Life is better without noise.

The Acoustic Comfort Classes.

How much noise can you stand?

We live in a noisy world.

All around the world, the general level of noise has now reached an alarmingly high level. Exposed to this soundtrack of modern life day and night, we can quickly reach the limit of our endurance. Today, protecting ourselves from noise definitely helps to improve our mental and physical well-being. It is a well-known fact that noise pollution not only makes relaxation more difficult, it also causes physical stress and even pain and thus poses a serious risk to our health.

To achieve maximum sound insulation, even in the most difficult environments, ISOVER – the world's leading manufacturer of insulation systems – has developed acoustic comfort classes which significantly exceed the current sound insulation standards applied in European countries.

By offering insulation solutions designed for both new buildings and renovation projects, ISOVER helps you to block out unwanted noise so you can enjoy the much-desired peace and quiet of your home.

Sound in mind and body?

Whether in the office or at home: noisy environments are the most common source of disturbance. Even while asleep, every third European is disturbed by noise – and thus prevented from getting the necessary rest and relaxation which is so essential for health. This severe lack of quietness not only causes psychological stress, but can also result in actual bodily harm, with effects ranging from elevated blood pressure and hearing defects to heart attacks. It's therefore high time to reduce the noise level. ISOVER offers you the acoustic comfort classes, insulation materials and systems which, at last, will give you back your peace and quiet.

Contents

The noise factor.

- 80 *million EU citizens are exposed to noise.*
- *Result of this negative health impact: EU GDP is reduced by an estimated* 0.2 *to* 2 *%.*
- *Annual follow-up costs: way in excess of* 12 *billion euros.*

Data: European Noise Policy. Strategy Paper of the CALM Network (DG Research of the European Commission – July 2002). European Union: Green Paper on Future Noise Policy (1996).

Negative impact of noise

Due to the changes that have taken place in society over recent years, the level of noise has gradually increased all over the world. Increased traffic noise due to more planes and vehicles, wider spread ownership of appliances like washing machines and dish washers, computers and multimedia systems such as home theatre, all contribute to increased noise. Under these circumstances the negative effects of noise exposure are even more pronounced. It is estimated that 17 % of the European population is exposed to unacceptably high noise levels, which lead to sleep disturbance and other adverse health effects. Another 170 million people are living in areas with a noise level of 55 dB-65 dB (A), so called 'grey areas', where noise seriously affects their well being.

Data: European Noise Policy. Strategy Paper of the CALM Network (DG Research of the European Commission – July 2002). European Union: Green Paper on Future Noise Policy (1996).

Adverse effects of noise

Excessive noise is a barrier to human well-being and comfort. Noise diminishes the quality of sleep, produces adverse health effects and causes ongoing stress in communication and concentration.

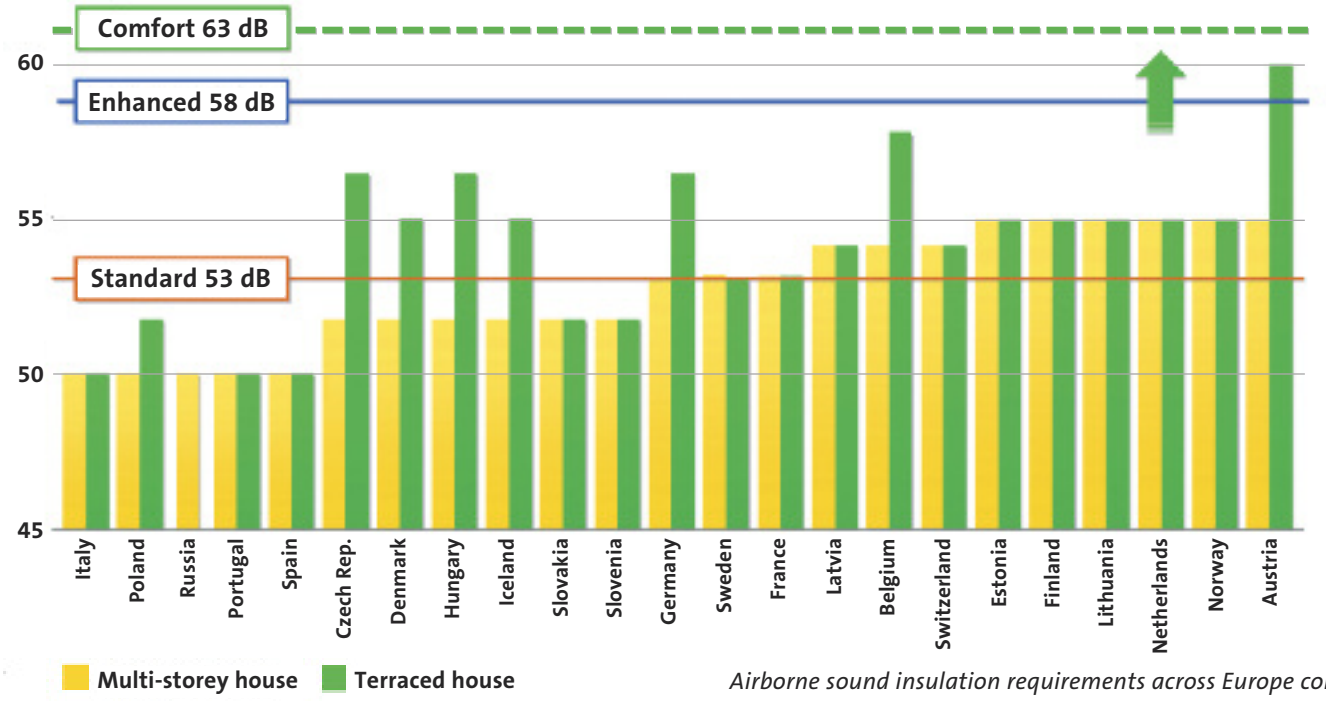
The negative effects of noise are well known:
- increased blood pressure
- mental stress
- heart attacks
- hearing damage
- Harm to the foetus during pregnancy

Based on extensive research and expert opinion ISOVER has developed the Acoustic Comfort Classes, setting new models for sound insulation in order to provide an optimal level of comfort for residential buildings.

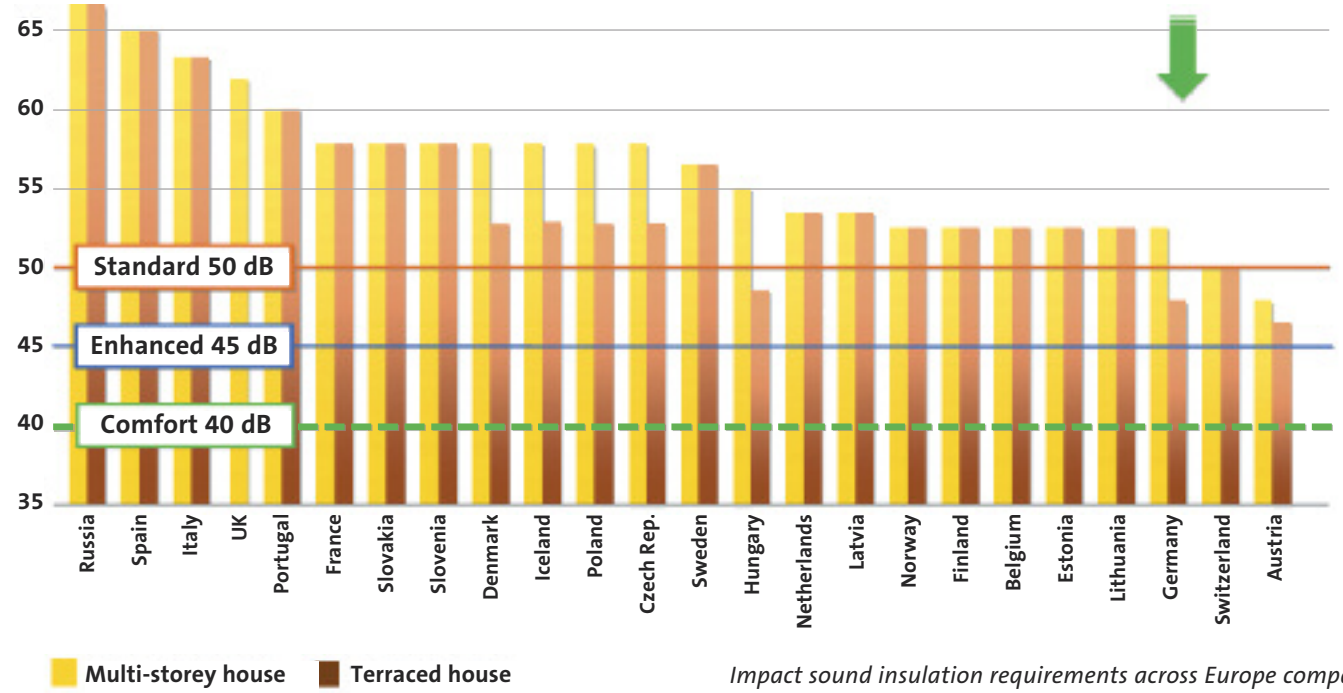
Sound insulation requirements across Europe

Although noise has increased constantly, the requirements for sound protection across European countries haven't kept pace. In the case of residential buildings, the actual requirements for sound insulation in both terraced houses and multi-storey houses, no longer match the level of comfort people now expect. A study at Vienna Technical University showed that in the case of both airborne sound insulation and impact sound insulation regulations for buildings, there is significant potential for improvement across Europe.

Noise can produce adverse health effects.

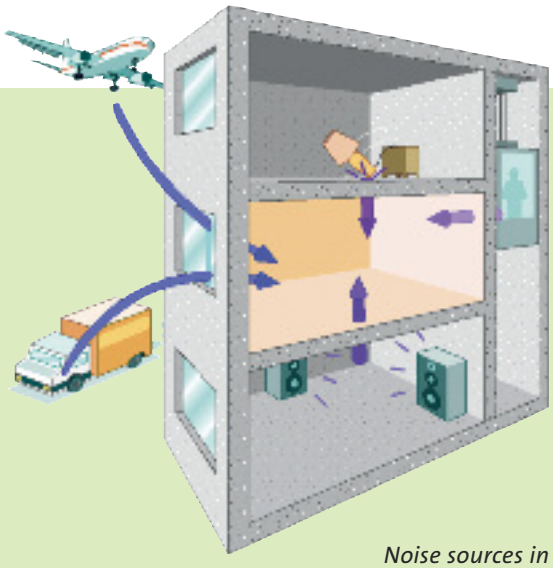


Airborne sound insulation requirements across Europe compared to Acoustic Comfort Classes. The higher the values, the better the acoustic comfort.



