INTRODUCTION

SOLID TIMBER MANUAL 2.0

binderholz

Rigips
SAINT-GOBAIN

3nd edition, February 2023

All information in this document reflects the latest state of development and has been prepared for you according to the best of knowledge and good faith. As we always strive to offer the best possible solutions for you, we reserve making changes due to improvements in terms of application or production technology. Assure yourself that you have the most recent edition of this document available. Printing errors cannot be ruled out.

This publication is targeted at trained specialists. The illustrations of executing activities contained in this document are not understood as processing instructions, unless expressly marked as such. Renderings and sectional views of the individual assemblies are not depicted on scale; they merely serve as illustration.

Our products and systems are matched to each other. Their interaction has been confirmed by internal and external testing. All information is generally based on the exclusive use of our products. Unless described otherwise, the information does not permit any conclusions as to the combinability with third-party systems or exchangeability of individual parts by external products; to this end, no warranty can be extended or liability accepted.

Please also note that our business relationships are exclusively subject to our general terms of sale, delivery and payment (GTC) in the current version. You can receive our GTC on request or find them online at www.binderholz.com and www.rigips.com.

We are looking forward to a pleasant cooperation and wish you great success with all of our system solutions.

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CONTENTS

"It is time to rediscover what makes wood so substantial on a broad basis. Building with this healthy material opens new horizons in all respects. Involving our technology and a new aesthetic relevance are a great opportunity for the pioneering use of timber."

Architect Josef Lackner, 1979

THE SOLID TIMBER MANUAL 2.0

The Solid Timber Manual is a detailed reference work for architects, planners, builders and executing workers, and investors who are interested in solid timber construction solutions. The manual was created by two partners sharing one vision: Both want to develop and provide the right systems for living space worth living and for the construction of sustainable buildings. This motto brings together binderholz and Saint-Gobain Rigips Austria, and thereby unites them to form a perfect team because every building is a symbiosis of the most diverse materials. A special combination is the connection of binderholz cross laminated timber CLT BBS and dry construction systems. The benefits of one material support those of the other. The manual explains briefly the advantages of timber construction, offers valuable information on the topic of environmental protection and explains details of building physics. In specific, this concerns fireproofing, sound and heat insulation. The most important and comprehensive chapter describes tested structural assemblies.

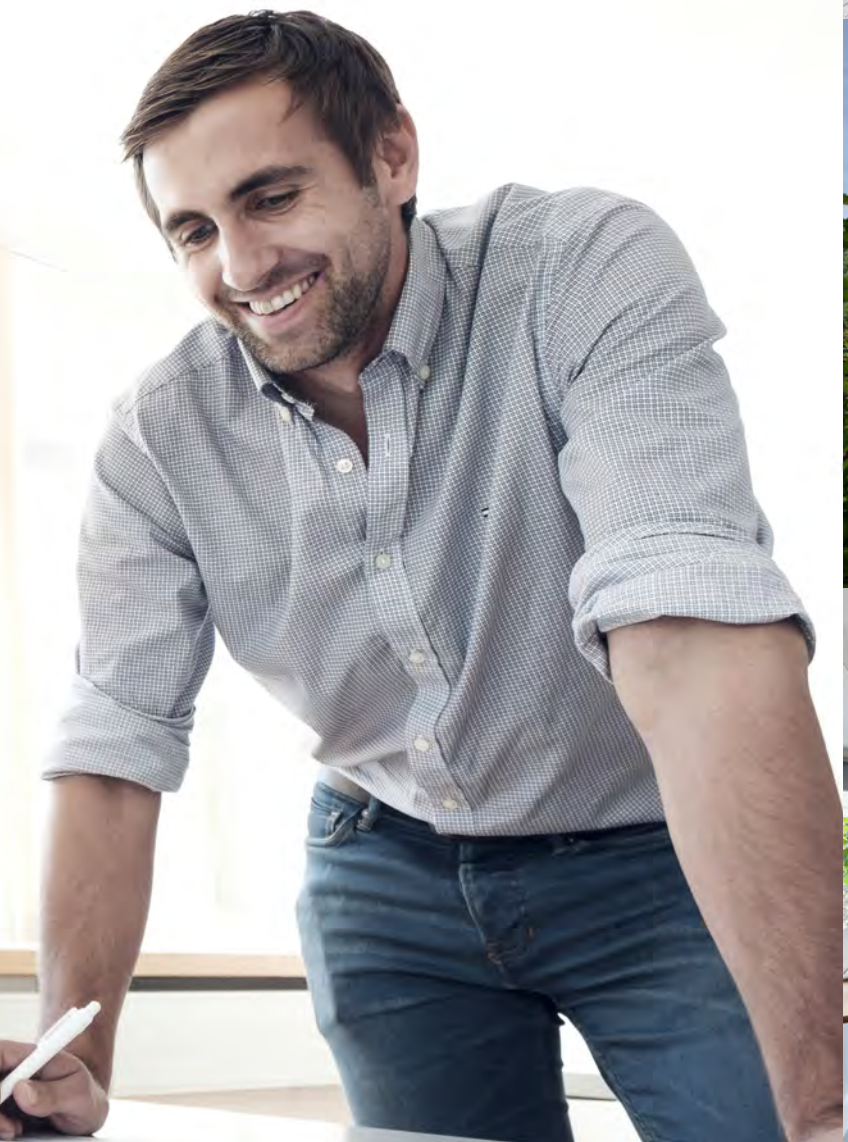
The revised Solid Timber Manual 2.0 continues to offer all system solutions of the previous version, but it has been expanded for improved comparisons, new and comprehensive results, more information about the topic of sustainability, and more detailed breakdowns of a variety of subjects relating to solid timber construction.

Improvements and expansions

Additional assemblies for sound insulation of residential partition walls with double-layer installation level that comprise only one carrying CLT BBS wall layer have been tested. Compared to the double-layer assemblies (two separate CLT BBS elements per assembly), they have a significant economic advantage, such as gains in space by virtue of lower wall thickness, material savings and much more.

In the Solid Timber Manual 2.0, not only the components are evaluated in terms of sound insulation but the secondary sound paths leading through flanking components and component connections have been considered as well. For this purpose, the results of the calculation models and tests from the research project “Vibro-acoustics in the planning process for timber construction” have been processed.

The newly developed materials of Saint-Gobain have been tested elaborately. Exterior walls with different heat insulating compound systems of Weber and the latest insulating materials of Isover have been considered. By means of the examined optimisations, panelling thicknesses could be reduced, for example, in systems with one layer of 12.5 mm thick panelling of Rigips fire protection boards in wall, ceiling and roof structures.



Green centre, Holzkirchen | DE

Living in the Park, Mondsee | AT

Dalston Lane, London | GB

Testing institutes

Testing was performed at accredited testing institutes. They have many years of experience from research and monitoring activities at home and abroad. Exclusively by the institutions listed below assigned the building physical and ecological rating of the structures.

FIRE RESISTANCE TEST

The IBS and the MFPA Leipzig have subjected the CLT BBS for load-bearing and non-load bearing components, also in combination with Rigips systems, to a number of fire tests and they have classified its functionality and safety.

SOUND INSULATION

All sound insulation tests have been conducted by the ift Rosenheim and the timber research institute Holzforschung Austria. Their far-reaching experiences in timber construction make a significant contribution to the development of efficient solutions.

ECOLOGY

The Österreichische Institut für Bauen und Ökologie [Austrian Institute for Building and Ecology] (IBO) as well as the Institut für Baubiologie Rosenheim [Rosenheim Institute for Building Biology] (IBR) test and evaluate building products regularly and certify them according to their safety in use as a recommended construction material.

HEAT INSULATION

The characteristic values of the exterior components with high-quality insulation have been calculated by the Österreichische Institut für Bauen und Ökologie (IBO).

Approval and component database

APPROVED EUROPE-WIDE

binderholz CLT BBS and the Saint-Gobain building products are building materials with Europe-wide approval. The CLT BBS received the European technical approval ETA-06/0009 as early as in the year 2006. Besides the EN classification, Rigips Riduro timber boards and Rigidur H fibre reinforced plasterboards additionally have a European technical approval for particular characteristics.

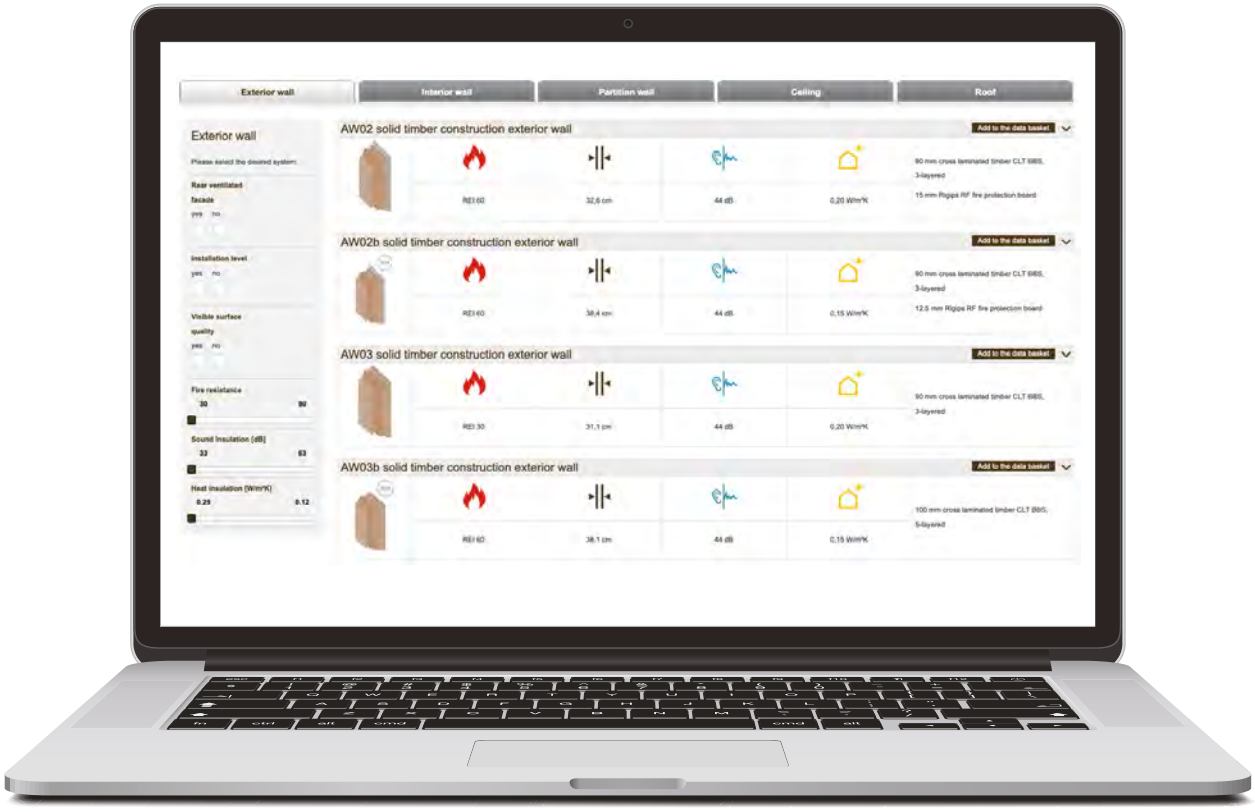
CONSTRUCTION BOOK

All assemblies in this manual have been evaluated and they can be found in the “baubook” construction product declaration book. The “baubook” is an online platform of ecological building products for guidance and information of manufacturers, dealers, builders, planners, experts and people interested. It not only serves to support the realisation of sustainable buildings but also as a reference work on topics such as subsidised housing development and climate control criteria.

Assemblies with additional details available online

You can find our Solid Timber Manual Online Tool at **www.massivholzhandbuch.com/en**.

All shown assemblies as well as supplementing details and component ratings are available in this database. Your benefit: You can download all drawing files and documents directly and use them in your CAD program.



TWO PARTNERS, ONE VISION

Developing systems for living space worth living and sustainable and functional buildings – this is the vision that connects binderholz and Saint-Gobain Rigips Austria.

binderholz – letting ideas roam freely

In the timber industry, the name of Binder stands for tradition and integrity, combined with high-tech and innovation. From humble beginnings as a small sawmill more than 70 years ago, the family-run binderholz has grown into a fully integrated group of companies that utilises state-of-the-art technology and manufacturing methods.

Besides its original headquarters in Fügen, Austria, binderholz operates 60 other sites. Some 6,300 employees at Austrian, German, British, Latvian, Finish and US sites share a passion for wood. Our solid wood products range from lumber, profiled timber, single and multi-ply laminated solid wood panels and glulam to binderholz CLT BBS. These are complemented by DIY products such as garden wood, construction wood and multi-purpose boards as well as wooden pallets and customised packaging solutions. Residual wood accruing during production is turned into densified biofuels, green electricity, press-board pallets and pressed pallet blocks.

Handling the wonderful raw material wood and of the environment responsibly guarantees high-quality solid timber products and biofuels. binderholz sees to the right raw material. All products are produced sustainably and efficiently according to the zero-waste principle and the resource wood is used to 100%. The energy-efficient processing that is sparing on resources assures an ecological, cost-aware and individual end product. By means of solutions based on energy and environmental awareness, wood can be used with a good conscience.

binderholz owes its reputation to providing elaborate customer care and its proximity to the customers, a product range and a price policy that are accordingly aligned to the market, as well as to binderholz's quality management.

As a competent partner, binderholz is at its customers' side with many years of experience, as well as tried and proven construction solutions using solid timber. Experts of the highly capable technical department offer comprehensive consulting and well-founded service. The qualified engineers, construction technicians and draftsmen provide competent support in all matters relating to statics and design, building physics and fire protection. In the development of building concepts, drafts of load-bearing structures and detail solutions, too, the experienced binderholz expert team is effectively at your side.

Each building is a symbiosis of the most diverse materials. A special combination is the connection of binderholz CLT BBS and dry construction systems of Saint-Gobain Rigips Austria. The benefits of one material support those of the other. Sustainability, the careful handling of resources and the energy-efficient operation of the buildings play a particularly important role in these considerations. To realise this aim, the companies bundle their know-how, development potential and consulting competency.

Rigips – sustainability in the DNA

Rigips drywall is one of the leading brands for modern interior finishing solutions in the German-speaking market and it is part of the Saint-Gobain Group, one of the world's 100 largest industrial corporations. Rigips offers diverse system solutions including all components needed for the purposes of the modern, dry and design-oriented interior finishing. The sparing use of natural resources is particularly important to the company. Therefore, the strict requirements that the company has imposed on itself go far beyond the legally mandated values.

Rigips Austria was founded in the year 1971 and has shaped dry construction in Austria over recent decades. By now, the company has three sites in Austria and multiple sales representations additionally in South East European countries. While capacity is being expanded continuously, the pollutant emissions have minimised to near zero and energy consumption has been reduced by more than 30%.

Rigips Germany has nine production sites and two logistics centres in Germany. Here, plasterboards, fibre reinforced plasterboard, dry screed and accessories are developed, produced and marketed under the Rigips trademark.

Sustainability is of central importance for Rigips. The innovative Rigips systems are therefore the ideal addition to timber construction. They round out the natural advantages of the building material wood with the ecological products of Rigips.

binderholz CLT BBS

The cross laminated timber CLT BBS (see Figure 1) has a multi-layered and completely solid timber design. By pasting lengthwise and traverse layers, the "working" of the wood, meaning swelling or shrinking, is reduced to a negligible measure. This way, it can safely fulfil the requirements for a modern construction material.

The material is monolithic, meaning in a certain sense made of "one piece of wood" with 0.6% ecologically harmless glue. The solid finished part can bear heavy loads, is fire resistant, can be installed quickly and dryly, and has sound and heat insulating effects. It regulates the room humidity and thereby creates a comfortable and well-balanced room climate – in the summer as well as in the winter.

It simplifies planning and construction. CLT BBS guarantees defined building physical and mechanical characteristics; this is why the planned building physics can be implemented and tested easily. Many planners quote this as being one of the greatest benefits of the CLT BBS construction design. No complexity in design, no films, no complicated details. Planning, construction and control – everything made simple.

Figure 1 – binderholz CLT BBS

Rigips dry construction systems

The dry interior finishing with systems made of plasterboard or fibre reinforced plasterboards (see Figure 2) has become well established for multiple reasons in architecture as well as in the private and public sphere: dry construction systems are standardised, easy to install and nonetheless permit the realisation of rooms with sophisticated design. Based on their composition, plasterboard products are ideally suited to master challenges of fire protection, acoustics and sound insulation, and they can be used permanently in wet rooms. Rigips boards are recommended in terms building biology and they contribute to a comfortable room climate.

Figure 2 – Dry construction systems of Saint-Gobain Rigips Austria

ADVANTAGES OF TIMBER CONSTRUCTION

International studies attest to a great future of timber construction. While the ecological component has been decisive until recently, strong economic arguments are now increasingly coming into play.

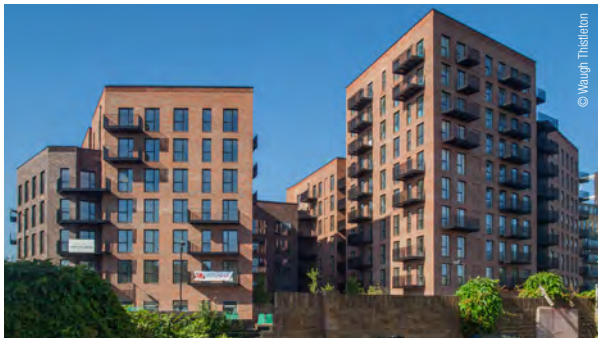
Solid timber is natural, beautiful and cosy

Construction projects are created with solid timber products and building solutions of binderholz that meet all normative requirements for building physics and fire protection. The solid timber structures are stable in value, sturdy and meet the highest demands for quality, efficiency and ecological sustainability.

To assure this, all binderholz construction solutions are developed in close orientation on practice, and they are tested and certified. In addition, they permit a quick, dry, clean and low-noise construction design.

Thanks to the comprehensive research, development and certification work of binderholz, solid timber structures can be implemented nowadays in technical terms within the limits of the building code so that they reliably fulfil all generally applicable construction standards.

A large number of successfully realised reference objects and the constantly increasing demand prove that solid timber construction is equally popular as economically competitive. Technical and economic aspects meanwhile are only one side of it. There are further good reasons in addition that support solid timber construction.



For the question of suitable construction solutions and building materials, criteria such as ecology, sustainability, lifecycle costs, recycling and a sparing treatment of resources play an ever more prominent role. Solid timber construction is clearly superior to all conventional construction methods in these aspects. Besides, the binderholz construction solutions also offer great quality at a comparably low expense of construction time and cost.

Furthermore, binderholz manufactures according to the zero-waste principle. In this process, the raw material wood is utilised to 100% and largely with no effects on climate. This begins with the sparing wood harvest in exclusively sustainably managed forests and culminates in a wide range of solid timber construction projects. All by-products created in the manufacturing are completely utilised and converted into green energy in special biomass heat power plants or for the production of biofuels. Moreover, binderholz construction solutions stand out for their high degree of reusability and they can be completely ecologically recycled at the end of their lifecycle. This way, binderholz ensures a sparing and smart handling of the raw material wood.

Projects, such as Dalston Lane in Great Britain with nine storeys and lift shafts made of binderholz CLT BBS impressively prove the capacity of the solid timber construction design. Of all construction materials, wood has the best capacity: this is the relation of weight to load-bearing capacity. It is not only suitable for realising buildings of solid timber construction on particularly difficult parcels of land, for example, on mountain ridges in Zillertal of Tyrol, but also for constructing roof structures on pre-war houses in Vienna's city centre. Wood is the most frequently chosen building material when it comes to low-energy and passive houses – and notably for good reasons, as experts know because wood accomplishes meeting the building physical requirements to the full extent. Many people decide in favour of wood because of its room climate characteristics: the pleasant surface temperature and the ability to balance temperature and humidity peaks. Wood has an equally positive effect as plasterboard on the well-being of people and thus on their health. This, too, is not only an economic but also a macro-economic factor.

Eco-bonus wood

The natural resource wood also offers numerous advantages under environmental protection aspects in comparison to conventional building materials

Energy store
Room climate
ECOLOGY
Natural carbon store
Growth
Environment
Energy efficiency
Climate protection
Sustainability
Recycling
Well-being
Compensation

Comfort and air quality

Solid timber stands for well-being and cosiness. This alone is ensured by the diverse possibilities for architectural design. For example, the visible surfaces in the interior of a building can be combined of different wood types such as spruce, stone pine, silver fir or CLT BBS antique and be further customised by means of paint varnishes and sanded or brushed surfaces. Together with the excellent properties of the wood mass as heat and moisture store, the warm wooden surfaces guarantee a balanced living climate and a high measure of comfort. Construction products of Saint-Gobain have been provided with the seals of quality of the Blauer Engel or the Indoor Air certificates, and essentially contribute to a good room climate. Rigips Activ'Air plasterboards cannot only absorb pollutants from the air but also even convert them into inert substances. These positive characteristics have already been used in many buildings in the domestic and in foreign countries.

Lean, light-weight structures with high degree of pre-fabrication

binderholz construction solutions permit a maximum of pre-fabrication. This substantially reduces construction periods and assures high quality. Furthermore, solid timber structures convince for their economically attractive relation of gross to net residential floor space compared to conventional construction designs. In view of construction costs, this fact increasingly gains importance especially in the urban areas. Smart combinations of solid timber and conventional building materials such as concrete, steel and glass often lead to efficient hybrid solutions. These conjoin the advantages of traditional materials with the benefits of the solid timber construction design. A big advantage, for example, is the comparably low weight of solid timber. This strength literally comes to bear when raising buildings by additional floors. Here, solid timber makes a compelling case by its structural possibilities and the fact that its comparably low weight does not significantly increase the load on the building.

Natural

As natural wood is used without building chemistry in solid timber construction, a building construction of solid timber has even positive effects on health. Cheap building materials and furniture can release problematic substances possibly causing allergies and other illnesses. To deliberately counteract the causation of such diseases, it should be relied upon materials that are harmless in terms of building biology. Solid timber is a completely unpolluted building material and moreover even strengthens the immune system and vitalises the nervous system. Wooden rooms have a calming effect and ensure a pleasant room climate. Plasterboards produced by Rigips Austria consist of natural plaster and they are tested regularly by the IBO for their non-objectionable properties.

Sustainability

Sustainability rests on three pillars: an economic, an ecological and a social pillar. All three of them must be in harmony before it can be spoken of sustainability. Building with wood fulfils all of them. Building with wood is economical. Building with wood is ecological because wood is a sustainable raw material. And building with wood is socially valuable because wooden structures are optimised energetically and therefore affordable over the long term.

Wood is a renewable raw material with a positive effect on the environmental climate. During their growth, trees convert CO_2 and water into hydrogen. When wood is used as building material, it serves for many years as a safe CO_2 store. Each cubic metre of wood that is used as substitute for other building materials, reduces the CO_2 emissions in the atmosphere by 1.1 tonnes on average. Gypsum is 100% infinitely recyclable. Through lean components that are sparing on resources, Rigips plasterboard contributes to sustainable construction throughout the entire lifecycle.

Pre-fabrication

Wooden building elements are nearly completely pre-fabricated (see Figure 3). This results in advantages of quality and scheduling. Even humidity and temperature is prevalent in the production halls. The assemblers work under steady framework conditions and the structures are protected from the effects of weather. The work in subsequent trades, such as electrical and sanitary installations, is prepared to the furthest extent so that the construction progress at the construction site proceeds in a coordinated and swift manner.

Figure 3 – Production supervision from the control room at the binderholz CLT BBS site in Unternberg

Efficiency

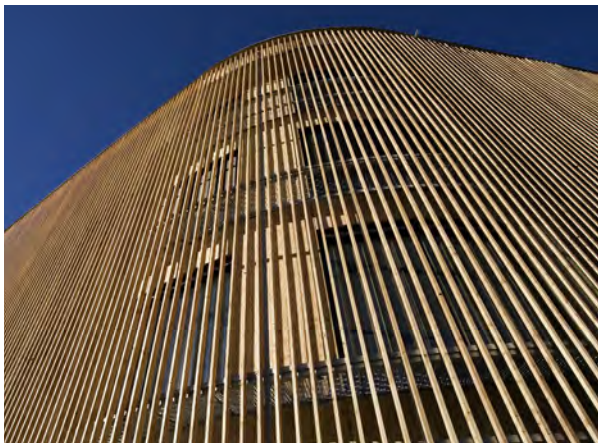
The low deadweight of timber and dry construction structures reduces the expense for the foundation and baseplates. The high degree of pre-fabrication simplifies the implementation at the construction site and secures a standardised and verifiable level of quality. The construction site equipment can be reduced and the logistics expense is lower. The dry construction design shortens the construction periods significantly and thereby enables that the buildings can be used at an earlier point in time, which in turn drastically reduces the financing periods.

Savings of time

The savings of time through the use of binderholz CLT BBS in combination with Rigips dry construction systems can be substantial in the construction of large-volume buildings. The high degree of pre-fabrication drastically shortens the construction phase. Load-bearing wall elements simply need to be aligned and linked to each other. Drying periods for brickwork or screed are eliminated when using Rigips dry construction systems. Based on their comparably low weight, these pre-fabricated timber elements can have very large dimensions. As the installation is made in the level between the plasterboard system and the timber element, the subsequent cutting and plastering work is omitted.

Long lifetime and value preservation

Long tradition in crafts and industry as well as targeted research and development have generated the experience to use the right product in the suitable manner for the various applications. Austrian institutions and businesses are internationally leading in the production and further development of wood and timber materials, and in state-of-the-art production and processing techniques. In modern timber construction, all businesses that manufacture self-contained wall and ceiling elements are subject to internal and external supervision. Moreover, many businesses are voluntary members of workmanship and quality associations. The quality of the used timber materials and products is ensured by means of defined standards and permits. If wood is used professionally (constructive wood protection), it has a long lifetime and its value is preserved.



Stability and light-weight

Wood stands out for its very high static quality. In reference to its deadweight, wood carries 14 times as much as steel; its pressure resistance equals that of reinforced concrete. Multi-story wooden buildings and wide-area load-bearing structures are optimal areas of use. The reason for the high stability is the microstructure of wood, which ensures high load-resistance with simultaneously low deadweight. Wood is therefore a light-weight building material with excellent technical characteristics. In spite of its low weight, wood offers high tensile and pressure resistance and it is resilient to weathering when it is used correctly.

More net useable area by virtue of narrower wall structures

Wood has excellent heat insulating characteristics, which is why substantially leaner walls than in conventional construction can be incorporated in solid timber buildings. For example, the portion of walls in timber construction adds up to merely 20% of the constructed overall floor space, while this portion is greater in conventional buildings (see Figures 4 and 5). This means that up to 10% more residential space can be had in a building made of wood with the same exterior dimensions as a conventional building. In the case of a single-family home this means a gain of floor space of almost an entire room. For larger projects, this outstanding construction feature of wood also has positive effects on the construction density. Significantly less land is needed for high-quality residential buildings. Thus, also the cost share for land is reduced for all involved. Building with wood creates more living space.

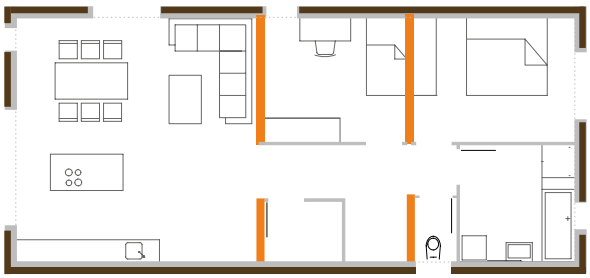


Figure 4 – Floor plan of a flat in the conventional construction style
Residential floor space of 100 m²

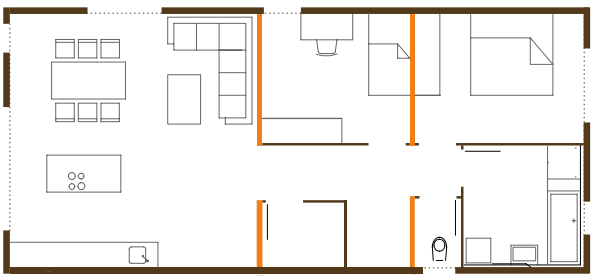


Figure 5 – Floor plan of a flat in the timber construction design
Residential floor space of 110 m²

Noise-free, dust-free, rainproof

Noise, waste and dust are three keywords that probably everyone associates with construction projects. Not so when building with CLT BBS. Based on the high degree of pre-fabrication and the installation method of solid timber, CLT BBS in particular, noise, waste and dust can be reduced drastically. The installation of CLT BBS does not require a noisy machine park, as individual elements are merely bolted together on site. A raised level of pre-fabrication of the CLT BBS elements reduces the processing steps on site and lowers the exposure to dust, waste and also noise. Since timber does not require any periods for drying and as the construction site is rainproof when the roof is set on top, also multi-storey floor additions can be realised quickly within a few days.

