of the material and the smaller its resistance to the air flow. In addition,



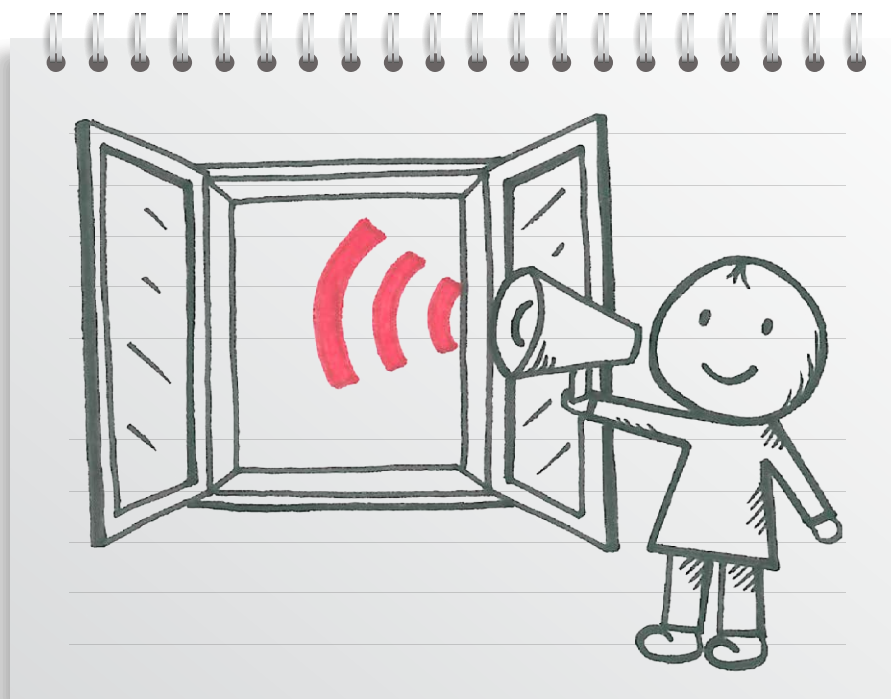
it depends on the thickness of the panel, and also on the panel installation with respect to the rigid surface (e.g. in adherence or with cavity).

The maximum absorption occurs when the surface that is impacted by the sound is an open window. In that case, it returns no reflected sound energy and represents the limiting case of total absorption.

Absorbing materials attenuate the reflected sound field, while they do not affect direct sound. The absorption of sound energy by materials and structures may be used to monitor the reflections of acoustic waves, and contain the sound level in a totally or partially confined

environment. That means, to achieve the optimum reverberation time that depends on the intended use and architecture of the room.

Sound absorption and sound insulation should not be confused. Sound absorption is the dissipation of sound energy within the material that covers the surface, whilst sound insulation is the ability of the whole partition structure to prevent the transmission of sound. Sound-absorbing materials are typically light and with openings or cavities, whilst soundproofing ones are massive and damping.



THE LEGAL STANDARD

The Italian legislation is not particularly thorough concerning the acoustics of interior spaces. There are indeed no limits or dispositions that define the proper reverberation time of a room. The only exception concerns school construction, particularly classrooms and gyms.

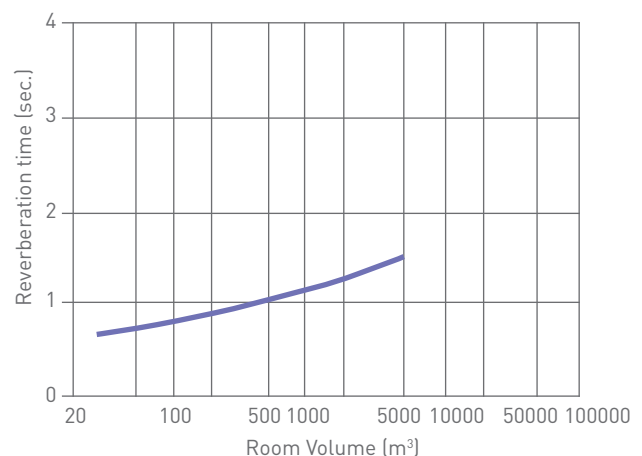
In this regard, the Prime Ministerial Decree 5/12/1997 "Determination of passive acoustic requirements of buildings" refers to the Circular of the Ministry of Public Works No. 3150 of 22 May 1967, which indicates as average reverberation time values, measured at the frequencies 250- 500-1000-2000 Hz, the limit of **1.2 sec** for classrooms (a furnished classroom with the presence of two people at the most) and **2.2 sec** for gyms.

Moreover, in Italy the DM 08/12/1975 is also in force, as reference standards for the general construction of schools. It sets out the value of the optimal reverberation time in relation to environment volumes, and the frequency, as shown in the two following diagrams, which represents a scenario at 500 Hz for a room of 1000 m³.

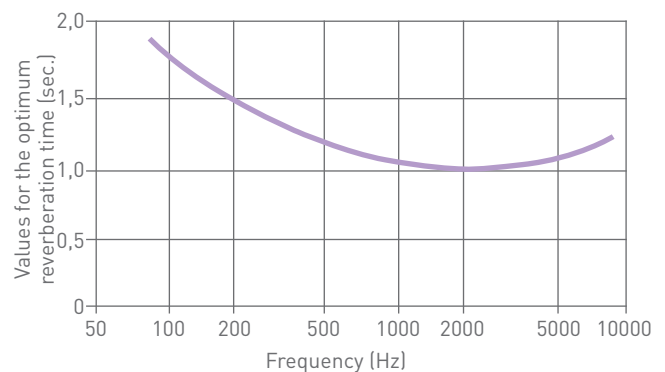
To comply with the Ministerial Decree, special care is needed in the choice of materials, so that the absorption coefficients can conform to the reverberation times shown in the second graph.

This dual regulation, although sometimes

contradictory, can in some cases still be met because the DPCM defines the average reverberation time value, while the DM foresees the trend for frequency bands.



Optimal reverberation time with regard to the volume of classrooms



Optimal reverberation time with regard to frequency





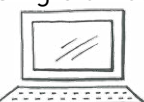





UNI 11532 “Acoustics in buildings - interior acoustic characteristics of confined spaces”

To solve the lack of legislation in the field of room acoustics, and provide support for the design of the acoustic comfort of the environments, in 20014 it was issued the standard UNI 11532 “Acoustics in building - interior acoustic characteristics of confined spaces”. This standard proposes reference values for the optimum reverberation time of rooms. The values of T60 suggested in the standard are taken from international standards, if not established by the Italian law.

With this tool, it is possible to get an indication of the optimal average reverberation times for rooms in the healthcare, office, sports, production, exhibition sectors and for collective use. In such places, an appropriate acoustic correction can be achieved with targeted interventions, though not particularly specific, such as those for theatres, concert halls and large auditoriums. In the school sector, standard is not limited to classrooms and gyms, but provides reverberation time values for music classrooms, libraries, school labs, computer labs. The school construction standards even provide provisions for the classrooms where there are children with auditory deficits.

Right: examples of reference values for some intended uses - for the full table, see standard UNI 11532

Use	Reference value T60	Reference regulations
Kindergarten 	≤ 0.4 s	SBI anvisning 218 (DK)
Refectory 	≤ 1.0 s ≤ 0.5 s	BB 96 (UK) SS 25268 (SE)
Restaurant 	≤ 0.6 s	SS 25268 (SE)
Company canteen 	≤ 0.6 s	SS 25268 (SE)
Single office 	≤ 0.6 s	SS 25268 (SE)
Open-space office 	≤ 0.5 s	SS 25268 (SE) SFS E249 (FI)
Meeting room 	≤ 0.7 s	SFS E249 (FI)
Swimming pool 	≤ 2.0 s	BB 96 (UK)

ISOLSPACE STYLE

IsolSpace Style is the panel for acoustic correction by Isolmant. It is indicated for any type of environment thanks to its high sound-absorbing characteristics, its total non-toxicity, and the wide range of customizations. When surface mounted, it can absorb the sound waves within very noisy rooms. It is a panel made of 100% ISOLFIBTEC STL, a special recycled fibre of polyester for technical application whose density increases along the thickness, and characterized by a high acoustic performance. Thickness approx. 45 mm.



Sound absorption

IsolSpace Style has a high coefficient of acoustic absorption, thanks to its thickness with differentiated density that has been designed by the Isolmant R&D department to improve the acoustic qualities.