Impact sound insulation requirements across Europe compared to Acoustic Comfort Classes. The lower the values, the better the acoustic comfort.

Under constant attack – a multitude of noise sources



Noise sources in a multi-storey building.

There are several types of noise that have to be taken into consideration when planning sound protection. Noise has different intensities and is transmitted in different ways

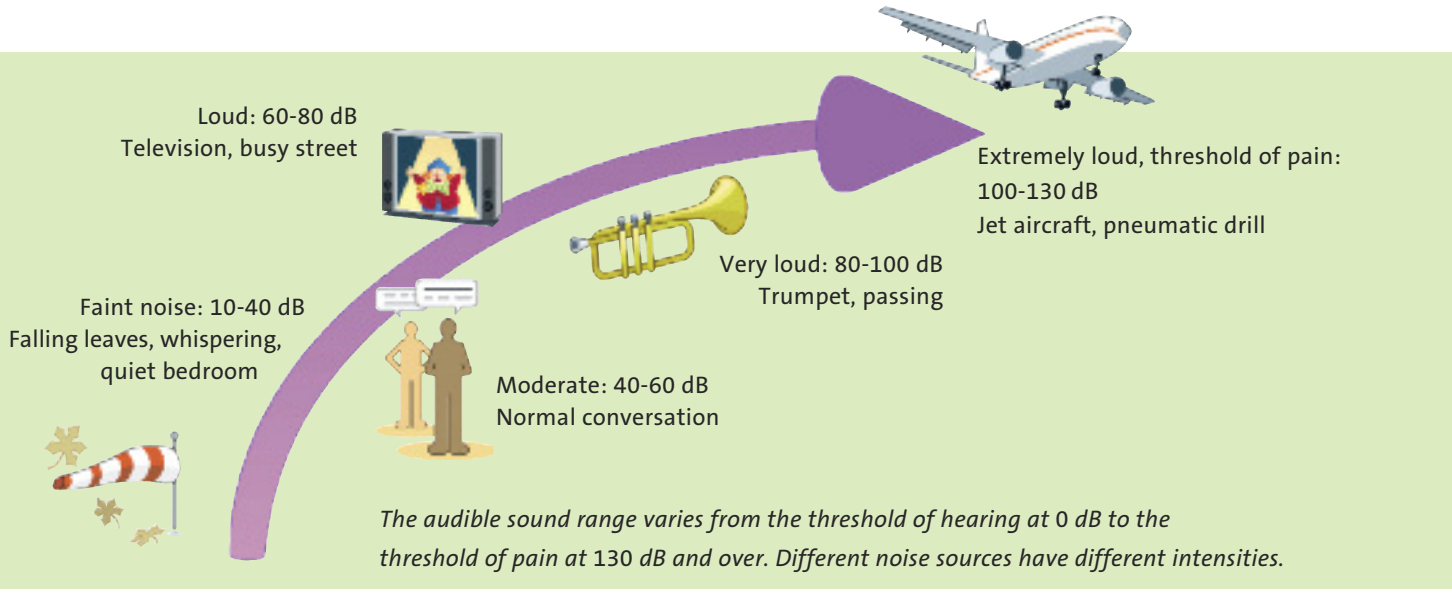
- Exterior noise
- Airborne noise inside the building
- Structure-borne noise
- Noise from technical equipment

Exterior noise

Exterior noise is primarily transmitted through air. Traffic is the main source of this type of noise. Road noise, generated by all kinds of vehicles (cars, buses or trams) and aircraft noise are the most important components of exterior noise. The level of exterior noise has increased significantly due to growth in both road vehicle numbers and active flight routes.

Airborne noise inside the building

Airborne noise is a combination of noise generated within a particular space and noise transmitted from adjoining spaces. TV and home theatre sets, Hi-fi devices and loud conversations all contribute to the level of noise inside the building. With changes in people's behavior in recent years (growth in multiple TV ownership and computers with advanced sound reproduction systems) the level of noise inside buildings is much higher today than 20-30 years ago.



The audible sound range varies from the threshold of hearing at 0 *dB to the threshold of pain at* 130 *dB and over. Different noise sources have different intensities.*

Structure-borne noise

This occurs when there is an impact between two hard surfaces: a footstep or a falling object hitting the floor. This type of noise is transmitted via the solid structure of the building and can therefore be easily heard over long distances – for example, during the night the noise produced by an elevator door slamming at the top level can also be heard at ground level.

Noise from technical equipment

This noise is generated by a wide variety of equipment and can be both airborne or impact noise. HVAC systems and other equipment produce airborne noise, while a poorly insulated elevator motor can cause vibration which is then transmitted through the structure.

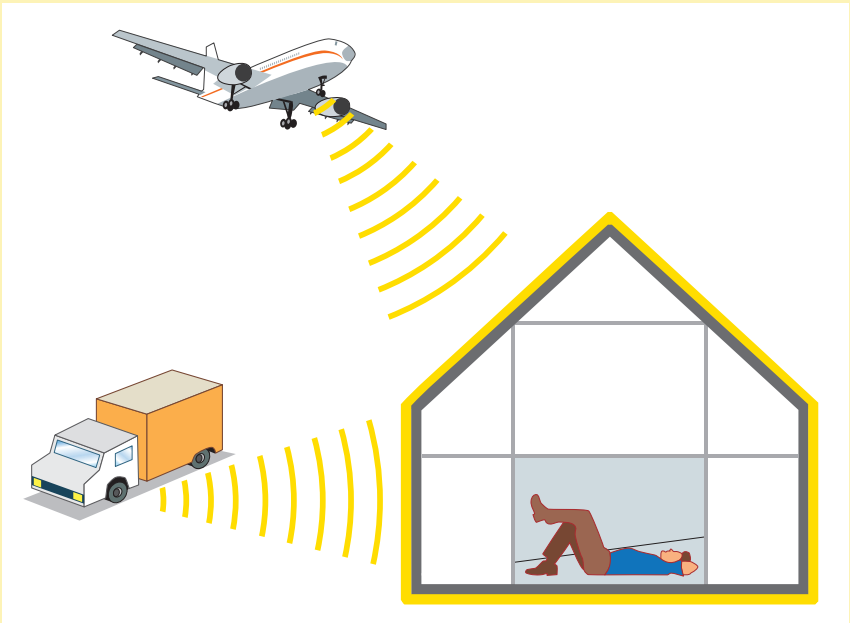
How to block out noise: the blueprint for acoustic comfort.

Only sound insulation that has been planned for and integrated into the structure at the earliest design stage can be expected to achieve maximum effect. In attempting to control noise, we must address every detail that can influence the noise level in a positive way. Good planning takes a wide range of factors into account.

Planning the building layout

It always pays to consider sound insulation at the earliest design stage, before internal layout is finalised. Consider measures such as:

- Avoiding common walls between stairs and bedrooms
- Positioning rooms that need to be quiet away from sound sources
- Inserting buffer spaces (e.g. corridors) between noisy and quiet rooms
- Avoiding common walls between bedrooms and a neighbour's bathroom

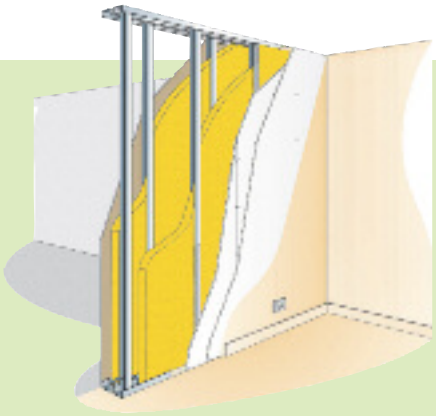


Building envelope

In order to block out environmental noise the envelope must be effectively sound insulated. It is important to use efficient solutions for each component of the building envelope as the overall insulation performance depends on the area weighted average sound insulation.

Interior partition walls

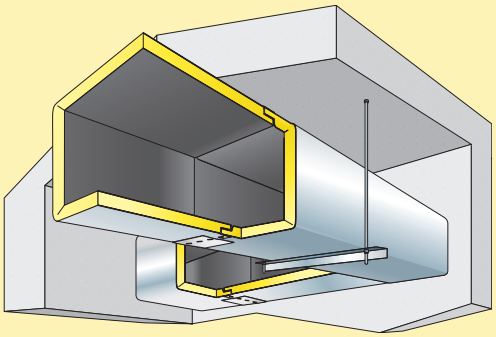
Carefully designed internal walls, floors and ceilings prevent noise transmission within the building. An efficient and carefully installed sound insulation solution will protect against noise over the entire life time of the building.



Partition wall between two rooms. By fully filling the cavity with mineral wool you obtain the best and safest acoustic result

HVAC Systems

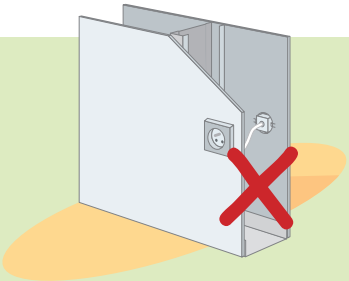
In the relatively short phase of construction planning special attention must be paid to the heating and ventilation system. By using ducts made of reinforced mineral wool, such as ISOVER CLIMAVER or by insulating the metal ducts with mineral wool, sound comfort can be significantly improved.



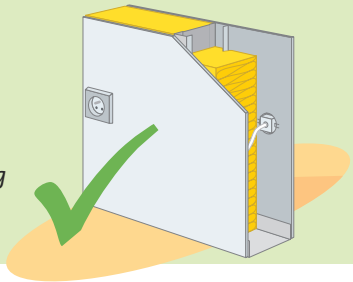
CLIMAVER products are produced from faced mineral wool boards, specially designed for noise reduction.

Avoiding acoustic bridges

It is often small details that make the difference. Sound bridges drastically reduce the efficiency of acoustic insulation. By placing electrical sockets in two adjoining rooms back to back, the total airborne sound insulation will decrease significantly.



Wrong installation – creating an acoustic bridge.



Correct installation – avoiding acoustic bridge formation.