BUILDING WITH A SYSTEM

Massive safety

Timber construction systems using CLT BBS and Rigips dry construction systems fulfil all building physical requirements and standards for load-bearing walls, ceilings and roofs. They are tested according to European standards and meet requirements applicable Europe-wide. The products and production sites are remote monitored at regular intervals and the systems are optimised further. Therefore, the binderholz construction solutions of solid timber deliver safe and lasting building products for a wide range of applications.

Living with wood

The many years of experience of binderholz in the handling of wood and the knowledge about the texture, structure and composition of the wood form the basis for the modern and future-oriented handling of the raw material wood. All processing steps internal of binderholz, covering everything from static planning and dimensioning of the structural timber products up to the production and final beam, take place at more than 60 sites by now in Austria, Germany, Great Britain, Latvia, Finland and the USA (see Figure 6).

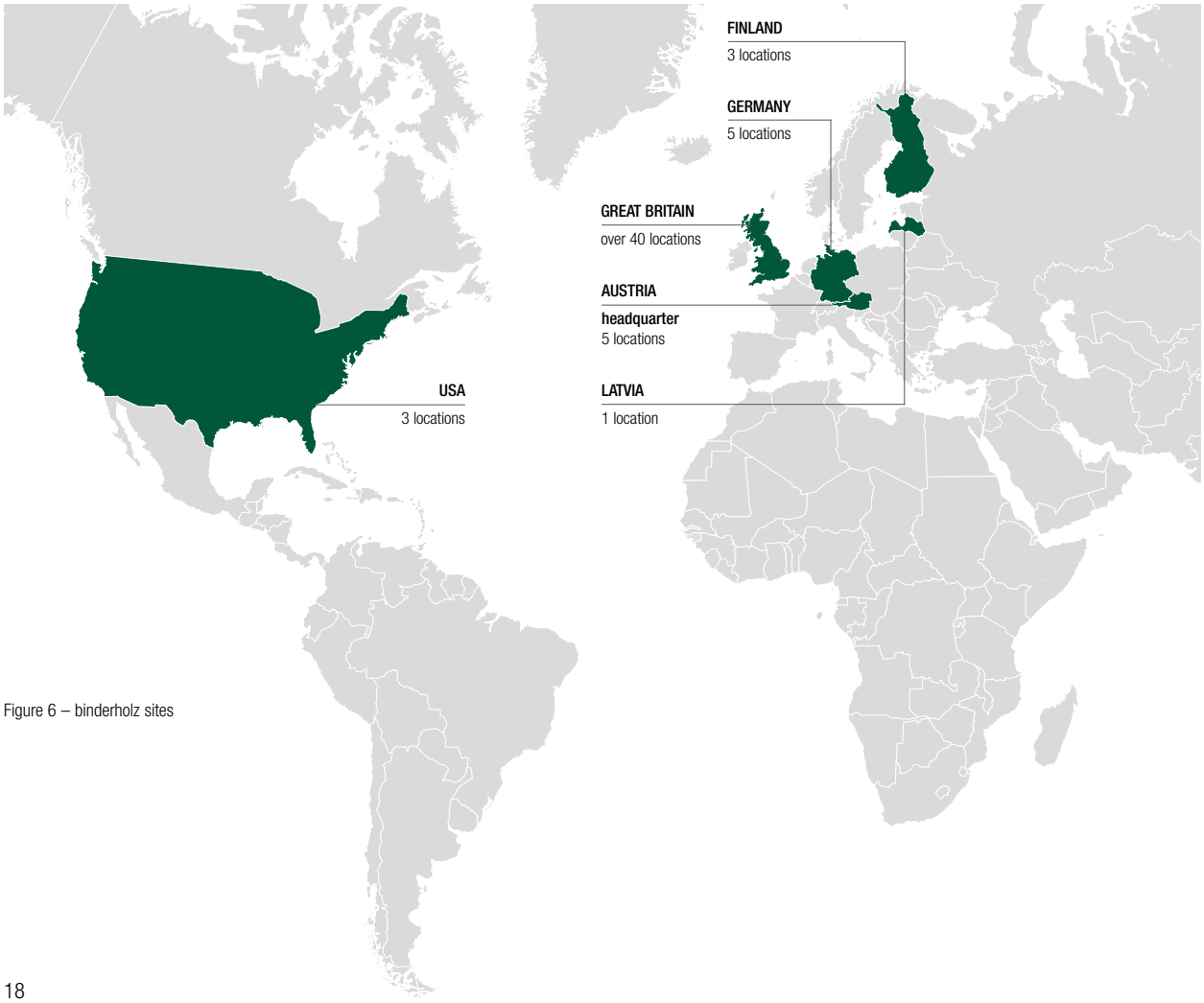


Figure 6 – binderholz sites

List of figures

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binderholz

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SUSTAINABILITY

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CONTENTS

SUSTAINABILITY

Future challenges

With 17 defined goals, the so-called Sustainable Development Goals (SDGs), UNECE lists its milestones for a sustainable further development. These are to contribute to mastering the global ecological, economic and social challenges (see Figure 1). To support reaching these goals, a campaign of measures has been launched. It is a special initiative of the UN Secretary General that is managed by the United Nations development programme. It is supported by the United Nations and the Member States in the publication and involvement of the public in the implementation of the SDGs. The SDGs apply to all states, companies and civil societies and took force on 1 January 2016 with a term of 15 years.

Figure 1 – 17 SDGs of the UNECE

Paris Agreement

In contrast to the Kyoto Protocol of the year 1997, the Paris Agreement obligates all states without exception for the first time since 2015 to develop a national climate protection contribution ("nationally determined contribution", NDC). Each state must resolve measures for implementation and also fulfil these. The primary goal is the so-called 2-degree target: By 2015, the global emissions are to be reduced by 40% to 70%, so that the critical temperature increase of 2 degrees Celsius is not exceeded. Furthermore, new comprehensive rules on the protection of forests have been adopted. New forms for the international cooperation on carbon markets are being established and the states are called upon to respond better to climate change and arrange global financial flows in such a way that climate protection is in the foreground.

Saint-Gobain contributes actively in the implementation of the Agreement and is available actively with its competence also at advanced conferences and to interested groups.

Moreover, the Paris Agreement can already accelerate reaching the goals by targeted specific measures such as the consistent use of wood in the construction sector.

Wood – THE most sustainable raw and building material

Following the principle of consuming only as much in the presence so that more will be available in the future, sustainability is and stays the top priority in European forestry. Accordingly, the three basic functions of the forest (utility, protection, and recreation function) is to be and remain available also for next generations. About 300 years ago, the term sustainability was coined by Hans Carl von Carlowitz in his "Silvicultura oeconomica". This economic management concept that was originally developed exclusively for forestry is put into practice today more than ever and in politics and the economy it by now stands for the model of a future-oriented use of resources worldwide. This is also reflected in the official data of the EU. Accordingly, the forested area in the EU has increased by 2% in 15 years, which means an absolute growth of rounded 4 million hectares of forested area. The same applies to the forestry and use of timber from the forests at a national level.

In Austria, currently nearly half of the country's entire territory is forest (see Figure 2). Since 1961, an area of 300,000 hectares has been added and by now, 0.5 hectares of forest per resident is reached. Of this, 82% is in private and 18% in public ownership. As continuously more timber regrows than is harvested, the Austrian forest, differently than is the case in the clearing of tropical forests, can perpetually spread more. Moreover, Austrian forests are the home to 3.4 billion trees and 65 different types of trees with a total reservoir of 1.1 billion metres of existing forest. Of the 30.4 million solid cubic metres that regrow each year in the Austrian forests, 25.9 million solid cubic metres are extracted to fully satisfy the principle of sustainable forestry.

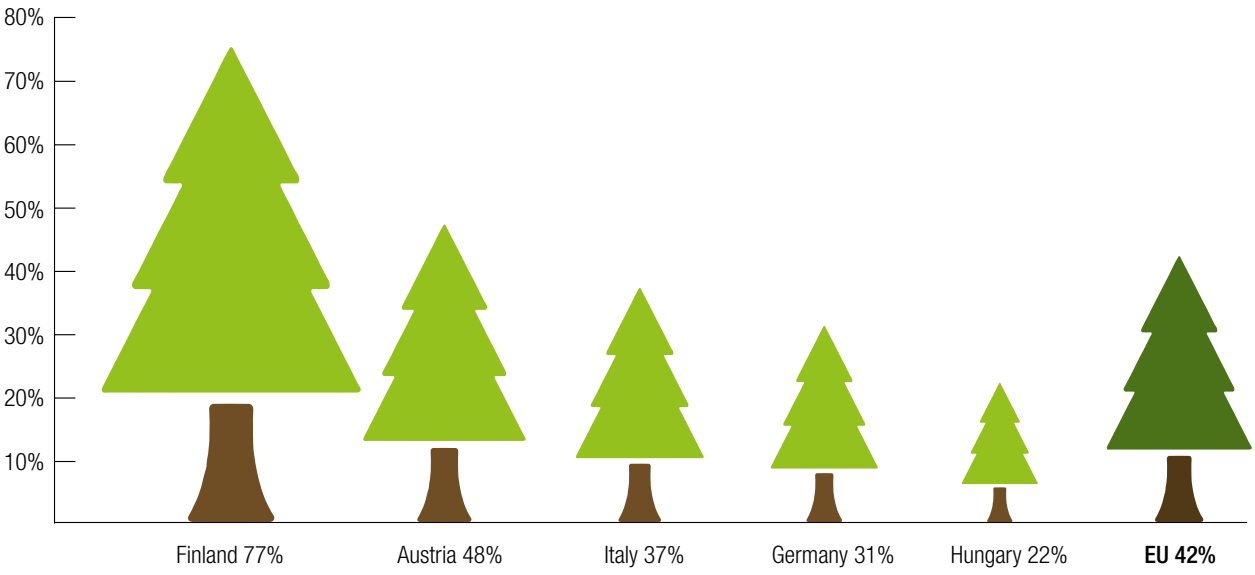


Figure 2 – Forest area of the EU Member States, Zuschnitt 51 proholz Austria

In contrast to the tropical rainforest, Austria's forest may not serve as a so-called "rainmaker" but it ensures that the country stays fresh and moist. The relative humidity in the forest is up to 10% higher than in the surrounding land. It thereby regulates the climatic conditions, binds greenhouse gases, protects against avalanches and flood water, promotes biodiversity and additionally serves as a local recreation area. In addition, it makes a significant contribution to the drinking water in the country maintaining its high quality.

Germany is among the European countries with the largest forested areas. Overall, there are about 90 billion trees in Germany's forests. One-third of the country's entire territory is covered by forests – this equals 11.4 billion hectares. In spite of its low growth of 0.4%, the forest keeps growing further. The Federal States that have the most forest in terms of hectares are Hesse and Rhineland-Palatinate with 42%.

Source: The forest in Germany

The German forest is characterised by its great biodiversity with 90 species of trees, 1,215 species of plants and 6,700 animal species. Without overextending the use of the forest, up to 120 million m³ of timber can be harvested in the domestic territory per year. As the annual timber consumption of Germany is around 135 million m³, 11% of the consumed timber must be imported. The annual timber increase according to the third Federal Forest Inventory is 121.6 m³ of timber. This equals forty times the Giza Pyramid in comparison. Thus, a con-

verted 3.8 m³ of wood regrows per second in the German forest. The overall inventory of timer available in the German forest is 3.7 billion m³. Thus, Germany has the highest timber inventory in Europe.

Source: Timber Balance for Germany

In Finland, 77% of the country's total territory is covered by forest, which means 4.2 hectares wooden area per resident. Nearly half of the Finish forests are pinewoods, the largest remaining portion is split between spruce, downy birch and weeping birch. The majority of Finland's forests are mixed forests, thus they are home to more than one species. Overall 30 different domestic species can be found in Finland.

The Finish forestry as well is managed according to the principle of sustainability because the annual increase of forests by 30% exceeds the annual timber harvest quantities. Consequently, the Finish forest grows continuously and this is true for all tree species and forest areas of Finland. The annual growth has exceeded the 100-million cubic metre threshold since a few years ago. In the year 2014, for example, there was a growth of 104 million m³. The total volume of the Finish forest in 2014 was at 2,360 billion m³ and since the beginning of the 21st century, Finland's timber inventories have grown by 60%.

Source: Finland's forests

Guaranteed sustainability along the supply chain – Chain of Custody (CoC)

To guarantee the benefits of the sustainable and resource-conscious European forestry for the end user along the entire value added chain, consistent monitoring along the supply and production chain is needed – from the tree to the customer!

At the level of the EU Member States, country-specific forestry laws ensure compliance with a sustainable and adjusted forestry. In the international economic area, this is ensured through a legal framework of the European Union to facilitate consistent control and monitoring of the sustainable supply chain.

The FLEGT action plan and the EUTR

With the FLEGT actions plan (Forest Law Enforcement, Governance and Trade), the EU has adopted a broadly based catalogue of measures to effectively fight the global problem of uncontrolled and illegal wood harvest. An important point in the FLEGT actions plan meanwhile is the European Timber Regulation (EUTR). At its core, it demands from all European market actors that they are accountable in the worldwide procurement of wood and wood products, to thereby be able to build up a sustainable supply chain in the long term.

The regulation, which took force on 3 March 2013, foremost demands central proof that illegal sources of timber are excluded by companies importing to the European Union. For this purpose, each importer has to undergo a company-internal due diligence process, which is based on three central pillars:

- Procurement of information
- Risk assessment
- Risk reduction

Source: FLEGT approval system

Independent certification of the supply chain

Besides the strict public control bodies, the companies of the timber industry can seek additional testing from independent certifying institutions. Various service providers such as the PEFC or FSC are available for this.

PEFC is the largest institution for the assurance and marketing of sustainable forestry by means of an independent certification system. It ensures a sustainable, careful and responsible forestry. This way, our forests will stay preserved also for future generations – as a living basis, workplace and recreational area. The aim is to continuously improve our forestry, preserve the forest and assure its positive effects on the environment. Thanks to an accreditation procedure according to international standards, the independence of the certifying institutes is guaranteed to a particularly high measure. The emphases here are on facilitating the fair participation of all forest owners, regardless of the size of their business, and consideration for the diversity of forest ecosystems, cultural heritage and ownership structures. PEFC is the first system that has integrated social criteria not only in the forest certification but also in the product chain certification (Chain of Custody).

PEFC
PEFC/06-35-20

Certification by binderholz

The traceability of the origin of the wood and the exclusion of exploitative harvesting represent the basis for certification and guarantee this way the promotion of a socially and environmentally compatible economy. The diversity of plants and animals thereby remains preserved and the social interests of humans are taken into consideration. As processing companies are also certified, the certification status is maintained up to the end customer.

Forest owners cannot only have their forests certified directly by a certifying institute but the buyers of the logs, in cooperation with the forest owners, can additionally rate wood originating from non-certified forests by means of a specially developed due diligence system, which has been accredited in advance by a certifying institute, and they can exclude it from the further process in the case of uncertainties.

All products of binderholz are 100% PEFC-certified or made of wood that originates from PEFC-controlled sources. The implementation of the strict PEFC criteria and a permanent internal self-monitoring of the flows of logs and lumber in combination with an annual external audit on site by an independent certifying institute serve to fulfil the goals of sustainable timber use and thus meeting the PEFC requirements.

Based on the sustainable approach of the European forestry that is sparing on resources and which is monitored by a strictly controlled regulatory framework, construction with timber is sensible in all respects. Wood is available everywhere in our latitudes to sufficient extent and it is a natural resource that regrows continuously more than it is harvested. It is therefore no surprise that the wood industry has been firmly rooted in Europe ever since.

Climate protection and resource protection

Carbon cycles in nature

The carbon cycles in nearly all ecosystems are decisively characterised by photosynthesis, as it supplies all creatures with energetic elements and sources of energy. In the course of photosynthesis, plants take up carbon dioxide (CO_2) from the air during their growth, as well as water and nutrients from the soil, and build their growth and textural structure from this. For trees, this basic structure is wood. During the photosynthesis process, the low-energy oxygen molecule is decomposed in the green leaves of the plants by means of light. Oxygen (O) that is vital for most living beings and created as a decomposition product this way is released again to the environment. Carbon (C) in contrast serves for the organic structure of the tree and remains bound in the form of biomass for its entire lifecycle. This way, the plants continuously extract the greenhouse gas carbon dioxide (CO_2) from the atmosphere (see Figure 3). Biomass is understood to mean wood, leaves, roots and humus. As soon as the biomass dies off, carbon dioxide is released again through decomposition and the natural cycle is closed.

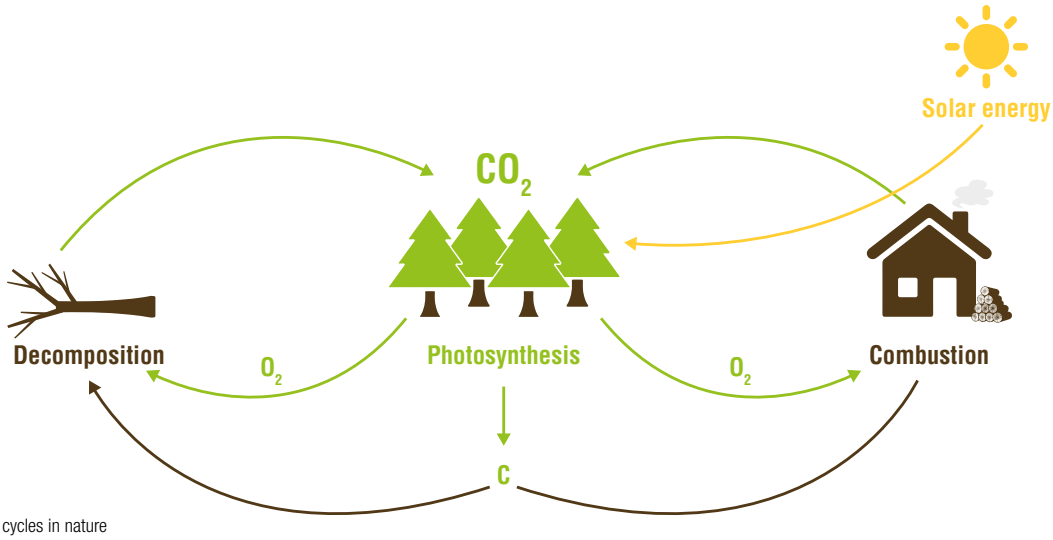


Figure 3 – Carbon cycles in nature

The forest as a carbon drain

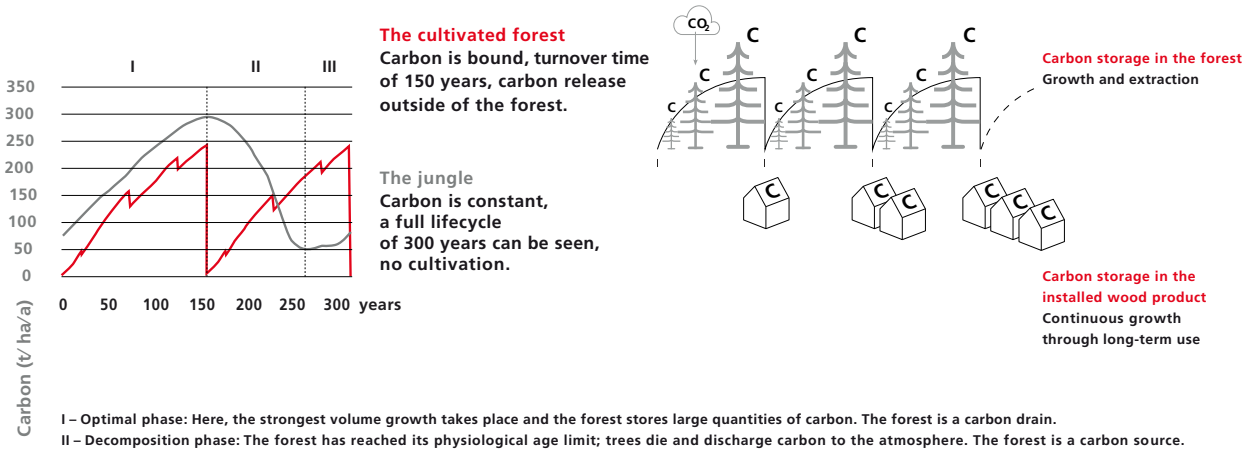
In times of rising CO_2 emissions due to increasing anthropogenic emissions, groomed and stable forests through regulated forestry, like they can be found in all of Northern and Central Europe, are one of the decisive factors in the reduction of the CO_2 load in the atmosphere.

The graphic below shows how important a regulated forest cultivation by means of forestry management is (see Figure 4). While the carbon balance in an unmanaged forest remains balanced due to the dying off and rotting of trees, the balancing in a cultivated forest takes a different course: when wood is harvested, the carbon remains stored in the harvested wood – meaning the rotting phase is simply skipped. If the cultivation of the forests was discontinued, there would be neither wood products storing additional carbon nor biomass that might replace fossil energy carriers. Thus, global warming would progress even faster. Therefore, non-cultivated forests are less beneficial for the atmosphere than cultivated forests. This is so because the wood cannot be used and the natural rotting causes that the CO_2, which has been absorbed by the tree during its growth phase, is released to the atmosphere again.

CO_2-sequestration - long-term deposit and storing of carbon

Based on the ability of trees to store it for the long term, even after the harvest, not only the forest but foremost also buildings, furniture or even toys made of wood contribute as carbon stores to the reduction of the CO_2 content in the atmosphere.

As a rule of thumb, 1 m³ of wood stores nearly one tonne of CO_2 equivalents from the atmosphere. Extrapolated, this means that the Austrian forest stores approx. 3 billion tonnes of CO_2 equivalents. This is almost 35-times as much as greenhouse gases emitted by Austria per year. Trees bind carbon dioxide and store it as biogenic carbon over a long period. Every used trunk creates space for new trees and increases the carbon store in the wood. Buildings with wood therefore make sense in all aspects, especially since wood is available to sufficient extent everywhere in our latitudes. At the same time, it is a natural and sustainable raw material that can be subject to a comprehensive natural cascade as a cyclical material.



I – Optimal phase: Here, the strongest volume growth takes place and the forest stores large quantities of carbon. The forest is a carbon drain.
II – Decomposition phase: The forest has reached its physiological age limit; trees die and discharge carbon to the atmosphere. The forest is a carbon source.
III – Rejuvenation phase: The forest is at the end of the decomposition phase with a lot of rejuvenation. The forest is carbon-neutral because decomposition and growth processes are about equal.

Figure 4 – Effects of the carbon drain between the forestry and the jungle, Zuschnitt 65, proHolz Austria

Figure 5 – Dalston Lane in London: In this project, CLT BBS binds approx. 3,000 tonnes of CO_2, which is equivalent of about 1,500 flights from London to New York City.

How much wood is needed to manufacture 1 m³ CLT BBS?

For the manufacturing of high-quality cross laminated timber CLT BBS, only suitable boards with certain strength properties and surface qualities can be used. For this reason, about 2.3 m³ of log wood are needed for 1 m³ CLT BBS. This quantity of wood regrows alone in Austria's forests as soon as after 2.3 seconds.

But what happens with the rest of the wood?

Before cutting the wood in our chip removal timber mills, the rind, which is approx. 10% of the volume, is removed from the trunk and converted into biomass directly on site in our timber mill. This biomass is converted into green electricity as well as heat for drying our woods. 58% of the log can be processed further into high-quality solid timber products. 0.7% of the volume of one log is then extracted from the wood through drying in our drying chambers. Another 20% that we convert again into milling by-products is eliminated when cutting open or planing the individual boards.

Thus, no waste is created in the production of CLT BBS; the entire log is processed sensibly. As the wood additionally originates from forests that are kept under sustainable management, building solid timber houses is no problem for our forest either, quite the contrary even. Cultivated forests have even more CO_2 storage capacity than non-cultivated forests, and thereby make an even bigger contribution to climate protection.

4,500 m³ binderholz CLT BBS, thus the complete Dalston Lane (see Figure 5) regrows alone in Austrian forests within just 2 hours and 52 minutes. Someone building a solid timber house thus not only does himself something good but also the forest and the entire environment.

Examples of CO_2 storage in buildings

If 10% of all houses in Europe were built of wood, the carbon emissions would reduce by an entire 1.8 million tonnes per year (rounded 2% of the entire carbon emissions).

The devastating earthquake in L'Aquila (Italy, 2009) cost 70,000 people their homes. They were to be reconstructed in high-quality and earthquake-proof construction design. binderholz CLT BBS emerged as the winner in the international tender procedure. Overall, 11,000 m³ CLT BBS were delivered and thus 29,600 m² of residential area were created. In the Austrian forest, 40 m³ of wood regrow per minute. Thus, it takes just 7 hours until the wood delivered to L'Aquila had regrown in the Austrian forest. In these 11,000 m³, 25,300 tonnes of CO_2 are bound for the long term. This is as much CO_2 as 1,000 Europeans or 5,000 cars per year emit on average (see Figure 6).

Each cubic metre of wood that is used as substitute for other building materials, reduces the CO_2 emissions in the atmosphere by 1.1 tonnes on average. When adding this to the one tonne of CO_2 that is stored in the wood, approx. two tonnes of CO_2 are stored overall in one cubic metre of wood.

Regional character based on short distances

Forestry management and the wood industry are usually staffed to greatest extent by regional employees and use the local raw material supply. Accordingly, the industry outside of the large urban centres offers plenty of jobs and occupational opportunities while it simultaneously assures a long-term regional value creation, and leads to an additional strengthening and stimulation within the regions through investment programs of the businesses.

Direct transport routes in the wood harvest and short distances for the creation of wood products or their semi-finished goods additionally contribute to the reduction of CO_2 emissions. The same applies to the production of the well-known plasterboards.

Transport by cableway

Around 15 kilometres on roads separate the mine in Grundlsee from the plasterboard in Bad Aussee (see Figure 7). The cable car saves the environment 22,800 trips by truck each year on this route and thus more than 350 tonnes of CO_2 emissions.

On export transports, too, wood saves emissions because wood transports on roads become inefficient from distances of 150 km, which is why these mostly take place by railway. In addition, the exported wood contributes in the importing countries to savings of CO_2 emissions – because they substitute energy-consuming building materials there as well.

Consumption in everyday life – CO_2 emissions

FLIGHT round trip	Munich – Mallorca	0.5 tonnes
	Munich – Tenerife	1.2 tonnes
	Munich – New York	2.4 tonnes
TRIP BY CAR 12,000 km	Small vehicle, petrol	2.8 tonnes
	Small vehicle, diesel	3.0 tonnes
	Off-roader SUV, petrol	6.7 tonnes
	Off-roader SUV, diesel	7.2 tonnes
NUTRITION per year	Heavy on meat	1.6 - 3.2 tonnes
	Vegetarian	0.9 - 1.8 tonnes
	Vegan	0.8 - 1.6 tonnes

Figure 6 – CO_2 consumption in everyday life

Figure 7 – Cable car of the plasterboard factory in Bad Aussee | Austria

Efficiency factor of forestry and wood

In Austria, about 280,000 people earn their livelihood in the forestry and wood industry, whether directly in the forest, in sawmills or in the further wood-processing industry. This number does not even include the employees working in the industries that are merely indirectly related to the wood industry such as the timber and building material trade. A similar pattern is found in Germany with 648,000 employees alone in the wood industry. When adding up the employees of the entire cluster consisting of forestry and wood industry, the number even exceeds the number of employees in the metal and electronics industry (see Figure 8).

The wood industry in Austria has approx. 1,500 businesses, of which the large majority, notably 1,200, are sawmills. The most important branches – as far as the production output is concerned – are the sawmill segment, furniture industry, construction, derived timber products segment and – how could it be different in Austria – the ski industry.

Occupations and personnel requirements have strongly evolved in recent years in consequence of various technical innovations, increasing automation and progressing digitalisation. There is a correspondingly large variety of professional opportunities that are represented in the industry: the bandwidth ranges from lumberjacks and wood engineers to industrial clerks and IT specialist and even includes controllers, lawyers and marketing experts.