Absorption coefficient

Frequency Hz	125	250	500	1000	2000	4000
α_p	0.25	0.50	0.85	1.00	1.00	0.90

Weighted sound absorption coefficient $\alpha_w = 0.80$

Non toxic

The ISOLFIBTEC STL fibre is commonly used for domestic purposes. It is totally non-toxic and non-allergenic (as pile cloths, padding for pillows and duvets, toys for children.) It is a water-repellent fibre, which reduces the accumulation of dust or mites. It can be handled without any protection. The panel is thermo-bonded without any formaldehyde phenolic binders.

Not inflammable

IsolSpace Style, plain or printed, has the Euroclass B-s2, d0 certificate for reaction to fire. The tests carried out certify that IsolSpace Style is a combustible non-flammable material, and therefore it can be applied in any space, according to the provisions for fire prevention techniques.

Customized solutions

IsolSpace Style can be ordered black or white, produced in bulk or customized on the visible surface with prints, photos and solid colours. The standard sizes are rectangular or circular shaped, but different shapes and forms with curved profiles can also be implemented on request. The customization of colours



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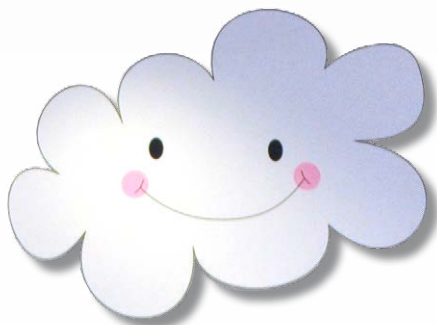
and shapes allows the integration into any environment, making it a nice piece of furniture.

Easy to install

IsolSpace Style can be applied to walls and ceilings, with baffle or island suspension or inserted in the appropriate aluminium frame.

Environment friendly

ISOLFIBTEC STL is 100% recycled from post-consumer material (recycled polyester from plastic bottles). It is therefore a low environmental impact material.



Variable density panel

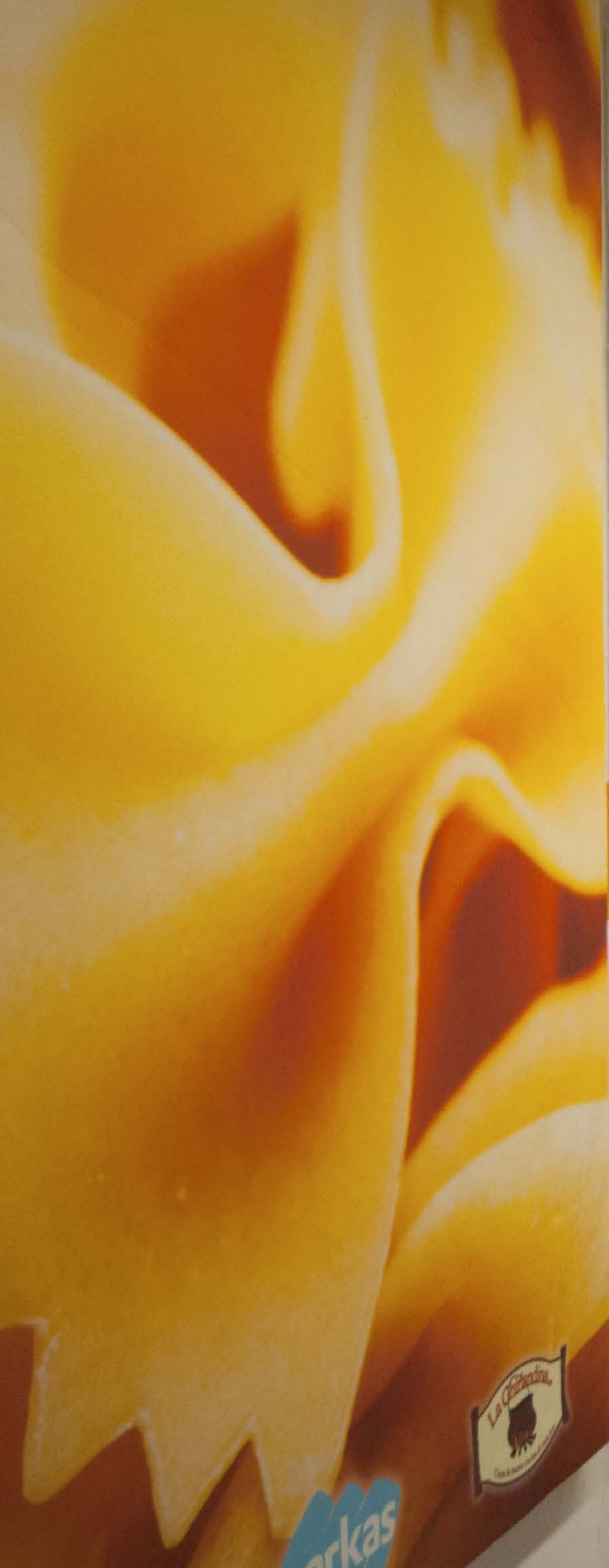
In terms of its morphological features, the IsolSpace Style panel is specially designed for high acoustic performance, maintaining low thickness and weight.

The unique characteristic of the panel is the variation of density along the thickness. The different compacting of the fibres is obtained directly during the production process, without changing the diameter of the fibres and without introducing other material. In this way, a panel with superior absorption characteristics at all frequencies is obtained. When compared to an analogous panel with constant density, it offers a significant improvement in particular at lower frequencies.



Standard size

Rectangular	Round
140x200 cm	diameter 125 cm
100x140 cm	diameter 85 cm
70x100 cm	diameter 65 cm
50x70 cm	diameter 45 cm





THE ROOMS

IsolSpace Style is conceived for the acoustic correction in any type of environment, public, professional or private. Its versatility allows to obtain excellent results to correct the reverberation and to improve the aesthetic of the room.



AREAS FOR CHILDREN

The pre-school stage is crucial for the development of the child's language, and it is evident that a disturbed sound environment can create major problems for everyone, especially when in contact with hearing impaired children.

Even before that real language grows, the child develops a social interaction made of composite sounds, giggles, shouts. Even the noise (generated by children crying, jumping and throwing of toys)

and music should be added to this type of communication. All this combines to make kindergartens full of noises and distractions that hinder a correct understanding of the words of the teacher. In this delicate phase of growth, it is essential to create sound environments that facilitate learning and do not disturb the baby in his daily activity, through good acoustic correction.



A photo of Peekaboo, a space for children in Milan. In spaces dedicated to children, all stimuli are designed to be “soft”. The colours are delicate and IsolSpace Style panels, designed to make also the sound environment “soft”, are perfectly integrated in the aesthetics of the room, offering additional colour harmony.



CLASS ROOMS

The school environment is undoubtedly one of the most sensitive in terms of acoustics, as provided by the limits imposed by law (Circular of the Ministry of Public Works no. 3150 of 22 May 1967 referenced by the Prime Ministerial Decree 5/12 /1997).

The reasons are clear: within the schoolrooms, and especially in classrooms, crucial moments for the growth of the individual, such as learning and the establishment of social relationships with peers and teachers take place. A non suitable acoustic environment, will not only affect everybody's health but also the learning ability of the students and the teachers' ability to concentrate.

Obviously, the problem is not just about compulsory education. Even in vocational schools or night courses, a good acoustic environment is essential for learning, especially in "hybrid" situations where the lesson are completed by laboratory or group work.

As for the classrooms, the limit imposed by the law on passive acoustic requirements is very specific and says that the reverberation time (T60) shall not exceed 1.2 seconds.



Classroom in the Centro Labor Transfer for Advanced Studies of Camorino (Switzerland). Here, custom printed IsolSpace Style panels were installed on classrooms and labs walls with Velcro, alternating white IsolSpace Style panels.



REFECTORIES

Within the school environment, canteens are among the noisiest and most chaotic rooms.

Students' voices are added to the sound of dishes, chairs being moved, noises coming from the kitchen. It all helps to create a chaotic and annoying sound environment.

While learning is not involved here, a good acoustic environment is critical not to create noise disturbance, to allow good speech intelligibility and to ensure enjoyable leisure moments.



The refurbishment of 'G. Rodari' school canteen in Maranello (MO). This building was renewed by applying large wall panels (140x200 cm) enriched by pictures provided by the client.