The Acoustic Comfort Classes: Reliably defining acoustic comfort.

Acoustic Comfort Classes

Class	Music	Comfort	Enhanced	EU average
Airborne sound insulation between living units $D_{nT,w}$ + C (dB)	≥ 68 ($C_{50\text{-}3150}$)	≥ 63	≥ 58	≥ 53
Impact sound insulation between living units $L'_{nT,w}$ + C_I (dB)	≤ 40	≤ 40	≤ 45	≤ 50

Between living units

Class	Music	Comfort	Enhanced	EU average
Airborne sound insulation of partitions (without doors) within a living unit $D_{nT,w}$ + C (dB)	≥ 48	≥ 48	≥ 45	≥ 40
Impact sound insulation within a living unit $L'_{nT,w}$ + C_I (dB)	≤ 45	≤ 45	≤ 50	≤ 55

Within living units

The legally required standard of sound insulation only protects us against the so-called "quiet noise" caused by our daily activities. This standard not only fails to meet the needs of many people who still complain about constant disturbance by neighbourhood noise, it also ignores the various opportunities for acoustic comfort offered by today's innovative technical solutions.

Based on the very diverse types of noise and extensive studies on the subject, ISOVER – the world's leading manufacturer of insulation systems – has now set a new sound insulation benchmark. The "Saint-Gobain ISOVER Comfort Classes" ensure a level of acoustic comfort that goes beyond the requirements of current European Standards. These classes are a unique guide for all those who want to enjoy some moments of perfect silence in our hectic world.

Exceptional comfort thanks to perfect silence.

Based on ISOVER's extensive expertise, the acoustic "Comfort" class provides reliable day-to-day noise protection. People with sensitive hearing will find the comfort of perfect silence again, even in a noisy environment. It doesn't matter whether the noise source is outside or inside the building, thanks to ISOVER, detached, terrace and multi-family houses will become an oasis of calm – without any restriction to your, or your neighbours', daily activities. And if you need to tackle an extreme challenge, like intense noise produced by piano playing, ISOVER's "Music" class offers reliable sound insulation at the highest possible level.

Whether airborne or structure-borne: ISOVER stops the noise

There are two main types of noise transmission – airborne and structure-borne. The ISOVER "Comfort" class guarantees excellent acoustic protection from both. Airborne sound describes the sound that radiates directly from a source and travels through the air, e.g. neighbours' voices, traffic noise or the sound radiated from a home cinema next door. By contrast, the second type of sound, largely caused by footfall and rolling noise, is transmitted predominantly via the structure of the building itself and is therefore referred to as structure-borne sound.
Whether airborne or structure-borne noise, thanks to ISOVER's insulation solutions, detailed on the following pages, neither sound type need bother you in the future.

Insulation between living units

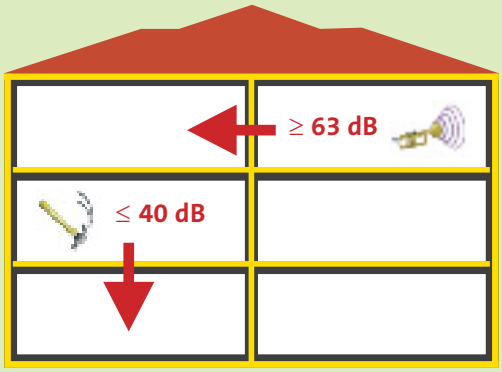
To achieve an adequate level of sound protection between adjacent living units the following insulation levels are recommended:

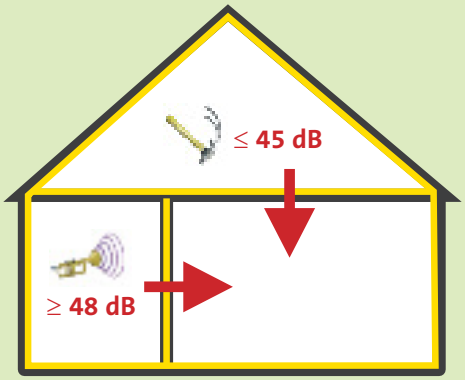
Airborne sound insulation

$D_{nT,w} + C \geq 63$ dB

Impact sound insulation

$L'_{nT,w} + C_I \leq 40$ dB





Within the same living unit

For rooms situated in the same living unit, lower insulation values are recommended as the noise sources are accessible:

Airborne sound insulation

$D_{nT,w} + C \geq 48$ dB

Impact sound insulation

$L'_{nT,w} + C_I \leq 45$ dB

Mass Law versus Mass-Spring-Mass systems

For many years the acoustic performance of a construction was linked directly to density, in line with the Mass Law. This is no longer the case for insulation solutions based on the mass-spring-mass principle. Using the mass-spring-mass principle we can obtain optimum acoustic protection using lighter, thinner constructions that are both quicker to install and less expensive.

Mass Law

In the case of conventional solid construction (single leaf) the acoustic effect depends primarily on the weight of the components and their surface mass.

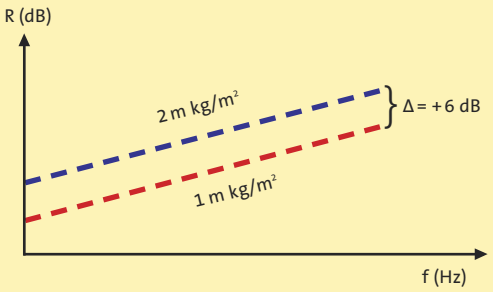
Doubling the mass of the wall, either by
- doubling the thickness of the wall or
- doubling the density of the material

will increase sound insulation by 6 dB on average.

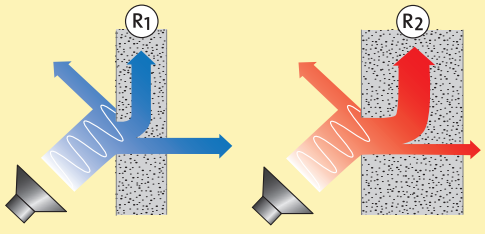
To obtain higher insulation values we must therefore build a structure that is disproportionately heavier or thicker in relation to the improvement achieved.

In practice, such an increase in wall thickness is generally not practical as it would impact on the size of the building and would also involve greater logistical expense and longer construction times.

In the case of a monolithic wall, doubling the thickness of the wall or doubling the density of the wall would only result in a 6 dB improvement in sound performance.



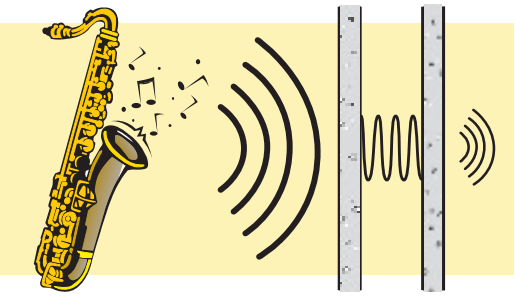
Mass Law – Sound insulation change when doubling the mass



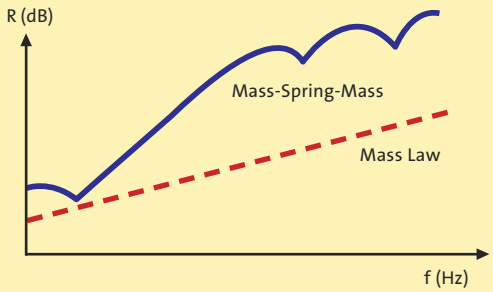
Sound insulation of monolithic walls when doubling the mass per unit surface
R2 = R1 + ≈ 6 dB

Mass-Spring-Mass

The system is composed of 2 outer leaves (most commonly gypsum boards) and a spring (lightweight mineral wool). Using these systems allows us to not only obtain superior acoustic performance but also to save space and use fewer resources.



Lightweight constructions outperform the acoustic damping of high mass walls



Mass-Spring-Mass system insulation versus monolithic constructions

In the case of double-leaf walls, the sound-damping effect is achieved by the interplay of the individual components. This interaction deter-mines the efficiency of the system as a whole. The opportunities to influence the efficiency of double-leaf walls are much greater than with single-leaf walls, as the individual components can be optimally matched to each other and to their respective environments.

The most effective ways of increasing the performance of a Mass-Spring-Mass system are:

- Increase the cavity width
- Increase the insulation in the cavity – for best results fill the cavity completely with mineral wool.
- Increasing the mass of the outer leaves

The cumulative acoustic effect of these factors makes a significant difference. This is where ISOVER lightweight insulating materials come into play. Their high performance makes them ideally suited for use in Mass-Spring-Mass systems, achieving the outstanding acoustic results you've come to expect from ISOVER.

At the heart of a Mass-Spring-Mass system: ISOVER lightweight mineral wool.

The sound damper.

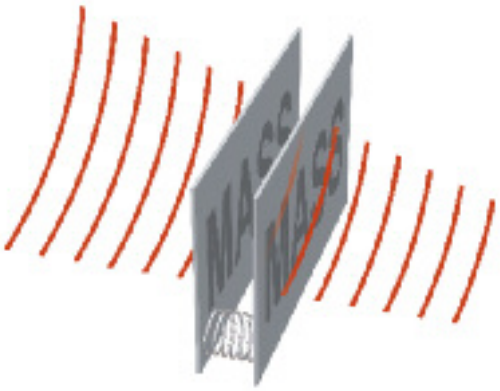
In terms of effective sound insulation, Mass-Spring-Mass systems perform far better than high mass constructions. Selecting the ideal insulation material is an important factor, and can increase performance even further.

When completely filling the cavity with ISOVER lightweight mineral wool, a unique insulation effect can be achieved due to the material properties.

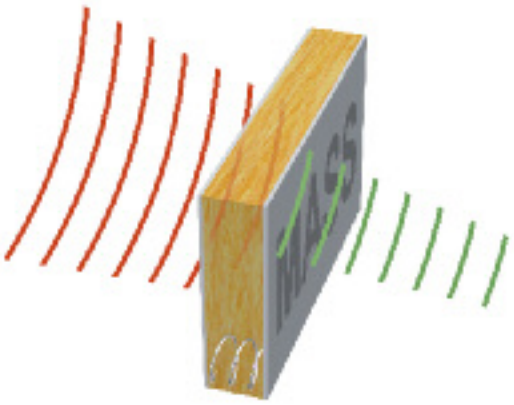
When sound waves pass through the fibrous material, friction occurs between the sound waves and the surface of the individual fibres. This friction causes some of the sound energy to be converted into heat. The result: less sound energy is transmitted through the wall.

