Insulate exterior walls from inside: an alternative worth exploring

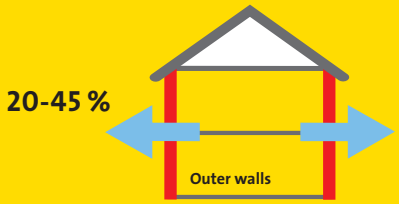
The advantage of insulating the room-facing side of exterior walls is that the complete renovation can take place in dry indoor conditions. If you wish, you can even do-it-yourself. This option is often chosen for multi-family houses and facades under monument protection.

Insulating from the inside will involve some reduction in your living space, but the high performance of ISOVER solutions will ensure that this is negligible – unlike the thermal effect, which will be considerable.

Effective airtightness

Airtightness of solid exterior walls is achieved by applying a plaster coat. Any weak points – such as joints around the windows, and penetrations for cable trays, ductwork etc. – need to be properly sealed before the interior insulation is installed.

The exterior walls of half-timbered houses present a special challenge with respect to airtightness. We recommend covering the inner wall surface with a continuous wind protection membrane, such as ISOVER Integra ZUB before installing the insulation layers. In all cases, the procedure should be to firstly install the thermal insulation, cover with VARIO KM or VARIO KM Duplex, and finally fix the interior lining.



The OPTIMA system – or how to make lasting savings in energy bills

Choose the 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. OPTIMA is a drylining insulation system that saves time as there is no delay due to adhesive drying times. All cables and pipes can be conveniently accommodated and, more importantly, Optima will considerable improve airborne sound protection – reducing the levels of external noise in your home by as much as 50 %.

Higher living comfort – achieved in only four steps

1. Fix OPTIMA U 235 studs to the floor and ceiling and OPTIMA C 240 studs horizontally at mid-height on the wall.
2. Fix OPTIMA plastic spacers to mid height stud and fix ISOVER insulation slabs, skewering and fixing them using the plastic spacers. Fix C 240 studs vertically into floor and ceiling studs, over the insulation.
3. Completely cover the surface with a VARIO KM or VARIO KM Duplex membrane, securing overlaps with adhesive tape. Use VARIO sealant to give airtight seals with the adjoining wall, ceiling and floor.
4. Fix the desired lining board – Gyproc plasterboard or timber board – on top.

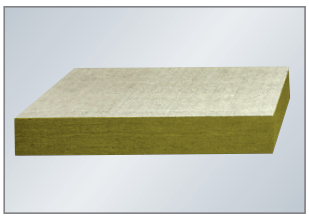
Get rid of thermal bridges – with ISOVER

The interfaces between intermediate ceilings or interior walls and the adjoining components are common areas for thermal bridges. It is essential to take the insulation of these flanking components into account when planning the job.

Insulation products for exterior walls

ISOVER stonewool slabs for use with composite thermal insulation systems

- For insulating exterior walls below an adhesive filler and plaster coat
- λ_d = 0.036 W/(mK) or 0.040 W/(mK)
- Breathable (i.e. open to diffusion)
- Excellent acoustic insulation
- Non-flammable (Euroclass A1)

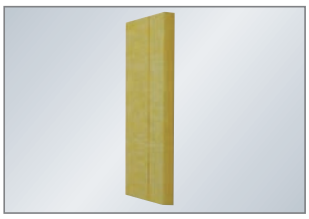


ISOVER stonewool lamella mats for use with composite thermal insulation systems

- For insulating exterior walls below an adhesive filler and plaster coat
- λ_d = 0.040 W/(mK)
- No need for dowelling on solid, load-bearing substrates and buildings up to 20 m height
- Breathable (i.e. open to diffusion)
- Non-flammable (Euroclass A1)

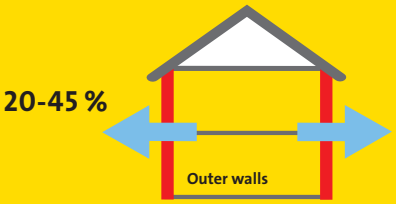
ISOVER glass wool slabs for use with composite thermal insulation systems

- For insulating exterior walls below an adhesive filler and plaster coat
- λ_d = 0.037 W/(mK)
- Breathable (i.e. open to diffusion)
- Excellent acoustic insulation
- Non-flammable (Euroclass A2-s1, d0)



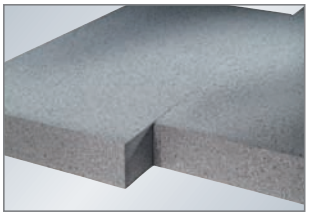
ISOVER EPS boards for use with composite thermal insulation systems and rusticated facades

- For insulating exterior walls below an adhesive filler and plaster coat
- λ_d = 0.035 W/(mK) or 0.040 W/(mK)
- Rustication boards – three different groove cross-sections for facade design
- Fire behaviour: Euroclass E



ISOVER EPS boards for use with composite thermal insulation systems

- For insulating exterior walls under adhesive filler and plaster coats
- λ_d = 0.032 W/(mK)
- Fire behaviour: Euroclass E

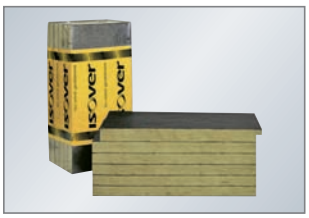


ISOVER stonewool insulation slabs for ventilated facades

- With or without a tissue facing
- λ_d = 0.035 W/(mK) or 0.040 W/(mK)
- Breathable (i.e. open to diffusion)
- Excellent acoustic insulation
- Non-flammable (Euroclass A1)

ISOVER glass wool insulation slabs for ventilated facades

- With or without a tissue facing
- λ_d = 0.030 W/(mK), 0.032 W/(mK) or 0.033 W/(mK)
- Breathable (i.e. open to diffusion)
- Excellent acoustic insulation
- Non-flammable (Euroclass A1 or A2)

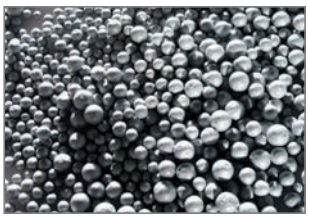


ISOVER glass wool rolls for ventilated facades

- With or without facing
- λ_d = 0.035 W/(mK) or 0.038 W/(mK)
- Breathable (i.e. open to diffusion)
- Excellent acoustic insulation
- Non-flammable (Euroclass A1 or A2)

ISOVER RigiBead® insulation beads of λ_d = 0.035 W/(mK)

- For machine-applied insulation in the cavities between double-leaf walls
- Fire behaviour: Euroclass E



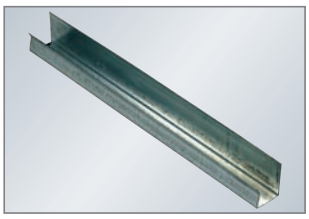
ISOVER blowing wool insulation of λ_d = 0.040 W/(mK)

- For machine-applied insulation of cavities in roof, wall and ceiling areas where access is difficult
- Non-flammable (Euroclass A1)

ISOVER OPTIMA System

OPTIMA U 235 floor and ceiling studs

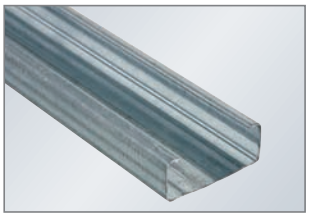
Metal floor and ceiling studs for fixing insulation boards and vertical C studs.