On this page, the gym of the Suore di Maria Consolatrice Institutes in Pavia. On the following page, the gym of Ricengo Kindergarten and Primary School, province of Cremona. In both refurbishments, the photos were chosen from IsolSpace Style's gallery, matching with the colours and the use of the rooms.

SCHOOL GYMS

A school gym, as well as a canteen, is one of the most problematic rooms concerning noise. This condition depends both on its architectural conformation (gyms usually have very high ceilings and large surfaces reflecting noise), and on the activities that usually take place there (e.g. running, ball

games or other sports that create impact on the floors, generating high levels of noise).

In a school gym the voices of the kids also overlap, forcing teachers to raise their voice to be heard. Such a situation is certainly unfavourable and creates confusion. It



can cause discomfort both to pupils and teachers, as well as making it difficult to normally carry out gym classes.

The Circular of the Ministry of Public Works No. 3150 of 22 May 1967 recalled by the Prime Ministerial Decree 5/12/1997

sets out the standards for school gyms by imposing a T60 reverberation time of 2.2 seconds.

OFFICES

Many modern offices are structured as open or semi open spaces. Undoubtedly this arrangement of the premises used for professional activities has positive aspects, because it facilitates the sharing of information and makes it easier to organise discussions and meetings. However, the noise that is generated in such a condition impacts on concentration and relationships, leading to less productive personnel.

As for instance, a small size open-plan office with few workstations, people talking on the phone and others engaged in a meeting. Not to mention wider open-space offices, such as call centres.

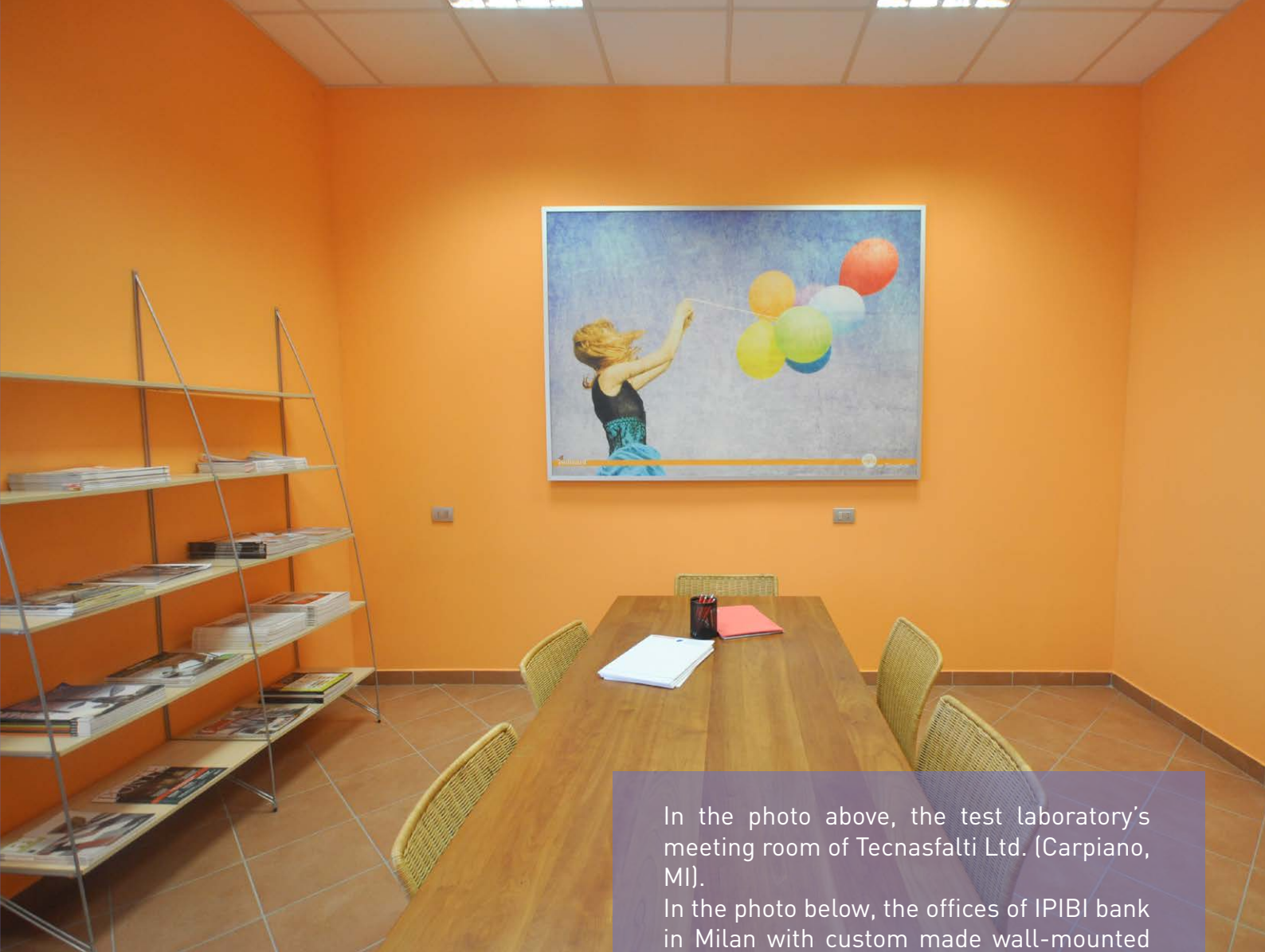
These rooms must necessarily be treated with sound absorbing products or the workplaces would become chaotic.

A properly treated sound environment is also needed in meeting rooms, in which many people often share reduced space and need to speak with a moderate tone of voice.

The same occurs in public offices, within which the communication between operators and users must also be taken into account. On the one hand, that means excessive noise and, on the other hand, the need to protect confidentiality by reducing reverberation.

Based on how offices are furnished or built, they can be refurbished in many different ways to integrate with the environment or with solutions that combine the effectiveness with an enhanced aesthetic value.





In the photo above, the test laboratory's meeting room of Tecnasfalti Ltd. (Carpiano, MI).

In the photo below, the offices of IPIBI bank in Milan with custom made wall-mounted IsolSpace Style panels and other solid colour panels installed by means of baffle system.





CONFERENCE ROOMS

The speakers in a conference room are forced to out of the ordinary concentration efforts: speaking in front of many people is challenging and their efforts increase as the audiences are very often particularly noisy, and the structure of the rooms is not conceived for that use.

The background buzz of voices that can arise for the participants' comments and chatter in a conference session, in addition to step noise during an open session, or the audio return caused by a non-professional Audio/Voice Conferencing systems, represents an annoying background noise, forcing the





Project implemented by Isolmant in the conference room of the Military Academy of Modena. The pictures printed on the IsolSpace Style panels were chosen by the customer to enhance the aesthetics of the walls while keeping the formal element of this kind of rooms.

speakers to raise their voice volume and use more concentration, as well as impacting on the participants' good understanding. This is a standard situation in which it becomes crucial to intervene on the reverberation time both from a professional point of view and for the health of those

who work in these spaces. Thus, it is important to intervene with professional acoustic correction solutions by detecting reverberation times and defining the exact surface of material needed to restore an optimal sound environment.

REHEARSAL STUDIOS

Silence is the “sine qua non” for those who make music. When realising a recording studio, it is very important to create a good insulation from airborne noise, but it is also important to treat the acoustic of the interior in the correct way.

If the environment is not well soundproofed, in fact, the performance could be affected, resulting in unprofessional conditions.

These spaces must be treated with caution because the acoustic component is always the main feature to be ensured. The environment itself becomes a tool and, as such, it must be “tuned” in harmony with all the other tools, depending on the type of music being played and the kind of result to achieve.

Inside a recording studio, the sound frequency must be as uniform as possible, in order not to excessively “colour” the reproduced sound waves.

In addition, these spaces need a proper percentage of sound absorption and diffusion to control the sound in the room and make it smooth all around the room.

The required reverberation time must be very low (around 0.2 seconds).

In such rooms, the acoustic correction should be carried out according to scientific standards.





A recording studio in Sassuolo with the combined use of three types of products: Black IsolSpace Sky on the ceilings, printed IsolSpace Style and grey Isolmant Perfetto TR on the walls.



RESTAURANTS

The restaurant is a place for pleasure and relax to share with our friends and relatives. Talking about the acoustic environment, restaurants have the most varied and heterogeneous background noise: people talking, dishes that make noise, footsteps, moving chairs, phones ringing, and sometimes also background music.