Along with the reduction in sound waves passing through the wall, ISOVER products also dampen the lateral standing sound waves in the cavity.

A complex physical process with a simple but clear audible effect: silence.



Air between the masses doesn't comply with up-to-date acoustic comfort classes.



ISOVER glass wool softens the spring and maximizes the sound insulation.

Why ISOVER lightweight mineral wool is better.

When installing soundproofing materials, the density of the sound absorber within a Mass-Spring-Mass system is not important for the human audible frequence range.

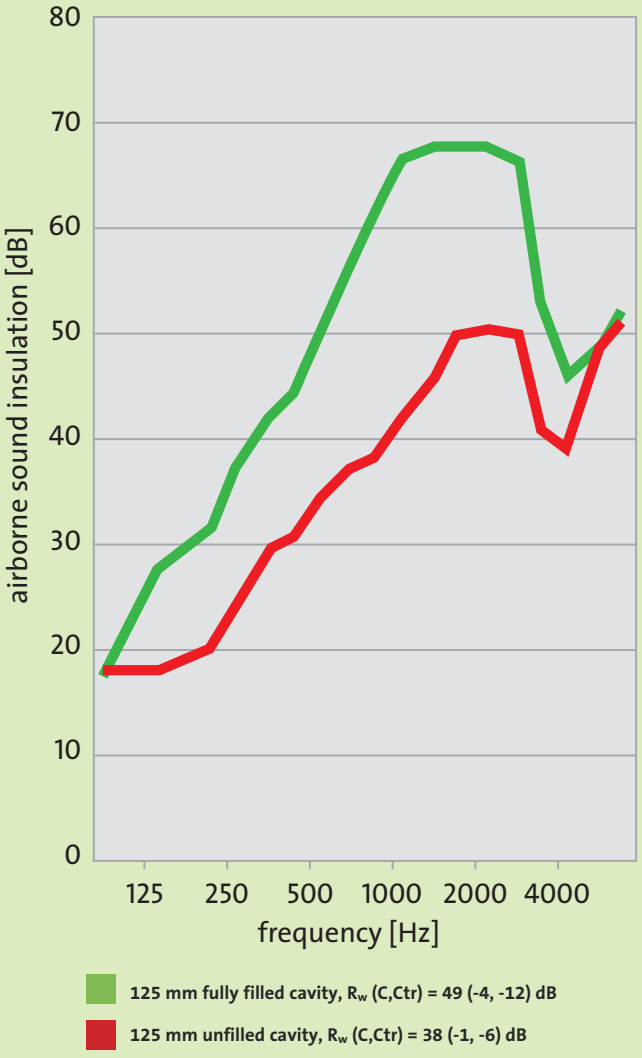
This is proven by ISOVER mineral wool: on the one hand, it reduces sound much better than thinner materials that are more pervious to air. On the other hand, materials with a higher density (or air flow resistance) do not achieve any further improvement; such materials are stiffer and thus likely to form sound bridges.

ISOVER mineral wool is therefore an excellent "spring" material in combination with multiple plasterboard "masses": such wall systems achieve the highest possible total sound insulation.

Every centimetre counts.

The wider the cavity and the more ISOVER glass wool it contains, the better the damping effect.

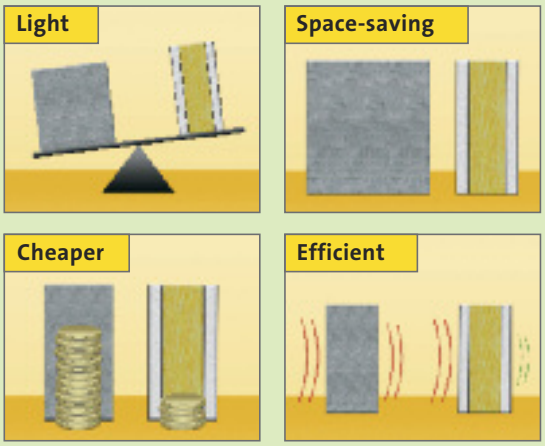
Every extra centimetre of glass wool converts more sound energy into heat. The following rule of thumb applies: one decibel improvement for every one centimetre of ISOVER mineral wool. There is no easier way of achieving sound insulation!



Sound insulation comparison between an empty partition wall and a partition wall fully filled with ISOVER mineral wool. By completely filling the cavity of partition walls better sound insulation results are obtained.

Efficient sound insulation

Superior performance: the multiple benefits of lightweight construction



The benefits of lightweight construction go far beyond mere acoustic comfort. Take for example the wall thickness. Although the wall is thinner, it offers similar or better sound insulation than a brick or concrete wall. At the same time, the useful floor space is enlarged. The lower weight also means that foundations will cost less.

Lightweight building components are well suited for prefabrication. In particular, their lower weight and dry application ensure rapid progress on the construction site and involve fewer work steps. This also helps to prevent job sites stops and bad workmanship. The savings in time, material and man-hours increase the efficiency of the construction process and add to the economic viability of the building.

Lightweight building systems keep proving their worth throughout the building's life. They offer, for example, unmatched flexibility. Room design can be changed and adapted to various uses while at the same time the value of the building is preserved or even increased. And, ISOVER insulation materials significantly improve the thermal insulation of the building and thus reduce its heating demand. In effect: the closer you look at lightweight building systems, the more attractive they become – in every respect.

 High mass walls		Sound performance	 Mass-Spring-Mass construction	
Thickness [mm]	Weight [kg/m²]	R_w [dB]	Weight [kg/m²]	Thickness [mm]
100	140	42	19	75
130	180	45	20	100
160	220	48	21	125

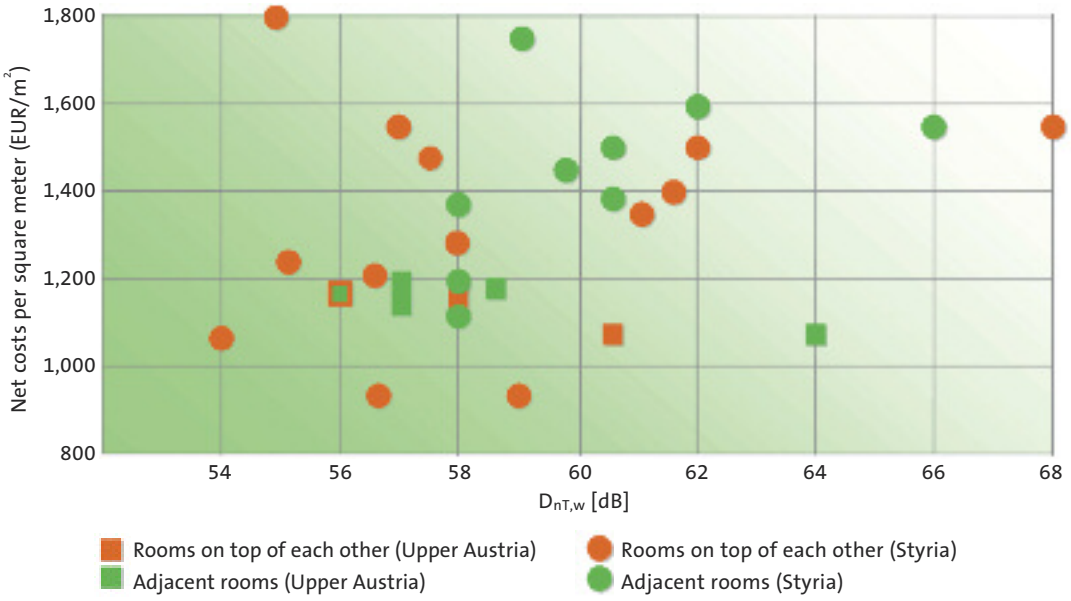
Lightweight constructions achieve the same performance with less weight and thickness.

Sound insulation means additional comfort. Not additional costs.

The quality of construction in terms of sound insulation is not linked to the costs. Achieving the required levels of acoustic comfort is primarily done through careful planning and workmanship.

A study done in two different regions of Austria for two different situations (rooms on top of each other and adjacent rooms) demonstrates the relationship between net cost per m^2 of construction and the acoustic performance of the buildings.

As you can see, for the same acoustic performance the cost might vary by 50%.



Net cost of construction vs acoustic comfort.

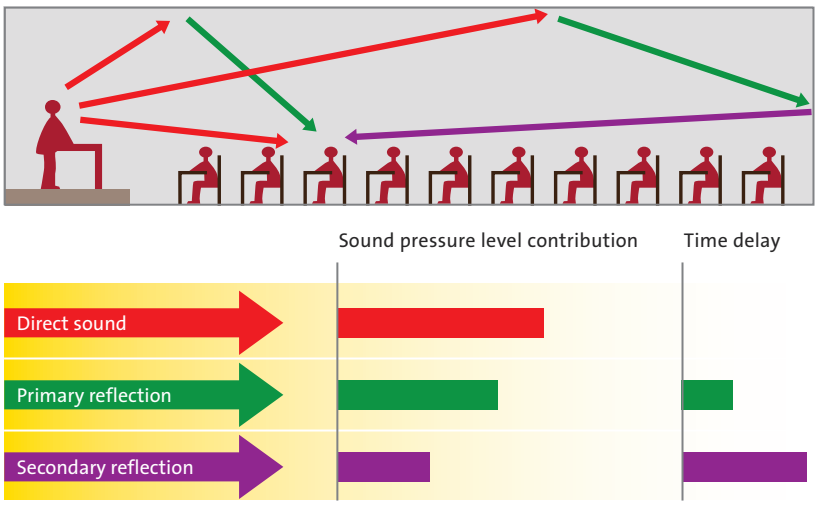
Vienna University of Technology, Sound insulation in housing construction, 2006

Room acoustics –
We can only learn what we can hear

Acoustic treatment for better listening

Beside having an environment free of sound pollution there are spaces (like classrooms, conference rooms or opera halls) where it is important to be able to hear sound clearly. Unless pupils can hear the teacher clearly, learning becomes much more difficult.

Each of these room types, therefore, requires a special interior acoustic treatment to prevent unwanted effects (such as echoes) and to create the right acoustic environment for the activity taking place. The easiest way to achieve this is to decrease the reverberation time using sound absorbing materials.



Sound reflections inside a class room.