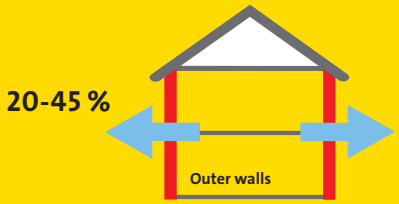
Article	Packaging
OPTIMA U 235 stud Length: 235 cm	Pallet of 12 bundles of 20 units = 564 m

OPTIMA C 240 studs

2.4 m long metal 'C' studs for fixing vertically between floor and ceiling studs to form the stud frame. Also used for mid height fixing to support OPTIMA spacers.

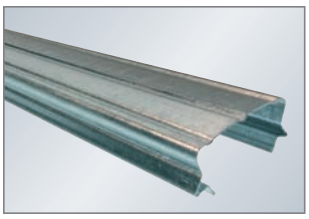


Article	Packaging
OPTIMA C 240 stud Length: 240 cm	Pallet of 40 bundles of 10 units = 960 m



OPTIMA 30 and OPTIMA 50 extension studs

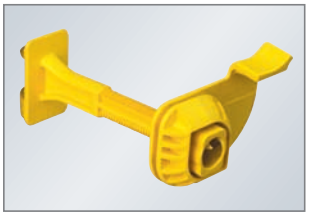
Short metal studs for connecting or extending OPTIMA C 240 studs.



Article	Packaging
OPTIMA 30 extension stud Length: 30 cm	Pallet of 40 bundles of 10 units = 120 m
OPTIMA 50 extension stud Length: 50 cm	Pallet of 40 bundles of 10 units = 200 m

OPTIMA support pillars (spacers)

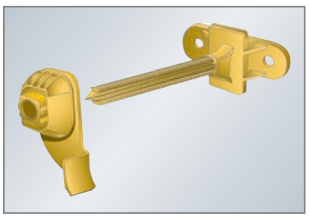
Plastic support pillars for securing insulation to metal 'C' studs. Plastic clamping key holds insulation securely in place.



Article	Packaging
OPTIMA support 75	50 units
OPTIMA support 100	50 units
OPTIMA support 115	50 units

OPTIMA support pillar Reno

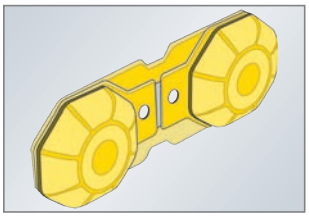
Plastic support pillar that can be fixed directly to the wall. Complete with plastic clamping key.



Article	Packaging
OPTIMA support Reno	40 units

OPTIMA connectors

Plastic connectors for joining OPTIMA C 240 metal studs.



Article	Packaging
OPTIMA connector	25 units

ISOVER VARIO System

Please refer to pages 56/58 for details of system components.

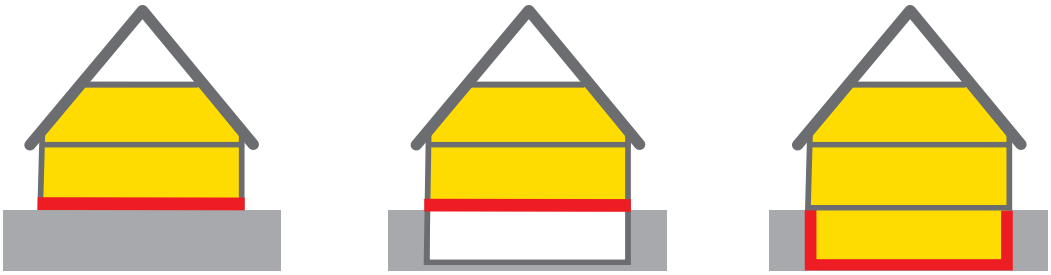
The basement: Your foundation for thermal comfort

The basement components – walls, ceilings and foundation slab – form the lower boundary of the thermal envelope. If the rooms in the basement are lived in, or used – e.g. for fitness, parties or the accommodation of guests – their primary need is for high insulation levels to provide a comfortable living environment and protect the building fabric from damage. This, in turn, will increase the market value of the property.

Is the thermal envelope located inside or outside the basement?

Is the basement within the thermal envelope? As you will see from the illustrations below, this depends on how it is used. If the basement rooms are constantly heated and have a room temperature above 19°C, the boundary of the thermal envelope runs along the floors and walls of these rooms. If the basement is not used or heated, it is the ceiling of the basement that forms the thermal boundary. And if there is no basement at all, the foundation slab of the building constitutes the thermal boundary.

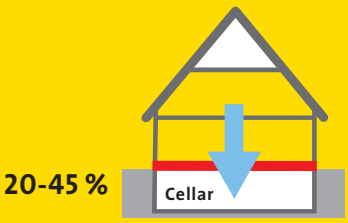
The area encompassed by the thermal envelope (red line) depends on how the basement is used.



No cellar | Unheated cellar | Heated cellar

Eliminate weak points in the cellar insulation

- *Exterior walls: insulation from inside or outside using perimeter insulation installed on the foundation and on the cellar wall.*
- *Interior walls: linings provide additional insulation.*
- *Floor and ceiling: insulation from above or from below.*
- *Heating system: insulation of the heating pipes (mostly in the cellar).*

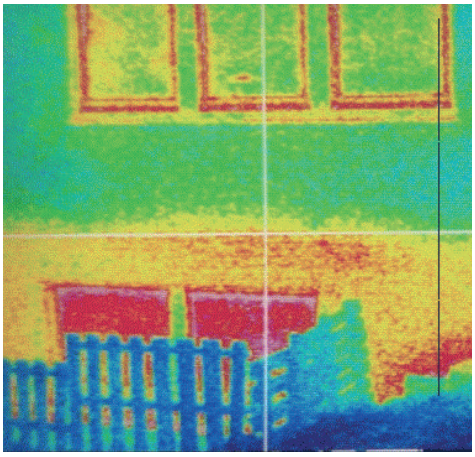


Save energy and avoid moisture – down in the cellar

In a heated cellar, the walls in contact with the ground need to be insulated just like the exterior walls of the house. This applies to the wall area above the so-called frost line, which is at a depth of around 1.5 m in Central Europe. Below this depth, the temperature differential between the walls and the outside soil is more or less the same as between the walls and the ambient outside air.

If the cellar is unheated, the ground floor of the house, which is also the roof of the cellar, forms the thermal boundary between the house and the earth below. In old houses, the walls and floors of cellars are often inadequately insulated against moisture, which may lead to mould growth and rot. Airing the cellar rooms is not the answer. In summer, humid air penetrates and condenses on the cold cellar walls, thus further increasing the humidity. And in winter people naturally avoid airing their cellars because of the cold outside air.