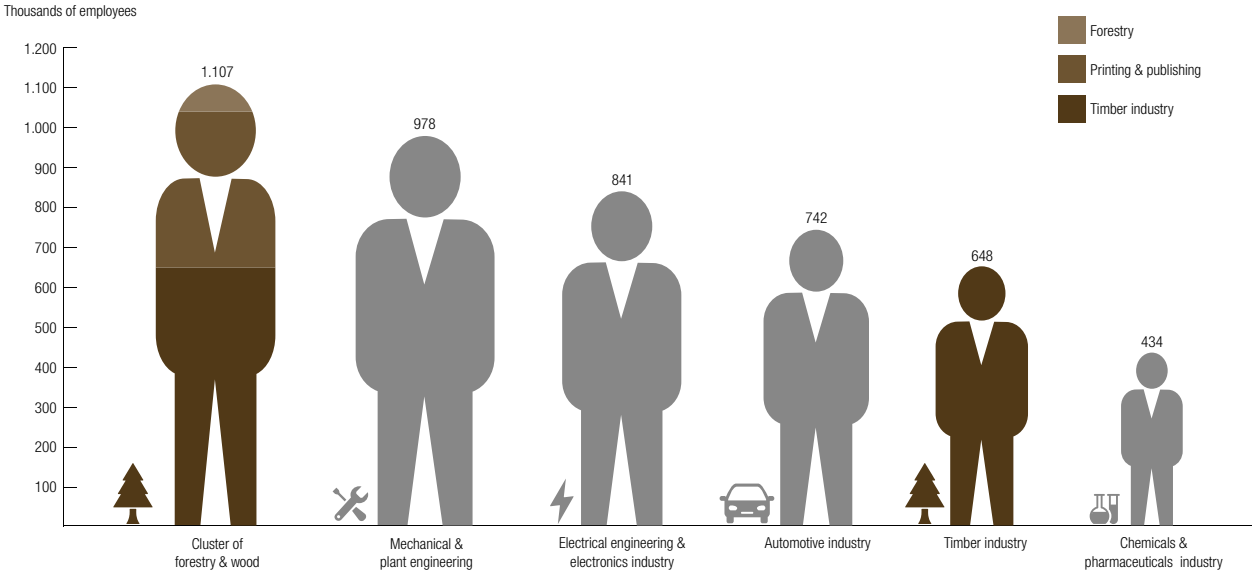


Figure 8 – Employees in the cluster of forestry & wood in Germany.

Great value, big benefit

The German milling industry quantifies the annual turnover of its 2,000 businesses at rounded EUR 5 billion. In the year 2017, the sustainable overall annual wood harvest of the German forestry was at around 53 million solid cubic metres of wood without rind. Of this, about 35 million solid cubic metres of logs were cut and processed further by the German sawmill industry.

In Austria, the overall timber industry earns EUR 6.12 billion per year. More than 70% of the domestic products are exported – primarily to other EU countries, the major part of which goes to the neighbouring countries Germany and Italy. With an export surplus of EUR 3.08 billion, the Austrian timber industry is practically at even par with tourism as a source of foreign currency.

Of the more than 17 million harvested solid cubic metres without rind, which are harvested annually in Austrian forests, the largest part initially goes to the sawmill industry, which conditions the raw log product for the processing sectors such as the furniture manufacturers or the construction industry. 63% of the annual pinewood harvest with 14.57 million harvested solid cubic metres goes to the sawmills, 16% are used in the industrial timber segment and 21% are used energetically (see Figure 9). The pinewood use of 98% in the sawmill industry is substantially above that of hardwood at 2%. Similar as in the German timber industry, the Austrian timber industry is also reliant on imports of log wood so as to be able to cover the rising demand.

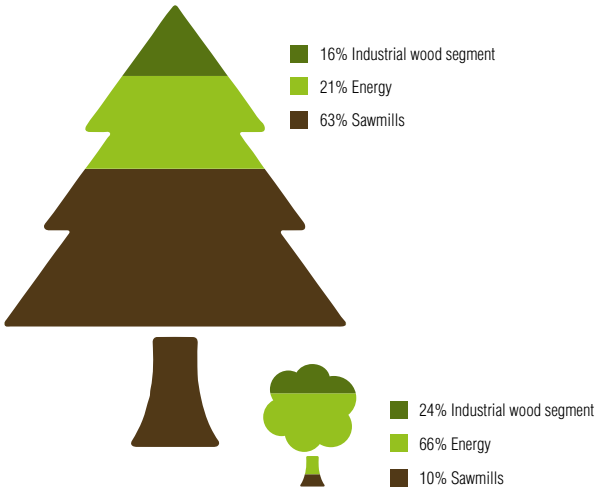


Figure 9 – Wood harvest in Austria in cubic metres harvested without rind, wood harvest report for the year 2015.

The zero-waste principle of binderholz

The top priority of binderholz is to use the raw material wood in the optimal way. At binderholz, therefore, every part of the log is assigned to its most efficient use that is most sparing on resources. This way, the lumber from the sawmill is processed further into the constructive solid timber components such as solid wood panels, gluelam or cross laminated timber CLT BBS that is used in modern timber construction.

To extend the useful life, the so-called cascade of timber products, additional possibilities for use are offered: The by-products that arise from the lumber production, such as the rind, wood chips or sawdust can be used as energy carriers for a climate-neutral generation of electricity and heat in biomass heating plants or they can be purchased in the form of pellets and briquettes as biofuels for private households. As an additional possibility for use of these by-products, further processing in the wood material and pulp industry suggests itself. Thus, the log is used to 100% and no waste burdening the environment is created (see Figure 10)!

Highly skilled timber construction businesses, wood construction engineering offices and architects bring the lumber generated this way to the best possible use in the construction sector – creating energy-efficient timber houses, multi-storey residential projects or even high-rises made of wood!

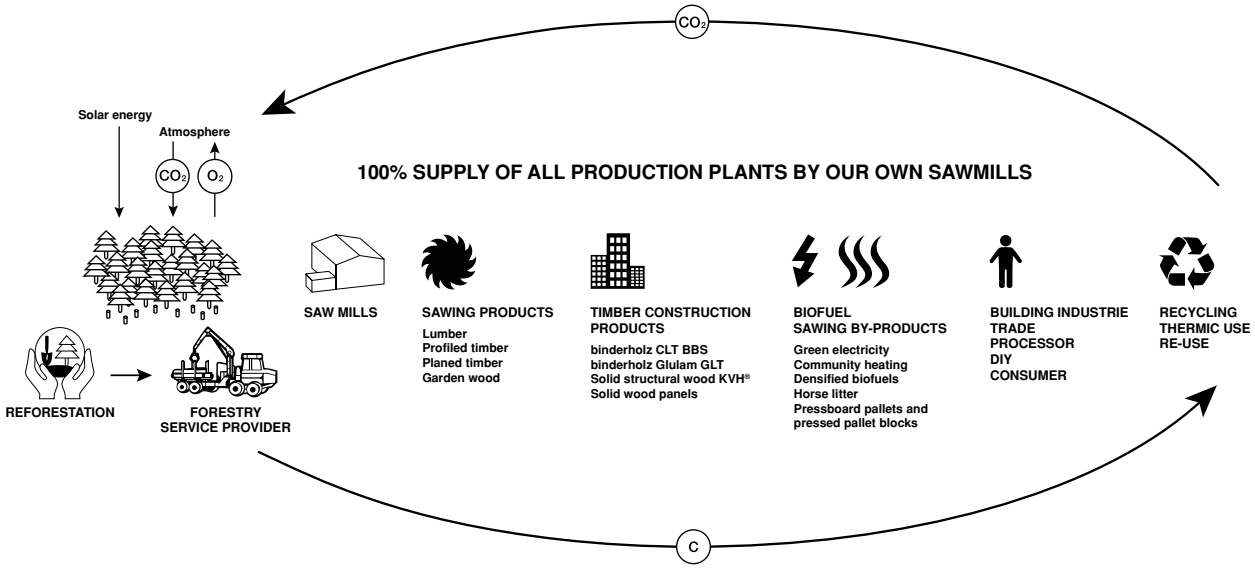


Figure 10 – Zero-waste principle

Timber construction in facts and figures

Every 40 seconds, enough wood regrows in the Austrian forests so that a complete single-family home could be built from it.

It takes one second for one cubic metre of wood to regrow in Austria. This would be sufficient building material for 2,160 single-family houses per day. In one year, enough wood for 788,400 houses grows in Austria without harvesting from existing forests.

According to the latest state of knowledge, timber buildings can be constructed up to 20 storeys high. One of the highest residential timber buildings of the world with nine storeys is located in London and was built in 2008 already by an Austrian company: the Dalston Lane.

International studies attest to a great future of timber construction. While the ecological component has been decisive until recently, strong economic arguments are now increasingly coming into play. This thesis is underpinned by the already high timber construction quotas in various countries and the continuously rising portion of timber in the construction industry (see Figure 11).

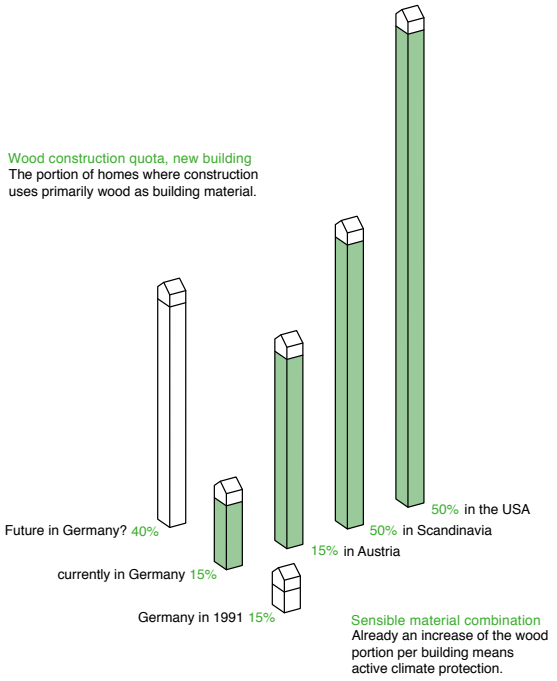


Figure 11 – Timber construction quotas of select countries, Holzforschung [Timber Research] Munich

Timber construction: Wood and its benefits

Wood is the most frequently selected building material when it is about low-energy and passive houses. And this is for a good reason as experts know. Wood accomplishes to fulfil the building physical requirements to the greatest extent. Many people decide in favour of wood because of its room climate characteristics: the pleasant surface temperature and the ability to balance temperature and humidity peaks. Wood has a positive effect on people's well-being and thus on their health – this, too, is an economic factor.

Projects such as the reconstruction of the region struck by the earthquake around L'Aquila in Italy impressively prove the capacity of the solid timber system construction design. Of all building materials, wood has the best ratio of weight to load-bearing capacity. It is not only suitable for realising buildings of solid timber construction on particularly difficult parcels of land, for example, on mountain ridges in Zillertal of Tyrol, but also for constructing roof structures on pre-war houses in Vienna's city centre.

Building redevelopment: renovating, modernising and densifying with wood

For building redevelopments, solid timber construction in combination with dry construction systems offers big advantages compared to other building materials given the possibility for pre-fabrication and the related short construction periods, the low weight, the positive CO_2 balance and the ecological profile.

The thermal renovation of buildings has been sponsored for many years by states and municipalities. Structural improvements are considered to be an effective means to reduce the emission of CO_2. Well-insulated building parts made of solid timber, which can be installed on site within a short time, represent an interesting alternative to the common methods.

In densely populated cities, there are hardly any open areas available for new buildings. Existing buildings offer greatest potential for modernisation and re-densification.

Construction designs for the inventory are in demand that can be implemented efficiently, quickly, without a lot of disruption and with precision. Timber construction in various pre-fabrication stages offers solutions for this (see Figure 12). The use of solid, pre-fabricated building elements made of CLT BBS saves long construction periods on site and thereby results in less disruptions of the operating processes or the residential surroundings. After all, besides residential construction, especially also public buildings such as schools, child care centres and administrative buildings are in need of being renovated while they are open for business. Here, the use of building parts that are to the greatest extent pre-fabricated has decisive advantages.

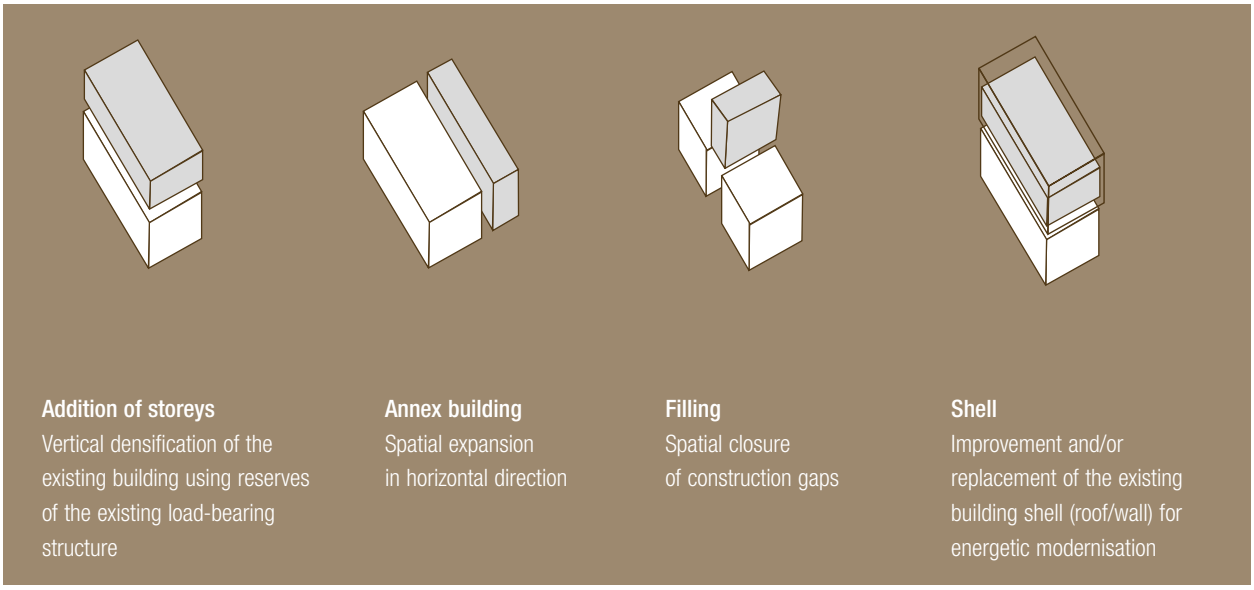


Figure 12 – Building redevelopment with wooden elements, proHolz Austria

Efficiency of solid timber buildings

The high degree of internal pre-fabrication in the manufacturing of timber construction elements permits a standardised production that is independent of the weather in steady and verifiable quality. Even humidity and temperature is prevalent in the production halls. The assemblers work in good framework conditions while the following trades such as electrical and sanitary installations are prepared to the point that the construction progress moves ahead in a coordinated and swift manner. In addition, the processing of the construction site is simplified, as the wooden elements are delivered on time and unnecessary waiting times can thereby be avoided. The lower deadweight of the timber structures reduces the construction effort for the building foundation and baseplates. The construction site equipment can be kept at a minimum and the logistics expense is lower. The dry construction design of the timber structures reduces the construction periods significantly, as the drying times for brickwork or screeds are eliminated. Thus, an exactly calculable construction period can be determined, which enables using the buildings sooner and which, in turn, reduces the financing periods.

High efficiency through CLT BBS

The savings of time through timber construction of binderholz CLT BBS can be substantial in the construction of large-volume buildings. The high degree of pre-fabrication drastically shortens the construction phase for large-scale projects because carrying wall elements merely have to be aligned and conjoined with each other. Based on their comparably low weight, these pre-fabricated timber elements can have very large dimensions.

Ecobalance and cascade use of wood

An ecobalance lists all processes that are relevant in terms of the environment and which arise throughout the lifecycle of products and materials. This includes, among other factors, emissions arising in the transport of semi-finished goods or that result from the energy generation for the production. The system limits of an ecobalance can vary depending on the product type and the product lifecycle (see Figure 13).

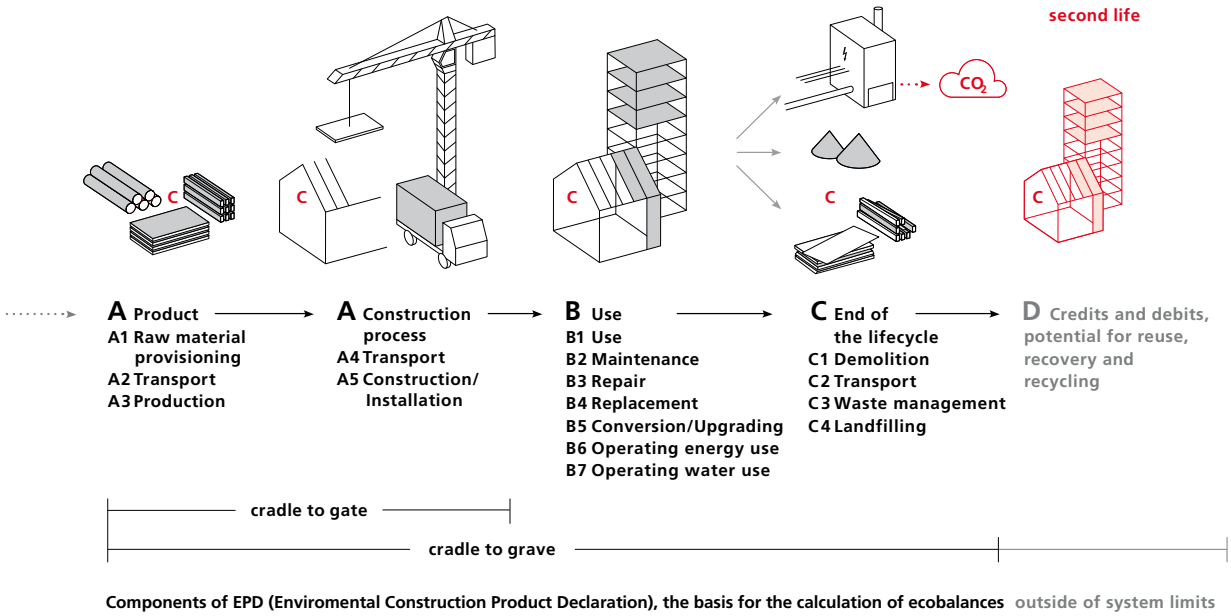


Figure 13 – System limits in the construction wood production, Zuschnitt 65, proHolz Austria

Product lifecycle and utilisation cascade

Phase 1 – production chain: from the tree to the product

During the entire production covering the harvesting of the trees, the manufacturing, processing of the products (sawing, surface treatment, assembly, etc.) and the transport to the construction site, as well as assembly, the energy expended (the so-called "grey energy") is much lower than for other construction methods.

Environmentally relevant data for basic building materials and wood

Building material	**Density** **ρ** [kg/m³]	**Acidification potential** **AP** [g/kg]	**Greenhouse gas potential** **GWP100** [kg CO_2-eq/kg]	**Primary energy concentration** **PEI relative to mass** [MJ/kg]
Bricks – honeycomb brick	1200	0.541	0.19	2.5
Reinforced concrete	2400	0.55	0.167	1.22
Wood – spruce lumber, planed, techn. dried	450	1.51	-1.63	3.21
Wood – solid wood panel PF 3 layer	450	2.25	-1.38	7.58

Phase 2 – use: Energy requirement

During the use, energy consumption, and the maintenance and repair of a building play a key role. In heat insulation, timber houses are at the highest standard. By nature, wood has air-filled cells whereby heat and cold are conducted to substantially lesser extent than in other building materials. During the winter, the cold penetrates only to insignificant extent and during the summer the heat is kept outside. Even in the standard construction design, timber houses keep effortlessly within the consumption values mandated by law. With sufficient insulating layers, the passive and 3-litre construction design is easily realised with the timber house. The low residual energy requirement enables a correspondingly small dimensioned heating system. According to the Austrian standard ÖNORM B 2320 a useful life of at least 100 years can be expected for timber houses constructed professionally.

Phase 3 – recycling, sorted dismantling and demolition

The recycling capacity of buildings and building materials is becoming increasingly important due to the future shortage of resources. The waste of residual construction masses consisting of construction rubble and concrete debris is around 5 million tonnes per year, which accounts for 18% of the entire construction waste. In the analysis of the waste accumulated during dismantling, a reduction of the waste volume is indicated with the increasing application of timber construction designs. Furthermore, the wastes resulting from this indicate a high potential for utilising the material and the energy, whereas the utilisation efficiency can be further raised through the development of construction designs that are appropriate for recycling. The aspiration of integrating the installed elements and components as far as possible in another constructive lifecycle is therefore closely suggested. Here, the monolithic and homogeneous construction design of cross laminated timber CLT BBS must be considered to be very advantageous, as it omits an additional material separation. “Today’s” choice of materials thus affects “tomorrow’s” wastes, which is why it must already be ensured in the planning process that materials are installed in such a way that they are easily available and broken down at the end of the lifecycle, and so that they can be used in the optimal way in terms of their components (“design for recycling”) or for energetic purposes (“design for energy”). In this connection, the timber construction design has an advantage, as wood can be manipulated more easily and be demounted ideally and be re-used as a complete component in high quality. The lifecycle will then start over again.

This way, a timber house that is dismantled after its use does not leave any non-recyclable rubble but useable wood. Individual components or elements can be re-used or be returned to the manufacturing process. The remaining wood is added to energetic use. This way, the CO_2 continues to remain bound in each piece of installed wood and it thereby does not reach into the atmosphere for until the wood is used thermally in the last recycling step.

DRY CONSTRUCTION WITH SAINT-GOBAIN RIGIPS AUSTRIA

Saint-Gobain is one of the oldest industrial enterprises of the world. As a sustainable building materials company, it takes its role-model function very seriously. The focus in the future as well will be on the sustainable and affordable structural engineering. At the same time, Saint-Gobain is also increasingly dedicated to building certification to offer practicable and sustainable solutions. The global challenge of the shortage of resources plays a likewise significant role besides energy efficiency. For Rigips, particular attention is paid in this regard on reducing specific consumptions and supporting recycling management.

Objectives

In the subject of sustainability, the Sustainable Development Goals (SDG) of the United Nations will set the keynote in the future. Saint-Gobain Rigips Austria has evaluated all 169 sub-goals (see Figure 14) for potential effects on the core business. These results are a part of the business strategy.

Figure 14 – Central goals of Rigips Austria

Gypsum - the raw material

Rigips Austria is aware of the great responsibility the construction industry has towards the environment. During the entire production process and in the product lifecycle, measures are taken specifically to minimise the effects on the environment.

Gypsum has been used as a building material for more than 5,000 years. The natural stone occurring as a raw material is recyclable to 100% and for infinitely many times, and it is harmless to the skin as well as fire-resistant. The production process (see Figure 15) is completely reversible: through dehydration, water is extracted from the rough stone and gypsum powder is created. When water is added to the gypsum powder, you will receive gypsum again.

Figure 15 – Production process of Rigips Austria

The natural raw material gypsum is extracted from a mine near the factory and the water required comes from a river near the factory. The cardboard originates primarily from Germany, while the percentage supplied from Austria is continuously increasing.

To constantly develop the production processes further in terms of their (energy) efficiency, the WCM (World Class Manufacturing) is established at Saint-Gobain as the management system.

Compared to dry construction solutions with traditional construction methods, light-weight construction with Rigips is clearly in the lead:

- fewer natural resources per m² useable area are needed for production.
- The energy consumption in production is lower.
- The CO_2 emissions are lower throughout the entire lifecycle.
- Great savings of time result during the pre-fabrication in the factory as well as during the assembly at the construction site.
- Dry construction systems offer flexible design options.
- Gypsum is 100% infinitely recyclable.

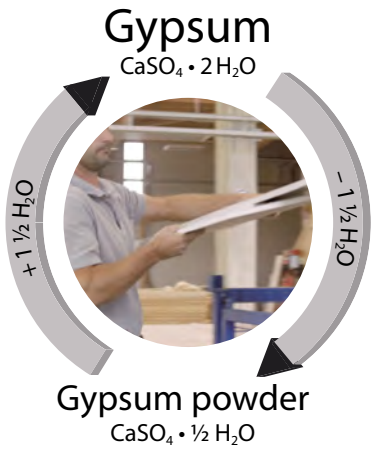


Figure 16 – Recycling cycle of gypsum

Recycling

In the mining of Rigips Austria, in Grundlsee and Puchberg, gypsum is extracted in surface mining. As the raw material deposits are limited, the return and use of scraps are top priorities. The aim is to continuously develop the recycling service range further and thereby raise the recycling quota of the boards (see Figure 16). At this time, 6% of each Rigips board is manufactured of recycling material already – the mid-term target is 10% and in the long term, 30% of a Rigips board is to consist of recycled material.

Transparency – environmental product declaration

Environmental Product Declaration (EPD)

To evaluate the sustainability of buildings, data about the installed building materials are needed. An Environmental Product Declaration (EPD) provides information about the environmental effects of individual products or building materials, thereby forming the basis for a building certification. Besides Environmental Product Declarations for all boards produced in Bad Aussee (33 product EPDs), Rigips Austria is also providing 63 declarations for relevant Rigips wall and ceiling systems since 2016 (see Figure 17). The data is available at any time (also at www.baubook.info) and helps in the planning according to requirements for the use of sustainable construction products.

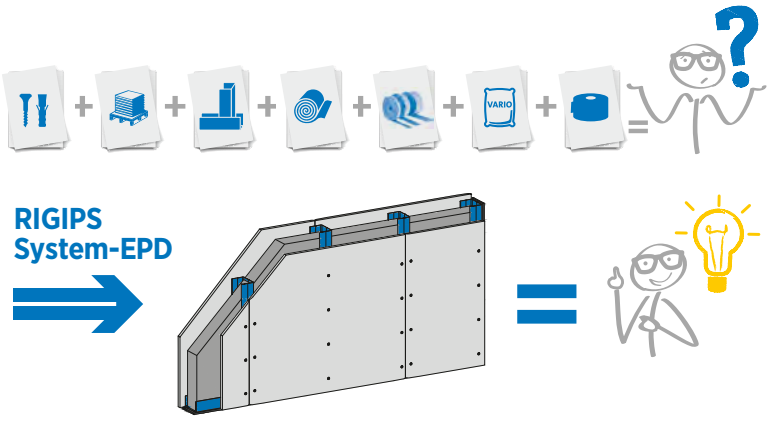


Figure 17 – Development of the EPD Rigips System

Multi-comfort

People spend up to 90% of their time indoors, which is why topics such as room climate, living comfort and affordable residential space are also important to Rigips Austria. The multi-comfort concept (see Figure 18) is an important means for Saint-Gobain to set standards in terms of comfort, sustainability and energy efficiency as a reference for creating and sustainably designing living spaces. The focus is on the users' comfort and the verifiable added values for all involved in the construction: everyone from the property owner to the planner, architect, contractor and dealer.

Foremost the following six dimensions are of central importance:

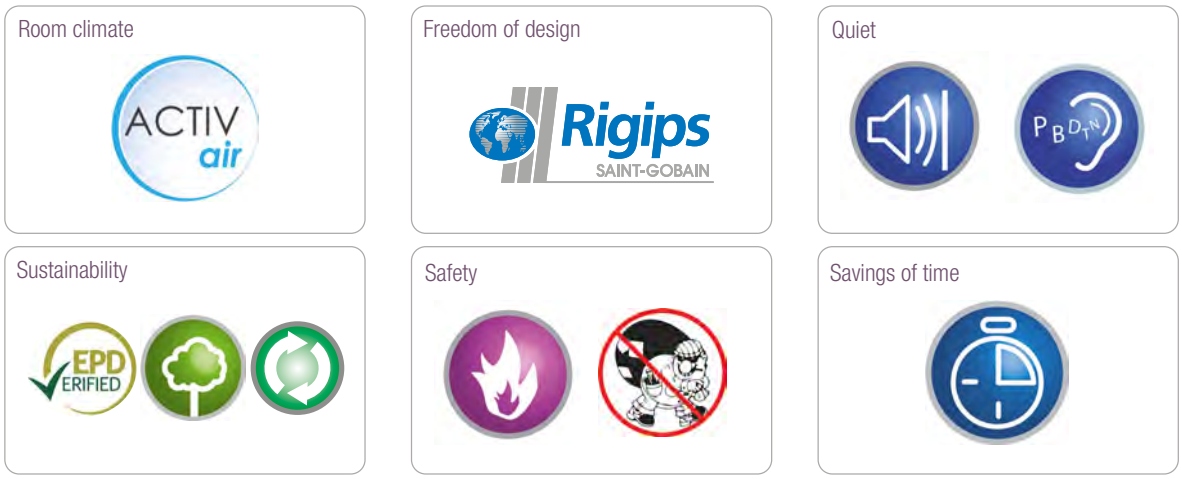


Figure 18 – Six dimensions of the multi-comfort concept

Innovation

For Rigips Austria, responsibility towards the market and society has a high priority. Sustainability, especially in terms of innovation and the environment, is very important to Rigips.

Timber construction is one of the strongly growing business fields. Innovative Rigips systems are the ideal addition to timber construction. At the same time, the natural advantages of the building material wood are combined with those of the Rigips systems.

