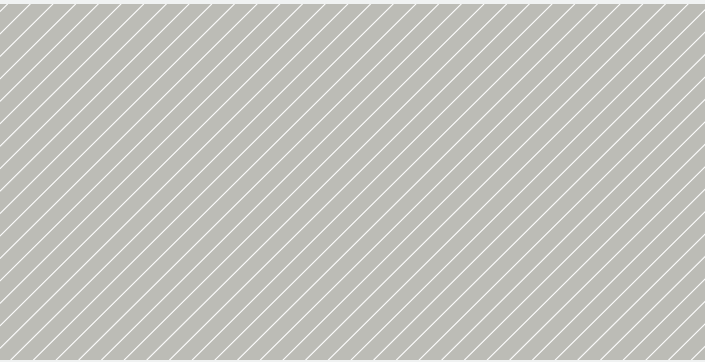


Intelligent sound insulation solutions in **wood construction**



1 | Wood – A naturally beautiful building material





Getzner Werkstoffe's home region of Vorarlberg has a long tradition of wood construction.

Austria's western-most province discovered the value of this natural resource as a high-quality building material generations ago. The "architectural province" of Vorarlberg has won many international awards for its pioneering achievements with wood and is thus an attractive destination for architects and enthusiasts from all over the world.

Wood: the material of the future

The demand for energy-efficient, sustainable construction methods is increasing. And large, multi-storeyed wooden buildings are becoming more and more popular. Wood is increasingly being used in the renovation of old buildings as well as for remodeling and additions.

Wood construction is gaining an increasing share in the total volume of construction. Lightweight wood construction represents an eco-friendly alternative that is cost-effective and flexible. Wood construction is one of the most natural methods of construction.

Sound insulation in wood construction: a challenging field

Builders, project managers, passive house builders, structural engineering firms, carpenters, architects, planners and engineers all have one thing in common: They all have to meet strict building requirements. Buildings in which people live and work must also meet unique challenges related to sound insulation.

Getzner Werkstoffe specializes in vibration mitigation for railway, construction and industrial applications. The company has been developing solutions for vibration isolation for over 40 years. Getzner was also quick to recognize the tremendous prospects of wood construction and sought out an active exchange of knowledge and experience with the pioneers in this field in Vorarlberg. Today, Getzner is the leading development partner for sound insulation solutions in wood construction.



2 | Efficient sound insulation in wood construction

Comfort requires more than just meeting minimum sound insulation requirements

Wood has a much lower mass than many other construction materials. Therefore, even small amounts of energy can cause vibrations in wood. In European countries, there are various construction standards aimed at protecting against disturbing vibrations and noise, including minimum standards that must be met for wood construction.

The standards and guidelines developed for standard construction (e.g. masonry) are not always relevant for wood construction. Modern buildings must offer a high level of comfort. However, the existing sound insulation standards only ensure a minimal degree of protection for residents against noise from neighboring apartments or from outside the building.

Some European countries are currently discussing stricter regulations. Until uniform regulations for wood construction are introduced, however, planners and builders must negotiate enhanced sound insulation specifications on a contractual basis.

Sound insulation is multi-faceted

Sound is transmitted through the air and through solid bodies. Sound insulation measures can be installed directly in building components or between the rooms of a building. Getzner Werkstoffe offers a range of materials with ten types of Sylomer® and five types of Sylodyn® that provide a high level of efficiency. The advantage is that the insulation materials can be adjusted to match the various loads that are encountered in wood construction.

Getzner Werkstoffe follows the source insulation principle in its sound insulation measures, meaning that noise is absorbed where it originates. This allows for a considerable reduction of disturbing vibrations.

Airborne noise

People, animals, machines and technical systems cause airborne vibrations. These vibrations are caused by speech, movement or music, for example. Technical building systems, such as ventilation systems and heating pumps, generate noise by exciting the surrounding air when they are in operation. The human ear perceives this as noise, which propagates through the air as sound waves.

Structure-borne noise and footfall noise

Structure-borne noise is produced, for example, when structures or building elements begin to vibrate when exposed to pounding, hammering or drilling. Technical building systems such as heating pumps and ventilation



Angle brace with optimal sound insulation

Consulting and the development of customized solutions

systems also generate vibrations in the form of structure-borne noise during operation.

Footfall noise, or the direct mechanical excitation of floors, steps, landings and similar building components, is a special form of structure-borne noise. By acoustic definition, it is not only produced by walking on a building component, but also by moving furniture, objects falling down, children playing and the use of household appliances.