Prior to the planning phase, therefore, a thorough analysis should be carried out in order to determine the extent of the necessary renovation measures.



The high level of heat loss through the cellar walls and windows is clearly visible, as is the temperature difference compared to the upper part of the house.

How humid is the air?

The amount of water vapour in the air is dependent on the temperature. The higher the temperature, the more water vapour can be absorbed by the air. At a temperature of 30°C, up to 30 g per m³ can be absorbed, whilst at 0°C this reduces less than 5 g/m³, and at -10°C it is down to just 2 g/m³ at most. In a 10 m² room with 2.5 m ceiling height and a temperature of +30°C, the air may contain as much as 750 g of water vapour.

Under tiles, laminate or parquet: ISOVER products keep your feet warm.

Living comfortably, above the cold cellar

The ceiling above an unused and unheated cellar is an often not properly considered when undertaking the low energy refurbishment of a house. Yet It's not hard to understand that poor or even missing insulation in this part of the building will inevitably lead to a reduction in comfort levels and high energy losses. When your feet are in direct contact with a cold floor, your body loses around six times as much warmth as normal. So it's easy to see why it is vitally important to insulate the cellar ceiling.

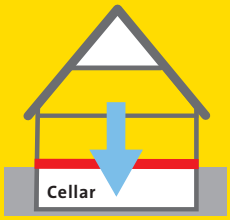
Cellar ceilings – with and without vapour barrier

Insulating a solid cellar ceiling from below is basically very similar to insulating a wall from outside. A vapour barrier is not required, and ISOVER insulation materials will ensure that the floor above the cellar, and therefore also your feet, are kept warm and dry. If, however, you decide to thermally renovate the solid cellar ceiling from above, i.e. from the warm side, you will need to install a climate membrane, such as ISOVER VARIO KM or VARIO KM Duplex, on the inner face to ensure an airtight seal. This will keep the insulation dry – and protect you from the cold. If the ground floor above the basement is of timber joist construction, you will also need to install one of the ISOVER climate membranes on the inner (warm) side of the floor.

Energy use and potential savings based on a cellar ceiling made of timber joists with 2 cm interior plaster and 100 m² ceiling space				**Low-energy house**			**ISOVER Multi-comfort House**		
				Thermal conductivity W/(mK)			**Thermal conductivity W/(mK)**		
	Built in 1900	**Built in 1950**	**Built in 1975**	**0.032**	**0.035**	**0.040**	**0.032**	**0.035**	**0.040**
Structure: 16 cm high timber joists with ...	air	cinder fill	3 cm insulation	**14 cm**	**16 cm**	**18 cm**	**22 cm**	**24 cm**	**27 cm**
U-value in W/(m²K)	1.14	0.78	0.59	0.23			0.16		
Heating energy demand in kWh per year	4,784	3,276	2,478	966			672		
Heating energy demand in kWh over a period of 40 years	191,352	131,040	98,952	50,568			30,912		

The calculation is based on a moderate climate with 3500 Kd heating degree days and a construction with 15% timber content. A degradation coefficient of 0.5 has been taken into account.

▶ *Please refer to the inside back cover for a glossary of all physical units and technical terms used.*



A perfect combination: timber ceilings and ISOVER

Since the joists are only 12 to 18 cm in depth, the load-bearing timber construction needs to be doubled up if you want to ensure optimum insulation results. As the floor clearance for doorways, fittings and other building elements at ground level is limited, it would be very costly in both time and labour to increase the floor level. In most cases, therefore, renovation is generally undertaken from the cellar side.

Before installing new insulation, the ceiling lining and any existing filling materials are completely removed. A sub-ceiling is then made in metal or timber frame and mounted below the existing ceiling, and the cavity between the two completely filled with ISOVER insulation. An insulation thickness of 24 cm thickness will be needed to guarantee that you reach the comfort level of an ISOVER Multi-Comfort House.

Install VARIO KM or VARIO KM Duplex on top of the ISOVER insulation, before covering it with your flooring of choice.

Provide an airtight seal – easy and fast

If you want to ensure that your timber joist cellar ceiling is airtight, install a VARIO KM or VARIO KM Duplex climate membrane on top of the insulation on the room-facing side. It is essential that seals in the VARIO membrane sheets are airtight. This is done with the help of two products: VARIO adhesive tape for securing the approx. 10 cm wide overlapping seam areas, and VARIO sealant, a flexible mastic that bonds the membrane edges to the adjoining parts of the building.

The advantage of blowing insulation: empty ceiling cavities can be completely filled while the lining remains almost intact.

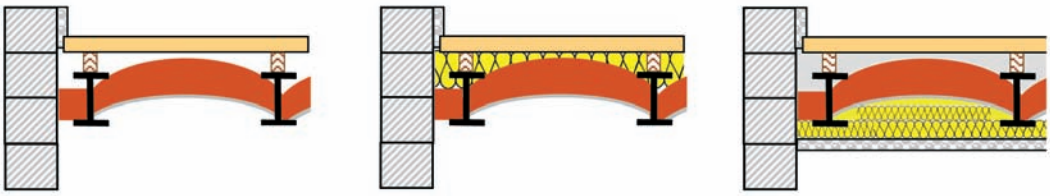
Vaulted ceilings and ISOVER go well together

In old cellars it is common to find a so-called "Kappendecke" or vaulted ceiling, made from vaulted brickwork supported by steel girders. Spacer slats are mounted on top to support the floor, leaving a cavity between the two elements of anything between 6 cm and more than 20 cm in height, depending on the vault.

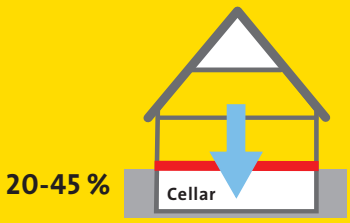
Make good use of old cavities – or create new ones

If the ceiling cavity is empty and the flooring needs to be replaced, thermal insulation is best installed from above. To do this, the old flooring is first removed and the enclosed ceiling space completely filled with ISOVER glass wool.

Constructions of this type are often filled with loose materials or cinders. In such cases, thermal insulation can be improved by mounting a timber or metal frame subconstruction below the vault and filling the resulting cavity with ISOVER glass wool. The new ceiling construction is then lined with plasterboard. As well as the two methods outlined above, it is also possible to use a non-destructive option – filling the existing ceiling cavity with blowing wool.