Innovation Riduro wooden building slab

Rigips Riduro wooden building slaps are fibre-reinforced plasterboards for use as reinforcing planking in timber frame construction and for increased sound insulation in solid timber construction.

The Riduro wooden building slab newly developed in Austria stands for:

- improved cohesion of the structure
- high flexural stiffness
- easy processing
- flexible jointing technique
- strong resistance under impact load

Besides the leaner fire protection solutions, the board stands out for its ecological evaluation (EPD) and a top price-performance ratio. 100% recyclability is the standard for products from Bad Aussee.

Employee commitment in the course of the world depletion day

The world depletion day marks the day in the year from which onward the earth can no longer regenerate all natural resources on its own. On occasion of this day, Rigips Austria has initiated seven workshops at its three sites. The employees' involvement and commitment was very strong. It was worked on topics such as sustainable civil engineering, my personal contribution to environmental protection, reduction and avoidance of emissions and energy consumption, as well as health and work safety; and concrete implementation activities were defined.

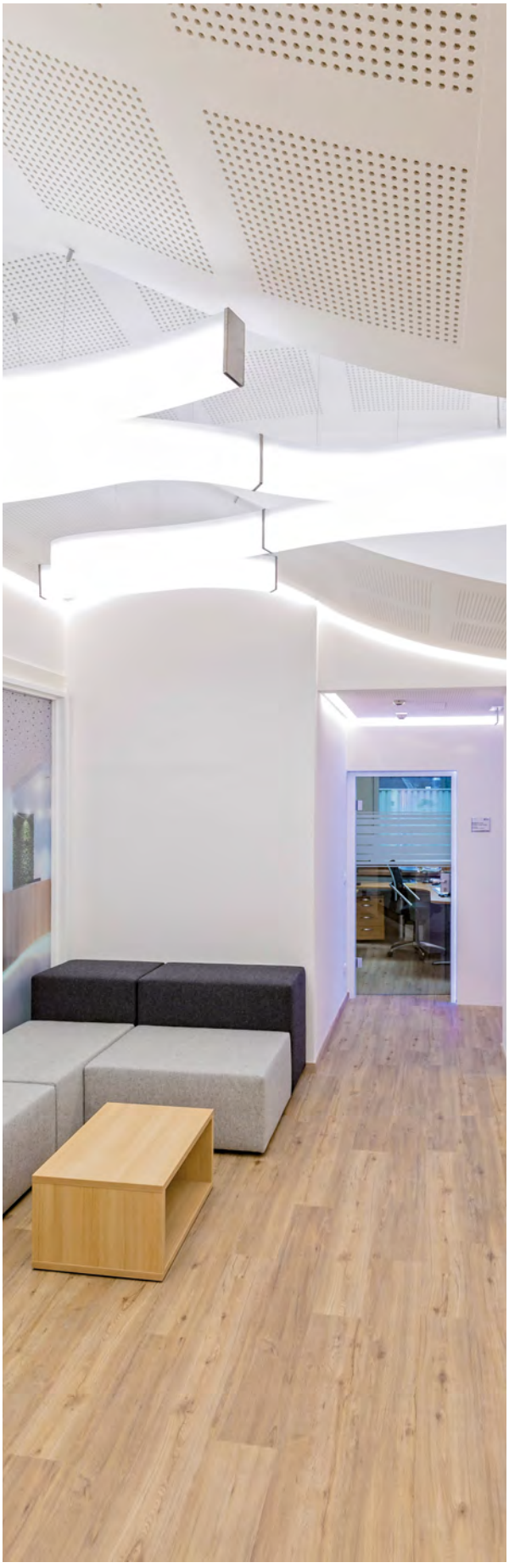
Rigips Austria is proud of its dedicated employees, who are committed to leaving behind a world worth living in for future generations and who are also willing to make their own contribution to this.

Key indicators

Rigips Austria publishes key figures on the sustainable development of the company every two years.

From 2015 to 2017, the following could be achieved, for example:

- 350 tonnes of CO_2 savings per year through the transport of the rough stone by cable car (investment of EUR 7 million for modernisation)
- LED lighting project:
  30 tonnes of CO_2 savings per year
  Improvement of luminosity: > + 200%
- Concentration of 6% recycling material in the boards produced in Bad Aussee



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BUILDING PHYSICS

SOLID TIMBER MANUAL 2.0

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Rigips
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1st edition, May 2019

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This publication is targeted at trained specialists. The illustrations of executing activities contained in this document are not understood as processing instructions, unless expressly marked as such. Renderings and sectional views of the individual assemblies are not depicted on scale; they merely serve as illustration.

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We are looking forward to a pleasant cooperation and wish you great success with all of our system solutions.

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CONTENT

SOUND INSULATION

SOUND INSULATION

Sound insulation serves the purpose of protecting people adequately from noise in social rooms. In timber construction, the components always comprise multiple layers. This way, the sound encounters multiple resistances on its path in between the individual components. While the sound insulation of single-layer components is based exclusively on their mass and flexural stiffness, smart multi-layer structures with decoupled layers and hollow space insulating materials can reach steady sound insulating values with substantially lesser masses. The construction situation is decisive for the evaluation of sound insulation. This means that given the requirements of sound insulation, a separating component must always be evaluated including the secondary sound paths.

binderholz CLT BBS

In solid timber structures, foremost the total thickness of the cross laminated timber CLT BBS, its surface weight and flexural stiffness play an essential role for the sound insulation of the basic component (without further layers). Generally, the complete component (wall, ceiling, roof) is supplemented by additional layers (façade, installation level, floor structure, etc.) The sound insulation of the complete component is significantly improved by additional cladding. Components made of CLT BBS are made of modular elements. The modular connections required due to the structure are tested comprehensively for sound insulation and designed so that they do not have any negative effects on the indicated sound insulation value.

For the use of CLT BBS as separating ceiling or partition wall in a residential unit, component assemblies have been developed in the course of comprehensive testing at the ift Rosenheim that meet the relevant requirements for sound insulation. The measuring results illustrate clearly that these optimised assemblies also withstand comparisons to reinforced concrete walls and notably so with one-fifth of the mass.

Rigips dry construction systems

Layers with large surface measures, for example, plasterboards have a positive effect on sound insulation. By additionally mounting an installation level, a flexible shell is created that substantially increases sound insulation in high and medium frequency ranges. Here, flexible bearing profiles such as RigiProfil as well as heavy flexible panelling, e.g. Rigips fire protection plates should be used and the largest possible shell spacing should be ensured.

Air-borne sound insulation

A structure is excited to oscillate during sound transmission. In the case of multi-layer structures, the insulating material in the hollow space affects the coupling of the individual layers and the sound distribution inside of the hollow space. The rated sound insulation value R'_w [dB] indicates the sound insulation of a component between two rooms including secondary sound paths (see Figure 1). The sound insulation of multi-layer components depends on the characteristics of each individual layer and on the interaction of all layers. The properties of the individual layers depend on their surface measure (mass inertia) and flexural stiffness. For example, the sound insulation can be improved by mounting an installation level in addition, which consists of plasterboards, meaning a flexible layer with large surface measure.

The sound insulation can be improved, for example, by

- a reduction of the surface connecting points of the individual layers (paying attention to statically required spacing);
- use of flexible bearing profiles such as spring rails, metal stand flexible shells;
- use of heavy flexible panelling such as plasterboards;
- use of soft insulating material in hollow spaces;
- increasing the shell spacing.

Figure 1 – The ceiling test bench in the sound testing lab and arrangement of the measuring instruments

Structure-borne sound / footfall sound

Structure-borne sound is induced in a component through mechanical stimulation (see Figure 2).

Footfall sound is a structure-borne sound that is caused, for example, by children jumping around or knocking. The disruptive sound is mechanically induced directly into the ceiling and deflected to the neighbouring rooms. The insulation of a ceiling is marked by the rated standard footfall sound level $L'_{nT,w}$ [dB]. Consideration of the construction situation including the secondary sound paths is indicated here by the line. For the measurement of footfall sound, the ceiling in the transmitting room is excited by a standard hammer mill and the sound level generated is measured in the receiving room. The lower the level, the better the rating of the ceiling for insulating footfall sound.

The assembly to be selected decisively depends on

- the dynamic stiffness s' of the sound insulation panels,
- the masses of the floor screed or unfinished ceiling,
- the reinforcement of the unfinished ceiling.

The weaker the dynamic stiffness s' the better the footfall sound insulation (the permissible load of the footfall sound insulation must be observed).

It is essentially attempted to prevent or minimise the induction of footfall sound into the structure and its transfer and deflection in the form of airborne noise. The deflection to the receiving room can be reduced by means of facing formwork.

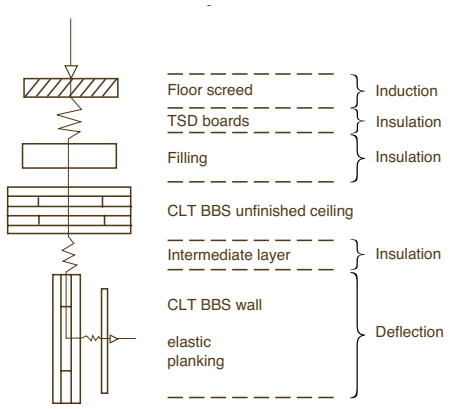


Figure 2 – Reduction of structure-borne sound
Source: HFA planning brochure "Ceiling structures for multi-storey timber construction", 2009

Flanking transmission / secondary sound paths

Besides the separating component, also all flanking building parts are involved in the sound insulation between two rooms. The separating component is just one of the many transmission paths. For separating components with high sound insulation, the sound is transmitted for the most part via the flanking ceilings, roofs, interior and exterior walls. To optimise the sound insulation of components, it must be aimed for the lowest possible transmission via secondary paths. The extent of the transmission via secondary paths depends on the concrete construction situation. The forwarding of the sound is structurally prevented by a bearing on elastic interim layers (see Figure 3).

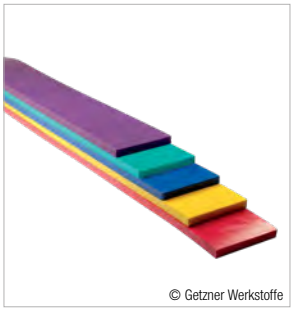


Figure 3 – On the left, Rothoblaas XYLOFON and on the right, Getzner Sylodyn

By planning in facing formwork and suspended ceiling structures, these additional measures can be reduced and, in part, they can even be omitted entirely.

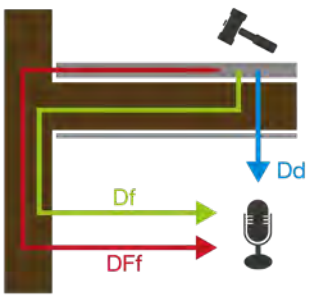
Source: Planning brochure of Holzforschung Austria

The behaviour of solid timber structures is very different from solid mineral construction. Forecast models existing so far do not reflect the actual behaviour of solid timber structures. To be able to reliably fulfil the requirements for sound insulation and suitability for use, the components are frequently overdimensioned through substitute models and simplified conservative approaches and thereby become inefficient.

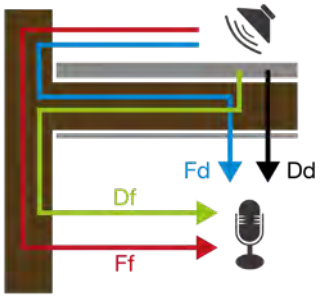
Within the scope of the project "Vibro-acoustics in the planning process for timber structures" that is supported by binderholz and Saint-Gobain Rigips Austria among others, comprehensive measurements of the sound transmission via flanking components have been conducted (see Figure 4).

A prediction model according to DIN EN ISO 12354 was developed, which considers the diverse transmission paths in the construction situation and nonetheless remains applicable for the construction practitioner. The model is being integrated in the new DIN 4109.

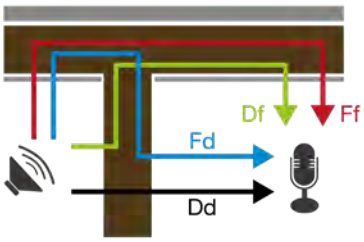
The following illustrations show the various secondary sound paths depending on the construction situation:



Footfall sound transmission



Vertical air-borne sound transmission



Horizontal air-borne sound transmission

Figure 4 – Schematic diagram of the contributions to the sound transmission in timber construction
Source: Vibro-acoustics research project

Model for calculation according to DIN EN ISO 12354

The calculation of single-number ratings of the sound insulation, R'_w and of the standard footfall sound level $L'_{n,w}$ in construction is based on the transmissions paths shown in Figure 4 according to the following equations:

(1) $R'_w = -10\ \lg(10^{-0,1R_w} + \sum 10^{-0,1R_{ij,w}})$ with ij = Ff, Fd, Df

(2) $L'_{n,w} = 10\ \lg(10^{0,1L_{n,w}} + \sum 10^{0,1L_{n,ij,w}})$ with ij = Df, DFf

The footfall sound flank path DFf, going into the floor screed and, via the flanking wall in the transmitting room, down into the flanking wall in the receiving room is not considered yet in the normative calculation according to EN 12354. Acoustics predictions were compared to construction site measurements and a substantial effect of this transmission path can be seen (vibro-acoustics research project). In this planning brochure, the corresponding predictive model is described, which is illustrated in detail in the calculation example provided.

Planning notes for sound insulation

The table below shows recommendations for the sound insulation of apartment ceilings and partition walls for multi-storey buildings for residential housing based on DIN 4109, supplement 2 and respectively ÖNORM B 8115.

The data refers to the construction situation including all secondary sound paths.

Building part	Austria	Germany
Apartment partition wall	$D'_{nT,w} \geq 55$ dB	$R'_w \geq 55$ dB
Apartment separating ceiling	$L'_{nT,w} \leq 48$ dB	Minimum requirement: $L'_{n,w} \leq 53$ dB Enhanced requirement: $L'_{n,w} \leq 46$ dB

Overview of the built examples in solid timber construction, enhanced requirements for apartment separating ceilings according to DIN 4109, supplement 2 are fulfilled

The table below shows structures in finished buildings that fulfil all enhanced requirements for apartment separating ceilings in consideration of all flanking components (vibro-acoustics research project)

BV	Ceiling	Walls	Additional measures	Prediction	Construction measurement
2	80 Concrete floor screed 50 MFT, s' = 6 MN/m³ 85 Lime chippings 200 CLT BBS	100 mm CLT BBS	Elastomer top and bottom	R'_w = 63.8 dB $L'_{n,w}$ = 42.5 dB	R'_w = 66 dB $L'_{n,w}$ = 45 dB
3	65 Concrete floor screed 40 MFT, s' = 6 MN/m³ 90 Lime chippings 100 Glulam	100 mm CLT BBS 12.5 mm Rigips RF fire protection board	Elastomer top	R'_w = 61.3 dB $L'_{n,w}$ = 45.8 dB	R'_w = 63 dB $L'_{n,w}$ = 45 dB
4	60 Concrete floor screed 40 MFT, s' = 6 MN/m³ 15 Fibreboard 447 Wood-concrete compound	≥ 100 mm CLT BBS	Facing formwork		R'_w = – dB $L'_{n,w}$ = 44 dB
5	60 Concrete floor screed 40 MFT, s' = 6 MN/m³ 90 Lime chippings 200 Glulam	2 x 18 mm Rigips RF fire protection board ≥ 100 mm CLT BBS 2 x 18 mm Rigips RF fire protection board	$K_2$60 encapsulation	R'_w = 60.9 dB $L'_{n,w}$ = 44.0 dB	R'_w = 59 dB $L'_{n,w}$ = 43 dB

Improvement possibilities to reduce the flank sound transmission

Based on the accompanying research project "vibro-acoustics in the planning process for timber structures" and a number of planning brochures as well as specialised lectures, binderholz and Saint-Gobain Rigips Austria gained valuable and practically applicable insights for the planning of solid timber construction that is optimised in terms of sound insulation. In the following, these measures are explained and the positive effects are presented in a comprehensible way by means of a calculation example.

Viewed for themselves, CLT BBS solid timber elements for walls and ceilings are rigid discs. This nature of a disc entails that the flanking components made of large-format elements have a poorer effect for the insulation of the flanks than components that consist of CLT BBS 125 elements. For example, the component of a flanking exterior wall consists of many lined-up elements with width of each 1.25 m that are joined with bolts by a wooden riser. The modular panel joint here works like a spring or a separating cut and thereby provides substantial insulation for the flank transmission (see Figure 5). The measurements of the flank insulation value R_{Ff} have been conducted with this modular construction method and the assessed values in the calculation example that are more favourable in terms of sound insulation are applicable only when using this construction method.

Source: Vibro-acoustics research project

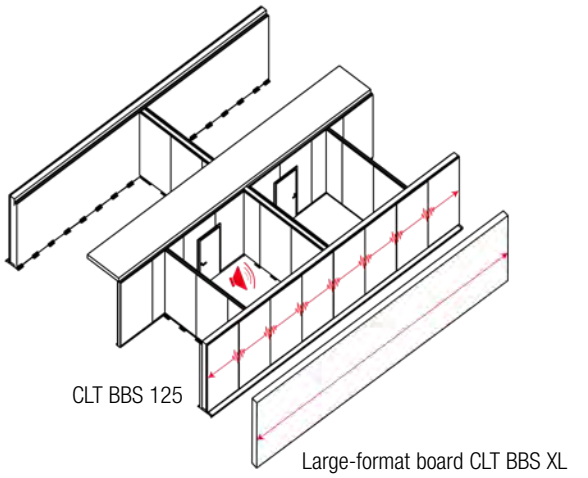


Figure 5 – Difference in the flank sound transmission between CLT BBS 125 and the CLT BBS XL large-format panel

Flanking CLT BBS walls should be provided with a facing formwork that has decoupling effects (installation level on vibration mounts, shell spacing at least 5 mm or use stand-alone facing formwork – see Figure 6).

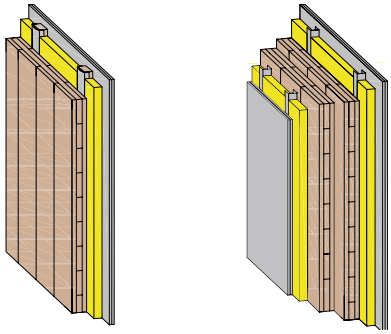
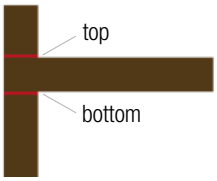


Figure 6 – Facing formwork working with decoupling effect on one or both sides

In the calculation of the sound transmission, the mass of the binderholz cross laminated timber CLT BBS wall and ceiling elements have a strong influence. The measurements show that directly applied plasterboard planking has a positive effect on the flank sound insulation. In detail, this effect is illustrated in the calculation example.

Elastomers can be used for the sound decoupling in the case of vertical flank transmission, for example, on the supports of an apartment separating ceiling. The following table shows the improvement of the joint insulation values (input parameters for calculation of the sound insulation value incl. secondary paths R'_w – see page 17).

Only the upper elastomer has effects on the transmission path Fd and only the bottom elastomer affects the path Df. The paths Ff and DFf are influenced by both elastomers.

Arrangement of the elastomers	Position	Data from the DAGA 2010 conference transcript	New measured data
	top or bottom	ΔK_{ij} = 7 … 10 dB	ΔK_{ij} = 4 … 10 dB
	top and bottom	ΔK_{ij} = 8 … 19 dB	ΔK_{ij} = 13 … 15 dB

Source: Vibro-acoustics research project

NOTES

The indicated values have a wide spread, as elastomers of different manufacturers have been used in combination with different wall and ceiling structures. The information applies only to decoupled mounting materials (angles with elastomer boards, bolts with lining and elastic insulating washers – see Figure 7).

If conventional fasteners are used, the decoupled effect of the elastomer will reduce significantly. In that case, a ΔK_{ij} of 2 to 3 dB can be assessed. Further planning bases for the influence of elastomer bearings with and without consideration of the installed fasteners can be found in the planning brochure of Holzforschung Austria entitled “Roof structures for multi-storey timber construction”.

Source: Rothoblaas planning brochure

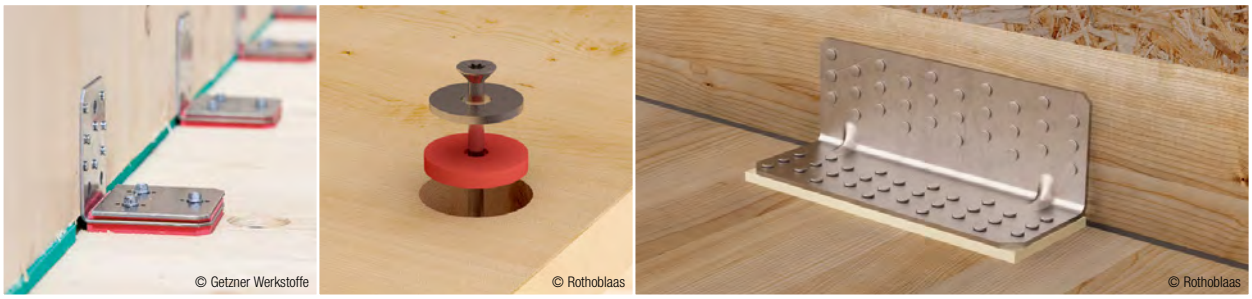


Figure 7 – Decoupled fasteners with elastomer bearings of different manufacturers

CLT BBS ceiling in visual surface quality – optimisation of the flank transmission of the ceiling support on an apartment partition wall

CLT BBS ceilings with wooden surface visible on the bottom side contribute to the flank transmission between adjacent rooms (see Figure 8). Current measurements of the flank insulation value R_{Ff} have shown that a ceiling reinforcement using filling in combination with a wet screed floor structure results in a substantial improvement of the flank insulation (vibro-acoustics research project).

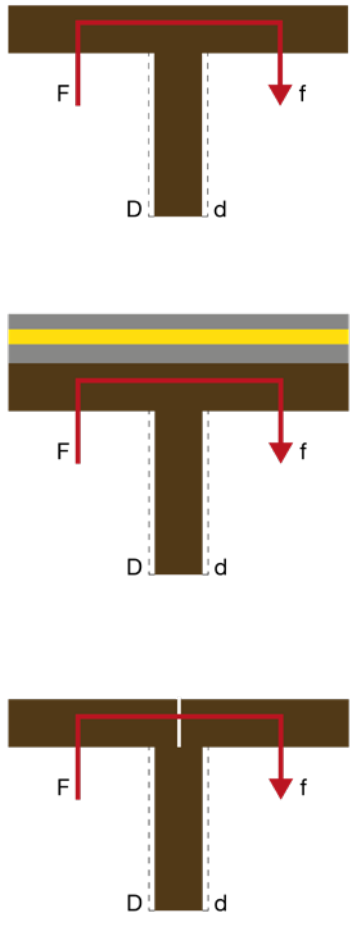


Figure 8 – Different path of the flank sound transmission in the ceiling area

A 150-mm thick binderholz CLT BBS 125 ceiling that rests on an 80-mm thick CLT BBS 125 wall results in a measured $R_{Ff,w}$ of 44 dB. If an element consisting of 60-mm chipping filling, a 40-mm footfall sound insulation board and 50-mm concrete screed is applied on the 1500-mm thick CLT BBS ceiling, the measured $R_{Ff,w}$ increases to 61 dB.

If a continuity effect of the CLT BBS ceiling is dispensable in terms of structural stability, a separation of the ceiling fields in the axes of the apartment partition walls is an effective measure to improve the flank insulation. With a continuous 150-mm thick CLT BBS 125 ceiling, the measured flank insulation value is R_{Ff} 44 dB (as described above); with execution of a separating cut, the measured value for R_{Ff} increases to 49 dB.

Another possibility to improve the flank insulation is to provide the flanking ceilings with an additional suspended ceiling with direct supports with vibration decoupling (see Figure 9). This way, the energy applied on the CLT BBS ceiling in the transmitting room and the deflection into the receiving room is significantly reduced.

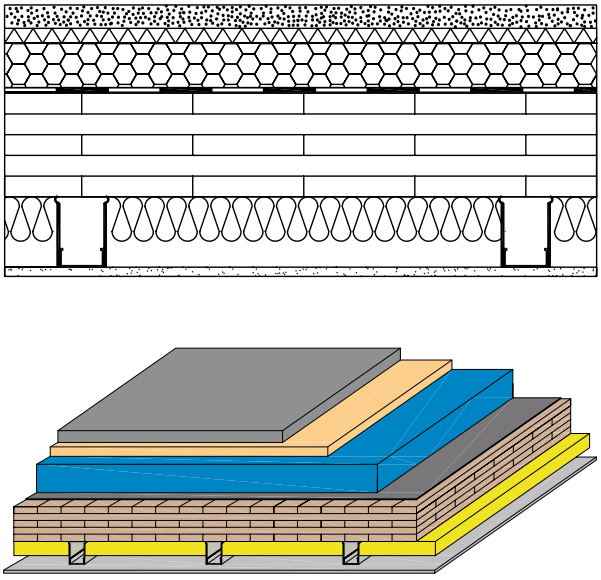
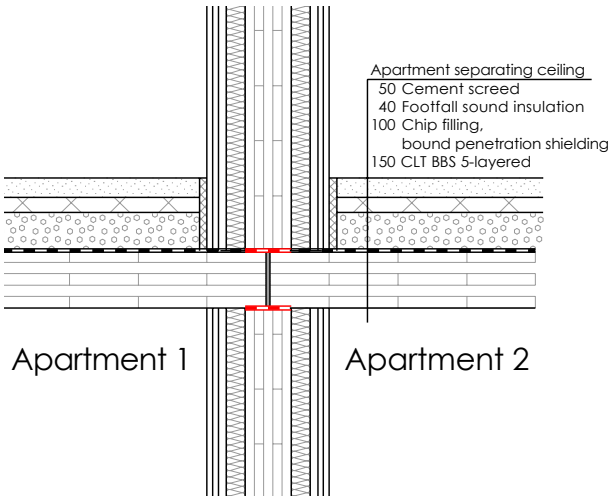
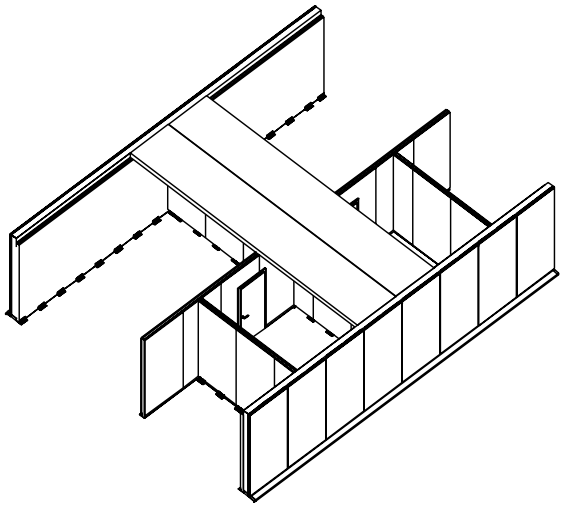


Figure 9 – Suspended ceiling with vibration decoupling

Example for calculating the sound insulation of a planned construction situation in consideration of secondary sound paths