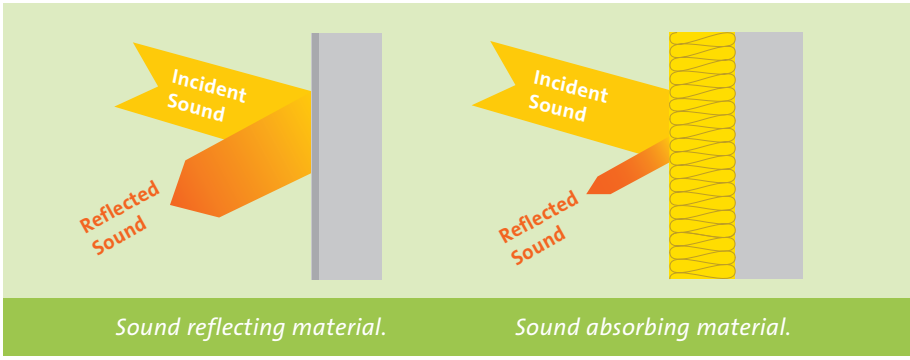
In a classroom each person can hear not only the direct sound from the teacher but sound reflected from the surrounding room surfaces:
• The primary reflections
• The secondary reflections

Because of the different paths that sound waves take, the same sound will take different periods of time to reach the listener. If there is a long delay between different reflections, echoes will be created and speech will appear distorted.

Sound absorption

A sound-absorbing material will almost entirely retain the incident sound that strikes it, reflecting only a part of the sound energy.

This property is expressed by □: sound absorption coefficient that indicates how much of the sound from the incident wave is absorbed by the material.



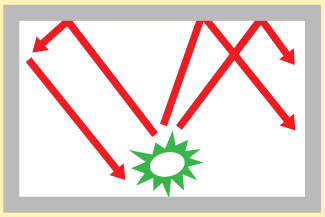
Sound reflecting material. *Sound absorbing material.*

- $\alpha = 0$ all the sound energy is reflected back – sound reflecting material
- $\alpha = 1$ all the sound energy is absorbed – sound absorbent material

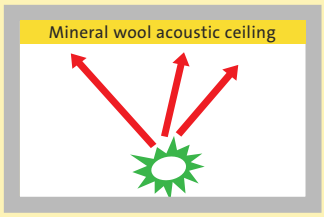
Reverberation time

The main indicator of room acoustics is the reverberation time (T).

- Long reverberation time – a lot of echo.
- Reduced reverberation times – less or no echo.



Untreated room
High reverberation time T= 4.5 s
Difficult hearing conditions.



Acoustically treated room
Low reverberation time T= 0.4 – 0.8 s
Good speaking and hearing conditions.

Different reverberation times are needed for different activities. In rooms where speech and hearing are important we need lower reverberation times, while in rooms where music is played (like concert halls) a higher reverberation time is needed. By adding sound absorption materials, such as a mineral wool acoustic ceiling, we decrease the reverberation time to:

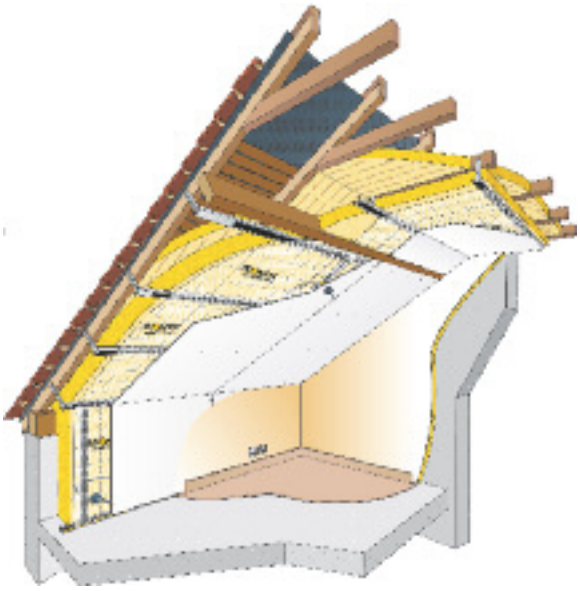
- create better conditions for speaking and listening
- decrease the ambient noise in the room

It is important to have an appropriate reverberation time in the room as quality of hearing (and thus the quality of learning or the quality of our work) will depend on this.

Solutions for excellent sound insulation

Flexible, fast and reliable loft extension

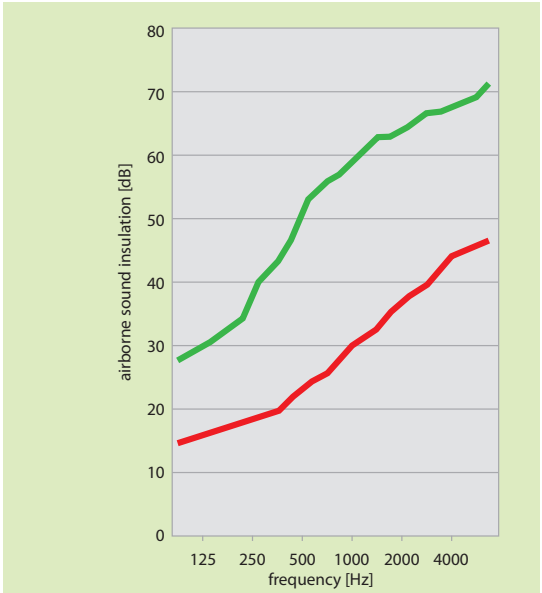
There are a number of arguments in favour of a loft extension. On the one side, the fast and inexpensive creation of additional living space, on the other, the unique atmosphere of rooms beneath the roof.



Pitched roof insulation

ISOVER mineral wool products fit perfectly between the rafters.

Construction elements
• Concrete tiles
• 80 mm air gap between wooden battens
• ISOVER rain screen
• First layer of ISOVER mineral wool insulation – 160 mm between rafters
• Second layer of ISOVER mineral wool insulation – 50 mm.
• ISOVER Vario KM Duplex UV – climate membrane for active moisture management
• One layer of Gyproc / Rigips plasterboard of 15mm



Acoustic performance:

Pitched roof insulated with ISOVER

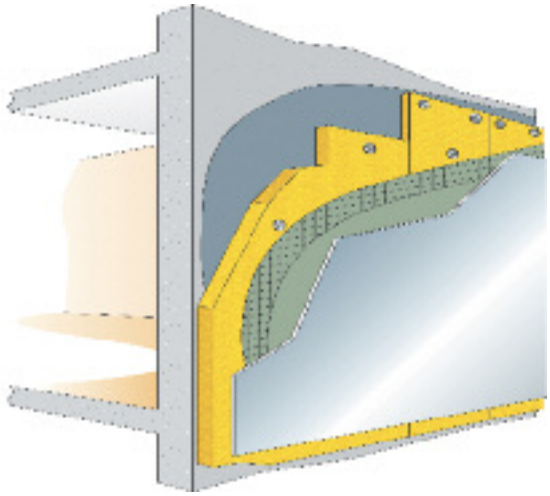
R_w (C,C_{tr}) = 54 (-3, -9) dB

Pitched roof not insulated

R_w (C,C_{tr}) = 31 (-1, -4) dB

Facade insulation from outside

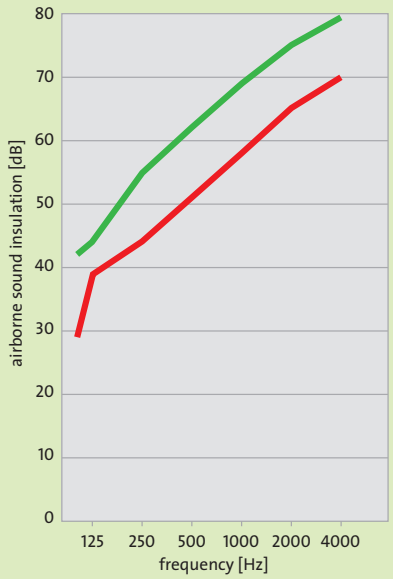
Whilst fitting insulation inside the building can often reduce your living space, there are usually no restrictions to extending outwards, so thicker layers of insulation can be used. The result: enhanced living comfort and your heat loss reduced.



Exterior Thermal Insulation Compound Systems (ETICS)

ISOVER products for Exterior Thermal Insulation Compound Systems – ETICS – guarantee highly efficient sound protection.

Construction elements
• Weber render layer 10 mm
• Concrete monolithic wall 150 mm
• ISOVER MINERAL WOOL FOR ETICS – 210 mm
• Weber render layer 25 mm



Acoustic performance:

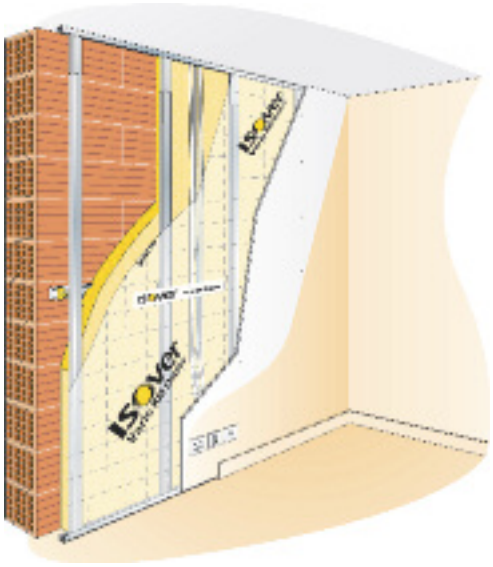
Exterior thermal insulation composite system (ETICS) with ISOVER mineral wool
R_w (C,C_{tr}) = 65 (-1, -6) dB

Wall only (without insulation)
R_w (C,C_{tr}) = 54 (-2, -8) dB

Solutions for excellent sound insulation

Get the best out of a brick wall: with a metal framework and gypsum boards.

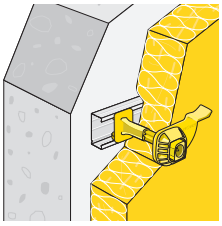
Choose the ISOVER OPTIMA system for your renovation and you can be sure of a quick and efficient increase in your living comfort as well as considerably lower heating bills. When using the OPTIMA system, all cables and pipes can be conveniently accommodated and, more importantly, Optima will considerably improve airborne sound protection – reducing the levels of external noise in your home by as much as 50 %.