Possible options for renovating a vaulted ceiling



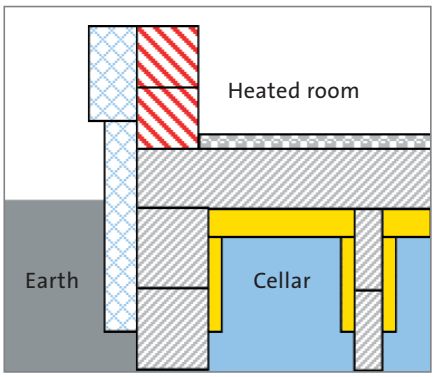
Simple but efficient: insulation of solid cellar ceilings

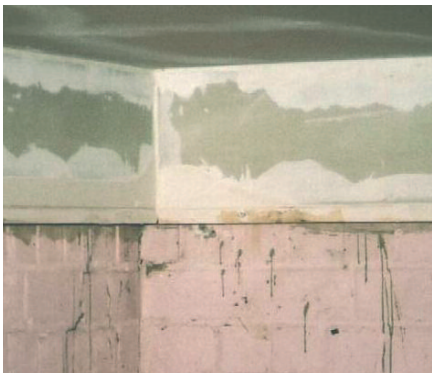
Solid cellar ceilings are usually made of concrete, brick or stone. More often than not, they are poorly insulated or, especially with older buildings, have no thermal insulation at all. Needless to say, this makes thermal upgrading a key issue, not only to address the problem of high heat loss, but to enhance comfort levels in the heated rooms. To achieve this, a timber or metal frame sub-construction is mounted underneath the ceiling, and the void created completely filled with ISOVER glass wool before applying a new ceiling lining.

Solid ceilings insulated from below – simple but efficient.

Avoid thermal bridging – and think "around the corner"

The renovation of a cellar ceiling can reduce the heat loss through that part of the building by up to 95 %. It is important beforehand to identify all areas where thermal bridges may occur and do everything possible to prevent them. Thermal bridging is caused when the insulated, and therefore warm, construction is in direct contact with cold cellar walls. To prevent the bridging, and resulting heat loss, the upper edges of the flanking walls need to be lined with minimum 50 cm wide, but preferably 100 cm wide, strips of thermal insulation no less than 4 cm thick.





Thermal bridge free insulation of the cellar ceiling: think "around the corner" and also insulate the flanking walls.

ISOVER solutions for the cellar ceiling – great variety, great effect

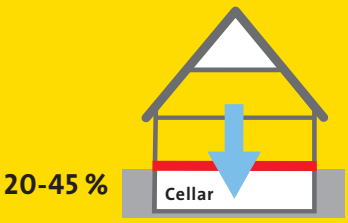
ISOVER insulation slabs allow flexibility in the way you achieve high levels of insulation for the cellar ceiling, when working from below. Thanks to a range of different materials, installation options and surface finishes, the insulation elements easily adapt to the different conditions on site. Take for example ISOVER mineral wool slabs. They can be fixed to the cellar ceiling by either bonding, dowelling or mounting in a metal framework, and thanks to their light coloured facing they will both brighten up and optically upgrade your cellar rooms.

Bonded, dowelled or mounted in a metal framework ISOVER offers a variety of solutions.

Whether storeroom, hobby room or garage – ISOVER optimally insulates and optically upgrades your basement.

Close the gaps and prevent airflows – with ISOVER

Concrete ceilings are airtight. But when drilling holes for routing cables or pipes, the penetrations must be properly sealed. No problem with a comprehensive range of purpose-made ISOVER products at your disposal.



ISOVER EPS: Ready-made insulation elements for the cellar ceiling

Designed specially for the insulation of cellar ceilings, the KDE insulation element, offers excellent technical properties and an impact-resistant, high-quality surface. It is based on an expanded polystyrene (EPS) board that comes factory laminated to 3 mm thick high-density fibreboard (HDF), finished on its exposed face with varnish. The handy elements are supplied with claw fasteners that are pressed into the insulation material and then dowelled into the ceiling. The minimal excess edge around the rigid EPS foam board is combined with tongue-and-groove connection around the perimeter, that determines the orientation and ensures that the elements fit together tightly to give continuous insulation with no fear of thermal bridges.

Aesthetic surface coupled with maximum efficiency – insulation elements by ISOVER.

ISOVER products for the insulation of basements

ISOVER clamping felts of λ_d = 0.032 W/(mK)

- For insulating cellar ceilings (solid and timber joist ceilings) from below
- Non-flammable (Euroclass A1)
- Can be easily cut to size thanks to a line marking.

ISOVER clamping felts of λ_d = 0.035 W/(mK)

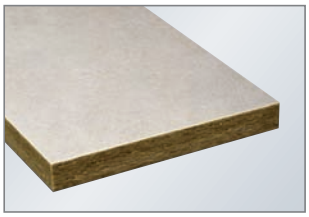
- For insulating cellar ceilings (solid and timber joist) from below
- Non-flammable (Euroclass A1)
- Can be easily cut to size thanks to a line marking.

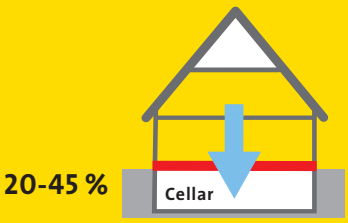
ISOVER glass wool slabs of λ_d = 0.030 W/(mK), 0.032 W/(mK) and 0.035 W/(mK)

- For insulating the cellar ceiling from below
- Non-flammable (Euroclass A1)

ISOVER stonewool slabs of λ_d = 0.035 W/(mK) and 0.040 W/(mK)

- For insulating the cellar ceiling from below
- Non-flammable (Euroclass A1)

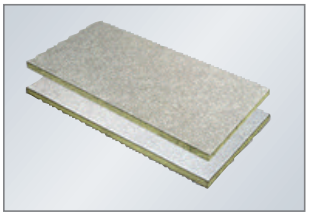




VARIO KM and VARIO KM Duplex climate membranes and their accessories are covered in detail on pages 56-58.

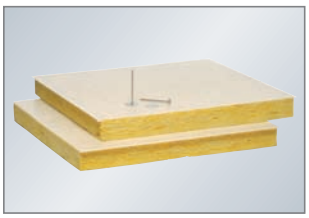
ISOVER stonewool slabs for insulating cellar ceilings

- For insulating cellar ceilings and garages
- Different surface structures
- Installation options: bonding, dowelling, mounting in metal framework
- λ_d = 0.040 W/(mK)
- Non-flammable (Euroclass A1)



ISOVER glass wool slabs for insulating cellar ceilings

- For insulating cellar ceilings and garages
- Different surface structures
- Installation options: dowelling, mounting in metal framework
- λ_d = 0.033 W/(mK)
- Non-flammable (Euroclass A2)



ISOVER EPS boards for insulating cellar ceilings

- For insulating cellar ceilings
- Installation: with metal rails and claw fasteners
- λ_d = 0.032 W/(mK)
- Fire behaviour: Euroclass E

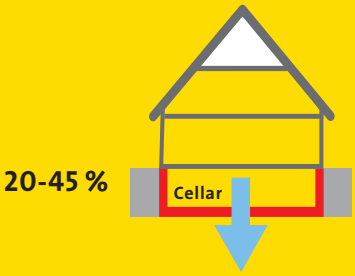
Excellent insulation – remember the outer walls of the cellar

Rooms in the basement that will be regularly used after refurbishment require high levels of thermal insulation and reliable protection from ground moisture and water seeping through the walls. This is why the walls should be professionally surveyed at the very outset of the project. Water can be present in the cellar as retained or capillary water and will even rise against the force of gravity. A permanently dry cellar can only be guaranteed if the necessary remedial measures are expertly planned and executed.