In such a condition, what should be a relaxing moment turns into a discomfort that affects the overall opinion on that restaurant itself.

The acoustic correction of restaurants is a very interesting area of intervention as the aesthetic concept is as important as sound absorption.

The versatility of IsolSpace Style, together with the custom oriented approach to realize an assortment of prints and shapes, is a unique value.



Some photos of the Trattoria Casale Mariposa in Parma. This typical Sardinian restaurant was refurbished by installing IsolSpace Style and its rooms are now quieter and more comfortable. In addition, the trait of a traditional restaurant was enhanced.



In the following photo, the gym room of Tecnasfalti srl (Carpiano, MI). On the next page, a detail of IsolSpace installed in a gym of Monasterolo di Savigliano (CN)



GYMS

Whether it is a private or a public gym, large or small, lodge for teenager soccer teams or for adults who practice martial arts, the gym is a particularly noisy environment, in which the reverberation is enhanced by the structure of the building: large rooms, high ceilings and highly reflective surfaces. A good acoustic correction is the ideal to comfortably

practice sport. That is valid both for those who work in a gym (gymnastic teachers, personal trainer, etc), and for professional athletes.





OTHER INSTALLATIONS

Many environments may require acoustic correction for their architectural conformation or intended use. Churches, for instance, normally have a high reverberation: an effect that may be suggestive for the persistence of sound in the environment but at the same time can be annoying and not very suitable for a place of worship, where silence should reign.

Acoustic correction may be required and useful in many environments, with very different intended use: from grooming

salons for dogs (which are now becoming real day care as many animals remain there together for several hours) to shops, where many people commonly remain talking to each other.

Isolmant and its acoustic correction products' versatility allows to intervene in any situation, analysing existing situations, calculating reverberation times and offering optimal solutions for an effective and custom correction.



Some examples of public places where acoustic correction may be required



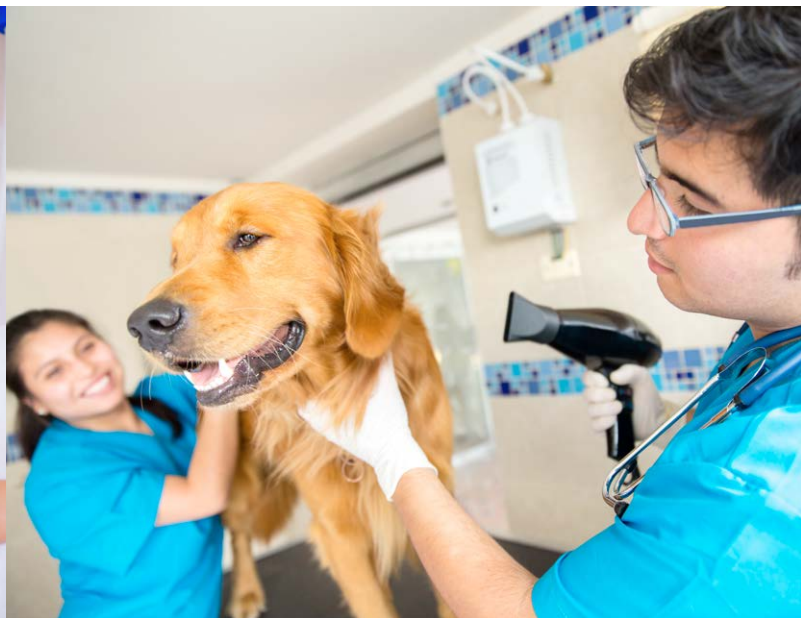
Shops



Hairdressing salons



Beauty salons



Pet grooming salons



Churches



Waiting rooms

Case history

IPIBI BANK, MILAN

The IPIBI's offices were refurbished by installing IsolSpace Style panels with horizontal and vertical baffle system. This procedure was set to create solutions that are flexible and adaptable to the different spatial configurations of a dynamic space. The horizontal baffle system limits the propagation of noise among the workstations since the panels act as sound absorbing suspended screens that reduce sound reflections on the ceiling. Wall panels limit noise reflections on longer distances and control the general reverberations of the room.

The use of frames for wall panels represents an additional aesthetic and decorative element together with professional and suggestive pictures.

Two offices were acoustically treated: in the first one approx. 8 m² of IsolSpace Style were installed by horizontal baffle system and approx. 4 m² by vertical baffle system. The second office was treated with approx. 12 m² of IsolSpace Style installed by horizontal baffle system and approx. 2 m² by the vertical one.

Such a design has reduced the reverberation time by about 30% compared to the baseline situation, thus improving

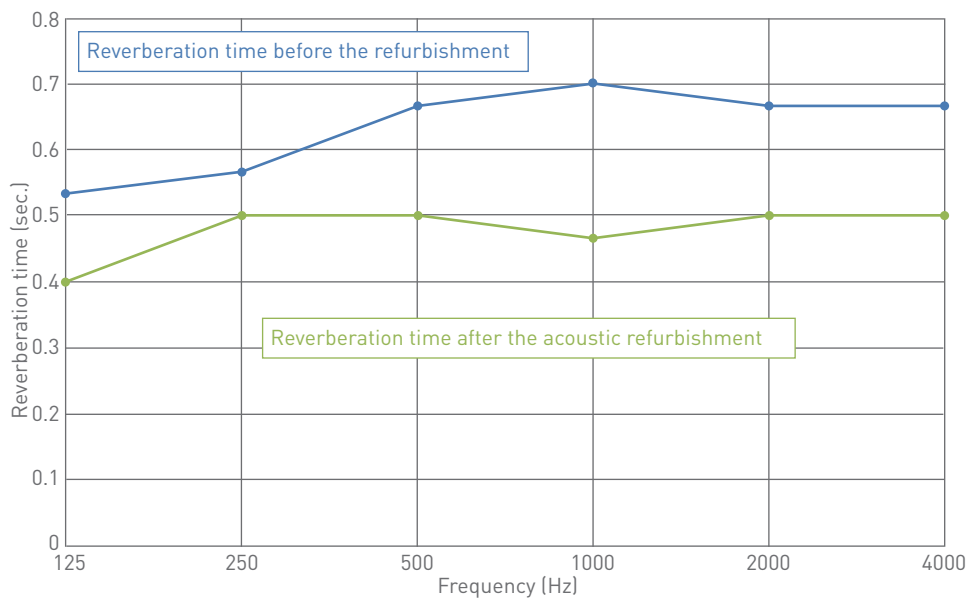
the intelligibility of speech, and facilitating interpersonal communication as well as information exchange and the creation of more acoustically protected operational areas.

The measurements carried out during the intervention have revealed a significant improvement of reverberation times, in particular in the most critical frequency spectrum for office rooms, that means the middle and upper frequency bands that characterise speech.



Office 1

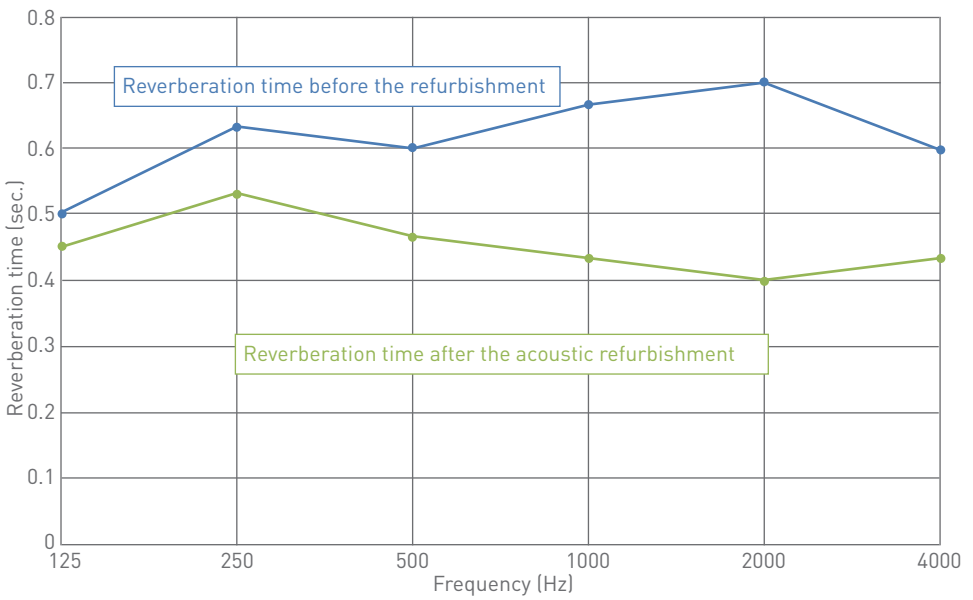
Comparison between
reverberation times before and
after the acoustic
refurbishment



T60	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	average 250-2000 Hz
T60 before refurbishment	0.5	0.6	0.7	0.7	0.7	0.7	0.7
T60 after refurbishment	0.4	0.5	0.5	0.5	0.5	0.5	0.5

Office 2

Comparison between
reverberation times before and
after the acoustic
refurbishment



T60	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	average 250-2000 Hz
T60 before refurbishment	0.5	0.6	0.6	0.7	0.7	0.6	0.7
T60 after refurbishment	0.5	0.5	0.5	0.4	0.4	0.4	0.5

Case history

THE MARCELLINE TOMMASEO INSTITUTE

The Tommaseo is a historic building in the centre of Milan, used as a school centre. The intervention was done in the refectory, which is a three-aisle room with frescoed vaults and smooth surfaces. These features of the room favour the reverberation of human voices that becomes extremely noisy during lunch break, with the presence of many students. The architectural features of the room meant that the initial reverberation time was excessively high.