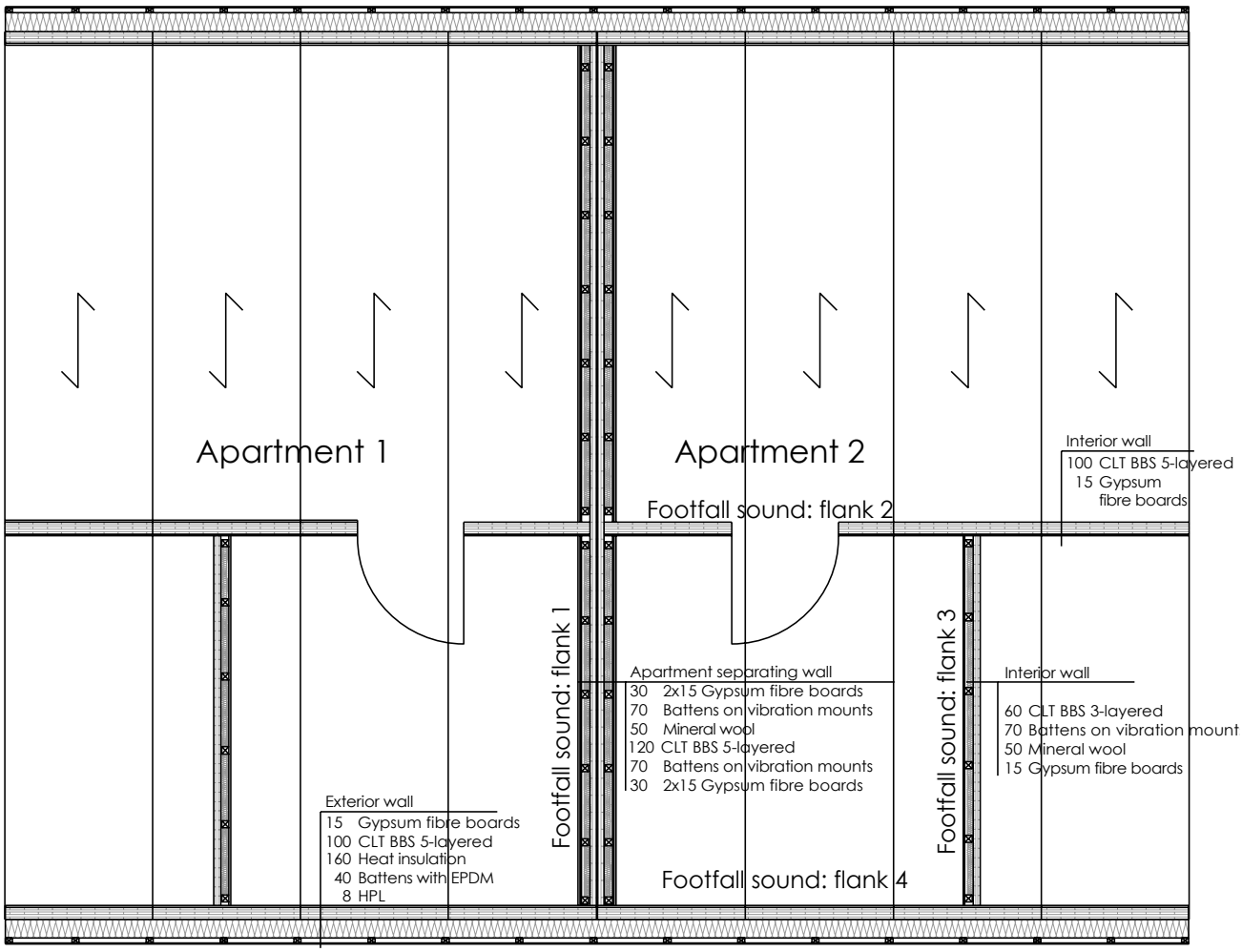


Figure 10 – Illustration of two apartments with apartment partition wall with vibration decoupling

Sound insulation of components without secondary paths as calculation basis

Calculation of R'_w from the mass of a single-shell separating component in CLT BBS construction design without facing formwork where no test results are available:

(1) $R'_w = 32.05 * \log(m'_{element}) - 18.68 + K_{wall\ type}$ with $K_{wall\ type} = -2$ dB for large-format elemente

Component	**Component length l_f**	**Component layers** for the flank sound calculation	**$R_{w,r}$** assessed air-borne sound insulation in the flank sound calculation	**$R_{w,P}$** tested air-borne sound insulation of the complete component
Apartment partition wall	3.14 m	5-layered CLT BBS 120 mm (57.6 kg/m²) without assessed mass increase, planking of CLT BBS decoupled by means of vibration mounts	35.7 dB	69 dB
Interior wall	3.12 m	5-layered CLT BBS 100 mm (48 kg/m²) with one-sided planking of 15-mm Rigips RF fire protection board, Additional mass 13.5 kg/m²	36.7 dB	-
Exterior wall (separating cut on the axis of the apartment partition wall)	3.12 m	5-layered CLT BBS 100 mm (48 kg/m²) with one-sided planking of 15-mm Rigips, RF fire protection board, additional mass 13.5 kg/m²	36.7 dB	47 dB*
Apartment separating ceiling	Area across the room viewed: S_s = 3.12 m x 3.14 m = 9.8 m²	5-layered CLT BBS 150 mm (72.0 kg/m²) with assessed mass increase from the floor assembly with heavy filling (196.0 kg/m²) results in a total mass of 268 kg/m²	57.1 dB	$R_{w,P}$ = 77 dB $L_{n,w,P}$ = 38 dB

* The value was measured with 90 mm CLT BBS and 12.5 mm Rigips RF fire protection board

Horizontal sound transmission through the apartment partition wall
Calculation of the sound insulation value in consideration of the secondary paths

The measured sound insulation value R'_w of the apartment partition wall (complete assembly R'_w = 69 dB) can be inserted directly in the formula below:

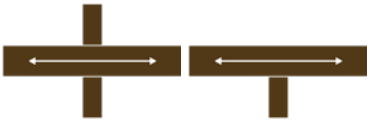
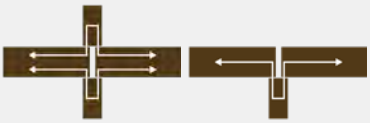
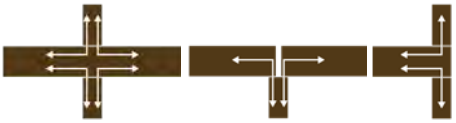
(1) $R'_w = -10\ \lg(10^{-0,1R_w} + \sum 10^{-0,1R_{ij,w}})$

The flank insulation values $R_{ij,w}$ are to be calculated:

(3) $R_{ij,w} = (R_{i,w+}\ R_{j,w})/2 + \Delta R_{ij,w} + K_{ij} + 10\ \lg\ (S_s/l_0 l_f)$

Explanation regarding the joint insulation value K_{ij}

Numerous K_{ij} values were measured in the research project "Vibro-acoustics in the planning process for timber structures". In addition, measured data of comparable assemblies from different European institutes have been compiled and assessed. The analysis in the table below shows the median values of the joint insulation values for various joint situations.

Case	Joint type	Transmission direction	Joint insulation value
1		"Vertical transmission" Path Ff	K_{Ff} = 20 dB
2		"Horizontal transmission" Path Ff Ceiling, continuous	K_{Ff} = 3 dB
3		"Horizontal transmission" Path Ff Ceiling, separated	$K_{Ff} = 12+10\lg(m_2' / m_1')$
4		"Mixed transmission" Path Df and Fd	K_{Fd} = 14 dB K_{Df} = 14 dB
5		"Horizontal transmission" Paths Ff, Df, Fd Walls of BBS 125	K_{Ff} = 12 dB $K_{Df} = K_{Fd}$ = 16 dB

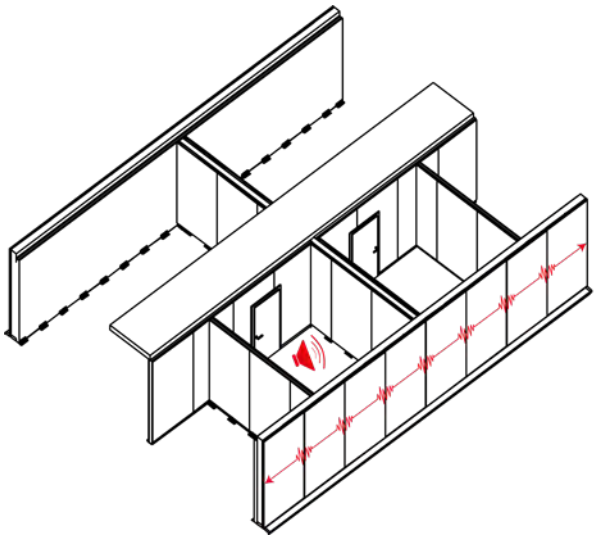


Figure 11 – Flank sound transmission with CLT BBS 125 elements

In the structure consisting of CLT BBS 125, always 1.25-mm wide wall elements are lined up side-by-side and joined with a wooden riser, which has an acoustic effect like a separating cut (see Figure 11).

Consequently, not case 1 must be expected for K_{Ff} with a continuous flanking wall, but the more favourable case 3. This was proven by means of the measurements in the course of the aforementioned research project.

Likewise based on the acoustically favourable construction design using CLT BBS 125 elements, the R_{Ff} measuring results show that with the execution of a separating cut in the flanking wall on the partition wall axis, the K_{Ff} value from case 1 must be used in the calculation for this case.

NOTE

These projections with favourable effects on sound insulation can be chosen only when the exterior wall does not consist of large-format elements. Furthermore, any potentially existing direct planking on the interior side of the flanking wall must not extend beyond the partition wall.

Flank insulation values $R_{ij,w}$ to be considered

1. Flank of apartment partition wall – exterior wall

$R_{Ff,w}$: Sound transmission into the flanking wall and out of the flanking wall again into the receiving room

$R_{F,w}$ = 36.7 dB
$R_{f,w}$ = 36.7 dB
$\Delta R_{Ff,w}$ = 0 dB (no facing formwork present)
K_{Ff} = 20 dB (case 1 based on the modular construction method with 125 cm wide CLT BBS wall elements)
S_s = 8.6 m²
l_o = 1.0 m
l_f = 2.75 m

Calculation result: $R_{Ff,w}$ = 61.6 dB

$R_{Df,w}$: Sound transmission into the partition wall and out of the flanking exterior wall again into the receiving room

$R_{D,w}$ = 35.7 dB (calculation based on the mass of the unfinished CLT BBS 125 wall elements, 12 cm thickness)
$R_{f,w}$ = 36.7 dB
$\Delta R_{Df,w}$ = 18 dB (improvement value of a one-sided facing formwork on vibration mounts with double 12.5 mm planking on CLT BBS 125 wall, 90 mm thickness, measuring results from binderholz/Rigips)
K_{Df} = 16 dB (case 5)
S_s = 8.6 m²
l_o = 1.0 m
l_f = 2.75 m

Calculation result: $R_{Fd,w}$ = 75.1 dB

$R_{Fd,w}$: Sound transmission into the flanking exterior wall and out of the partition wall again into the receiving room

For the calculation, the path Fd is set equal to Df:
$R_{Fd,w}$ = 75.1 dB

---

2. Flank of apartment partition wall – interior wall

$R_{Ff,w}$: Sound transmission into the abutting interior wall and out of the abutting interior wall again into the receiving room

$R_{F,w}$ = 36.7 dB
$R_{f,w}$ = 36.7 dB
$\Delta R_{Ff,w}$ = 0 dB (no facing formwork present)
K_{Ff} = 20 dB (case 1 based on the modular construction method with 125 cm wide CLT BBS wall elements)
S_s = 8.6 m²
l_o = 1.0 m
l_f = 2.75 m

Calculation result: $R_{Ff,w}$ = 61.6 dB

$R_{Df,w}$: Sound transmission into the partition wall and out of the abutting interior wall again into the receiving room

$R_{D,w}$ = 35.7 dB (calculation based on the mass of the unfinished CLT BBS 125 wall elements, 12 cm thickness)
$R_{f,w}$ = 36.7 dB
$\Delta R_{Df,w}$ = 18 dB (improvement value of a one-sided facing formwork on vibration mounts with double 12.5 mm planking on CLT BBS 125 wall, 90 mm thickness, measuring results from binderholz/Rigips)
K_{Df} = 16 dB (case 5)
S_s = 8.6 m²
l_o = 1.0 m
l_f = 2.75 m

Calculation result: $R_{Df,w}$ = 75.2 dB

$R_{Fd,w}$: Sound transmission into the abutting interior wall and out of the partition wall again into the receiving room

For the calculation, the path Fd is set equal to Df:
$R_{Fd,w}$ = 75.2 dB

---

3. Flank of apartment partition wall – ceiling

$R_{Ff,w}$: Sound transmission into the flanking ceiling and out of the flanking ceiling again into the receiving room

$R_{F,w}$ = 57.1 dB
$R_{f,w}$ = 57.1 dB
$\Delta R_{Ff,w}$ = 0 dB (no suspended ceiling present)
K_{Ff} = 5,3 dB (case 3, m_1' = 268 kg/m², m_2' = 57.6 kg/m²)
S_s = 8.6 m²
l_0 = 1.0 m
l_f = 3.14 m

Calculation result: $R_{Ff,w}$ = 66.8 dB

$R_{Df,w}$: Sound transmission into the partition wall and out of the flanking ceiling again into the receiving room

$R_{D,w}$ = 35.7 dB (calculation based on the mass of the unfinished CLT BBS 125 wall elements, 12 cm thickness)
$R_{f,w}$ = 57.1 dB
$\Delta R_{Df,w}$ = 18 dB (improvement value of a one-sided facing formwork on vibration mounts with double 12.5 mm planking on CLT BBS 125 wall, 90 mm thickness, measuring results from binderholz/Rigips)
K_{Df} = 14 dB (case 4)
S_s = 8.6 m²
l_0 = 1.0 m
l_f = 3.14 m

Calculation result: $R_{Df,w}$ = 82.8 dB

$R_{Fd,w}$: Sound transmission into the flanking ceiling and out of the partition wall again into the receiving room

For the calculation, the path Fd is set equal to Df:
$R_{Fd,w}$ = 82.8 dB

---

4. Flank of apartment partition wall – floor

The related secondary paths ij = Ff, Df, Fd are not considered, since the sound transmission is prevented structurally by

- heavy floor assemblies with concrete floor screed
- correct installation of the apartment partition wall, as shown in the cut, on the unfinished ceiling using the screed rim insulating strip

Calculation of the air-borne sound insulation value R'_w with consideration of the secondary paths

Based on the above described individual values, the following can be calculated by means of the formula R'_w:

(1) $R'_w = -10 \log(10^{-0,1\times69} + 10^{-0,1\times61,6} + 10^{-0,1\times75,1} + 10^{-0,1\times75,1} + 10^{-0,1\times61,6} + 10^{-0,1\times75,1} + 10^{-0,1\times75,1} + 10^{-0,1\times66,8} + 10^{-0,1\times82,8} + 10^{-0,1\times82,8}) = 57.3$ dB

According to DIN 4109, 2 dB must be considered as forecast unreliability for the air-borne sound:

$R'_w = 57.3$ dB – 2 dB = 55.3 dB > measured $R'_w = 55$ dB

Proof of the air-borne sound is thereby provided.

REMARK regarding R_{Df} and R_{Fd}

These flank insulation values are far above the value of the flank paths R_{Ff} due to the decoupled insulation levels. For simplification, this path can be neglected in the execution of double-sided installation levels (stand-alone or on vibration mounts) on the apartment partition wall or on the interior side on the flanking wall. In the calculation example shown above, the difference when neglecting these flank paths is +0.3 dB for R'_w.

Vertical sound transmission via the apartment separating ceiling

Footfall sound transmission in consideration of secondary paths

The measured standard footfall sound level of the apartment partition wall (complete assembly $R_w = 69$ dB) can be inserted directly in the formula below:

(2) $L'_{n,w} = 10 \lg(10^{0,1L_{n,w}} + \sum 10^{0,1L_{n,ij,w}})$

The footfall sound flank transmissions on the path Df and DFf are to be calculated:

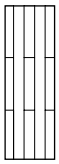
(4) $L_{n,Df,w} = L_{n,Df,lab,w} - \Delta K_{ij} - \Delta R_{j,w} - 10\lg\,(S_s/(l_o\,l_f))$

(5) $L_{n,DFf,w} = L_{n,DFf,lab,w} - \Delta K_{ij} - \Delta R_{ij,w} - 10\lg\,(S_s/(l_o\,l_f))$

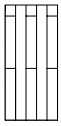
The lab value for the flank transmission of the footfall sound on the path Df is to be calculated according to the following formula:

(6) $L'_{n,Df,lab,w} = 10 \lg(10^{0,1(L_{n,w}+K_1)} - 10^{0,1L_{n,w}})$

The factor K_1 required for this purpose besides the rated standard footfall sound level $L_{n,W}$ can be found in the following table as dependent on the construction variant: Corrective summand K_1 for consideration of the flank transmission on the path Df.

Wall arrangement in the receiving room	**Ceiling assembly**
	 CLT BBS ceiling
 CLT BBS wall	K_1 = 4 dB

The lab value for the flank transmission of the footfall sound on the path DFf, $L_{n,DFf,lab,w}$ is shown shaded in grey in the right column of the table below, as dependent on the wall structure and floor assembly. In the table that applies under lab conditions, the value was referred to as $L_{n,DFf,w}$.

Wall assembly in the transmitting and receiving room	**Floor screed assembly**	**Footfall sound transmission on the paths Dd + Df: $L_{n,w}$ + K_1 in dB**																						**$L_{n,DFf,w}$ in dB**
		35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	>5	
	a) ZE/HWF	11	10	10	9	8	7	6	5	5	4	4	3	3	2	2	1	1	1	1	1	1	0	n = 1 46
	b) ZE/MF	10	10	9	8	7	6	5	5	4	4	3	3	2	2	1	1	1	1	1	1	0	0	n = 7 45 σσ = 1.5
	c) TE	8	7	6	5	5	4	4	3	3	2	2	1	1	1	1	1	1	0	0	0	0	0	n = 6 42 σσ = 0.9

Floor screed assembly:

a) ZE/HWF mineral-bound screed or cast asphalt
on soft fibre timber footfall sound insulation boards
Rim insulating strips: > 5 mm mineral fibre or PE-foam rim strips

b) ZE/MF mineral-bound screed or cast asphalt
on soft fibre or PST footfall sound insulation boards
Rim insulating strips: > 5 mm mineral fibre or PE-foam rim strips

c) TE dry screed
on mineral fibre, PST or soft fibre timber footfall sound insulation boards
Rim insulating strips: > 5 mm mineral fibre or PE-foam rim strips

With these formulas and the related tables shown, the vertical footfall sound transmission in consideration of secondary paths can now be calculated for the illustrated planning example. In this process, respectively the two flank paths Df and DFf must be examined for all four walls of the analysed room, from which eight values result for $L_{n,ij,w}$. The following plan excerpt (see Figure 12) shows the analysed room with the flanking walls to be considered for the footfall sound transmission.

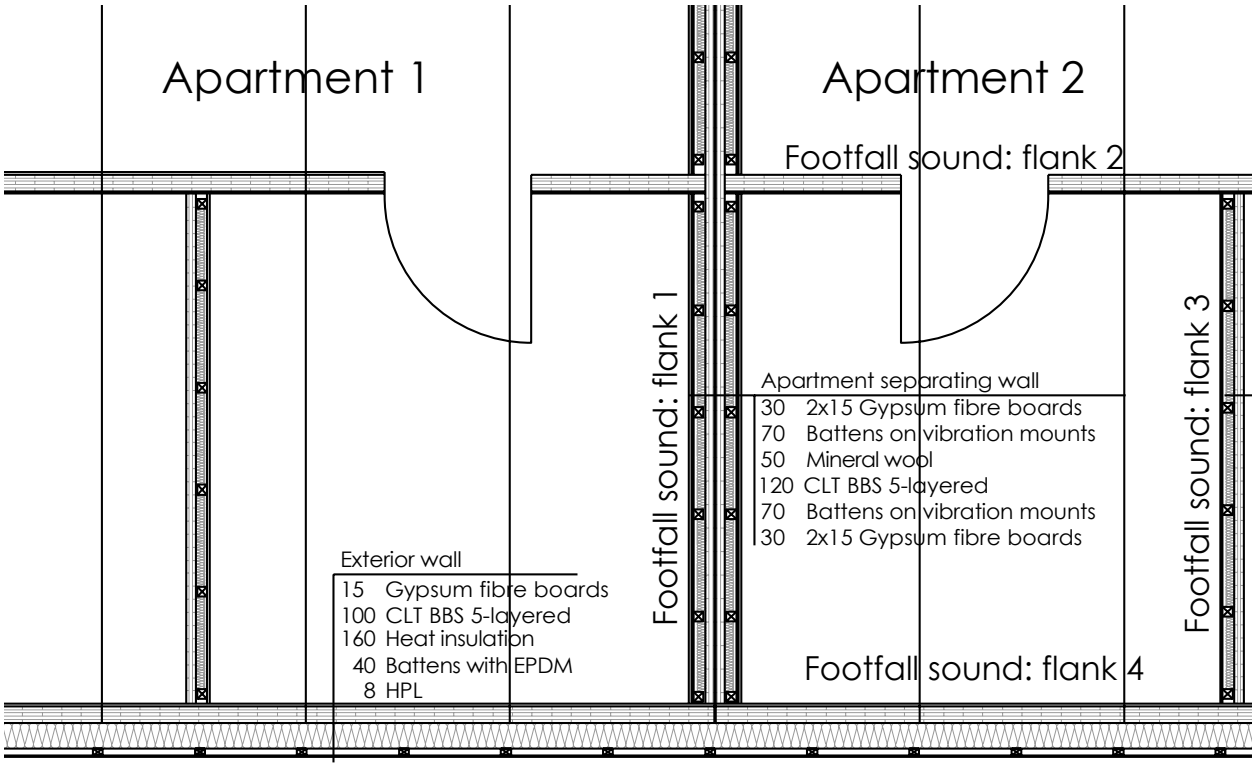


Figure 12 – Optimised apartment partition wall for the prevention of flank sound transmission

Secondary paths to be considered for vertical footfall sound transmission

1. Flank ceiling – apartment partition wall

$L_{n,w}$ = 38 dB
S_s = 9.8 m²
l_f = 3.14 m
K_1 = 4 dB (from Table 1, CLT BBS 125 ceiling in visual surface quality, CLT BBS 125 walls in visual surface quality or directly planked without consideration of potentially planned facing formwork / installation levels)
$L_{n,Df,lab,w}$ = 39.8 dB (calculation according to formula 6)
$L_{n,DFf,lab,w}$ = 45 dB (from Table 2, CLT BBS 125 ceiling in visual surface quality, floor assembly with concrete screed and mineral fibre footfall sound insulation boards, rim insulation strips always required)
ΔK_{ij} = 0 dB (no elastomer at the top)
ΔK_{ij} = 3 dB (elastomer at the bottom, effective for both flank paths)
$\Delta R_{ij,w}$ = 18 dB (improvement value of a one-sided facing form work on vibration mounts with double 12.5 mm planking on CLT BBS 125 wall, 90 mm thickness, measuring results from binderholz/Rigips)

Calculation result:
$L_{n,Df,w}$ = 13.9 dB
$L_{n,DFf,w}$ = 14.1 dB

2. Flank ceiling – interior wall

$L_{n,w}$ = 38 dB
S_s = 9.8 m²
l_f = 3.12 m
K_1 = 4 dB (corresponding to flank 1)
$L_{n,Df,lab,w}$ = 39.8 dB (corresponding to flank 1)
$L_{n,DFf,lab,w}$ = 45 dB (corresponding to flank 1)
ΔK_{ij} = 0 dB (no elastomer at the top)
ΔK_{ij} = 3 dB (elastomer at the bottom, effective for both flank paths)
$\Delta R_{ij,w}$ = 0 dB (no facing formwork planned)

Calculation results:
$L_{n,Df,w}$ = 31.8 dB
$L_{n,DFf,w}$ = 37.0 dB

3. Flank ceiling – interior wall

$L_{n,w}$ = 38 dB
S_s = 9.8 m²
l_f = 3.14 m
K_1 = 4 dB (corresponding to flank 1)
$L_{n,Df,lab,w}$ = 39.8 dB (corresponding to flank 1)
$L_{n,DFf,lab,w}$ = 45 dB (corresponding to flank 1)
ΔK_{ij} = 0 dB (no elastomer at the top)
ΔK_{ij} = 3 dB (elastomer at the bottom, effective for both flank paths)
$\Delta R_{ij,w}$ = 15 dB (improvement value of a one-sided facing formwork on vibration mounts with single 15 mm planking on CLT BBS 125 wall, 90 mm thickness, measuring results from binderholz/Rigips) HolzBauSpezial conference transcript)

Calculation results:
$L_{n,Df,w}$ = 16.9 dB
$L_{n,DFf,w}$ = 22.1 dB

4. Flank ceiling – interior wall

$L_{n,w}$ = 38 dB
S_s = 9.8 m²
l_f = 3.12 m
K_1 = 4 dB (corresponding to flank 1)
$L_{n,Df,lab,w}$ = 39.8 dB (corresponding to flank 1)
$L_{n,DFf,lab,w}$ = 45 dB (corresponding to flank 1)
ΔK_{ij} = 0 dB (no elastomer at the top)
ΔK_{ij} = 3 dB (elastomer at the bottom, effective for both flank paths)
$\Delta R_{ij,w}$ = 0 dB (no facing formwork planned)

Calculation results:
$L_{n,Df,w}$ = 31.8 dB
$L_{n,DFf,w}$ = 37.0 dB

5. Calculation of the footfall sound transmission in consideration of secondary paths

Calculation $L'_{n,w}$ by means of the following formula

(2) $L'_{n,w} = 10\log(10^{0,1\times38} + 10^{0,1\times13,9} + 10^{0,1\times14,1} + 10^{0,1\times31,8} + 10^{0,1\times37,0} + 10^{0,1\times16,9} + 10^{0,1\times22,1} + 10^{0,1\times31,8} + 10^{0,1\times37,0}) = 43.0$ dB

According to DIN 4109, 3 dB must be considered as forecast unreliability for the footfall sound:

$L'_{n,w} = 43,0$ dB + 3 dB = 46.0 dB ≤ measured $L'_{n,w} = 46$ dB

Proof of the footfall sound is thereby provided.

Remarks regarding the calculation example

Since the scientifically proven calculation described here differs from the requirements of DIN 4109, the proof for the separating ceiling must be rendered by means of a construction measurement.

Simplified in-situ correction:
for the calculation, the lab values $L'_{n,w}$ and R'_w of the direct transmission are converted to match the construction situation by means of the structure-borne sound resounding period of the ceiling in the lab, $T_{s,lab}$, and at the construction site, $T_{s,situ}$.

(7) $R'_{Dd} = R'_{situ} = R'_{lab} - 10\lg(T_{s,situ}/T_{s,lab})$ or

(8) $L'_{n,Dd} = L'_{n,situ} = L'_{n,lab} + 10\lg(T_{s,situ}/T_{s,lab})$

The effect of the in-situ correction (measured examples from the vibro-acoustics research project) is not considered in this calculation example; it results in a change of the calculated R'_w or $L'_{n,w}$ values of an averaged ± 1 to 2 dB.