The airborne or structure-borne noise passes directly into the building component, propagates from there and radiates into the adjacent rooms as secondary airborne noise.

Within the field of wood construction, Getzner Werkstoffe specializes in sound insulation.

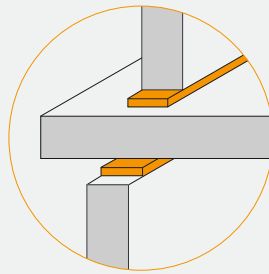
Solutions are available for stairs, floors, ceiling structures, terrace floors and the junctions between walls and floors. Vibration isolation can also be performed on sanitary equipment, pipes, machines and technical building systems using the elastic materials Sylomer® and Sylodyn® in order to ensure that buildings meet even the highest demands for comfort. Getzner Werkstoffe also offers products for a unique field of wood construction: modular construction as a mobile, expandable and flexible solution for living spaces.

Getzner is much more than just a manufacturer of premium vibration isolation solutions. Its vast wealth of technical expertise from years of development and project work allows the company to offer its customers highly specialized services. Getzner stands apart from the competition thanks to its comprehensive consulting services and intense cooperation with its customers in the development of solutions. The extensive range of services is rounded off by modeling work, measurements and tests in the company's own testing facility as well as individual designs and design studies. Getzner manufactures the elastic materials and performs any special cutting required at its own plant.

The creative experts at Getzner work together with builders, project managers, passive house builders, craftsmen, planners, structural engineering firms and architects to develop efficient, tailored solutions that fulfill the highest of sound insulation requirements. To this end, Getzner has been cooperating closely with leading wood construction companies and universities for years. Quality assurance and environmental sustainability play a decisive role in all of the company's developments.

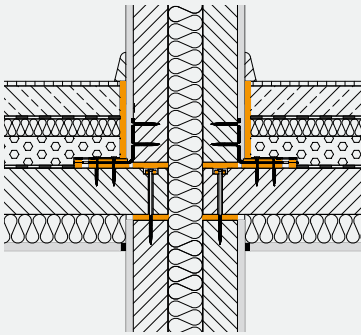


3 Applications in wood construction



Elastic mounting of flanking components

Flanking transmission



Sound can be transmitted between two rooms both directly through the partitioning element and also around the partitioning element. The better the sound insulation for the partition is, the stronger the impact of flanking transmission via the abutting elements becomes. The elastic materials Sylomer® and Sylodyn® can be used to separate the floors from the walls in order to eliminate flanking transmission. This makes it possible to eliminate the sound-insulating shells that would otherwise be necessary.

Elastic decoupling between the wall and the floor prevents the transmission of noise. However, fasteners such as angle braces and screws must also be optimized in order to prevent sound bridges; in order to achieve this, they must be fitted with elastic mountings. Various measurements have been conducted together with Holzforschung Austria, the accredited testing and monitoring subsidiary of the Austrian Society for Wood Research. These tests showed that the footfall noise level $L'_{n,w}$ can be reduced by up to 7 decibels compared to static mounting by using elastic Sylodyn® layers. By installing Sylodyn® mountings above and below the ceiling frame, it is possible to achieve noise

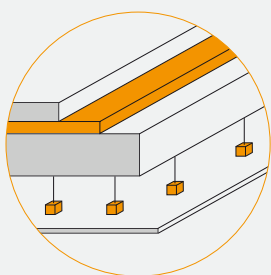
reductions of up to 14 decibels in the noise level difference $D'_{n,w}$.

Fasteners

Fasteners that are necessary for structural purposes, such as angle braces and screws, considerably reduce the effectiveness of sound insulation measures used on flanking elements. For example, if the number of braces is doubled, the measured noise level difference $D'_{n,w}$ declines by up to 3 decibels when elastic mountings are installed between the floor and the wall. Optimized fasteners, on the other hand, do not transmit any acoustic energy.



Elastic mounting of walls and ceilings



Ceiling structures with elastic materials

Getzner Werkstoffe offers effective solutions for reducing footfall noise in wood construction. Elastically mounted floor systems and suspended ceilings can reduce the transmission of footfall noise to a minimum. Footfall noise insulation can be installed on the top or bottom side of the ceiling frame.

Lewis sheeting

If the footfall noise insulation is installed on the top side of the ceiling frame, the screed is applied to dovetail-shaped "Lewis" sheeting, which is mounted on highly effective Sylomer® TSS strips. This system provides enhanced sound insulation, even with a very thin floor build-up.