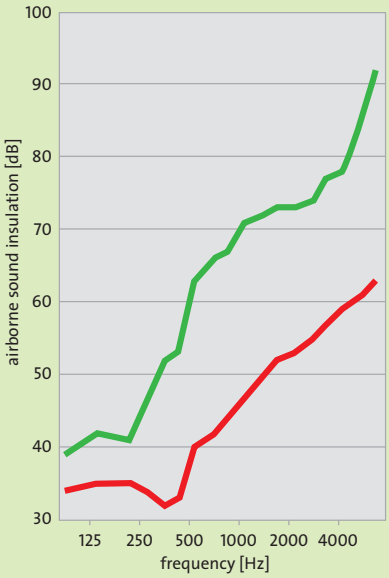


ISOVER OPTIMA system

Construction elements
• Hollow block 200 mm
• Weber render layer 10mm
• ISOVER lightweight mineral wool 75 mm
• Air layer 15 mm
• ISOVER Vario Km duplex uV – climate membrane for active moisture management
• One layer of Gyproc / Rigips plasterboard of 15mm

The special OPTIMA fixing system supports the insulation material and secures the vertical studs, allowing thickness adjustment with millimeter precision.





Acoustic performance:

OPTIMA wall

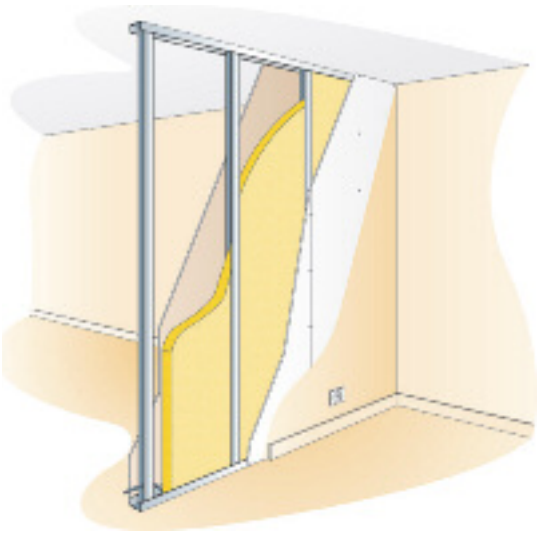
R_w (C,C_{tr}) = 66 (-2, -7) dB

Basic wall

R_w (C,C_{tr}) = 45 (-0, -3) dB

Effective sound insulation between rooms inside the same apartment

Lightweight partition walls, incorporating plasterboard and ISOVER insulation, can be quickly installed and adapted as our needs change, making conversion and space separation easier, and providing acoustic, fire and thermal insulation performance.



Lightweight partition wall

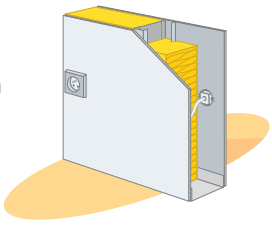
By fully-filling the cavity of partition walls with mineral wool we always obtain the best results.

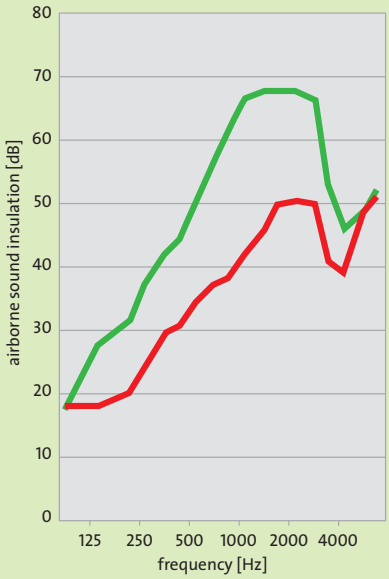
Construction elements
• One layer of Gyproc / Rigips plasterboard of 12.5 mm
• ISOVER LIGHTWEIGHT MINERAL WOOL – 100 mm
• One layer of Gyproc / Rigips plasterboard of 12.5 mm

It is important to avoid creating acoustic bridges as these dramatically reduce the efficiency of acoustic insulation.

Example:

- Place electrical switches on opposite sides of a separating wall as far as possible from each other to prevent acoustic bridges.





Acoustic performance:

Fully filled cavity

R_w (C,C_{tr}) = 49 (-4, -12) dB

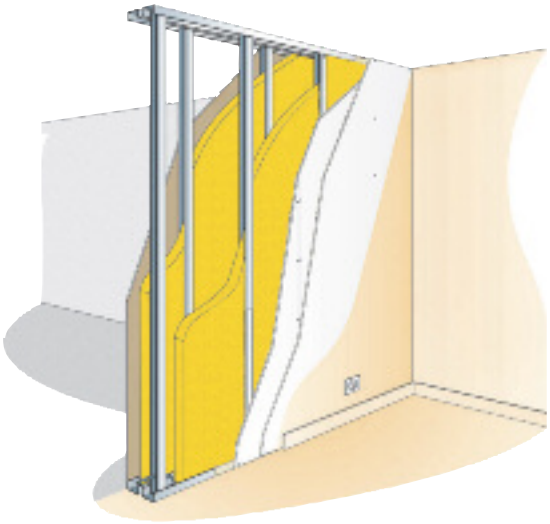
Unfilled cavity

R_w (C,C_{tr}) = 38 (-1, -6) dB

Solutions for excellent sound insulation

Keep neighbour's noise out – lightweight partition walls

Compared to a conventional solid wall, a lightweight metal stud wall offers nothing but benefits: it saves time and money due to low material and transport costs, reduces the static load and prevents delays caused by long drying times.

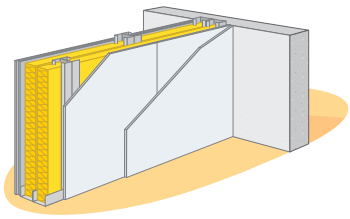


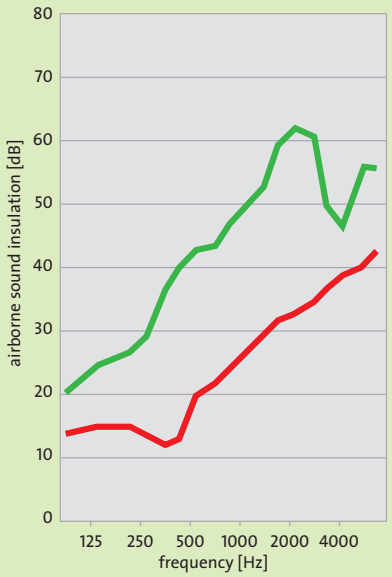
Lightweight twin frame metal stud partition wall

Recommended construction of a twin frame metal stud partition.

Construction elements
• Two layers of Gyproc / Rigips plasterboard of 12.5 mm
• First layer of ISOVER lightweight mineral wool -75 mm
• Second layer of ISOVER lightweight mineral wool -75 mm
• Two layers of Gyproc / Rigips plasterboard of 12.5 mm

Where double layers of plasterboard are used, all joints should be staggered.





Acoustic performance:

Partition wall 200 mm

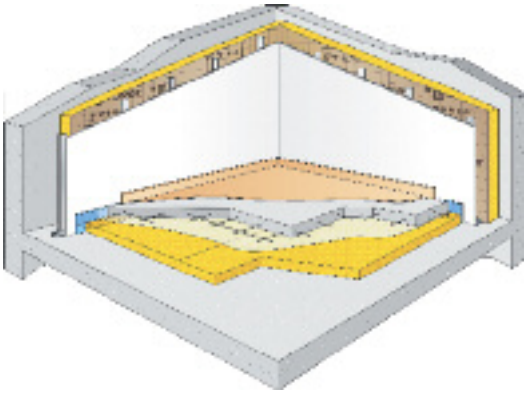
R_w (C,C_{tr}) = 67 (-5, -12) dB

Brick wall 200 mm

R_w (C,C_{tr}) = 45 (-0, -3) dB

Airborne and impact sound insulation with one solution – floating floor

The most effective way to prevent noise is to stop it at source. This is why the insulation of floors plays such an essential role in the sound insulation of your home.

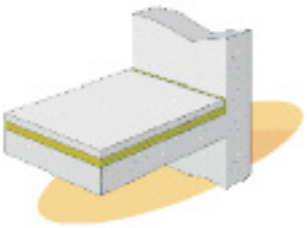


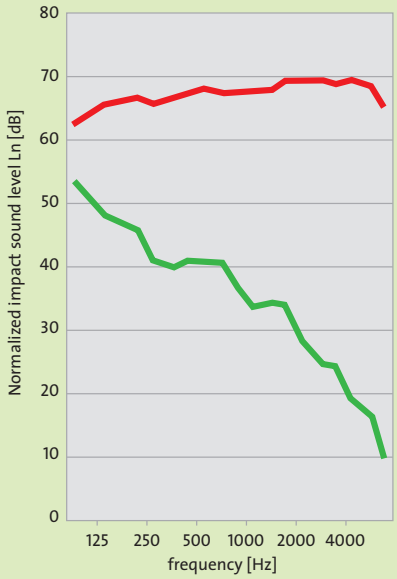
Floating floor solution
with ISOVER mineral wool

In the case of new multi-storey buildings, the most efficient way to achieve excellent sound insulation between two different apartments situated one on top of other, is to use a floating floor construction. This provides both impact sound insulation and airborne sound insulation.

Construction elements
• Cement screed 70 mm
• Polyethylene (PE) foil
• ISOVER mineral wool board for impact sound insulation 30 mm
• High mass concrete floor 140 mm

Ensure there are no sound bridges between the floor and the screed.