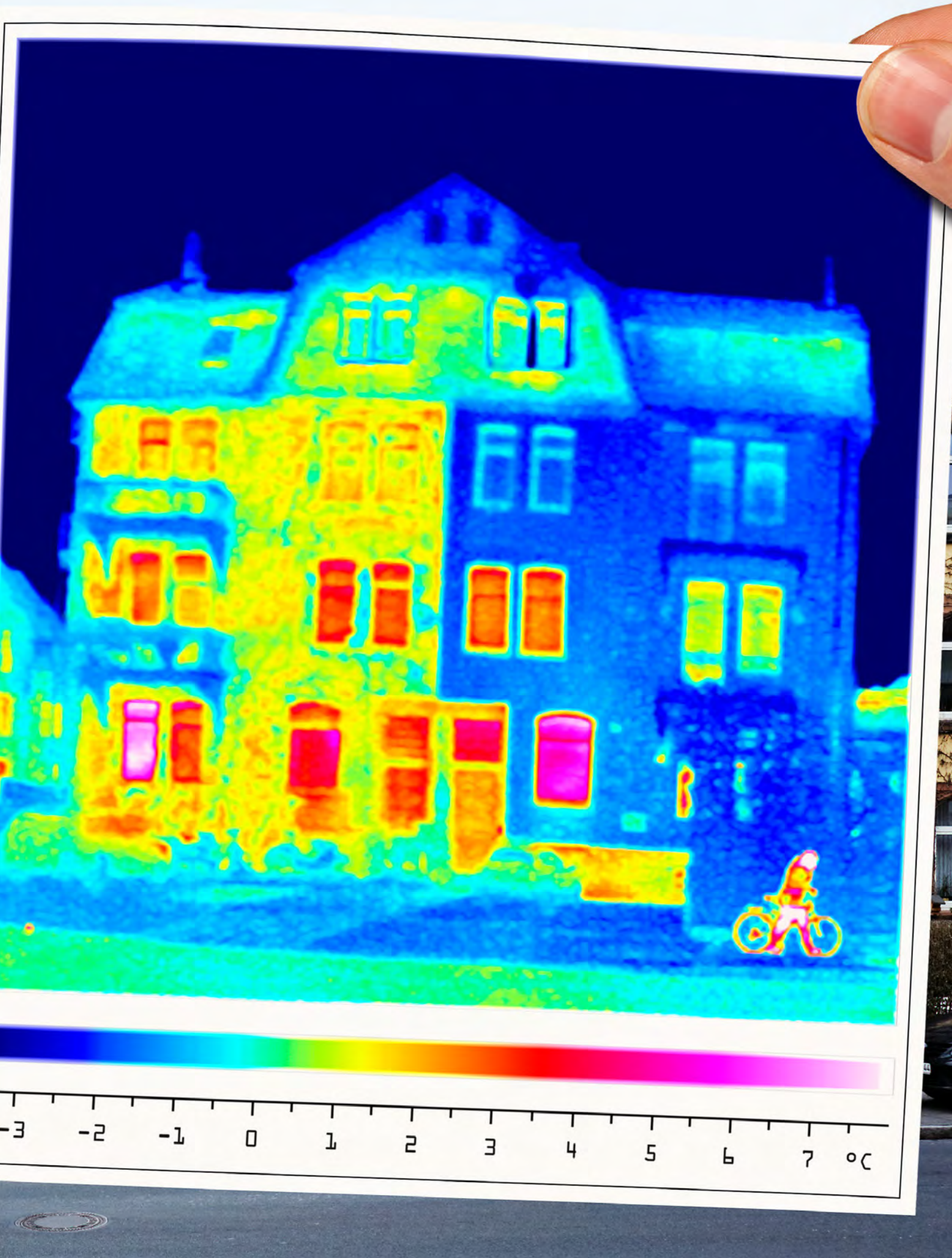
List of formulas on sound insulation

1	R'_w [dB]	Rated construction sound insulation value of a separating component (requirement for Germany) in installed condition with secondary paths
2	$L'_{n,w}$ [dB]	Standard footfall sound level (requirement for Germany) in installed condition with secondary paths
3	$R_{ij,w}$	Calculated flank insulation value of a separating component for the individual secondary sound paths with ij = Df, Fd, Ff
4	$L_{n,Df,w}$ [dB]	Footfall sound flank transmission on the path Df, converted to the construction situation
5	$L_{n,DFf,w}$ [dB]	Footfall sound flank transmission on the path DFf, converted to the construction situation
6	$L_{n,Df,\,lab\,w}$ [dB]	Lab value of the footfall sound flank transmission on the path Df
7	R'_{Dd}	Calculated sound insulation value of a separating component (requirement for Germany) with secondary paths and with in-situ correction
8	$L'_{n,Dd}$	Calculated standard footfall sound level of a separating ceiling (requirement for Germany) with secondary paths and with in-situ correction

Table of abbreviations, sound insulation

R_w [dB]	Rated sound insulation value of a component without secondary sound paths
$L_{n,w}$ [dB]	Rated standard footfall sound level of a component without secondary sound paths
$R_{i,w}$ [dB]	Air-borne sound insulation value of the flanking component in the transmitting room
$R_{j,w}$ [dB]	Air-borne sound insulation value of the flanking component in the receiving room
$\Delta R_{ij,w}$ [dB]	Improvement value of the flank sound insulation (air-borne sound and footfall sound) achieved through installation levels or stand-alone facing formwork
S_s [m²]	Surface of the separating component
l_0 [m]	Reference length 1.0 m
l_f [m]	Length of the butt joint of the flanking component to the separating component [m]
K_{ij} [dB]	Joint insulation values for calculation of the flank insulation value Rij,w
ΔK_{ij} [dB]	Improvement of the footfall sound flank transmission achieved through decoupling elastomers
K_1 [dB]	Factor to calculate the footfall sound flank transmission on the path Df
K_2 [dB]	Factor to calculate the footfall sound flank transmission on the path DFf
$L_{n,DFf,lab,w}$ [dB]	Lab value of the footfall sound flank transmission on the path DFf
$D'_{nT,w}$ [dB]	Rated standard sound level difference of a separating component (requirement for Austria) in the built-in condition with secondary paths; resounding period in the receiving room is considered in it
$L'_{nT,w}$ [dB]	Standard sound level of a separating ceiling (requirement for Austria) in the built-in condition with secondary paths; resounding period in the receiving room is considered in it
m_1' [kg / m²]	Assessable surface measures of the flanking component (without the mass of potential facing formwork or suspended elements) for the calculation of the joint insulation value K_{ij}
m_2' [kg / m²]	Assessable surface measures of the separating component (without the mass of potential facing formwork or suspended elements) for the calculation of the joint insulation value K_{ij}

HEAT INSULATION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HEAT INSULATION / HUMIDITY REGULATION

Winter heat insulation

Heat insulation in construction above ground level covers all measures to avoid a need for heating during the winter and cooling during the summer. At the same time, more comfort because of a pleasant room climate and the related significant relief for the environment are key points. With insufficient heat insulation, uncomfortable and unhygienic room climatic living conditions can set in.

Why heat insulation?

- To increase comfort.
- To prevent illnesses.
- To save costs because heating costs can be reduced substantially.
- To increase the value of the building (energy costs).
- To protect our environment because the CO_2 emissions are significantly lowered.

binderholz CLT BBS

With cross laminated timber CLT BBS, low energy, passive energy and plus energy buildings can be constructed. CLT BBS structures fulfil all customary heat insulation values and create a comfortable and balanced room climate due to their permeable design and their capacity to lower the peak values of the humidity in the room.

Since CLT BBS is made of pinewood lamellas, which are subject to strict quality control, the moisture of CLT BBS wood in the condition as delivered is guaranteed to be within a very narrow range at 12 % ± 2 % and a controlled gross density is also assured. For this reason, an improved value for heat conductivity λ of 0.12 W/mK can be assessed for CLT BBS according to the valid ETA-06/0009.

Rigips dry construction systems

Modern timber structures in the passive and multi-comfort design using systems of Saint-Gobain guarantee the highest measure of quality. A comprehensive product range of Saint-Gobain insulating materials is available for floors, walls, ceilings and roofs. The range includes everything from normal heat insulation to complete system solutions for residential areas and for commercial and public buildings (see example in Figure 13).

Mineral fibre insulating materials of Isover with a λ of 0.034 W/mK and WDV systems of Weber offer the greatest comfort at the lowest insulation thicknesses. Rigips facing formwork and suspended ceiling and roof structures with complete hollow space insulation (for example Isover mineral wool) additionally contribute to the reduction of the U-values of building parts.

For the required improvement of the overall energy efficiency also in existing buildings, the dry interior finishing makes one of the most decisive contributions. The energy efficiency of existing buildings can be improved substantially in the finishing of existing roof structures. Besides the short construction periods, the resulting opportunity to update the building technology in the installation levels at the same time represents a particular advantage of dry construction.

Moreover, planking with Rigips boards and a volumetric weight of approx. 800 and up to 1200 kg/m² can contribute to increasing the component mass that has a capacity for storing heat and thereby to the summerly comfort.

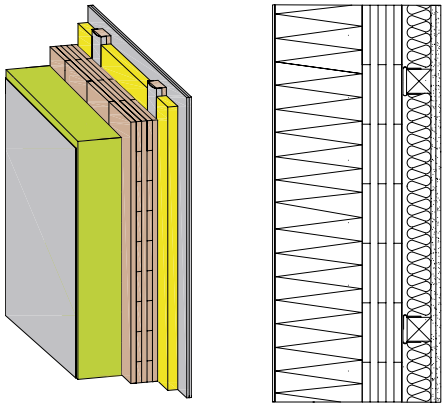

Figure 13 – Exterior wall 22 b

Summer heat insulation

Summer heat insulation (heat protection) helps limit the heat that is created in the interior of the building through the direct or indirect irradiation of the sun, which is usually largely due to irradiation through the windows, to a bearable measure.

This is done primarily by minimising the heat addition from the direct irradiation of the sun, reducing the heat conductivity of wall, roof and ceiling surfaces, and the waste heat of electrical devices and people. Windows without protection from the sun have the biggest effect on the heating of interior rooms.

Summer heat insulation is becoming more and more important, in particular in consequence of global climatic change and the trend toward rising temperatures. This is related to the increasing use of air conditioners, which in turn lead to climbing power and respectively energy consumption, and thereby also to increasing CO_2 emissions especially in the summer months.

This is why summer heat insulation has to be considered already in the building planning phase to avoid that buildings overheat during the summer resulting in uncomfortable room temperatures.

In residential buildings room temperatures in an average summer will remain below 27 °C due to nightly ventilation, low heat dissipation of devices, sun shading and heat storage. During heat waves, they are likely to rise somewhat. In offices, temperatures of below 26 °C are aimed for. In this regard, it is particularly important to pay attention, on the one hand, to corresponding sun shading devices that are installed on the outside of the windows, so that the “glasshouse effect” can be prevented and, on the other hand, to especially understanding and considering the summer behaviour of buildings and that of the users. Not only the occurring maximum temperature but also the period during which a certain temperature threshold is exceeded is significant for the user’s subjective perception. The effect of the user behaviour on summerly room temperatures in consideration of various building materials or construction methods applied – light-weight construction, brick construction, concrete construction – has been analysed by measurements in occupied properties within the scope of a research project.

Parameters that influence the behaviour of not actively climate-controlled buildings during the summer or the room heating in consequence of summerly irradiation of heat are:

- the outdoor climate
- the thermal properties of the used components in the exterior area such as surface paint, heat insulation capacity, component assemblies or layer sequence, the capacity to store heat especially of components located on the inside, the overall degree of energy permeation, the size and orientation of the used glazing, existing sun shielding systems and their effects
- orientation of the exterior wall surfaces
- use of possibilities for night-time ventilation and the sun shielding equipment
- release of heat from electrical devices, illumination and people
- storage efficiency of items of furniture and structural design

The results of the research project show that regardless of the construction method, the building materials used, and the existing thermal storage of the mass in the interior room, it is the user behaviour and foremost incorrect use of ventilation possibilities that has a greater effect on the progression of summer room temperatures. At the same time, the nightly dissipation of heat through windows is decisive for the summertime thermal behaviour of rooms.

Ensuring comfort in the living rooms (see Figure 14) during frequently occurring heat periods is a central concern of Saint-Gobain Multikomfort. The aim is to reduce temperature peaks in the summer and increase comfort in the room. The Rigips Alba®balance full-gypsum boards developed for this purpose absorb the room heat that exceeds the comfort zone and release it again when there is sufficient nightly ventilation.

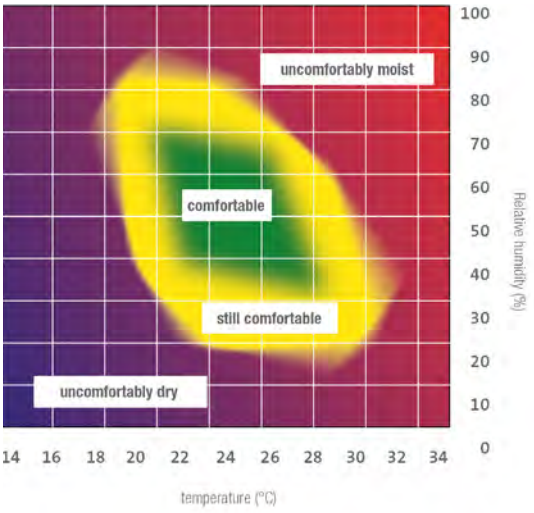

Figure 14 – Well-being in the interior space

Reasons why rapid air exchanges are incorrectly omitted in the summer:

- assumption that ventilation at night is not required in passive houses
- risk of falls in children's rooms (max. tilting of the windows)
- reduced ventilation effect because of insect screens
- pets (windows are tilted at most)
- ground floor apartments (for security reasons, windows are tilted at most)
- restriction of the ventilation effect for the apartment because of closed interior doors
- noise in the surroundings especially at night

In the summer, the daily fluctuations of the outdoor temperature are generally greater than in the winter. Moreover, there is a very high temperature difference on the component surfaces in consequence of the irradiation of the sun.

Measures for optimisation:

- increasing the heat insulation.
- Insulating layers placed on the outside and masses with the capacity of storage have favourable effects on indoor temperatures.
- Choice of windows: according to more recent building physical research, the heat permeability of windows has a much greater effect on the interior room temperature than the capacity of the interior masses to store heat.
- The kind of the chosen insulating material does not have such decisive importance. Instead, the thickness of the provided insulating layer, as well as the material type and thickness of the cladding facing the interior room are in the foreground of the examinations.
- Correct user behaviour: the room climate can be additionally improved by ventilation during the night and keeping windows and doors closed during the day.

The results of the scientific studies show that the summer heat insulation can be equated only to limited extent with the components' storage capacity. With a rising level of heat insulation, the summer temperatures in the room fall to a comfortable measure. CLT BBS elements have a positive effect in this because CLT BBS provides simultaneously good insulation from heat as well as excellent storage capacity. The simulation of a single-family home shows that with increasing heat insulation, temperature exceedances become much less frequent and are by far weaker. The experiences gathered by residents, too, show that comfort and room climate in timber houses are consistently evaluated as being positive also during the summer.

Humidity regulation

Wood as a natural and replenishable raw material has many positive building physical properties. One is the ability to absorb moisture and release it again. Thus, CLT BBS has a reducing effect on the peak values of humidity in rooms (see Figure 15). At a room temperature of 20 °C and relative humidity of 55 %, 1 m³ CLT BBS stores around 43 litres of water. If the relative humidity changes from 55 % to 65 %, 1 m³ CLT BBS absorbs a rounded 7 litres of water from the room air.

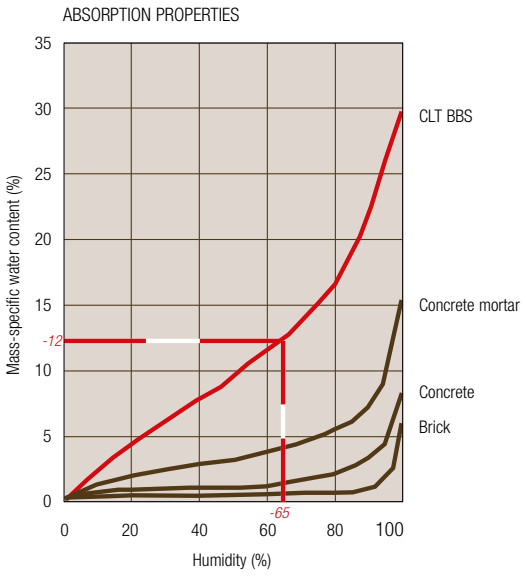

Figure 15 – Absorption behaviour of different building materials

binderholz CLT BBS

Wood is permeable for diffusion and therefore permits the autonomous movement of steam through building parts. This positive building physical attribute of cross laminated timber CLT BBS and its capacity to absorb room humidity without being damaged (absorption property) contribute decisively to a comfortable and balanced room climate.

Steam diffusion

The full-surface adhesive joints of CLT BBS are permeable for diffusion. Attempts by the adhesive manufacturer prove that the common adhesive joint has the same diffusion resistance as a 13-mm thick spruce board. CLT BBS is accordingly permeable for diffusion while it has a steam-reducing effect. These two positive characteristics are important criteria for a comfortable living climate. The glued single-layer CLT BBS boards do not have any effect on the diffusion behaviour of the complete structure. In principle, CLT BBS structures are designed without steam retardants or steam barriers. The suitability of the complete component must be proven in the individual case. All structures contained in this brochure have been tested in terms of building physics.

Rigips dry construction systems

Rigips controls the room climate Gypsum panels contain a great number of pores that absorb and store the moisture in the room when the humidity is temporarily increased. If the room air is dry, it releases the moisture to its environment again. This way, the room climate is automatically regulated. Rigips panels do not contain any health-hazardous substance such as heavy metals, biocides, formaldehyde or fine dust. Therefore, the products have been recommended by the Institut für Baubiologie Rosenheim [Rosenheim Instite for Building Biology] (IBR) and the Österreichisches Institut für Baubiologie und Ökologie [Austrian Institute for Building Biology and Ecology] (IBO) as a building material.

Convention

Due to the full-surface gluing of the CLT BBS elements, there are no hollow spaces that permit a convection. When installing built-in parts, it must be ensured that the construction is provided airtight to prevent convection through leakages.

Building physical parameters of CLT BBS

	Parameter	Remarks
Gross density	450 kg / m³	with a wood moisture of 12 % ± 2 % in the condition on delivery
Heat conductivity λ	0.12 W / mK	according to ETA-06 / 0009
Specific heat capacity	1,600 J / kgK	c_p according to EN ISO 10456
Water steam diffusion resistance factor μ	40 to 70, dependent on the wood moisture and number of glued joints	according to EN ISO 10456
Airtightness	airtight from 3-layered design	tested by Holzforschung Austria, expert report on request
Flammability	Euro class D-s2, d0	according to EN 13501-1

FIRE PROTECTION

FIRE PROTECTION

Components must maintain their function in the event of a fire during the required period of time. The capacity of a component is dependent on the interaction of the individual layers such as the load-bearing structure, the insulating materials and the planking.

Requirements for fire protection are defined, as described below, by means of fire resistance classes.

Fire resistance of components

In the event of a fire, the period during which a structure remains fire resistant is particularly important (see Figure 16). It is essentially determined by the interior cladding systems when there is a fire load on the inside. Gypsum boards contain crystal-bound water concentrations that serve as “firefighting water” in the event of a fire.

Figure 16 – Fire test with direct flame treatment

The following points have to be considered in a detailed fire protection plan:

- Planking facing away from the fire: ensuring the room partition
- Insulation: contribution to fire resistance, especially temperature distribution
- Load-bearing structure: preservation of the carrying capacity and minimisation of deformations caused by the temperature
- Component joints: prevention of the spreading of the fire and avoidance of hollow space fires, room partition, smoke tightness

Accordingly, the fire resistance of a structure is determined and specified for the entire assembly and not only for individual layers.

The rating of components’ fire resistance is made according to EN 13501-2. In timber construction, commonly the following classes are used (see Figure 17):

- R = carrying capacity
- E = room partition
- I = heat insulation

Carrying capacity R | Room partition E | Heat insulation I

Figure 17 – Designations for the fire resistance according to ÖNORM 13501-2 (Teibinger and Matzinger, 2013)

Example of typical fire resistance classifications of components in timber construction:

Designation	Requirement	Component example
R 30, R 60, R 90	Load-bearing component	supports, wall, beams, ceiling
EI 30, EI 60, EI 90	room partitioning, heat insulating component	non-carrying partitioning components, shaft walls, bulkheading, suspended ceiling
REI 30, REI 60, REI 90	carrying and room partitioning, heat insulating component	carrying partitioning component

Source: Teibinger and Matzinger, 2013

Moreover, special requirements may apply in the individual case such as

- M = resistance to mechanical effects (fire wall replacement wall)
- K_2 30 or K_2 60 for effective protection for 30 and 60 minutes respectively to prevent that timber structures protected by planks also catch fire

In Germany, there are the designations of “fire-retardant” or “highly fire-retardant” according to DIN 4109, which is equivalent of 60 and respectively 90 minutes of fire resistance.

Proof of the fire resistance of timber components is provided either by classification reports pursuant to EN 13501-2 based on large fire experiments or through a measurement pursuant to EN 1995-1-2 in combination with the respective national application document. All component assemblies contained in the Solid Timber Construction Manual have been rated in terms of fire protection by accredited institutes. The rating and the boundary conditions to be kept for this purpose (component dimensions and loads) are indicated on the individual datasheets.

Fire behaviour of building materials

Besides the fire resistance of the components, additional requirements may apply for the fire behaviour of building materials. In the evaluation of the fire behaviour of building materials, numerous characteristics such as ignitability, flammability, flame propagation and smoke development are considered. To make different materials comparable, there is a standardised testing procedure that is regulated by EN 13501-1. This standard evaluates all materials according to the following three criteria:

Fire behaviour

- non-flammable (A1, A2)
- hardly flammable (B, C)
- normally inflammable (D, E)
- easily flammable (F)

Smoke development

- Classes s1, s2, s3 (s1 = lowest value)

Blazing dripping

- Classes d0, d1, d2 (d0 = lowest value, non-dripping)

binderholz cross laminated timber CLT BBS components are attributed pursuant to EN 13501-1 to the Euro class D-s2-d0. This equals a normal flammability, the smoke development is modest and there is no blazing dripping. (see Figure 18)

Gypsum board or gypsum fibre board are attributed to the Euro class A2-s1-d0 and thus non-flammable. Insulating materials made of mineral wool are non-flammable and attributed to the Classes A1 or A2.

Figure 18 – Test procedure pursuant to EN 13501-1 to test the fire behaviour

binderholz CLT BBS in the event of a fire

Wood has the capacity of building up a protective layer of carbon in the event of a fire. It has an insulating effect, delays burn-off and counteracts fire propagation.

The burn-off speed of binderholz CLT BBS has been determined by comprehensive testing at accredited testing institutions. The carrying capacity of CLT BBS components in the event of a fire can therefore be calculated with high accuracy.

Thus, it is understandable that firefighter prefer deployments in plywood board structures over fighting fires in buildings with other construction designs. This is because they know how long they can stay in them without putting themselves in danger.

Classification of the fire resistance of CLT BBS components

To determine the fire resistance, comprehensive fire tests have been conducted on CLT BBS elements at various independent and accredited testing institutions. In the fire tests, not only large-area CLT BBS elements have been tested by themselves but also different connecting joints.

These are, like the component itself as well, smokeproof and gastight and they accordingly do not permit any burn-through (see Figure 19).

The classification of the assemblies in the Solid Timber Manual 2.0 was made by IBS Linz and MFPA Leipzig on the basis of the fire tests explained above. The classification is also shown on the individual datasheets.

Figure 19 – Smoke-tight butt joint through caulking strip and wooden riser

Burn-off behaviour of unprotected plywood boards according to EN 1995-1-2

The burn-off speed or the burn-off rate ß0 for pinewood according to EN 1995-1-2 is 0.65 mm/min and remains constant through the formation of a carbon layer on the surface. The glued layers in the plywood boards lead to local small-area chippings in the carbon layer through the softening caused by the temperature. Before the next layer on which the fire load is working has built up a carbon layer again (25 mm), this effect causes the burn-down rate to double to 1.3 mm/min. Thus, the first 25 mm of each new plywood board layer after a glued joint burns off at this increased speed (Teibinger and Matzinger, 2013).

Tested burn-off rates of binderholz CLT BBS

The burn-off rate β_0 indicates how many millimetres of wood in a large-surface application burn down per minute of the fire duration.

To determine this parameter of binderholz CLT BBS, representative plywood cross sections with and without fire protection planking have been treated with flames in the standard tests at accredited testing institutions. Wall and ceiling components that are or are not exposed to load have been tested this way.

Based on the results of these individual tests, the following burn-off rates can be expected on the safe side for the engineering measurement of the carrying capacity of binderholz CLT BBS in the event of a fire. Any potentially existing planking layers have no negative effects on the burn-off rates, which is why the burn-off rates for CLT BBS with and without initial protection by planking are considered to be equal.

For the protection period t_{ch}, the time until the burn-off starts behind the gypsum board planking, the values specified under β_0 can be measured, when Rigips RF fire protection boards, Rigidur H gypsum fibre boards or Riduro wooden building slabs are used.

Burn-off rate β_0

Component description	Burn-off rate β_0 [mm / min]
Wall, 3 or 5 or more than 5 layers, initially protected or unprotected, 30 to 90 min. fire duration	0.75
Ceiling, 3 or 5 or more than 5 layers, initially protected or unprotected, 30 to 90 min. fire duration	0.90

The measuring rules explained in this Section have been confirmed in an official expert report by an accredited testing institution.

Burn-off behaviour of CLT BBS components protected by gypsum boards

The time when the planking fails, t_f, as well as the time when the burn-off of the CLT BBS elements starts behind the protecting planking, t_{ch}, are required in order to calculate the burn-off of a structure without the good test results of the company binderholz purely on the basis of the Euro standard EN 1995-1-2 requires.

From the time t_{ch}, the carbonisation of the CLT BBS begins at a reduced burn-off speed. After this fire phase, the time t_f occurs, from which the planking fails by falling off. From this moment in time, the CLT BBS begins to burn off, according to the Eurocode model, at an accelerated speed of 1.30 mm/min.

Saint-Gobain Rigips Austria had its products used for fire protection

- Rigips RF fire protection board,
- Rigidur H gypsum fibre board,
- and Riduro wooden building slab

evaluated regarding t_{ch} and t_f on the basis of numerous fire tests. The table shows a summary of the results.

Calculation table for the burn-off rate of protected components

	Wall components	
	Hardwood with direct planking	Facing formwork in solid timber construction
t_{100}	2.8 * d – 22.7	2.8 * d – 22.7
t_{ch}	2.8 * d – 14	2.8 * d – 14
t_f	2.2 * d + 4	1.73 * d + 30.7

	Ceiling components	
	Hardwood with direct planking	Suspended ceiling in solid timber construction
t_{100}	2.8 * d – 22.7	2.8 * d – 22.7
t_{ch}	2.8 * d – 14	2.8 * d – 14
t_f	2.2 * d + 4	2.43 * d + 0.22

d: Plate thickness of the outer layer in mm and 80% of the thickness of the inner layers if multi-layered
t_{100}: Time of overtemperature of 100 K behind the planking
t_{ch}: Beginning of the burn-off behind the planking in minutes
t_f: Time of failure behind the planking in minutes

Advantages from the binderholz tests on the burn-off behaviour of binderholz CLT BBS

The protective effect of the gypsum boards can be assessed up to the time t_{ch} for initially protected components. Thereafter, the residual cross section of the binderholz CLT BBS is to be calculated by means of the average burn-off rate explained under the calculation table. This calculation method results in residual cross sections that come closer to the tested values than the conservative model of the Eurocode EN 1995-1-2.

Assessment software

The assessment program offered free of charge by binderholz contains the tested burn-off rates of CLT BBS. Likewise, the protection times of initially protected components can be entered here. Thus, it is possible to quickly and effectively render proof for the CLT BBS components in the event of a fire and it can be printed out and filed in a transparent manner. For testable structural analysis proof based on the Euro code 5, we can make a free assessment program available to you (see Figure 20) and which can be requested from bbs@binderholz.com. All relevant characteristic product values are saved in this program.

Figure 20 – binderholz DC structural analysis program

Fire stops in timber construction

Installations of building technology are usually also led through components forming fire sections.

In a research project sponsored by binderholz and Saint-Gobain Rigips Austria among others, practical construction solutions have been developed jointly with Holzforschung Austria for the use of fire stop systems in solid timber construction and the solutions have been fire-tested (see Figure 21).

The brochure shows solutions for line passages of water pipes or air conditioning ducts, as well as electrical wiring in solid timber elements, and details of connecting conduits on solid timber walls and ceilings (see Figure 22).

Figure 21 – Test of fire stops with Rigips solutions.

The manufacturers and product names of the various fire stop systems are specified in the planning brochure. The system's fire resistance and the boundary conditions to be observed for the installation are shown in tables.

In addition, in a research project at Technical University Munich, which is supported by binderholz and other companies (development of advanced design rules/details for multi-story buildings in solid timber design of building class 4), detail catalogues have been developed that are applicable in Germany up to the building class 4. Here, too, fire tests have been conducted that support the proposed solutions (see Figure 23).

Figure 22 – Planning brochure for fire stops in timber construction
Source: Holzforschung Austria

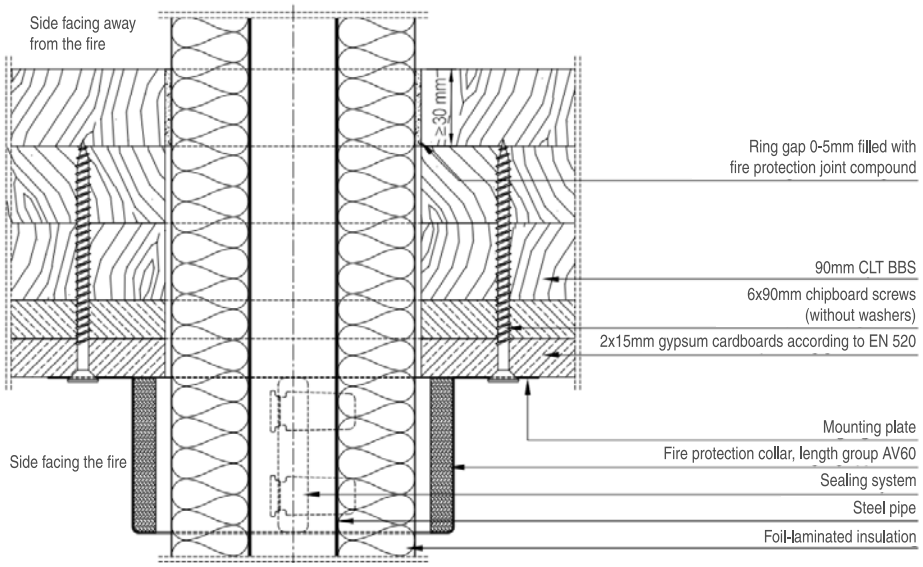

Figure 23 – Rigips classification: Installation of insulated tubes with an annular gap 0-10 mm

Fire protection evaluation of component joints

To prevent fires in buildings, it is not sufficient to know the fire resistance duration of the respective components. The interaction of the components joined with each other must also be considered, meaning the fire behaviour of connecting parts and installations. Spreading of the fire and smoke gases through hollow spaces and joints must be prevented.

Thus, the same requirements of fire resistance are posed for connections and passages as also apply to the respective individual components.