Successful insulation prevents water damage

If the outer walls of the cellar are damp or even leaking water, it is time to carry out large-scale exterior renovation of the cellar walls. The first step is to repair any defective moisture barrier or dampproofing. Thermal insulation, in the form of ISOVER expanded or extruded polystyrene (EPS or XPS) slabs, is then installed on the outer surface of the wall.

Correct renovation of a cellar wall from outside: expose the wall, install the drainage, apply the dampproofing and XPS-insulation layers and finally re-fill the excavation.



Even cellar walls are not totally protected from the cold

Although up to 80 % of the cellar walls are generally covered by the soil, and only 20 % therefore have contact with the external air, the same thermal requirements apply as for all other exterior walls. The frost line (or frost-free zone) starts underground at a depth of 1.5 m, below which constant summer and winter temperatures are maintained, which reduces the amount of heat loss through the cellar walls. It generally, therefore, requires only a 30 cm thickness of ISOVER glass wool insulation to achieve the thermal comfort level of a Multi-Comfort House.

Renovation on the inside: the easiest way to higher energy efficiency

Access to the outside of cellar walls is often difficult. Thermal renovation from inside, i.e. on the room-facing wall, is therefore the only viable option in most cases. The ideal solution in this case is the ISOVER OPTIMA system. Installation is quick and straightforward, and provided the correct insulation thickness is used, the rooms will remain warm in winter and pleasantly cool in summer. By including on top, VARIO KM or KM Duplex climate membranes in the construction you will also provide protection against the intrusion of moisture. Please refer to page 71 for details of the installation procedure.

OPTIMA combined with VARIO KM Duplex – an ideal solution for cellar walls.

Energy use and potential savings based on an outer cellar wall of 36 cm concrete, with a wall area of 100 m² and different insulation thicknesses			**Low-energy house**			**ISOVER Multi-Comfort House**		
			Thermal conductivity W/(mK)			**Thermal conductivity W/(mK)**		
	Built in 1900	**Built in 1975**	**0.032**	**0.035**	**0.040**	**0.032**	**0.035**	**0.040**
U-value in W/(m²K)	2.80	0.48	0.20			0.11		
Insulation thickness in cm	No insulation	6	14	16	18	27	30	33
Heating energy demand in kWh per year	23,520	4,032	1,680			924		
Heating energy demand in kWh over a period of 40 years	940,800	161,280	67,200			36,960		

The calculation is based on a moderate climate with 3500 Kd heating degree days.

▶ *Please refer to the inside back cover for a glossary of all physical units and technical terms used.*

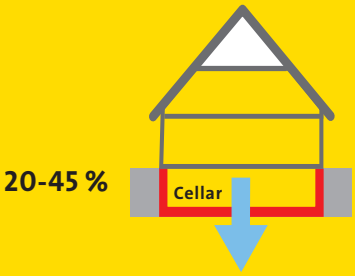
Thermal envelope inside the cellar? Proper protection of the inner walls is needed!

It may well be that the boundary of the thermal envelope runs through the cellar. In this case, the walls between heated and unheated areas – as well as the outer cellar walls themselves – must be properly insulated to prevent heat loss. This can be effectively achieved with ISOVER mineral wool slabs. They give you the choice of three installation options: either direct-fix to the wall: fixed in a timber or metal stud framework; or installed in ISOVER's high performance OPTIMA system. In each case, the insulation is then lined internally, usually with plasterboard.

When installing the thermal insulation on the warm room-facing side, it is also necessary to apply a VARIO KM or VARIO KM Duplex membrane over the insulation before the internal lining is fitted. This membrane is not needed when insulation is installed on the "cold" side.

When carrying out a cellar conversion, you may also want to include a toilet and shower room. ISOVER extruded polystyrene (XPS) boards are ideal for insulating wet rooms as they have a very high compression resistance and can be covered directly with tiles.

XPS boards are unaffected by water and therefore ideally suited for wet rooms. Additional benefit: they can be directly tiled over.



Cellar floors turned habitable with ISOVER insulation

Provided the existing cellar floor is already water- and vapour-tight, any additional thermal insulation can be installed directly on top. There are a number of different ISOVER systems designed for this purpose. Depending on the existing condition and future use of the room, the floor can either be covered with dry screed panels or with a wet screed to which the final floor covering is applied later. Whichever option you choose, an insulation thickness of 30 cm ensures that you reach the level of an ISOVER Multi-Comfort House.

But what if the cellar is heated and in use, but the cellar floor is not dampproof? In this case, expert analysis will generally recommend that the old floor be completely removed and replaced.

Energy use and potential savings based on a concrete foundation slab with 100 m² floor space			Low-energy house			ISOVER Multi-Comfort House		
			Thermal conductivity W/(mK)			Thermal conductivity W/(mK)		
	Built in 1900	Built in 1975	0.032	0.035	0.040	0.032	0.035	0.040
U-value in W/(m²K)	2.15	0.68	0.20			0.11		
Insulation thickness in cm	No insulation	4	14	16	18	27	30	33
Heating energy demand in kWh per year	9,030	2,867	840			462		
Heating energy demand in kWh over a period of 40 years	361,200	114,667	33,600			18,480		

The calculation is based on a moderate climate with 3500 Kd heating degree days.

▶ *Please refer to the inside back cover for a glossary of all physical units and technical terms used.*

Raised access floors: Top choice – not only when you need fast results

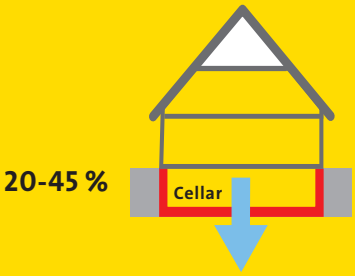
The TEL raised floor system is a dry and lightweight floor construction. Thanks to its adjustable height, it can be adapted to suit all floor conditions, while levelling out irregularities and differences in height. The "legs", or pedestals, are placed directly onto the load-bearing subfloor, even if the surface is uneven – all that's needed to level out any difference in height is a single turn of the screw, from above. The next day you can install the flooring – and the job's done!

How to install a raised access floor

Start by determining the direction of installation, then take the edge panels and cut off the tongue. Next, glue the flexible perimeter strips to the wall, along the floor edges. Drive the TEL pedestals into the predrilled holes of the panel and mount the ISOVER insulation slab on top of the panel. Then, slip the sound absorber disks onto the pedestal heads, turn the complete insulated panel over and install it on the floor. This is done by first adjusting the corner and then the middle pedestals using the special TEL screwdriver. Glue the tongue-and-groove joint and finally place the panels into position, with joints staggered. Pipes and cables can be conveniently hidden away under the TEL raised access floor.