Impact sound insulation:

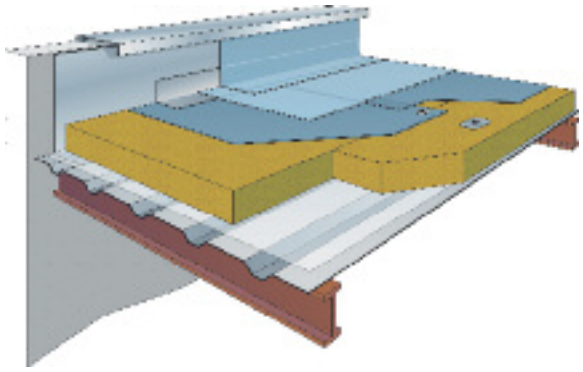
Floating floor with ISOVER mineral wool
$L_{n,w}$ (C_1) = 40 (2) dB

High mass floor
$L_{n,w}$ (C_1) = 76 (-11) dB

Solutions for excellent sound insulation

Non-residential roof solutions

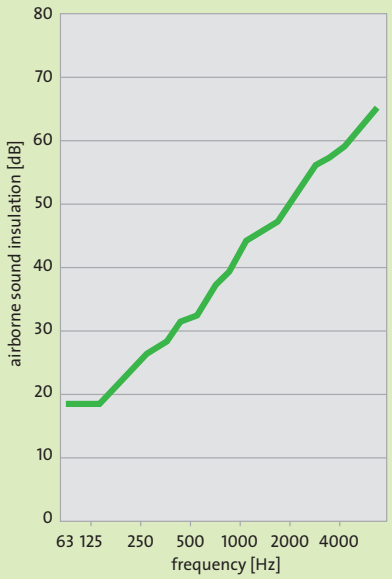
Providing acoustic comfort in not only important in residential building but also in non-residential constructions such as: production facilities, hangars and similar.



Metal roof insulation

Using ISOVER products and solutions we can achieve optimal acoustic comfort in metal buildings.

Construction elements
• Bituminous layer 10 mm
• ISOVER mineral wool 60 mm
• Water vapour barrier
• Profiled metal roofing sheet



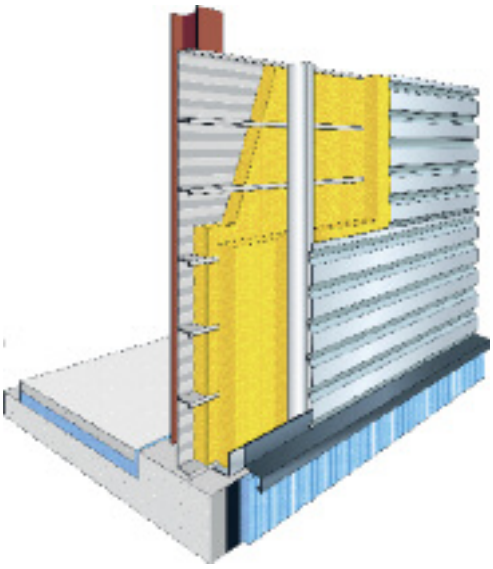
Airborne sound insulation:

Metal roof

R_w (C,C_{tr}) = 40 (-2, -7) dB

Non-residential wall solutions

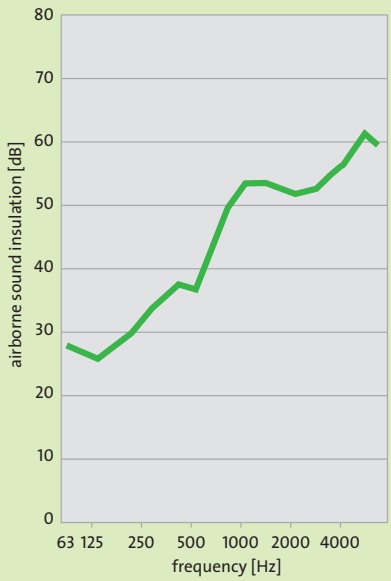
Providing acoustic comfort is important both for the interior of the metal buiding and for local residents. The noise produced by the different activities might otherwise cause disturbance in the surrounding area.



Metal cassette system for an exterior wall

Sound insulating solution for metal wall construction.

Construction elements
• Metal lining
• First layer of ISOVER mineral wool 50 mm
• Second layer of ISOVER mineral wool 70 mm
• Air gap
• Profiled metal sheet



Acoustic performance:

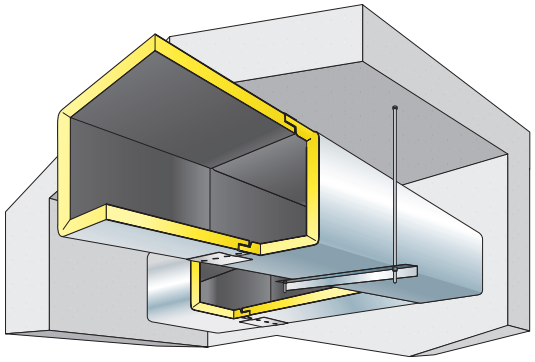
Metal wall system

R_w (C,C_{tr}) = 47 (-2, -7) dB

Solutions for excellent sound insulation

Air distribution ducts

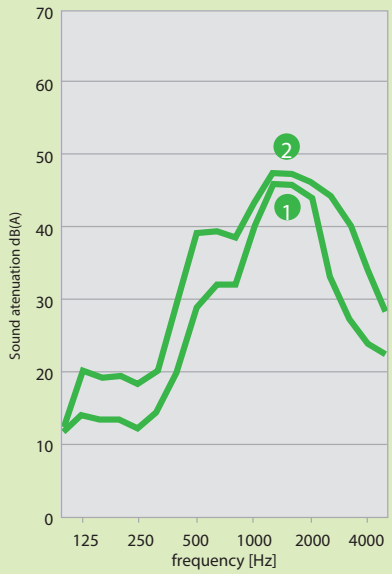
Domestic air distribution systems are designed to provide thermal comfort and ventilation for residents. But, of course, being comfortable means much more than feeling warm in winter and cool on hot summer days. We need to sleep in peace, without any noise to disturb us. The ISOVER Multi-Comfort House has a specially designed ventilation system for maximum acoustic comfort.



CLIMAVER products for ducts

CLIMAVER ducts, ISOVER's solution for achieving Multi-Comfort House Comfort level, are made of glasswool boards with alufoil covering which are connected to form complete air duct networks. This system combines the properties and advantages of glasswool insulation, with easy and quick installation.

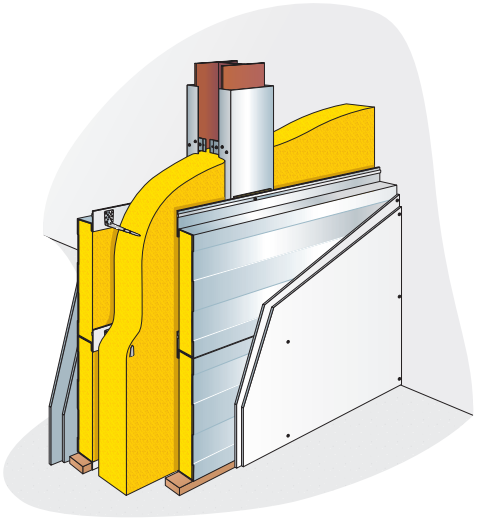
CLIMAVER ducts not only provide fresh air but also thermal protection and noise control. This is due to their excellent sound attenuation properties: they dampen sound that would otherwise be transmitted through the ventilation system. In addition, the high thermal insulation provided by the glasswool reduces thermal losses through the duct network.



Acoustic performance (experimental determination):

Duct section 315 x 225	1	2
Duct length (m)	1.55	2.7
Air speed (m/s)	6	6
Sound attenuation dB (A)	24	28

Best in class



ISOVER TECHNOSTAR system – developed for the highest acoustical requirements.

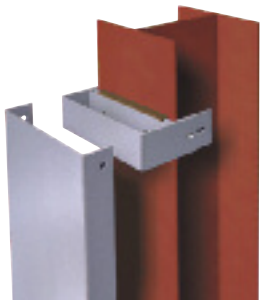
Developed specially to meet the highest acoustic requirements, the ISOVER TECHNOSTAR system is proof that ISOVER lightweight mineral wool can meet even the most demanding standards

The system is build around the Mass-Spring-Mass concept and is composed of:

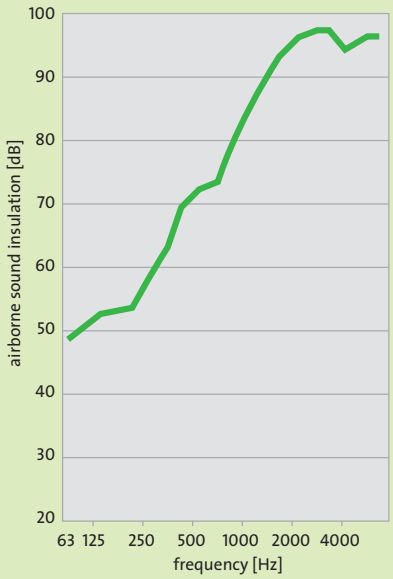
1. One or more plasterboard layers on each side, acting as the mass of the system
2. ISOVER mineral wool in cassettes with special designed profiles, acoustically sealed at the base.
3. ISOVER mineral wool between the cassettes
4. Specially designed fixing elements

Measurements carried out on site and in the laboratory have demonstrated the effectiveness of this system for the highest acoustic requirements, and have shown that there is basically no difference in performance using either low density or high density mineral wool.

The TECHNOSTAR system not only makes it easy to achieve extremely high insulation values, it also offers a series of advantages in terms of logistics, erection time and freedom of design.



ISOVER TECHNOSTAR – fixing system

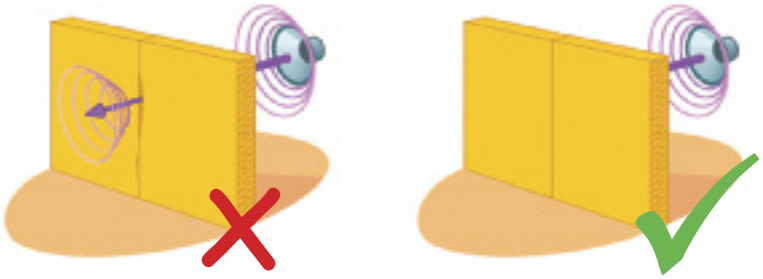


Impact sound insulation:

Cinema performance TECHNOSTAR

R_w (C,C_{tr}) = 74 (-2, -9) dB

Acoustic bridges: negative impact that must be avoided

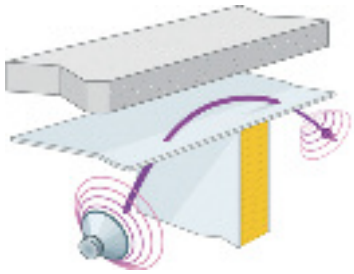


Continuous insulating layer

In order to maximise acoustic performance, the insulating layer must be continuous across the whole area. Any gaps or uninsulated spaces will downgrade the overall insulation performance of the building.