Figure 24 – binderholz processing guideline: Exterior wall-to-ceiling connection detail

To prove the fire resistance of the component joint, for example, between a CLT BBS ceiling in visual surface quality and a wall planked directly with 12.5-mm gypsum fire protection boards, several fire tests have been conducted.

It was shown that with a force-fit connection of the elements (fastener spacing up to 500 mm), a burn-through in the connecting joints can be prevented for 60 minutes. For the solid timber construction, a Sylomer bearing was inserted between the timber elements and the connecting joint was sealed with common retail acrylic or an intumescent product. It was shown that both versions fulfil the requirements for fire resistance.

Source: binderholz processing guidelines

At Technical University Munich, various connecting joints between walls and ceilings made of CLT BBS have been tested. The test duration was 60 minutes, the protection targets for the tested joints to be reached are smoke-tightness and preventing a burn-through for 60 minutes.

The fire protection board planking (gypsum fibre boards) abutted on the CLT BBS of the ceiling. Fire protection acrylic was plastered onto half of the joint length, the corner joint between the timber and the gypsum fibre board and the gypsum fibre board was set abut on the timber “dry” without sealing on the other half of the joint length.

An elastomer bearing was installed in the joint, which was protected on both sides by mineral wool strips. This protection measure is not required if the gap created by the elastomer bearing is filled with stone wool or fire protection mass. If no elastomer bearing is installed, no sealing measure is required. Figure 24 shows a planned joint and Figure 25 shows a realised butt joint before a fire test.

Source: Technical University Munich

Test results and rating in reference to the butt joint:

The butt joint of the wall covering on the uncovered ceiling did not result in a hollow space fire and continued smouldering in the connection area. No traces of fire could be found on the elastomer bearing. The described design of the butt joint with and without fire protection acrylic reached the protection targets, meaning smoke tightness and prevention of burn-through for 60 minutes.

The company Rothoblaas has conducted its own tests for its XYLOFONN elastomer bearings, in which the elastomer bearings were installed as a separating layer between solid timber ceiling elements not covered with planks. This design was tested successfully for smoke tightness and insulating effect for a fire duration of 60 minutes.

Figure 25 – Preparation for the fire testing of the elastomer bearing
Source: Technical University Munich

List of figures

Sources

Planning brochure of Holzforschung Austria	Planning brochure “Ceiling structures for multi-storey timber construction”, Holzforschung Austria
Vibro-acoustics research project	Calculations and measurements in the research project “Vibro-acoustics in the planning process for timber structures” of the collective industrial research 2017
Rothoblaas planning brochure	Rothoblaas planning brochure “Solutions for sound insulation – Flanksound Project”
Data from the DAGA 2010 conference transcript	Conference transcript DAGA 2010 “Butt joints in timber construction –planning, forecast and execution”
Technical University Munich	Technical University Munich “Development of advanced design rules/details for multi-story buildings in solid timber construction for building class 4”
binderholz processing guidelines	
Teibinger and Matzinger, 2013	Fire resistance classification and its requirement
Holzforschung Austria	Planning brochure of Holzforschung Austria, “Fire stops in timber construction”
Rigips Alba®balance brochure	Available online at: www.rigips.com/albabalance
8. HolzBauSpezial conference transcript	Forum Wood | Construction | Physics, Bad Wörishofen, 2017

Compilation of building physical parameters of some relevant materials in the datasheets of the Solid Timber Manual

Layer type	**Building material**	**Heat conductivity** λ [W / (m · K)]
Roof cladding	Gravel	0.700
Façade	Wooden exterior wall cladding	0.150
Façade	8 mm HPL-boards on 1.2-mm sealing tape	0.300
Insulation	Wood fibre insulating panel (under-roof panel)	0.045-0.05
Insulation	Wood fibre insulation panel	0.39-0.047
Insulation	Stone wool above-rafter insulation system, e.g. Isover Integra Basic	0.034
Insulation	Stone wool WDVS board Isover Sillatherm WVP 1-035	0.034
Insulation	Stoen wool flat-roof insulation, e.g. Isover S flat roof insulating panel	0.039
Insulation	Full-surface stone wool, e.g. Isover Integra AP Basic	0.034
Insulation	Mineral wool, e.g. Isover Akustic SSP2	0.039
Insulation	Glass wool WDVS Panel Isover Isocompact	0.034
Sealing	fabric-reinforced plastic welded sheeting (> 1.7 kg / m²)	—
Load-bearing structure	CLT BBS, 90 mm, 3-layered*	0.120
Load-bearing structure	CLT BBS, 100 mm, 5-layered*	0.120
Load-bearing structure	CLT BBS, 120 mm, 5-layered*	0.120
Load-bearing structure	CLT BBS, 140 mm, 5-layered*	0.120
Load-bearing structure	CLT BBS, 150 mm, 5-layered*	0.120
Substructures	Pinewood (squared timber, battens)	0.130
Planking	Rigips RF fire protection board	0.25
Planking	Rigidur H gypsum fibre board type GF-C1-I according to EN 15283-2	0.35
Planking	Riduro wooden building slab	0.25
Floor screed	Concrete floor screed	1.33
Floor screed	Rigidur or Rigiplan screed element	0.35
Floor screed	Rigidur screed element	0.35
Footfall sound insulation	Footfall sound insulation Isover Akustic EP1	0.032
Footfall sound insulation	Footfall sound insulation Isover Akustic EP2	0.035
Footfall sound insulation	Footfall sound insulation Isover Akustic EP3	0.04
Filling	Rigips balancing filling	0.16
Filling	Lime chippings filling	0.7

*μ value calculated for pinewood (μmin = 40) with additional assessment of 13 mm pinewood layer per glued joint existing on the cross section

	Water steam diffusion resistance factor μ *min – max [—]*	**Gross density** ρ [kg / m³]	**Specific heat capacity** c [J / (kg · K)]	**Flammability class** EN 13501-1
	1	1500	1000	A1
	50	600	1600	D
	17200	1350	—	B
	3-7	210-270	2100	E
	3-7	110-140	2100	E
	1	110	840	A1
	1	125	840	A1
	1	150	800	A1
	1	110	840	A1
	1	25	840	A1
	1	60	1030	A2
	40,000	680	—	E
	52	450	1600	D
	61	450	1600	D
	57	450	1600	D
	55	450	1600	D
	54	450	1600	D
	50	500	1600	D
	10	900	1050	A2
	19	1200	1200	A1
	10	1000	1050	A2
	50-100	2000	1080	A1
	19	1200	1200	A1
	19	1200	1100	A1
	1-2	80	840	A2
	1-2	150	840	A1
	1-2	150	840	A1
	2	600	1000	A1
	2	1500	1000	A1

1st edition, May 2019

binderholz

Rigips
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EXTERIOR WALL

SOLID TIMBER MANUAL 2.0

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Rigips
SAINT-GOBAIN

1st edition, May 2019

All information in this document reflects the latest state of development and has been prepared for you according to the best of knowledge and good faith. As we always strive to offer the best possible solutions for you, changes are reserved due to improvements in terms of application or production technology. Ensure yourself that you have the most recent edition of this document available. Printing errors cannot be ruled out.

This publication is targeted at trained specialists. Any illustrations of executing activities contained in it are not understood to be any processing instructions, unless expressly marked as such. Renderings and sectional views of the individual assemblies are not depicted on scale; they serve merely as illustration.

Our products and systems are aligned to each other. Their interaction has been confirmed by internal and external testing. All information is generally based on the exclusive use of our products. Unless described otherwise, the information does not permit any conclusions as to the combinability with third-party systems or exchangeability of individual parts by external products; to this end, no warranty or liability can be extended.

Please also note that our business relationships are exclusively subject to our general terms of sale, delivery and payment (GTC) in the current version. You can receive our GTC on request or find them online at www.binderholz.com and www.rigips.com.

We are looking forward to a good cooperation and wish you great success with all of our system solutions.

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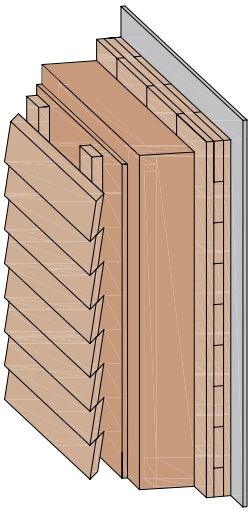
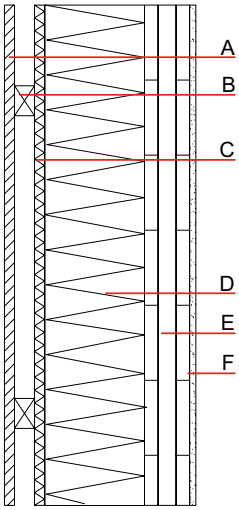




Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.151
	Sound insulation	R_w [dB]	44
	Ecology	ΔOI3	40

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	22	Under-ceiling board, wood fibre insulation panel	0.05	250	E
D	200	Wood fibre insulation panel	0.04	110	E
E	90	CLT BBS, 3-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**38.35 cm**			**89.80 kg/m²**	

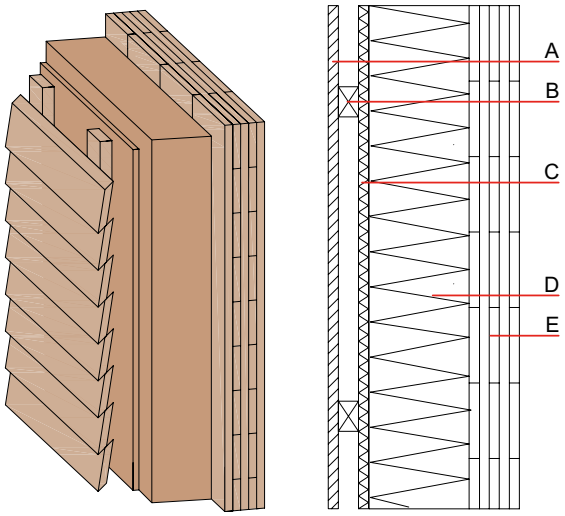
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
766	-85	0.218

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated, visual surface quality: AW03 b



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.150
	Sound insulation	R_w [dB]	44
	Ecology	ΔOI3	40

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	22	Under-ceiling board, wood fibre insulation panel	0.05	250	E
D	200	Wood fibre insulation panel	0.04	110	E
E	100	CLT BBS, 5-layered	0.12	450	D
Total	**38.10 cm**			**84.30 kg/m²**	

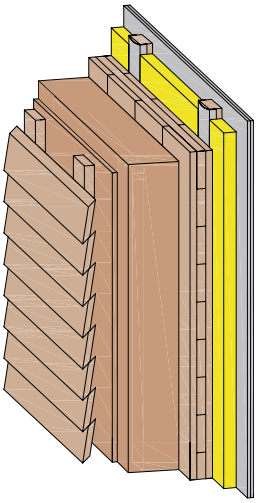
Ecological rating in detail | www.baubook.info/massivholzhandbuch

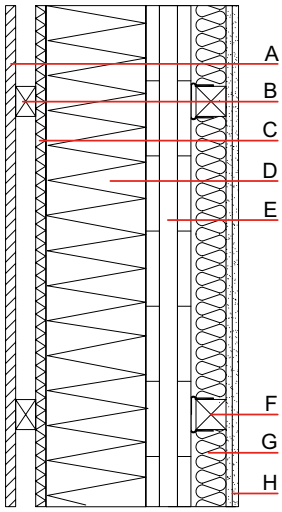
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
765	-91.6	0.224

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW04 d





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.123
	Sound insulation	R_w [dB]	53
	Ecology	ΔOI3	47

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	22	Under-ceiling board, wood fibre insulation panel	0.05	250	E
D	200	Wood fibre insulation panel	0.04	110	E
E	90	CLT BBS, 3-layered	0.12	450	D
F	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**46.60 cm**			**103.74 kg/m²**	

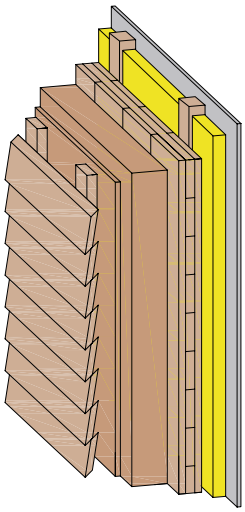
Ecological rating in detail | www.baubook.info/massivholzhandbuch

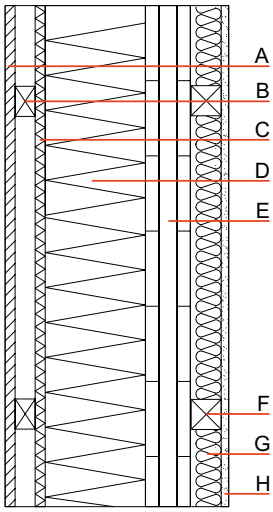
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
861	-86.6	0.242

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW04 g





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.125
	Sound insulation	R_w [dB]	50
	Ecology	ΔOI3	45

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	22	Under-ceiling board, wood fibre insulation panel	0.05	250	E
D	200	Wood fibre insulation panel	0.04	110	E
E	90	CLT BBS, 3-layered	0.12	450	D
F	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**44.35 cm**			**93.74 kg/m²**	

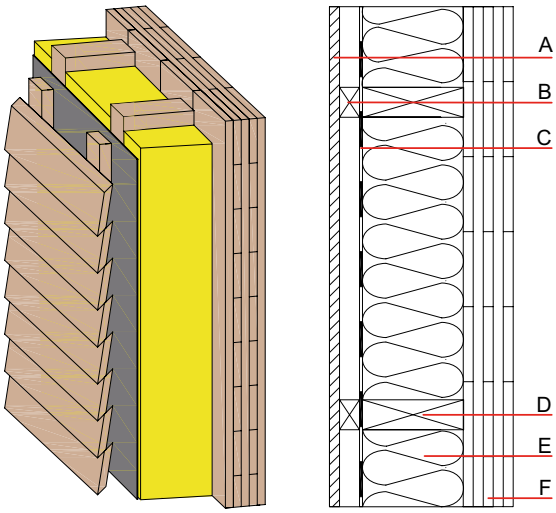
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
825	-87.4	0.238

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated, visual surface quality: AW09 d



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.146
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	36

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	240	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
E	240	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
F	100	CLT BBS, 5-layered	0.12	450	D
Total	**39.90 cm**			**73.50 kg/m²**	

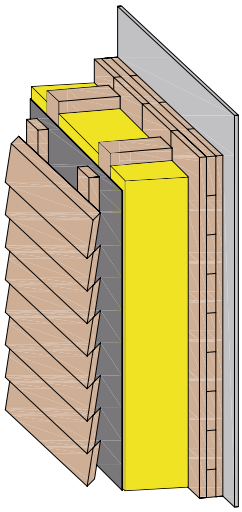
Ecological rating in detail | www.baubook.info/massivholzhandbuch

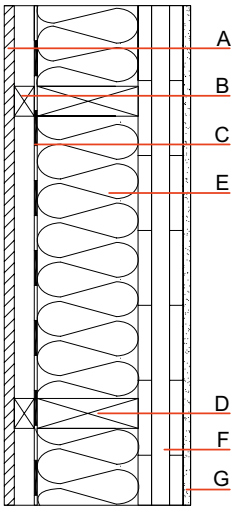
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
659	-82.7	0.209

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated: AW10 d





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.144
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	36

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	240	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
E	240	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
F	90	CLT BBS, 3-layered	0.12	450	D
G	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**40.15 cm**			**79 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
652	-71.5	0.200

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
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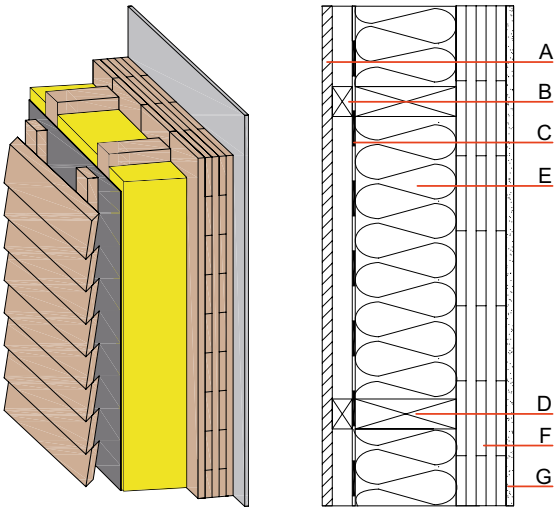
Exterior wall – solid timber construction, rear ventilated: AW10 e



Building physical and ecological rating

	Fire protection	REI i → o	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 18.7 [kN/m]		
	Heat insulation	U [W/m²K]	0.143
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	38

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	240	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
E	240	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
F	100	CLT BBS, 5-layered	0.12	450	D
G	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**41.15 cm**			**83.50 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
686	-76.4	0.210

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
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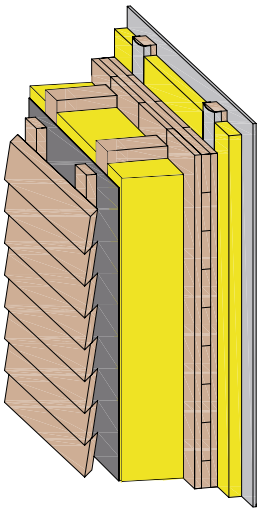
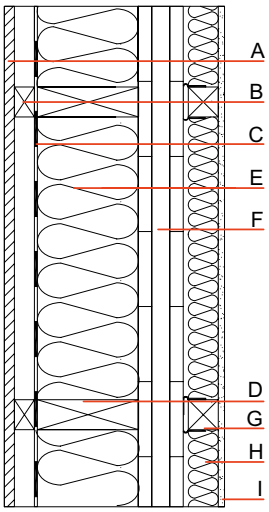
Exterior wall – solid timber construction, rear ventilated with installation level: AW12 e





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.120
	Sound insulation	R_w [dB]	55
	Ecology	ΔOI3	41

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	240	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
E	240	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
F	90	CLT BBS, 3-layered	0.12	450	D
G	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
H	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
I	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**47.15 cm**			**82.94 kg/m²**	

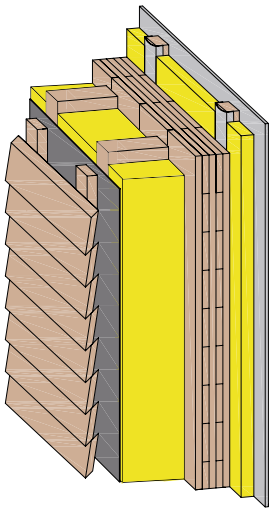
Ecological rating in detail | www.baubook.info/massivholzhandbuch

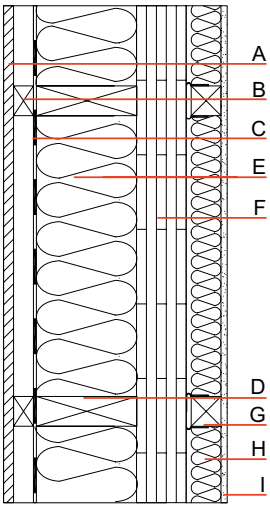
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
710	-73.6	0.220

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW12 f





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.119
	Sound insulation	R_w [dB]	55
	Ecology	ΔOI3	43

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	240	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
E	240	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
F	100	CLT BBS, 5-layered	0.12	450	D
G	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
H	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
I	15	Rigips RF fire protection board*	0.25	800	A2
Total	**48.40 cm**			**89.44 kg/m²**	

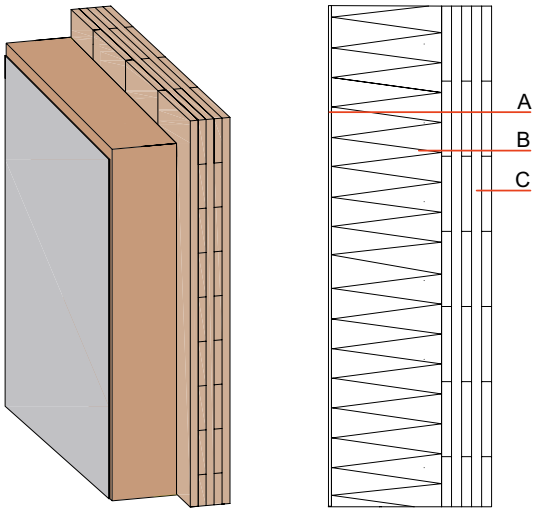
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
751	-78.3	0.230

Inspection by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, visual surface quality: AW13 b



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.157
	Sound insulation	R_w [dB]	37
	Ecology	ΔOI3	49

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	220	Wood fibre insulation panel	0.04	140	E
C	100	CLT BBS, 5-layered	0.12	450	D
Total	**32.70 cm**			**87 kg/m²**	

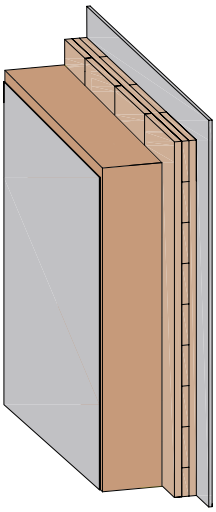
Ecological rating in detail | www.baubook.info/massivholzhandbuch

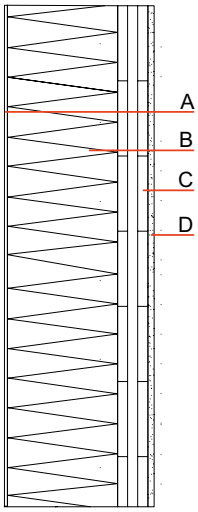
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
836	-62.1	0.236

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction: AW14 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.174
	Sound insulation	R_w [dB]	37
	Ecology	ΔOI3	53

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	220	Wood fibre insulation panel	0.04	140	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**32.95 cm**			**92.50 kg/m²**	

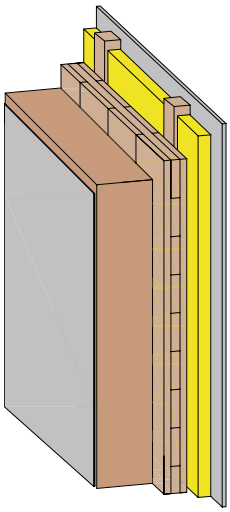
Ecological rating in detail | www.baubook.info/massivholzhandbuch

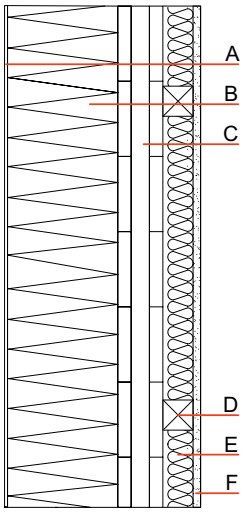
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
901	-59.1	0.247

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW15 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.140
	Sound insulation	R_w [dB]	43
	Ecology	ΔOI3	57

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	220	Wood fibre insulation panel	0.04	140	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**38.95 cm**			**96.44 kg/m²**	

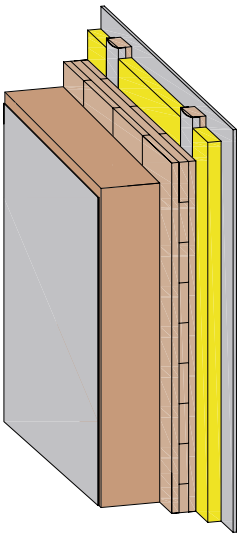
Ecological rating in detail | www.baubook.info/massivholzhandbuch

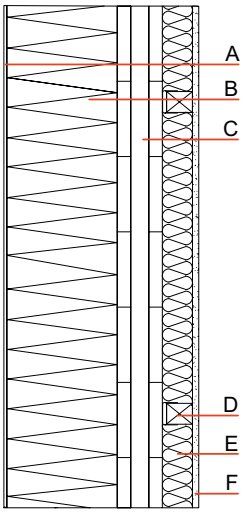
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
955	-60.3	0.265

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW16 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.139
	Sound insulation	R_w [dB]	49
	Ecology	ΔOI3	57

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	220	Wood fibre insulation panel	0.04	140	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**39.95 cm**			**96.44 kg/m²**	

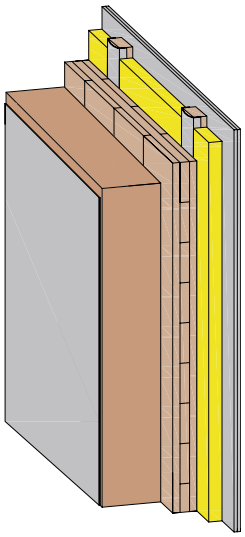
Ecological rating in detail | www.baubook.info/massivholzhandbuch

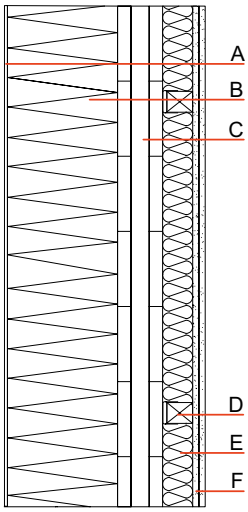
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
956	-60.9	0.266

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW16 c





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.139
	Sound insulation	R_w [dB]	57
	Ecology	ΔOI3	59

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	220	Wood fibre insulation panel	0.04	140	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**41.20 cm**			**106.44 kg/m²**	

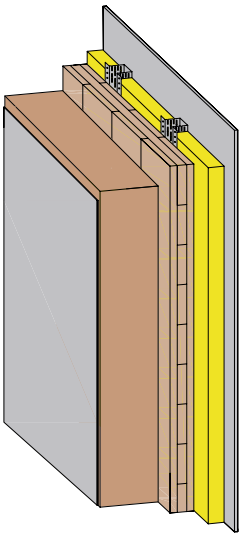
Ecological rating in detail | www.baubook.info/massivholzhandbuch

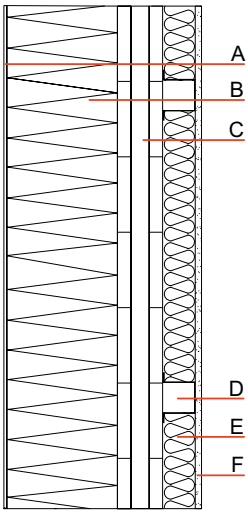
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
995	-60.7	0.271

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW16 d





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.153
	Sound insulation	R_w [dB]	43
	Ecology	ΔOI3	59

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	220	Wood fibre insulation panel	0.04	140	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	27	Rigips spring rail (e = 625)	—	—	A1
E	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**35.65 cm**			**94.60 kg/m²**	

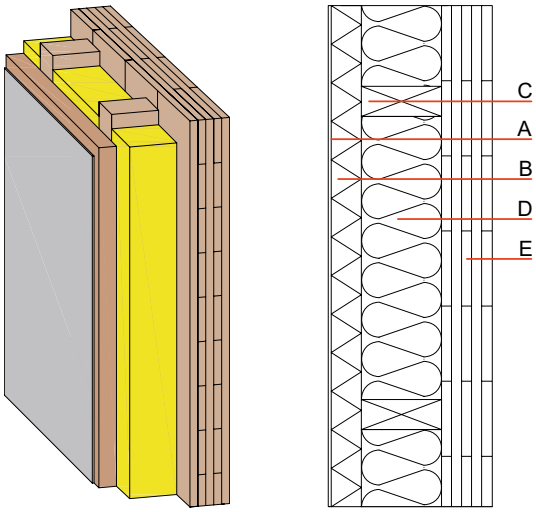
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
970	-54.9	0.270

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, visual surface quality: AW17 b



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.165
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	48

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	60	Wood fibre insulation panel	0.042	140	E
C	160	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
D	160	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
E	100	CLT BBS, 5-layered	0.12	450	D
Total	**32.70 cm**			**75.74 kg/m²**	

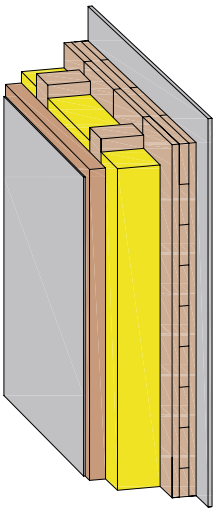
Ecological rating in detail | www.baubook.info/massivholzhandbuch

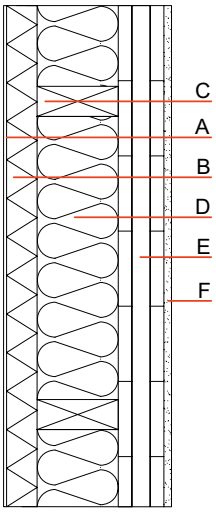
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
779	-55.2	0.231

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction: AW18 c





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.166
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	48

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	60	Wood fibre insulation panel	0.042	140	E
C	160	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
D	160	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**32.95 cm**			**81.24 kg/m²**	