Advantages of the TEL raised access floor:

- *Construction heights of 5 to 29 cm*
- *Installed on the subfloor without loose fill*
- *Pipes and cables can be simply hidden away*
- *Can be covered with flooring after just 1 day*
- *Low weight of only 22 kg/m²*
- *Load-bearing up to 500 kg/m² (5 kPa)*
- *Point loads up to 300 kg (3 kN)*



Dry screeds – the perfect basis for wooden floors

Wooden floors convey an aura of warmth and cosiness and are well suited for all types of room, from a living room or party room to your own private "fitness oasis". Regardless of its design, a high quality wooden floor, expertly fitted, will be hardwearing and will retain its good looks for decades to come.

Highly important: the vapour barrier

If the floor is located directly above the cold ground, it needs to be very well insulated. As well as thermal and acoustic insulation, effective dampproofing is a must. In this case 0.2 mm thick PE sheeting, such as ISOVER FLAMMEX, should be installed on top of the final thermal insulation layer. This is done immediately before installing, for example, tongue and groove boarding or chipboard floor covering. This sheeting acts like a vapour barrier and must always be installed on the warm side of the construction.

An energy-efficient solution: floating dry screed with a chipboard covering.

Whether tongue and groove boarding on timber battens or mosaic parquets on chipboard – together with ISOVER they will keep your feet warm.

ISOVER EPS and XPS – Floor insulation that meets every demand

ISOVER insulation boards made of expanded or extruded rigid polystyrene foam (EPS or XPS) are remarkably strong and robust. As these boards are also virtually immune to moisture, they are commonly used for insulating cellar floors and floors that are in direct contact with the ground – regardless of whether they are installed as part of a dry floor system or under a wet screed.

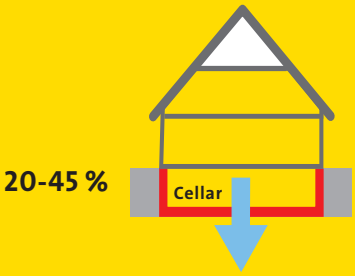
ISOVER expanded polystyrene insulation boards (EPS)

Extruded polystyrene (XPS) insulation boards: double-layered to ensure higher living comfort and lower energy costs.

Pinpoint and remedy weak spots

You will only be able to enjoy a healthy indoor climate and a cosy home if all of the components of the building are sufficiently dry. Besides increasing heating costs, building moisture can have other far-reaching consequences:

- *Moisture decreases the efficiency of the insulation materials in your home.*
- *Freezing water destroys materials and structures.*
- *Soluble salts may cause efflorescence.*
- *Moisture leads to rot, decay and corrosion.*
- *Moisture causes the growth of mould and fungi.*
- *Consequentially, the value of the property will decline.*



Lower energy costs – for HVAC systems too

HVAC systems, which include pipework for heating, ventilation, air-conditioning systems and the supply of cold and warm water, as well as technical equipment such as pumps and boilers, lose useful heat to their surroundings. When undertaking a low energy refurbishment of your home, take the opportunity to check these systems and associated equipment and improve their insulation. You will be surprised at just how much energy you can save.

Wrap up the pipes – ISOVER shows you how

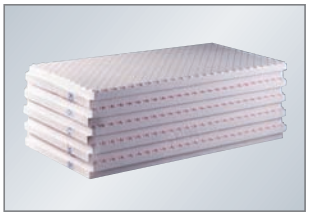
ISOVER offers you a range of different insulation systems designed to reduce heat loss through HVAC systems: mineral wool pipe lagging, with or without aluminium foil facing, as well as a choice of insulation slabs. Apart from cutting down on energy costs, this type of insulation offers an extra benefit: noise from, for instance, air-conditioning systems or sewer pipes is significantly reduced – so do your bit for a quiet life.

Apart from optimal thermal insulation, ISOVER pipe sections offer excellent fire, sound and environmental protection.

ISOVER products for insulating cellar walls and floors

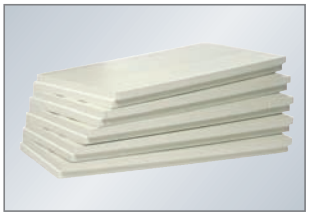
ISOVER EPS boards for insulating perimeter walls

- Compression-resistant, with an embossed surface
- λ_d = 0.035 W/(mK)
- Fire behaviour: Euroclass E



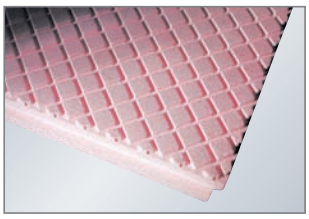
ISOVER XPS boards for insulating perimeter walls

- Highly compression-resistant, with an embossed surface
- Also suitable for insulating interior walls, especially in wet rooms. Can be directly covered with tiles.
- λ_d = 0.033 W/(mK) to 0.039 W/(mK) (depending on the thickness)
- Fire behaviour: Euroclass E



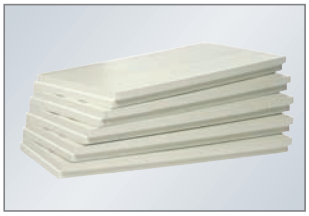
ISOVER EPS boards for insulating cellar walls

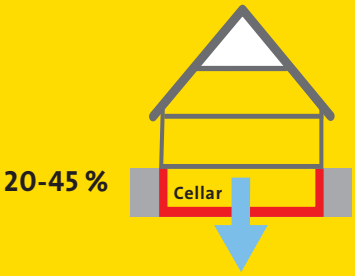
- Highly compression-resistant, with an embossed surface
- Ideal protection of vertical dampproofing, drainage and insulation layers
- Can be used down to a maximum depth of 6 m
- λ_d = 0.035 W/(mK)
- Fire behaviour: Euroclass E



ISOVER XPS boards for insulating cellar walls

- Highly compression-resistant
- Ideal protection of the vertical dampproofing and insulation layers
- λ_d = 0.033 W/(mK) to 0.039 W/(mK) (depending on the thickness)
- Fire behaviour: Euroclass E





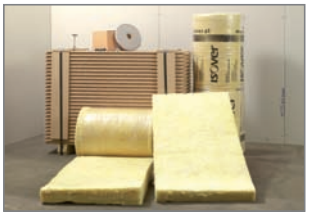
ISOVER OPTIMA and ISOVER VARIO system

- Insulation system for the inner face of cellar walls (dry wall construction)
- Fast installation thanks to matching components
- Durable thermal insulation and moisture protection

The system components are described on pages 74-75 (ISOVER OPTIMA) and 56-58 (ISOVER VARIO).

ISOVER TEL raised access floor system

- Dry and lightweight floor construction
- Due to the variable height of 5-29 cm, the construction can be optimally adapted to the room conditions.
- Levels out height differences and uneven surfaces
- The system consists of timber-based boards, pedestals with sound absorber disks, flexible edge strips and ISOVER insulation slabs.