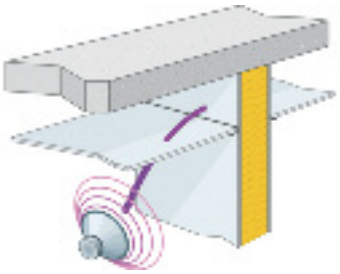
Suspended ceilings

It is important to effectively insulate the plenum to prevent lateral sound transmission.

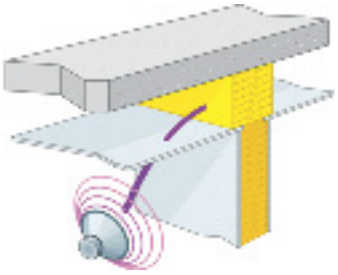


Solutions

Where possible, continue the partition wall to the underside of the soffit.

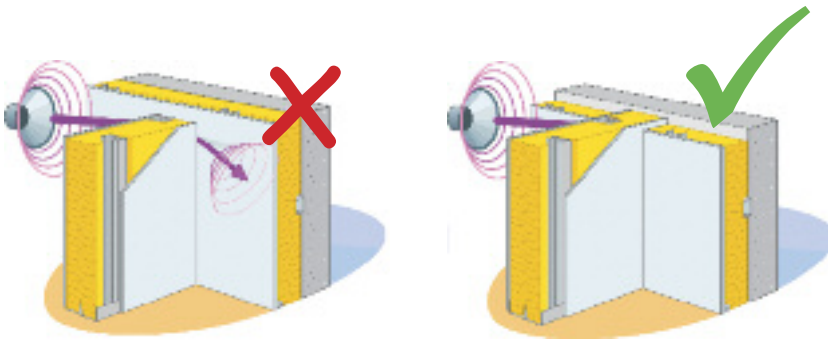


Install mineral wool acoustic barriers as required.



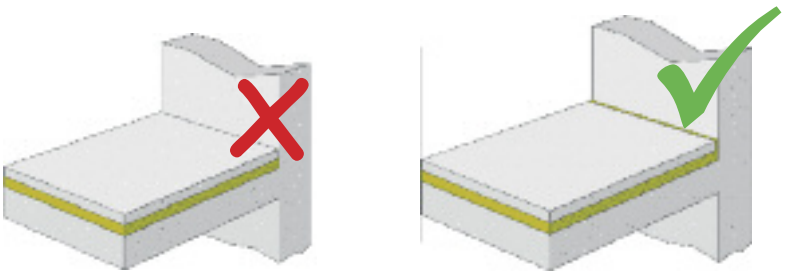
Junctions

Special attention should be paid to the joints between partition walls and/or dry lining.



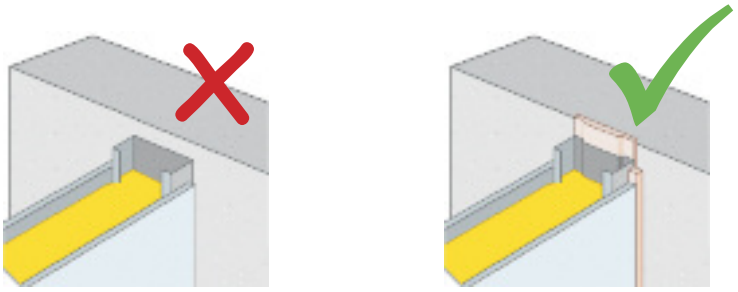
Floating floors

In the case of floating floors it is very important that there is no fixing between the screed or floating layer and the floor structure. Any rigid connection between the screed and the floor will drastically reduce the sound insulation performance of the solution.



Flexible connections for metal profiles

One of the most common mistakes is not to use flexible acoustic sealant when fixing metal profiles in lightweight partition walls. This can reduce the acoustic performance of the wall by 3 dB.



Quality products for top-grade sound insulation

ISOVER's product portfolio meets the most diverse requirements: with a broad range of individual product formats, packaging solutions and facings, it is perfectly tailored to your needs. Whether using slabs or rolls, all ISOVER mineral wool products offer the same outstanding acoustic performance. Like ULTIMATE, the new high performance insulation material that combines all of the advantages of conventional acoustic, fire and thermal insulation materials with substantial weight savings. And with ISOVER mineral wool you also help to protect our environment by preserving natural resources. By using up to 80 % recycled raw materials, ISOVER products are manufactured in an ecologically sustainable way and feature an excellent CO_2 balance.

Products made by ISOVER – Always a favourable balance.

ISOVER mineral wool offers a whole host of benefits – before you even start construction, throughout the building's entire lifetime and even after.

- Environmentally friendly production
- Contains up to 80 % recycled materials
- Easy on- and off-site transport
- Compact storage
- Easy and efficient workmanship
- Maintenance-free over the entire lifetime
- Non-combustible
- Durable
- Chemically neutral
- Free of groundwater-polluting chemicals

ISOVER products – Exceptionally convenient handling.

ISOVER glass wool not only proves its worth in providing comfort throughout the lifetime of the building, but its benefits start as soon as installation begins. Here, the material shows its strengths, and cost saving potential:

- 75 % savings in storage and transport due to high compressibility
- Dimensionally stable and high tensile strength
- No waste
- Multi-purpose, reusable, recyclable
- Easily disposable

Dedicated to plasterboard.

Saint-Gobain Gypsum, with the brands Gyproc, Placo and Rigips, manufactured the first plasterboard more than 90 years ago. Since then, they have developed this relatively simple concept into a range of modern high-performance lining products to meet the varying demands of buildings as diverse as houses and cinemas, hospitals and schools.

Today, these plasterboards provide durable, high-quality linings for walls and ceilings, lift shafts and stairwells, corridors and auditoria. They offer a wide variety of solutions from simple space division all the way to demanding acoustic, fire, thermal, moisture and impact resistance – ensuring comfort and safety for all.

As well as being synonymous with quality and choice in plasterboards, they have a range of accessories, from screws to adhesives and finishing products – everything you need to guarantee a perfectly finished internal lining.

Plasterboards are the modern way of equipping today's buildings with high-quality linings. They are available in an unrivalled range of types and sizes, enabling you to select exactly the right product for every application.

Glossary

Decibel (dB)
The measurement unit for acoustic pressure – used to express noise level. The smallest difference in sound that the human ear can perceive is 1 dB. A 10 dB difference corresponds to a doubling of the sound intensity.

Frequency (Hz)
The number of cycles of a vibrating molecule in air, in a period of one second. It allows us to distinguish low, medium and high frequency sounds.

Sound absorption
Sound energy reduction due to dissipation when sound waves travels through a medium or pass from one medium another one. Product performances are expressed by a weighted coefficient: α_w

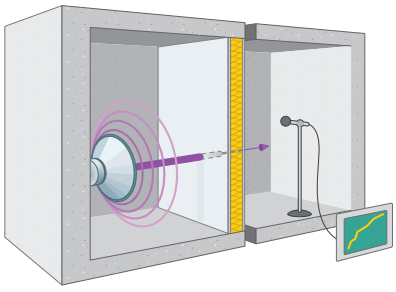
Sound insulation
Sound intensity decrease between two points situated on opposite sides of an obstacle.

T: Reverberation time (s)
The reverberation time of a room is the time (in seconds) needed for the sound pressure level at a specific frequency to decrease 60 dB from its steady-state value, when the source of sound energy is suddenly interrupted. It shows how much echo there is a closed or semi closed space. The longer the reverberation time the bigger the echo.

Airborne sound
Sound that propagates through air (human voice, music).

Airborne sound

R_w: Weighted Sound Reduction Index (dB)
Measures the airborne sound insulation of a product or building element. The higher the R_w value, the better the sound insulation properties.

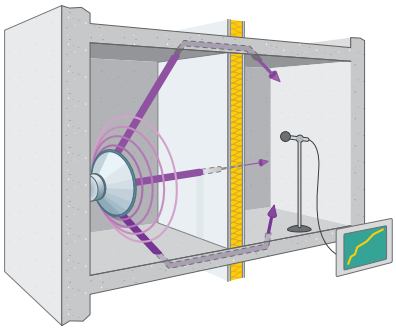


Laboratory measurement for airborne sound insulation

C (C, C_{tr}): Spectrum Adaption Term for air borne sound (dB)
The spectrum adaptation terms express how much the airborne sound insulation afforded by the building element would vary in case of:
- living activities noise – C
- urban road traffic noise – C_{tr}

D_{nTw}: weighted standardized level difference (dB)

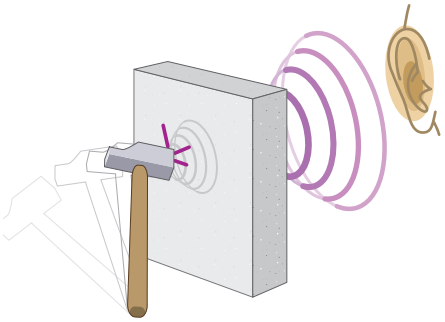
A single figure rating used to characterise airborne sound insulation. It is influenced by the insulation of the separating elements (walls, ceiling and floor), by the transmission path and by the reverberation time in the receiving room.



Insitu measurements for airborne sound insulation

Impact sound

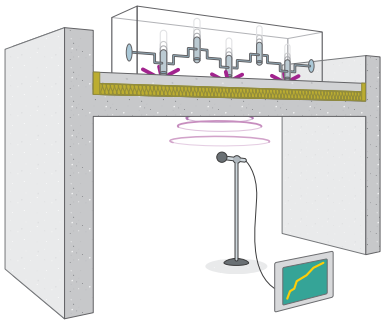
Sound caused by contact between two hard surfaces (hammer hitting a wall or a high heel shoe hitting the floor). The sound propagates through the solid structure.



Impact sound

$L'_{nT,w}$: weighted standardized impact sound pressure level

A single figure rating used to characterise the impact sound insulation of a construction element. It is measured 'in situ' and takes into consideration all transmission paths. The lower the $L'_{nT,w}$ value, the better the impact sound insulation of the construction element.



Determination of weighted standardized impact sound pressure level.

C_I: Spectrum Adaption Term for impact sound

Used for a better evaluation of the noise produced by walking on the floor.

The best address for the best information.

Always there for you – 24 hours a day – providing state-of-the-art information:
www.isover-constructions.com

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