AMC ceiling mounts

If the footfall noise insulation is installed on the bottom side of the ceiling frame, footfall noise is reduced by isolating the ceiling with "Akustik + Sylomer®" ceiling mounts. The void between the ceiling frame and the suspended ceiling is then filled with insulating material and can be used to route ventilation ducts and electric lines. The use of Sylomer® ensures that the acoustic connection between the ceiling frame and the suspended ceiling is completely eliminated.

If both systems are combined, it is possible to achieve an $L_{n,w}$ footfall noise dampening level of 38 decibels, even for renovations of old buildings.

Elastic floor mounting is also ideal for terraces that are located directly above living spaces. Due to design considerations, terrace floors are often built with inadequate footfall noise insulation. Sylodyn® allows for the effective decoupling of terrace floors and ensures a good level of insulation against footfall noise.

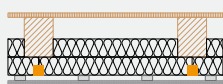
Measures using Getzner materials significantly reduce footfall noise. It is possible to reduce footfall noise by at least 29 decibels (see detailed diagram).

Detailed diagram of footfall noise insulation

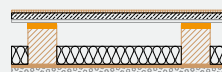
Research project: "Wooden beam ceilings in the renovation of old buildings" (DGfH: F-2006/26; HAF: 540-2006-F2/3)



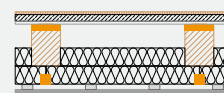
Ceiling frame
 $L_{n,w} = 67$ decibels



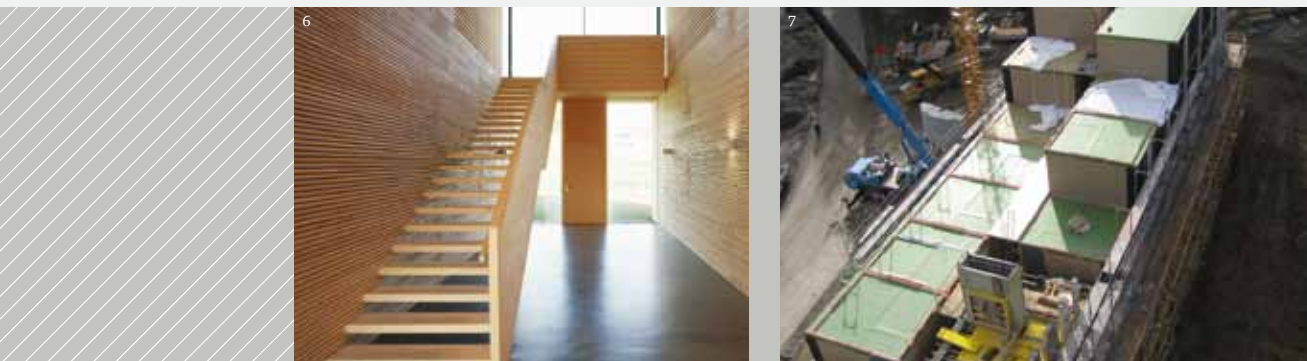
Ceiling frame with
Akustik + Sylomer®
 $L_{n,w} = 53$ decibels



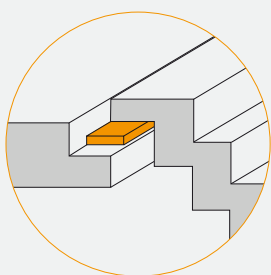
Ceiling frame with
Lewis sheeting
 $L_{n,w} = 46$ decibels



Ceiling frame with Akustik
+ Sylomer® and Lewis
sheeting $L_{n,w} = 38$ decibels



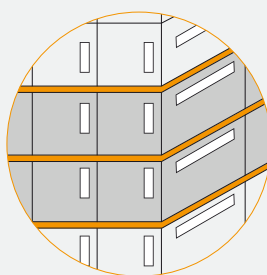
Modular dwellings on Sylomer®



Mounting of staircases and landings

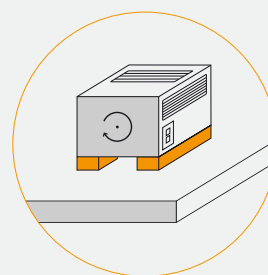
Staircases are often directly fixed to partition walls in apartments. As a result, the structure-borne noise that is generated by walking on the stairs is transmitted into the adjacent rooms via the supporting surfaces. Even if enhanced sound insulation requirements are fulfilled, problems with footfall noise can still occur.