Moreover this refectory is subject to the supervision of the Cultural Heritage. Therefore the intervention was conceived with particular care to be as less invasive as possible and obtain a technically effective solution that was also completely reversible, so that the figurative consistency of the room and the morphological, architectural and symbolic feature of the refectory could be preserved. The quantity of sound-absorbing panels and their laying system were evaluated by taking into account the space available for the application of the panels within the room.

The panels are housed in recesses in the walls and suspended by means of horizontally extended steel cables or fixed with Velcro bands along the walls, also allowing to conceal room installations.

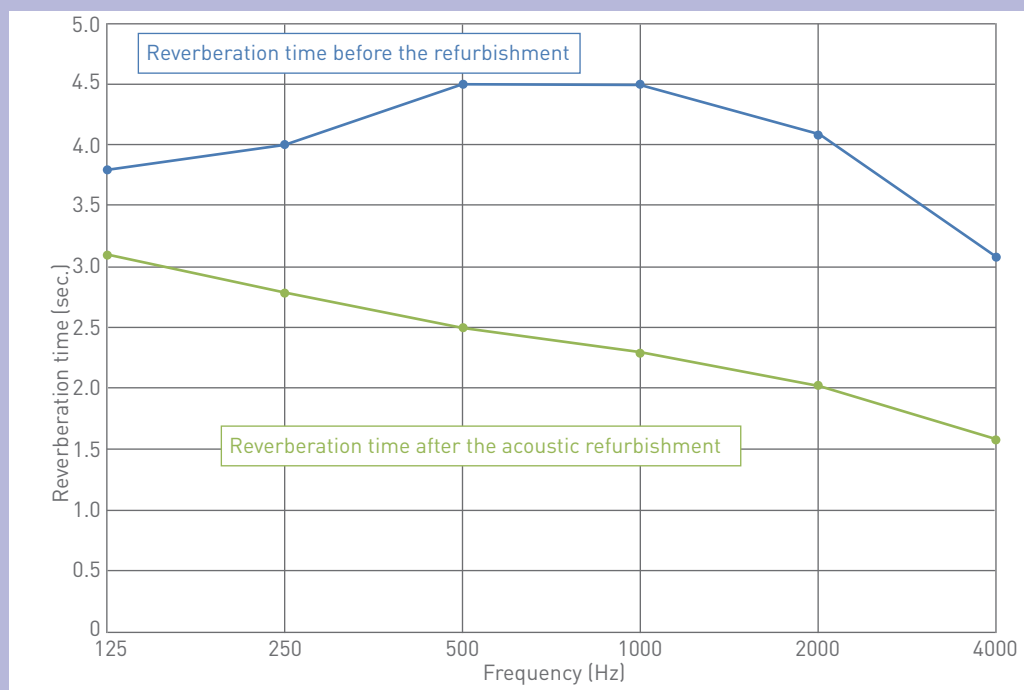
Concerning the sustainability of maintenance interventions on a building bounded for historical interest, these can be frequently carried out, as panels are completely removable and minimize damage in the event of disposal.

Approximately 38 m² of IsolSpace Style panels have been installed on the walls.

The measurements carried out after the intervention revealed a significant improvement of reverberation times at around 44% by installing IsolSpace Style. In particular, the greater improvement came on medium-high frequencies, typical of speech, reaching a peak of 51% at 2000 Hz, the most annoying frequency for human hearing. A considerable improvement is also found at medium-low frequencies, the most acoustically difficult to correct.



Comparison between
reverberation times before
and after the acoustic
refurbishment



T60	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	average 250-2000 Hz
T60 before refurbishment	3.8	4.0	4.5	4.5	4.1	3.1	4.3
T60 after refurbishment	3.1	2.8	2.5	2.3	2.0	1.6	2.4



Post-refurbishment photos of the refectory: IsolSpace Style panels blends in perfectly with the aesthetics of the room and are almost invisible.



Fixing systems of panels' support cables

ACCESSORIES



Velcro

Self adhesive Velcro for IsolSpace Style panels' for wall or ceiling installation. It comes in rolls of 25 m length and 5 cm thickness.



Frame

Aluminium frame to install IsolSpace Style wall panels. It comes to be assembled with the appropriate kit. Section 45 x 25 mm. Available in satin silver and matt black.



Baffle suspension system kit

Each kit comprises:

- n. 2 galvanised steel cables with loop length 2 m, diameter 1.5 mm
- n. 2 style hooks

The kit comes mounted on the panel. One kit is required for each panel.



Islands suspension system kit

Each kit comprises:

- n. 1 galvanised steel cable 2 m length and 1.5 mm diameter with loop
- n. 1 coiled steel hook

The kit does not come installed on the panel. The number of kits for a panel is in relation to the size of the panel itself.



Ceiling brackets

Ceiling bracket for the cable, with automatic tensioning system that comes with screws and dowels.

For island or baffle installation systems.



OTHER SOUND ABSORBERS

One of the most common technical solutions for the acoustic correction of the reverberation time is the installation of a ceiling system. By just reducing the volume of the room it is possible to achieve an improved inside sound quality. It is possible to solve the problem by substituting the traditional squares that are placed on the metal framework with sound-absorbing material.

IsolSpace Sky

IsolSpace Sky is a product specially developed for the acoustic correction, made in a format that makes it ideal for application inside the ceiling metal framework instead of square-shaped plasterboard. IsolSpace Sky is made of the same fibre of IsolSpace Style: the ISOLFIBTEC STL, a special recycled fibre of polyester for technical application whose density increases along the thickness. This fibre has high thermal and acoustic performance, and unlimited duration. Moreover it is non-toxic and eco-friendly.

IsolSpace Sky is available in a thickness of 20 mm and in white and black, for an aesthetic effect that can be customized according to personal taste and room colours.

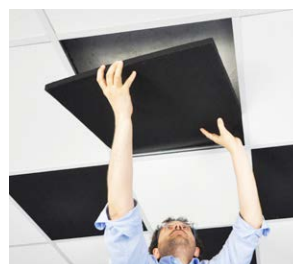
Absorption coefficient

Frequency Hz	125	250	500	1000	2000	4000
α_p	0.20	0.45	0.55	0.50	0.60	0.65

Noise Reduction Coefficient NRC = 0.55

Easy to install

IsolSpace Sky is easy to install and can easily substitute plasterboard squares without being fixed to the structure.



INSTALLATION INSTRUCTIONS

Laying in adherence

The installation can be carried out on the wall or ceiling and in different ways: glue, Velcro or frame.

If glued IsolSpace Style panels cannot be repositioned, while using Velcro or frames, panels may be repositioned at a later time without suffering any type of damage.

INSTALLATION WITH GLUE

1. It is recommended to use a gypsum-based glue like Knauf Perlfix or similar. This product allows not to change the Reaction to fire Class of the panel. Before proceeding with the gluing, check that support and application surface are suitable.

2. Surfaces must be stable, clean and free of dust, grease or debris.

3. Prepare the gypsum-based glue according to the manufacturer's specifications to achieve a semi-fluid consistency.

4. Carry out a preliminary test (both on wall and ceiling) to determine the optimum quantity of water in the mixture as well as the relative setting times.