ISOVER stonewool slabs for floor insulation

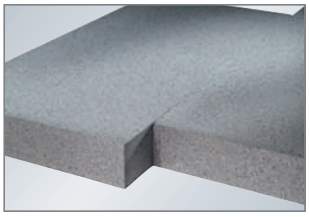
- For insulating floating dry screeds
- Stable and load-bearing
- λ_d = 0.040 W/(mK)
- Non-flammable (Euroclass A1)

ISOVER glass wool slabs for floor insulation

- For insulating floating dry screeds with timber-based board covering
- Stable and load-bearing
- λ_d = 0.033 W/(mK)
- Non-flammable (Euroclass A2-s1, d0)

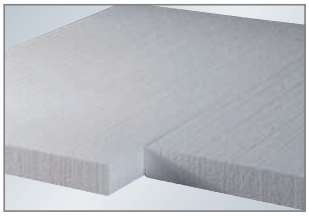
ISOVER EPS boards for floor insulation

- Ideally suited as insulation layer under wet and dry screeds
- Excellent thermal insulation
- λ_d = 0.031 W/(mK)
- Fire behaviour: Euroclass E



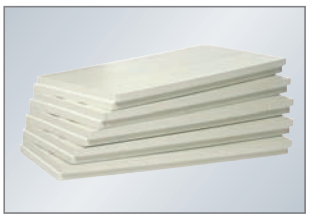
ISOVER EPS boards for floor insulation

- Ideally suited as insulation layer under wet and dry screeds
- λ_d = 0.035 W/(mK)
- Fire behaviour: Euroclass E



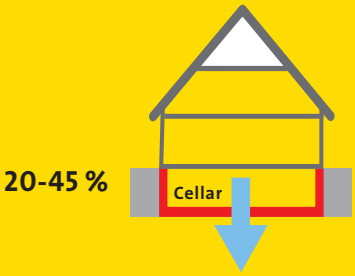
ISOVER XPS boards for floor insulation

- Highly compression-resistant
- Ideally suited as insulation layer under wet and dry screeds
- λ_d = 0.033 W/(mK) to 0.039 W/(mK) (depending on the thickness)
- Fire behaviour: Euroclass E



ISOVER FLAMMEX vapour barrier membrane

- Extremely tear-proof PE sheeting of 0.18 mm thickness
- Ideally suited as separating layer and vapour barrier for wet and dry screeds
- High s_d-value (60 m)



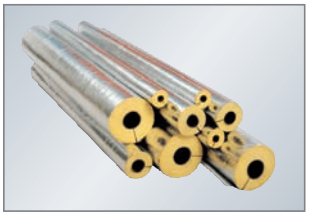
ISOVER products for insulating HVAC systems

ISOVER ULTIMATE pipe sections, with / without aluminium foil facing

- For pipe insulation with precision fit
- λ_d = 0.035 W/(mK)
- Non-flammable (Euroclass A1) without aluminium foil facing
- Non-flammable (Euroclass A2) with aluminium foil facing

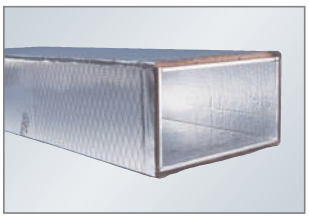
ISOVER glass wool pipe sections, with / without aluminium foil facing

- For pipe insulation with precision fit
- λ_d = 0.035 W/(mK)
- Non-flammable (Euroclass A1) without aluminium foil facing
- Non-flammable (Euroclass A2) with aluminium foil facing



ISOVER CLIMAVER insulation system for ventilation ducts

- Lightweight and fast insulation of ventilation ducts
- λ_d = 0.035 W/(mK)
- Excellent thermal and acoustic insulation
- Non-flammable (Euroclass A2)



Acoustic comfort – an integral part of all ISOVER solutions

Whether at work or in your own home, more and more people are now complaining about the growing level of noise pollution. Many even suffer disturbed sleep. Sleep is crucial for regeneration of the mind and body and lack of it is known to bring about serious health problems. Noise not only includes the sound penetrating the building from outside. Noise is also generated inside the building – causing disturbance which is particularly important in multi-family houses. Recent studies in several European countries prove that, after road traffic, our own neighbours are the second largest source of noise nuisance.

When undertaking the refurbishment of a house or flat, this is also a good opportunity to reconsider the acoustic insulation requirements of single rooms and to plan appropriate solutions. With good planning and high quality workmanship, acoustic performance can be significantly enhanced with ISOVER insulation solutions. However, you need to differentiate between airborne sound and impact sound: the former is transmitted via the air through walls and ceilings, the latter through the floor or stair structures themselves.

The good news is that ISOVER solutions not only lower the energy consumption of your home but also the noise level – automatically.

ISOVER Acoustic Comfort Classes

Class	Music	Comfort	Enhanced	Standard
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

Class	Music	Comfort	Enhanced	Standard
Airborne sound insulation of the components (excluding 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

ISOVER acoustic classes ensure long-lasting, maximum comfort – even when changing the intended use of a room.

The noise factor

- *80 million EU citizens are exposed to harmful noise.*
- *Another 170 million live in acoustic grey zones that seriously affect their personal well-being.*
- *As a result of this negative health impact, the EU's GNP (gross national product) is reduced by up to 2 %, entailing annual follow-up costs of well over 12 billion euros.*

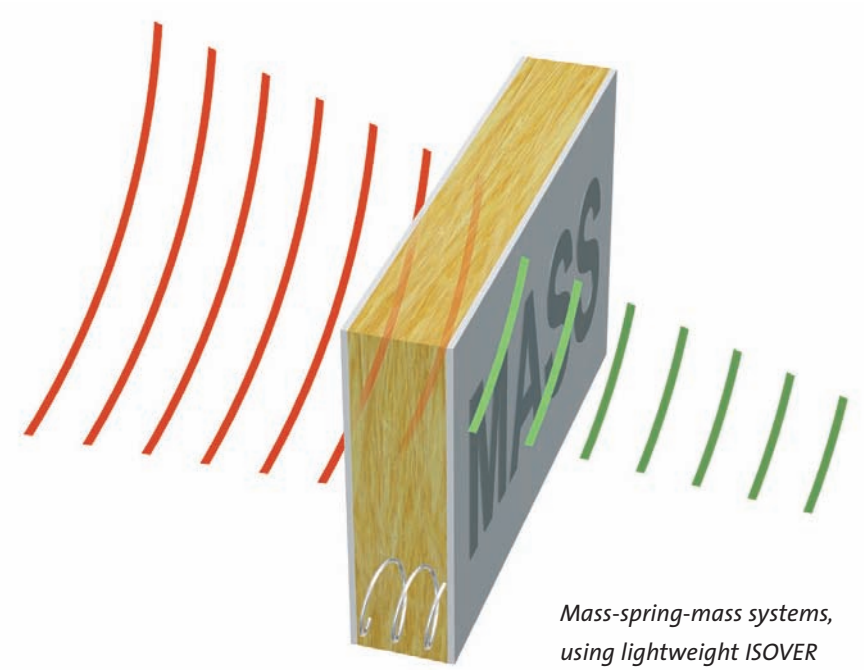
Sources: European Noise Policy. Strategy Paper of the CALMNetwork (DG Research of the European Commission – July 2002). European Union: Green Paper on Future Noise Policy (1996).