The low-frequency “rumbling” that is produced by walking on stairs can be alleviated by completely decoupling the stairs: The staircase is mounted on elastic support points (strip bearings, discrete bearings or molded parts). In the case of staircases with landings, the landing is mounted elastically, and is thus decoupled from the partition wall. The junctions between the stringers and the floors are also decoupled using elastic layers. This considerably improves the level of comfort and thus the quality of life in the building.



Mounting of modular dwellings

Modular dwellings are an innovative form of wood construction which offers the advantage that a large portion of the structure can be factory built, thus eliminating problems related to weather conditions. This method of construction is often used for hotels, schools, daycare centers, residential buildings and additions to buildings. Modular dwellings are built using standardized individual components and can be dismantled. Additional arguments for modular dwellings include short construction times and simple transport. About 90 percent of noise transmission in modular dwellings takes the form of flanking transmission. Noise transmission can be successfully prevented by mounting the individual modules on Sylomer®, which decouples them from one another.



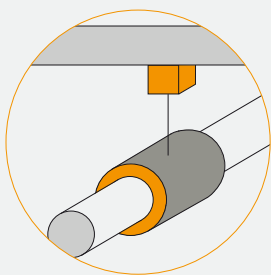
Mounting of machinery and other technical building systems

Vibrations and disturbing noise are caused by mechanical equipment and other technical building systems. Sylomer® and Syldyn® can be used to isolate vibrations at the points where they are transmitted to the building’s structural elements. This includes pipes and electric lines that are routed through walls and floors.

Elastic mountings for heating and ventilation systems, for example, help to acoustically decouple the equipment from the building components. Emissions such as noise and structure-borne noise from washers, dryers and other equipment can be reduced to a minimum in this way. Mounting can be full-surface, but the use of discrete bearings and strip bearings also yields excellent results.



Modular construction methods



Mounting of sanitary fixtures and suspension of pipes

The use of sanitary facilities generates structure-borne noise, which can impair the level of comfort offered by a building. Pipes, ducts and chimneys also generate noise. These problems can be solved by elastically separating these elements in order to achieve effective sound insulation. For example, pipes can be installed using elastically decoupled brackets.

This prevents vibrations from being transmitted into adjacent building components. In order to achieve premium comfort, it is necessary to decouple all of the sanitary fixtures from the building components.

Customized solutions

Getzner Werkstoffe can help you to achieve the absolute pinnacle in living and working comfort in wood construction. The company is the first choice when it comes to efficient solutions for insulation against structure-borne noise and footfall noise. Innovative planners, architects, builders and craftsmen rely on Getzner's creative experts. Working together, these experts constantly develop optimized

solutions for sound insulation in wood construction. The specialized testing facilities and laboratories at the company's plant in Bürs, Austria, are equipped with state-of-the-art technology. Universities also use Getzner's high-tech infrastructure for research purposes.



4 | References





Hotel Post, Bezau, Bregenzerwald



Alpenhotel Ammerwald, BMW Group
(modular construction)

List of reference projects

The projects Getzner has completed speak for themselves.

Selected projects:

- Munich/DE, Pariserstraße, elastic decoupling of wall and floor elements, 2009
- Växjö/SE, Portvakten (*passive building*), elastic decoupling of wall and floor elements, 2008-2009
- Rosenheim/DE, Börsenverlag, elastic mounting of a terrace floor (*footfall noise insulation*), 2008
- Reutte/AT, BMW Alpenhotel Ammerwald, acoustic decoupling of building components (*modular wood construction*), 2008
- New York/USA, System 3, elastic mounting of a residential module for an exhibition at the Museum of Modern Art (*MoMA*), 2008
- Växjö/SE, Limnologen, elastic decoupling of wall and floor elements, 2006-2008
- Vienna/AT, Mühlweg, elastic decoupling of wall and floor elements, 2007
- Bludenz/AT, Muther apartment complex, elastic decoupling of wall and floor elements, 2007
- Housing concept, "Bo-Klok" Skanska-Ikea, acoustic decoupling of building components (*modular wood construction*), since 2002
- Ludesch/AT, Bieleweg, elastic decoupling of wall and floor elements, 2002
- Judenburg/AT, Judenburg apartment complex, elastic decoupling of wall and floor elements, 1998
- London/GB, Kingsdale Music School, elastic decoupling of wall and floor elements, 2006

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