5. Apply the glue on the supporting surface with a 8 mm toothed trowel on an area equivalent to that of the IsolSpace Style panel.

6. Apply the panel and press carefully to ensure good adhesion to the substrate.

7. Hold in place for the time necessary to guarantee the panel to keep the position (for the ceiling approximately 30-60 seconds of pressure are needed).

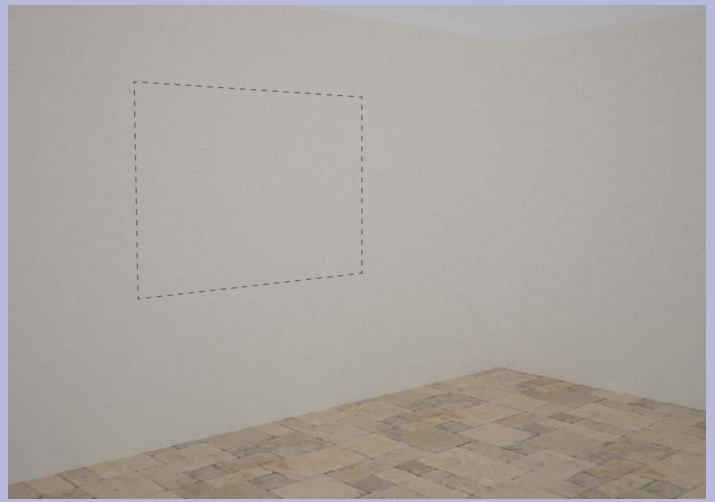
Only smaller sizes can be installed on the ceiling (50x70 cm, 70x100 cm, 100x140 cm).



INSTALLATION WITH GLUE

STEP 1

Trace the position where the panel will be laid on the wall/ceiling



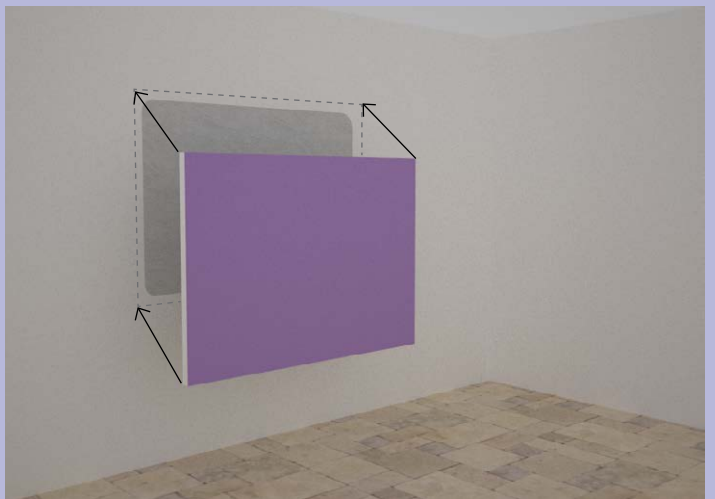
STEP 2

Lay the gypsum-based glue on the wall/ceiling area identified leaving a margin of approx. 5 cm



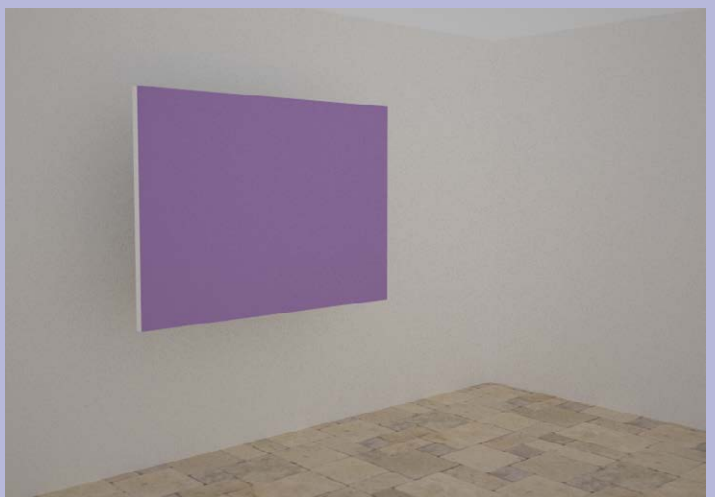
STEP 3

Apply the panel and press carefully to ensure good adhesion to the substrate



STEP 4

Hold in place for the time necessary to guarantee the panel to keep the position



INSTALLATION INSTRUCTIONS

VELCRO SUSPENSION SYSTEM

This installation system allows to place IsolSpace Style panels also successively and on different materials. Velcro has an adhesive side, however it is recommended to fasten the Velcro strips on the walls also with tacks or staples. This solution is recommended especially on very smooth walls for a tight installation of the Velcro on the wall. The Velcro system depends on the size of the panel and the mounting surface (wall or ceiling). Velcro to IsolSpace Style panel ratio:

Size	Velcro Qty	
	ceiling	wall
50x70 cm	1.6 m	1.6 m
70x100 cm	3,1 m	2.6 m
100x140 cm	5.6 m	4.8 m
140x200 cm	NO	7.8 m

FRAME SUSPENSION SYSTEM

For an even more refined aesthetic effect IsolSpace Style can be hung on the wall after being inserted in a dedicated frame. Although this method of installation allows reinstalling the panels successively and in different ways.