▶ *Please refer to the inside back cover for a glossary of all physical units and technical terms used.*

The insulation principle: Mass-spring-mass

Systems based on the 'mass-spring-mass' principle offer the most effective sound insulation. They are far superior to solid single-leaf constructions, whose acoustic performance is almost totally dependent on the mass of the element alone, and would require a disproportionately thick and heavy construction to achieve a comfortable level of sound insulation. In practical terms such an increase in wall thickness is virtually impossible as it would require stronger foundations, cut down on living space and entail longer construction and drying times.

In contrast, multiple-leaf mass-spring-mass systems filled with ISOVER mineral wool, add an extra 1 db of sound performance for every extra centimetre of insulation used. This makes mass-spring-mass systems superior in many ways, including their acoustic properties, their practicality of use and their cost effectiveness. A complex physical process with a clear, unbeatable effect: significant noise reduction.



Mass-spring-mass systems, using lightweight ISOVER glass wool as a "spring" material, apply the laws of acoustics and repeatedly "break up" the sound waves.

Where does indoor noise come from?

Noise originates from numerous sources:

- *external noise (mostly traffic)*
- *people talking and moving*
- *household appliances (washing machine, dishwasher)*
- *water supply and effluent drainage systems*
- *air-conditioning systems*
- *elevators*

Noise is transmitted via different paths:

- *directly through walls or ceilings*
- *indirectly via flanking (adjacent) components*
- *through ventilation shafts, chimneys and conduits*

A new room layout – fast and easy

A large-scale renovation project offers the ideal opportunity to design new room layouts. Naturally, our individual wishes and needs change over the life cycle, which is where lightweight partition walls, made of plasterboards and ISOVER insulation come into their own. They can be quickly installed and adapted as our needs change, making conversion and space separation easier, and providing excellent acoustic, fire and thermal insulation performance. All this is achieved without significant disruption, drying times or the need for additional structural strengthening. Even special features such as projecting box-type elements can be quite easily achieved with these systems, and the plumbing, wiring or lighting systems are easily accommodated inside the wall cavity. Since the wall surface is level and dry, it can be painted, wallpapered or even tiled without delay – according to your personal wishes.

"Class instead of mass"

Surprisingly, a lightweight stud wall with a mass per unit area of just 25 kg/m² has a weighted sound reduction index of about 50 dB – the same as a 250 kg/m² solid wall. However, to achieve this tenfold efficiency it is important that the cavity between the plasterboards is completely filled.

Compared to a conventional solid wall, a lightweight 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.

It's all in the name: OPTIMA provides optimal sound insulation

The OPTIMA system not only boosts the energy efficiency of your home, it also improves the soundproofing and protects you from the noise produced by neighbours, music lovers, party fans or hobby craftsmen. Simply install ISOVER mineral wool with the black tissue facing. For more details on OPTIMA refer to page 71.

The OPTIMA system: simply better sound insulation for walls and ceilings.

Totally relaxed and soft-footed – thanks to impact sound insulation by ISOVER

Noise is stopped most effectively at its source. This is why the insulation of floors plays such an essential role in the acoustic refurbishment of your home. With ISOVER you can be sure to get optimum solutions that effectively prevent impact sound from footsteps from being transmitted through the surrounding walls and other flanking building components.

ISOVER impact sound insulation boards combine thermal and acoustic insulation.

From roof to cellar: acoustic insulation always included

The roof? The basement? The facade? No matter which components of your home you want to upgrade, ISOVER will always automatically include optimum sound insulation. Let's take, for instance, a pitched roof. After renovation with a double-leaf construction based on the mass-spring-mass principle, it reliably keeps the ambient noise outside. Whether you prefer between- or above-rafter insulation, resilient ISOVER mineral wool is guaranteed to "cushion" the noise. You can rest assured that the same ISOVER effect is achieved on the facade: noise is kept outside, warmth inside. This is why ISOVER facade insulation systems are ideal – even in areas suffering extremely high traffic noise levels.

Impact sound insulation below the ceiling

If it is not possible in an already inhabited building to improve the impact sound insulation at "source", it may help to mount a suspended ceiling from below. The new ceiling is suspended from special fastening elements to ensure an elastic construction. The resulting cavity is filled with ISOVER insulation. In this way, you can cut the perceived noise disturbance in half.

ISOVER products for acoustic insulation

ISOVER glass wool rolls for insulating partition walls and wall linings

- Quick installation thanks to roll widths of 40 cm, 60 cm or 62.5 cm to suit different stud centres
- Optimum acoustic insulation when completely filling the cavity, $r \geq 5$ kPa·s/m²
- Considerable storage and transport benefits due to compressed rolls
- λ_d = 0.035 to 0.039 W/(mK)
- Non-flammable (Euroclass A1)

ISOVER glass wool boards for insulating partition walls and wall linings

- Optimum acoustic insulation when completely filling the cavity, $r \geq 5$ kPa·s/m²
- λ_d = 0.035 to 0.039 W/(mK)
- Board width between 60 cm and 62.5 cm to suit different stud centres
- Non-flammable (Euroclass A1)

ISOVER stonewool boards for insulating partition walls and wall linings

- Optimum acoustic insulation when completely filling the cavity, $r \geq 5$ kPa·s/m²
- λ_d = 0.040 W/(mK)
- Board width between 60 cm and 62.5 cm to suit different stud centres
- Non-flammable (Euroclass A1)

ISOVER glass wool boards for impact sound insulation

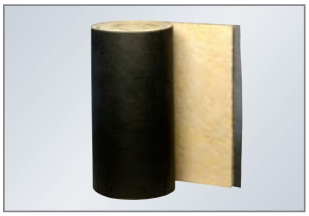
- Acoustic and thermal insulation under floating wet and dry screeds
- Optimum acoustic insulation thanks to high resilience
- Stable and load-bearing: from 2 kPa (200 kg/m³) to 10 kPa (1.000 kg/m³)
- λ_d = 0.033 to 0.035 W/(mK)
- Non-flammable (Euroclass A2-s1, d0)

ISOVER stonewool boards for impact sound insulation

- Acoustic and thermal insulation under floating wet and dry screeds
- Stable and load-bearing
- λ_d = 0.035 to 0.040 W/(mK)
- Non-flammable (Euroclass A1)

ISOVER glass wool rolls for acoustic insulation for use with the OPTIMA system

- Glass wool with a black tissue facing to ensure maximum soundproofing performance
- Very high sound absorption due to high porosity
- Ideally suited for use with the OPTIMA system
- λ_d = 0.038 W/(mK)
- Non-flammable (Euroclass A2-s1, d0)



All components of the OPTIMA system are shown described on pages 74-75.