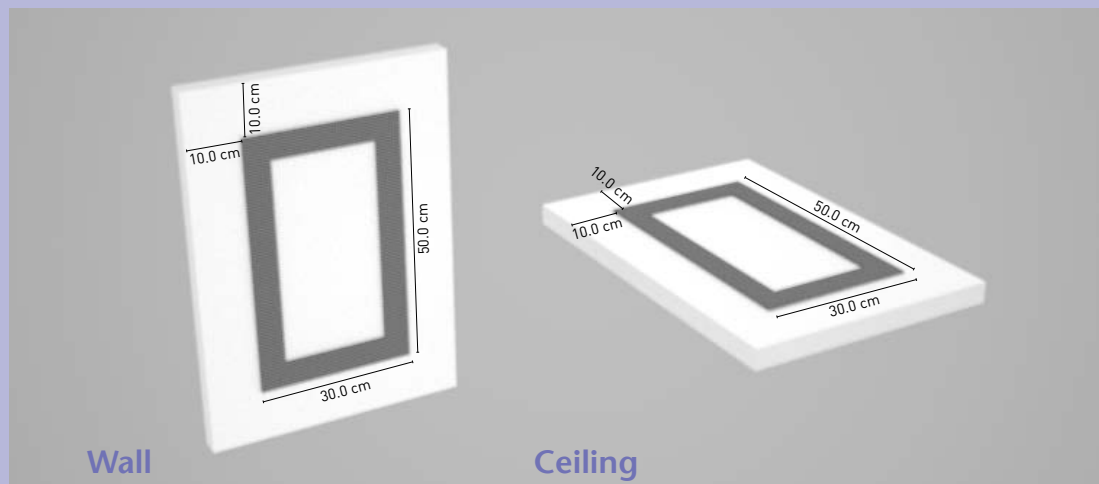
Velcro



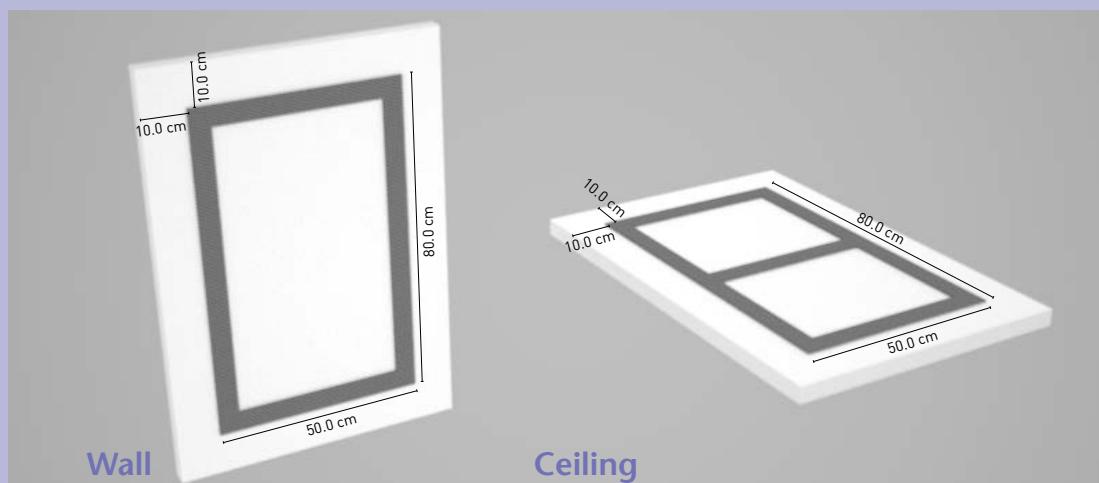
Frame



Size 50x70 cm

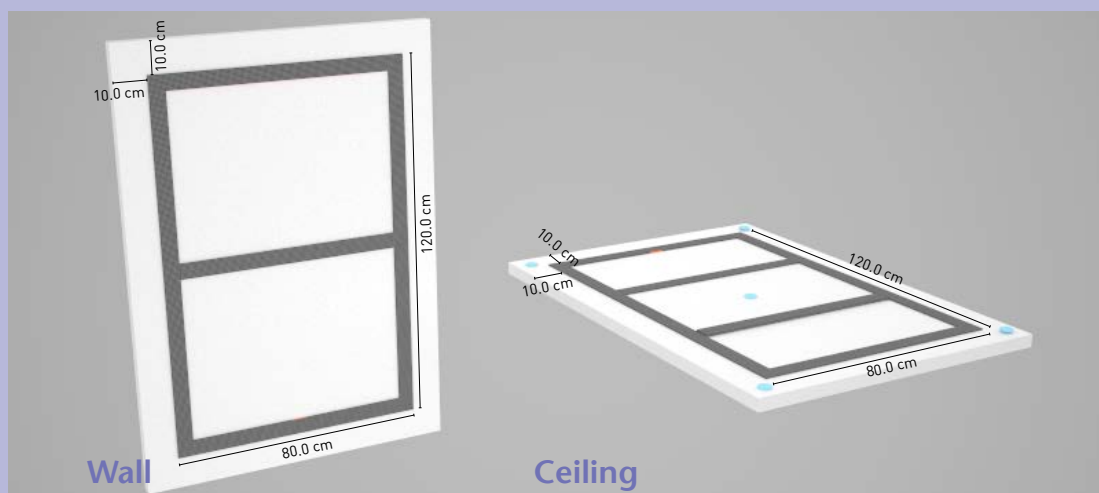


Size 70x100 cm



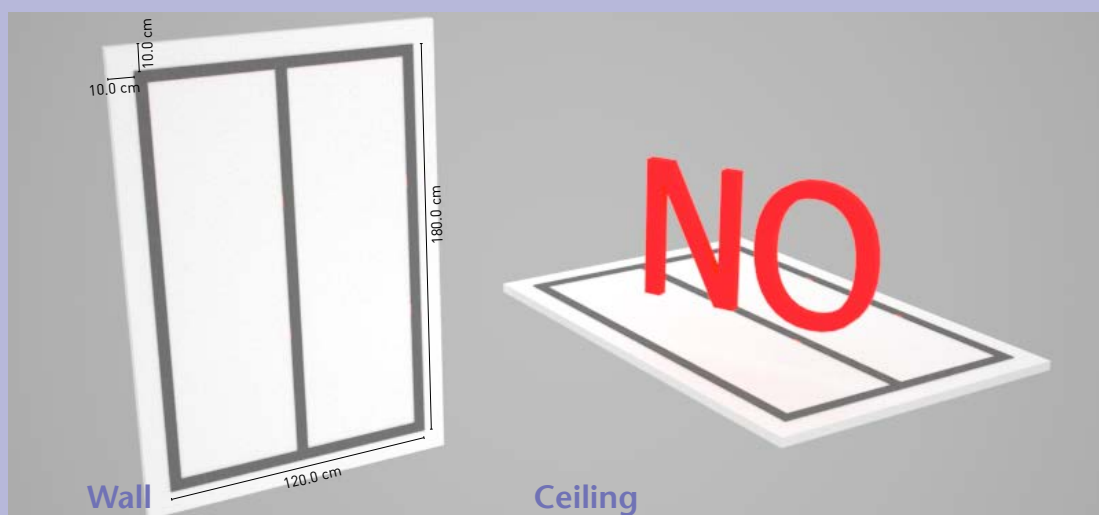
Size 100x140 cm

To install 100x140 cm panels on ceiling, Velcro and 5 silicones applications are required (centre and corners)



Size 140x200 cm

For 140x200 cm panels the Velcro installation system is not recommended ceiling installation



INSTALLATION INSTRUCTIONS

Suspended installation

This installation system consists of a baffle suspension for vertically suspended panels, and an island suspension for horizontally suspended panels. Both solutions require dedicated installation kits.

BAFFLE SUSPENSION SYSTEM

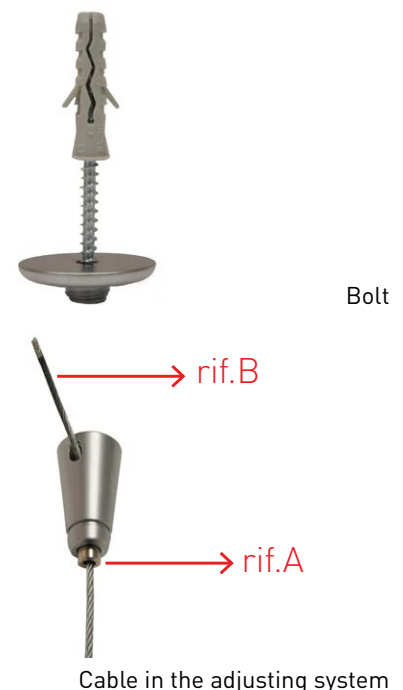
This system allows to place IsoSpace Style panels vertically and perpendicular to the ceiling by means of the Baffle suspension system kit. This kit (upon request) comes already mounted on the panel. One kit is required for each panel, while two brackets should be added (always on request) for each kit. It is possible to install standard or customized panels along both the long and the short sides. The baffle system may also be used in case of false ceiling.

1. Tighten the ceiling bolts to the frame as shown in the picture and the table on the next page.
2. Insert the cables into the adjusting systems by inserting the end of the cable into the pin at the base of the adjusting system, then make the cable slide to the side hole.
3. Adjust the length of the cables according

to the desired distance between ceiling and baffle: by applying finger pressure on the pin at the base of the adjusting system (ref.A), the cable can slide to the desired length; by releasing the pin, the clamp locks the cable in position.

4. Trim the exceeding part using wire cutters (ref.B).

5. Tighten the adjusting systems to the bolts on the ceiling and hang the panel.





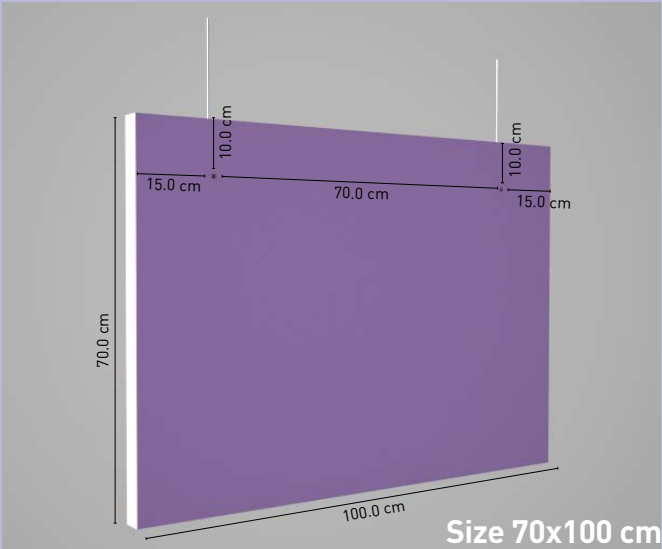
Example of baffle suspension system



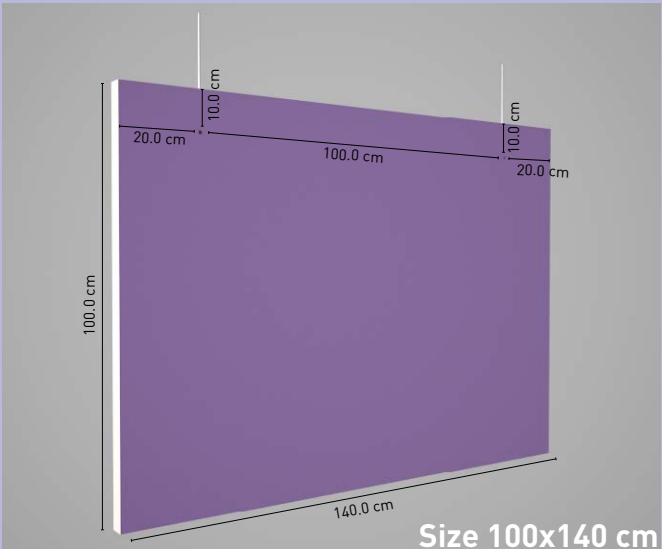
Kit for baffle suspension system



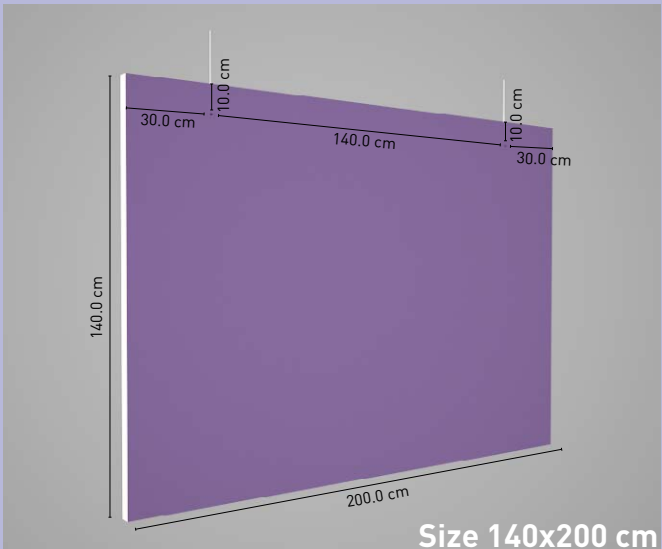
Apply bolts every 50 cm along the supports



Apply bolts every 70 cm along the supports



Apply bolts every 100 cm along the supports



Apply bolts every 140 cm along the supports

Distance between brackets

	50x70 cm	70x100 cm	100x140 cm	140x200 cm
Horizontal baffles	50 cm	70 cm	100 cm	140 cm
Vertical baffles	30 cm	40 cm	60 cm	80 cm

INSTALLATION SYSTEMS

ISLAND SUSPENSION SYSTEM

This system allows to place IsolSpace Style panels horizontally. The panels can be parallel or inclined to the ceiling by means of the Islands suspension system kit. The number of kits for panel depends on the size of the panel itself and is not supplied already mounted on the panel. For each kit one ceiling bracket is added.

The island suspension system can also be used in case of false ceiling.

1. Tighten the brackets to the ceiling by means of an automatic tensioning system (the number of kits needed and of fixing points is specified in the pictures and in the table on the following page). For an accurate installation, it is recommended to create a template using the package paper-board by marking the anchor points as reference for both the back of the panel and the ceiling. In this way it will be possible to fix a perfect match between the bracket points on the ceiling and the locking points on the panel.

2. Tighten the spiral anchors on the back of the panel (not smoothed and printed side).

3. Enter the galvanized steel cable slot in the spiral hook and insert the other end in the fixing points.

4. Adjust the cable length according to the desired distance between panel and ceiling: by applying finger pressure on the pin at the base of the controller, the cable can slide to the desired length; by releasing the pin, the clamp locks the cable in position.

5. Trim the exceeding cable with wire cutters.

Watch our installation tutorials



Download our technical manuals for more details about installation

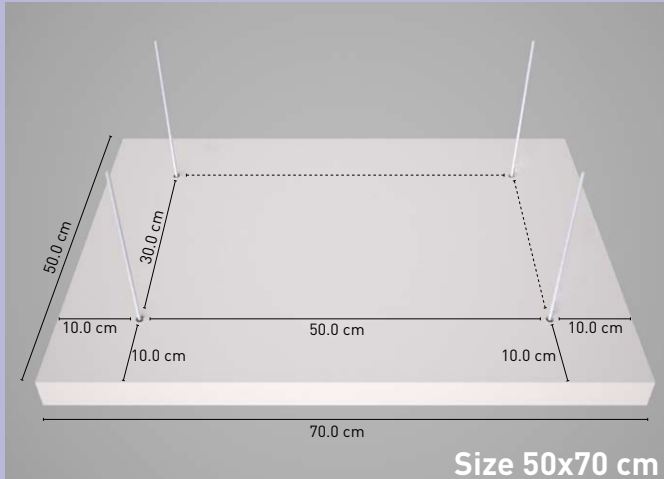




Example of island suspension system

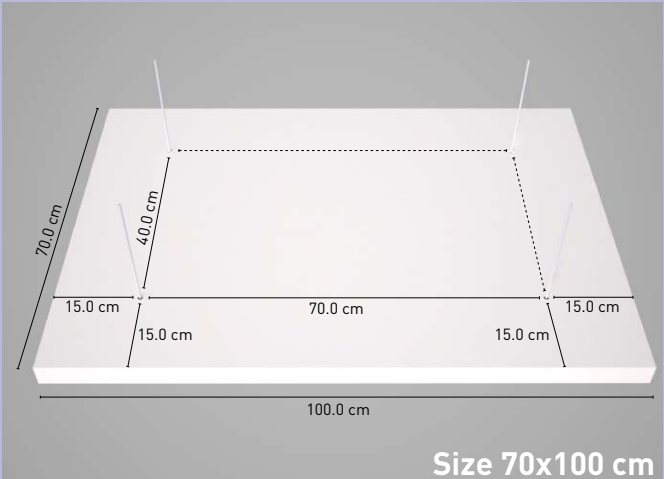


Kit for island suspension



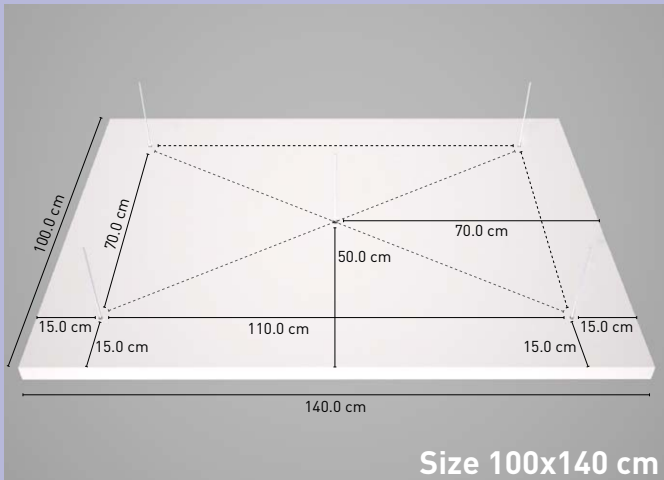
Size 50x70 cm

4 kits for island system should be laid as shown



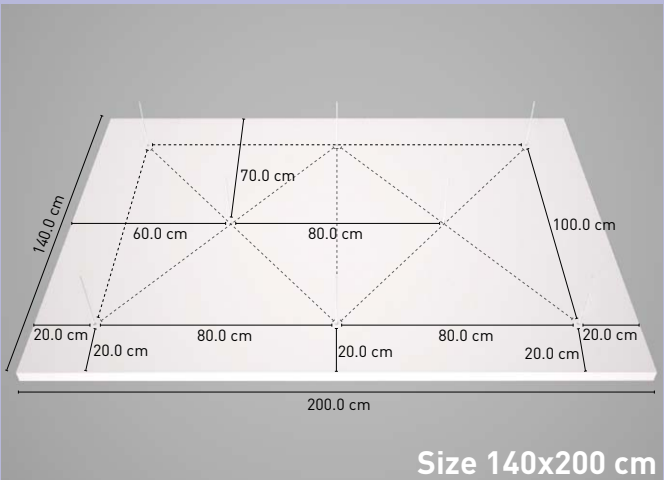
Size 70x100 cm

4 kits for island system should be laid as shown



Size 100x140 cm

5 kits for island system should be laid as shown



Size 140x200 cm

8 kits for island system should be laid as shown

	50x70 cm	70x100 cm	100x140 cm	140x200 cm
Required kits	4	4	5	8
Space between brackets - long	50 cm	70 cm	110 cm	80 cm (3 brackets)
Space between brackets - short	30 cm	40 cm	70 cm	100 cm
Further brackets	-	-	1 bracket at the centre of the panel	2 brackets along the centre line of the long side of the panel, evenly spaced with respect to the others

Kits and relevant arrangement

isol**space**



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