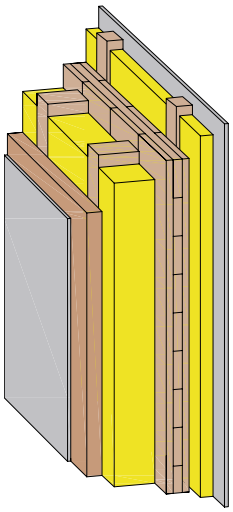
Ecological rating in detail | www.baubook.info/massivholzhandbuch

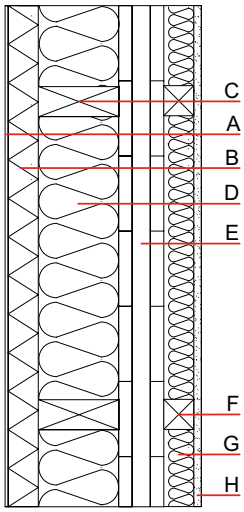
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
780	-48.7	0.224

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW19 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.135
	Sound insulation	R_w [dB]	52
	Ecology	ΔOI3	52

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	60	Wood fibre insulation panel	0.042	140	E
C	160	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
D	160	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**38.95 cm**			**85.17 kg/m²**	

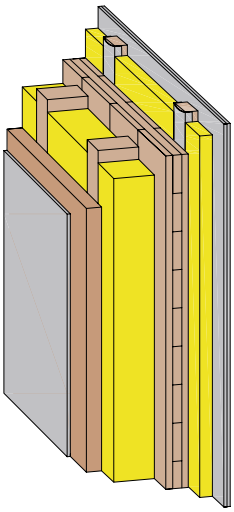
Ecological rating in detail | www.baubook.info/massivholzhandbuch

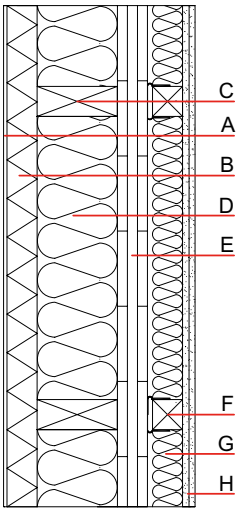
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
838	-50.2	0.243

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW20 c





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.134
	Sound insulation	R_w [dB]	63
	Ecology	ΔOI3	54

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	60	Wood fibre insulation panel	0.042	140	E
C	160	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
D	160	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**41.20 cm**			**95.17 kg/m²**	

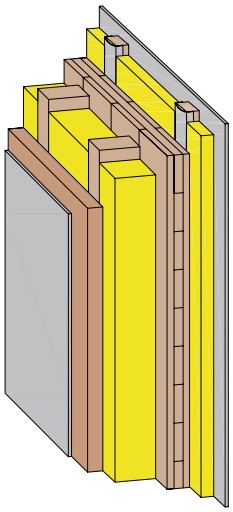
Ecological rating in detail | www.baubook.info/massivholzhandbuch

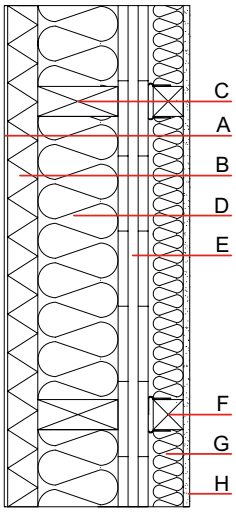
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
874	-49.3	0.248

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW20 d





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.135
	Sound insulation	R_w [dB]	55
	Ecology	ΔOI3	52

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	60	Wood fibre insulation panel	0.042	140	E
C	160	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
D	160	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**39.95 cm**			**85.17 kg/m²**	

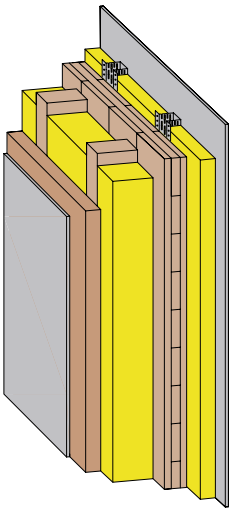
Ecological rating in detail | www.baubook.info/massivholzhandbuch

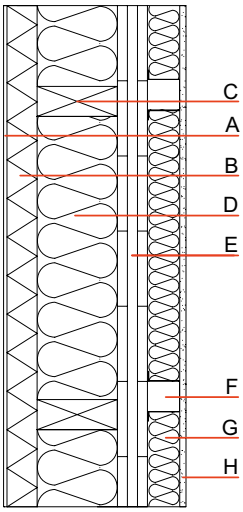
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
839	-50.8	0.244

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW20 e





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.146
	Sound insulation	R_w [dB]	52
	Ecology	ΔOI3	54

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	60	Wood fibre insulation panel	0.042	140	E
C	160	Construction hardwood (b ≥ 60; e = 625)	0.13	475	D
D	160	Mineral wool, e.g. Isover Kontur FSP 1-035	0.034	24	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	27	Rigips spring rail (e = 625)	—	—	A1
G	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**35.65 cm**			**83.34 kg/m²**	

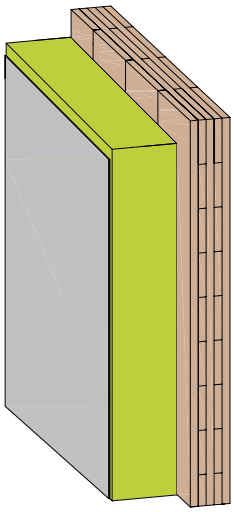
Ecological rating in detail | www.baubook.info/massivholzhandbuch

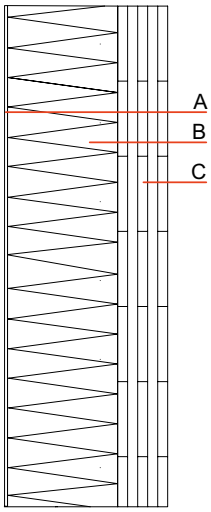
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
850	-44.5	0.247

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, visual surface quality: AW21 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.145
	Sound insulation	R_w [dB]	44
	Ecology	ΔOI3	98

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Mineral wool Isover Sillatherm WVP 1-035	0.034	125	A1
C	100	CLT BBS, 5-layered	0.12	450	D
Total	**30.70 cm**			**81.20 kg/m²**	

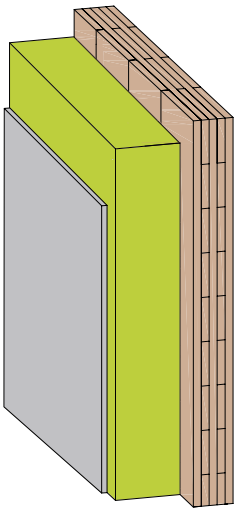
Ecological rating in detail | www.baubook.info/massivholzhandbuch

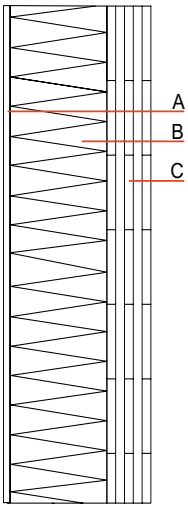
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,000	3.84	0.478

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction: AW21 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.145
	Sound insulation	R_w [dB]	51
	Ecology	ΔOI3	90

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	18	Plaster façade, e.g. webermin freestyle	0.45	1,600	A2
B	200	Mineral wool Isover Sillatherm WVP 1-035	0.034	125	A1
C	100	CLT BBS, 5-layered	0.12	450	D
Total	**31.80 cm**			**98.80 kg/m²**	

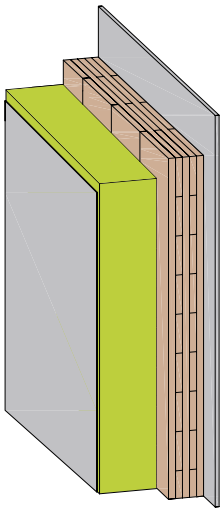
Ecological rating in detail | www.baubook.info/massivholzhandbuch

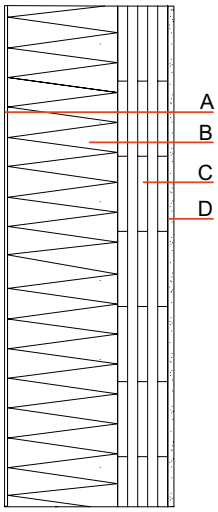
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
890	1.52	0.452

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction: AW21 c





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 18.7 [kN/m]		
	Heat insulation	U [W/m²K]	0.144
	Sound insulation	R_w [dB]	44
	Ecology	ΔOI3	90

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Mineral wool Isover Sillatherm WVP 1-035	0.034	125	A1
C	100	CLT BBS, 5-layered	0.12	450	D
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**31.95 cm**			**91.20 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
900	0.172	0.449

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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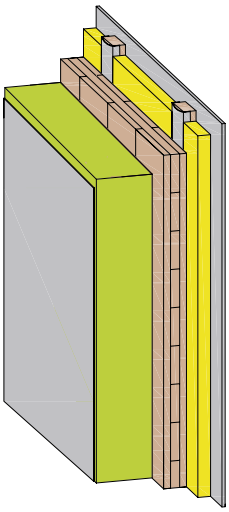
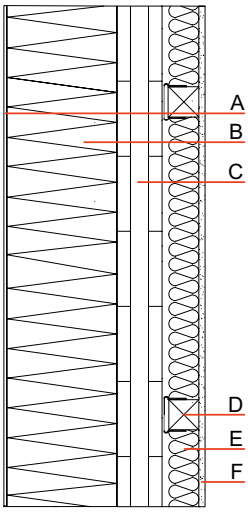
Exterior wall – solid timber construction with installation level: AW22 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.121
	Sound insulation	R_w [dB]	55
	Ecology	ΔOI3	92

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Mineral wool Isover Sillatherm WVP 1-035	0.034	125	A1
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**37.95 cm**			**90.64 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
924	3.01	0.458

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
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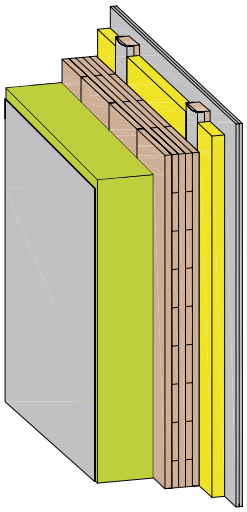
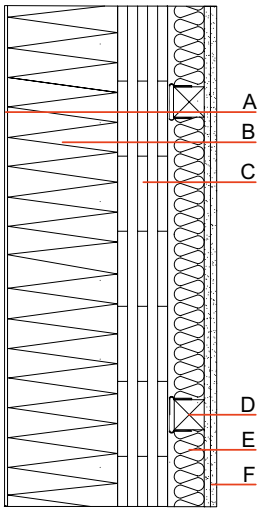
Exterior wall – solid timber construction with installation level: AW22 b





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.119
	Sound insulation	R_w [dB]	60
	Ecology	ΔOI3	96

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Mineral wool Isover Sillatherm WVP 1-035	0.034	125	A1
C	100	CLT BBS, 5-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**40.20 cm**			**105.14 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
993	-0.402	0.473

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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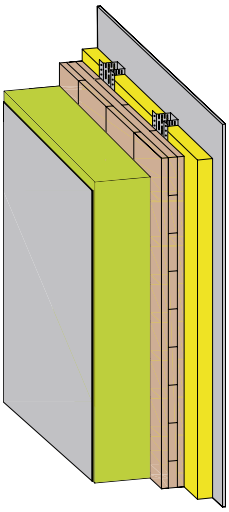
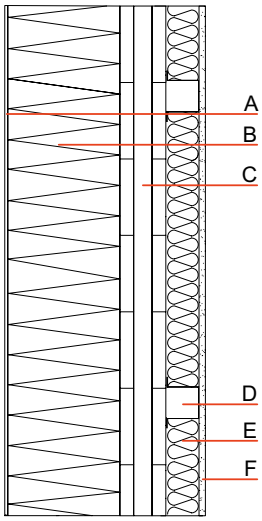
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW23 a





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.131
	Sound insulation	R_w [dB]	51
	Ecology	ΔOI3	94

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Mineral wool Isover Sillatherm WVP 1-035	0.034	125	A1
C	90	CLT BBS, 3-layered	0.12	450	D
D	27	Rigips spring rail (e = 625)	—	—	A1
E	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.65 cm**			**88.80 kg/m²**	

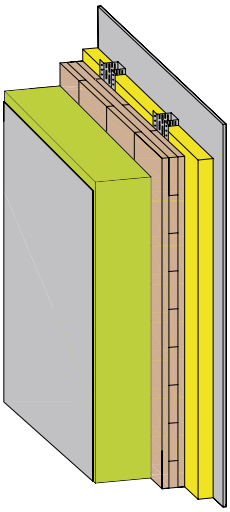
Ecological rating in detail | www.baubook.info/massivholzhandbuch

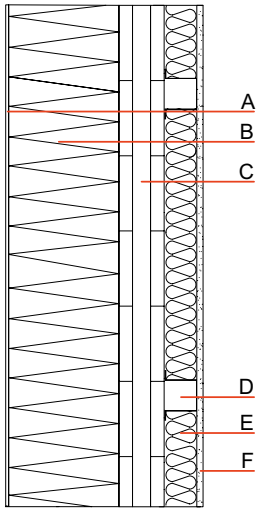
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
935	9.33	0.462

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, visual surface quality: AW23 b





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.131
	Sound insulation	R_w [dB]	54
	Ecology	ΔOI3	95

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Mineral wool Isover Sillatherm WVP 1-035	0.034	125	A1
C	90	CLT BBS, 3-layered	0.12	450	D
D	27	Rigips spring rail (e = 625)	—	—	A1
E	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
F	15	Rigips Riduro wooden building slab*	0.25	1,000	A2
Total	**33.90 cm**			**93.80 kg/m²**	

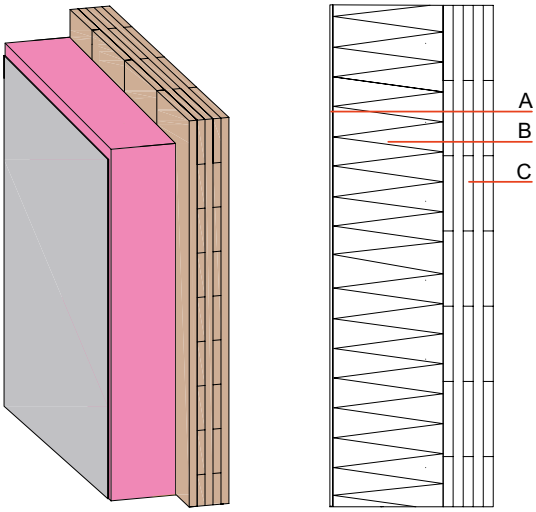
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
951	10.3	0.464

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or RF fire protection board.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, visual surface quality: AW24 a



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.166
	Sound insulation	R_w [dB]	33
	Ecology	ΔOI3	36

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Expanded polystyrol, e.g. weber.therm EPS-F	0.04	15	E
C	100	CLT BBS, 5-layered	0.12	450	D
Total	**30.70 cm**			**59.20 kg/m²**	

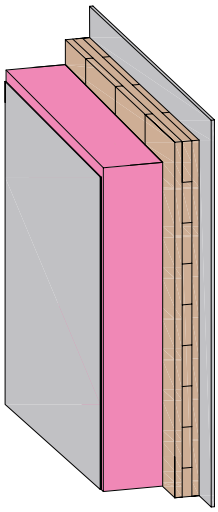
Ecological rating in detail | www.baubook.info/massivholzhandbuch

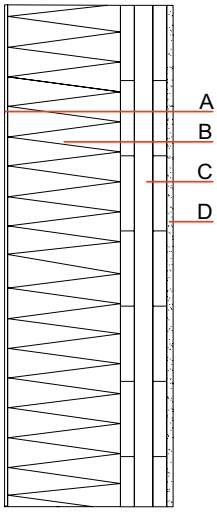
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
649	-35.3	0.151

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction: AW24 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.167
	Sound insulation	R_w [dB]	33
	Ecology	ΔOI3	36

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Expanded polystyrol, e.g. weber.therm EPS-F	0.04	15	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**30.95 cm**			**64.70 kg/m²**	

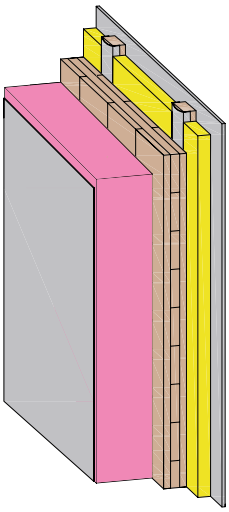
Ecological rating in detail | www.baubook.info/massivholzhandbuch

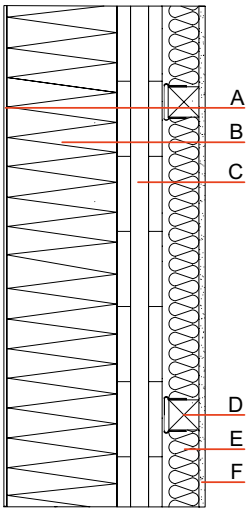
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
650	-28.8	0.145

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW26 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.135
	Sound insulation	R_w [dB]	41
	Ecology	ΔOI3	40

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Expanded polystyrol, e.g. weber.therm EPS-F	0.04	15	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**37.95 cm**			**68.64 kg/m²**	

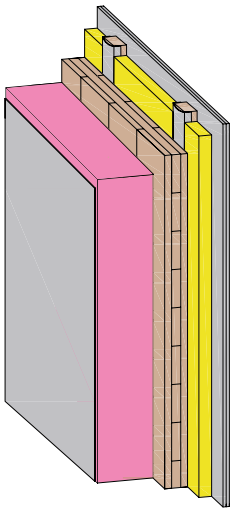
Ecological rating in detail | www.baubook.info/massivholzhandbuch

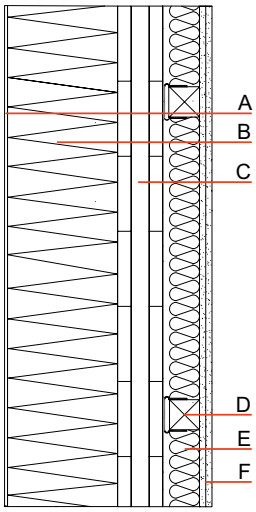
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
708	-30.9	0.164

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW26 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.134
	Sound insulation	R_w [dB]	47
	Ecology	ΔOI3	42

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Expanded polystyrol, e.g. weber.therm EPS-F	0.04	15	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**39.20 cm**			**78.64 kg/m²**	

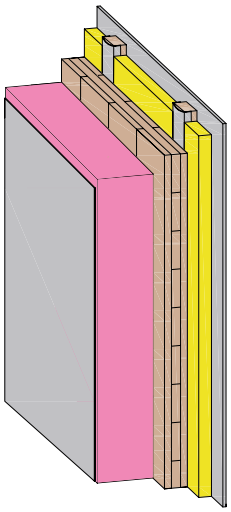
Ecological rating in detail | www.baubook.info/massivholzhandbuch

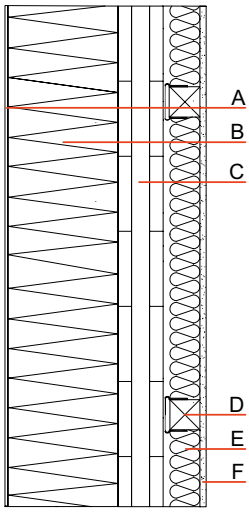
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
743	-29.4	0.168

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW26 c





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.135
	Sound insulation	R_w [dB]	44
	Ecology	ΔOI3	41

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Expanded polystyrol, e.g. weber.therm EPS-F	0.04	15	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	15	Rigips Riduro wooden building slab	0.25	1,000	A2
Total	**38.20 cm**			**73.64 kg/m²**	

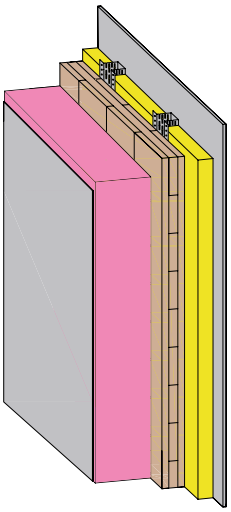
Ecological rating in detail | www.baubook.info/massivholzhandbuch

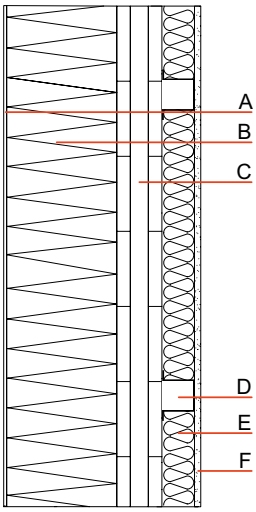
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
724	-29.9	0.166

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW27





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.148
	Sound insulation	R_w [dB]	37
	Ecology	ΔOI3	42

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Expanded polystyrol, e.g. weber.therm EPS-F	0.04	15	E
C	90	CLT BBS, 3-layered	0.12	450	D
D	27	Rigips spring rail (e = 625)	—	—	A1
E	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.65 cm**			**66.80 kg/m²**	

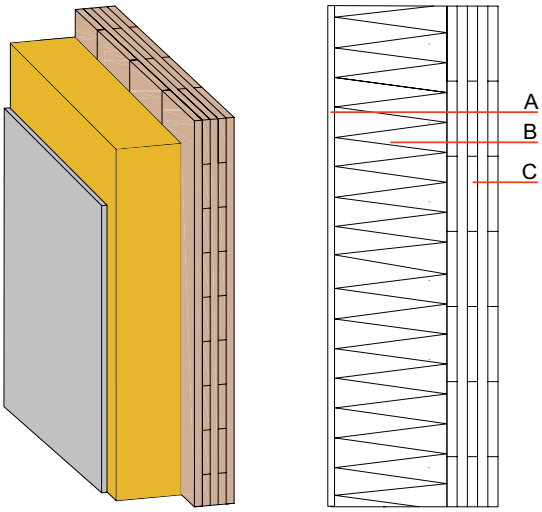
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
719	-24.6	0.168

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, visual surface quality: AW28 a



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.145
	Sound insulation	R_w [dB]	53
	Ecology	ΔOI3	68

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	18	Plaster façade, e.g. webermin freestyle	0.45	1,600	A2
B	200	Glass wool, e.g. Isover Isocompact	0.034	60	A2
C	100	CLT BBS, 5-layered	0.12	450	D
Total	**31.80 cm**			**85.80 kg/m²**	

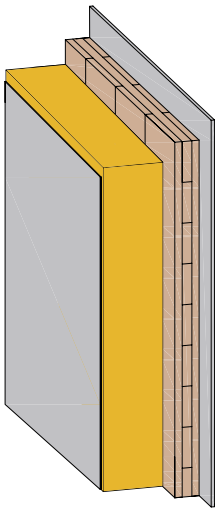
Ecological rating in detail | www.baubook.info/massivholzhandbuch

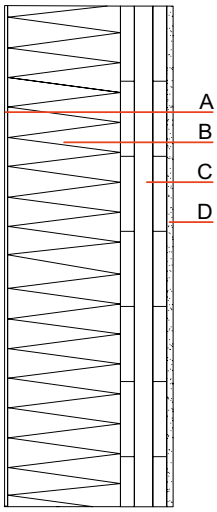
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
933	-15.5	0.297

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction: AW28 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.146
	Sound insulation	R_w [dB]	43
	Ecology	ΔOI3	66

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Glass wool, e.g. Isover Isocompact	0.034	60	A2
C	90	CLT BBS, 3-layered	0.12	450	D
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**30.95 cm**			**73.70 kg/m²**	

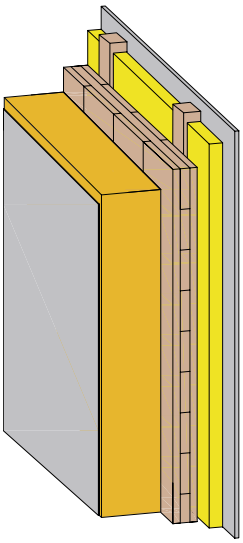
Ecological rating in detail | www.baubook.info/massivholzhandbuch

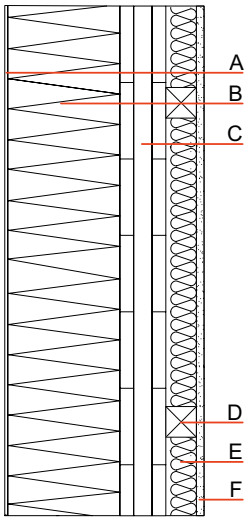
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
908	-11.8	0.284

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW29





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.121
	Sound insulation	R_w [dB]	48
	Ecology	ΔOI3	70

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Glass wool, e.g. Isover Isocompact	0.034	60	A2
C	90	CLT BBS, 3-layered	0.12	450	D
D	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**36.95 cm**			**77.64 kg/m²**	

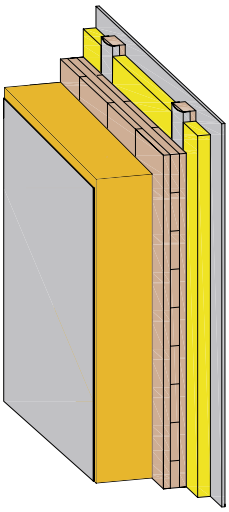
Ecological rating in detail | www.baubook.info/massivholzhandbuch

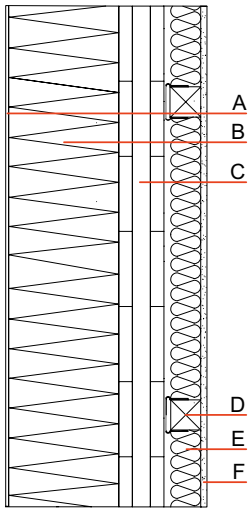
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
965	-13.3	0.303

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW30 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.121
	Sound insulation	R_w [dB]	56
	Ecology	ΔOI3	70

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Glass wool, e.g. Isover Isocompact	0.034	60	A2
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**37.95 cm**			**77.64 kg/m²**	

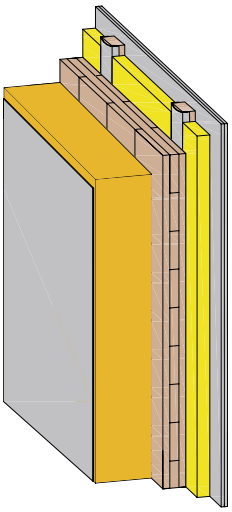
Ecological rating in detail | www.baubook.info/massivholzhandbuch

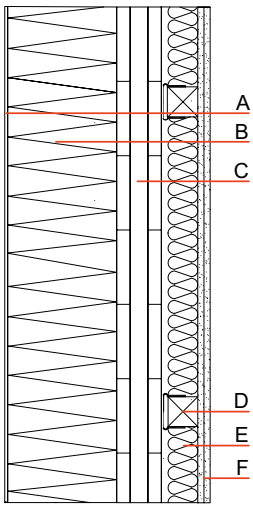
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
967	-14	0.303

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW30 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.120
	Sound insulation	R_w [dB]	62
	Ecology	ΔOI3	72

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Glass wool, e.g. Isover Isocompact	0.034	60	A2
C	90	CLT BBS, 3-layered	0.12	450	D
D	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
E	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
F	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**39.20 cm**			**87.64 kg/m²**	

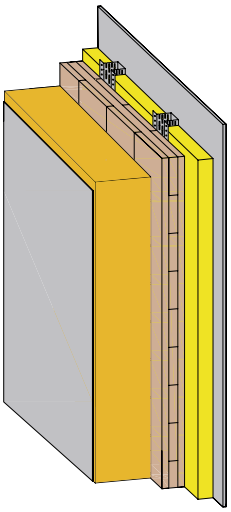
Ecological rating in detail | www.baubook.info/massivholzhandbuch

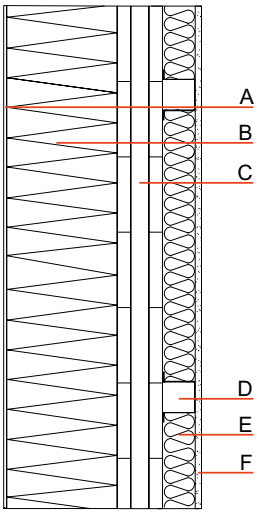
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,001	-12.4	0.307

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction with installation level: AW31





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.131
	Sound insulation	R_w [dB]	50
	Ecology	ΔOI3	72

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	7	Plaster facade, e.g. weberpas topdry	0.45	1,600	A2
B	200	Glass wool, e.g. Isover Isocompact	0.034	60	A2
C	90	CLT BBS, 3-layered	0.12	450	D
D	27	Rigips spring rail (e = 625)	—	—	A1
E	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.65 cm**			**75.80 kg/m²**	

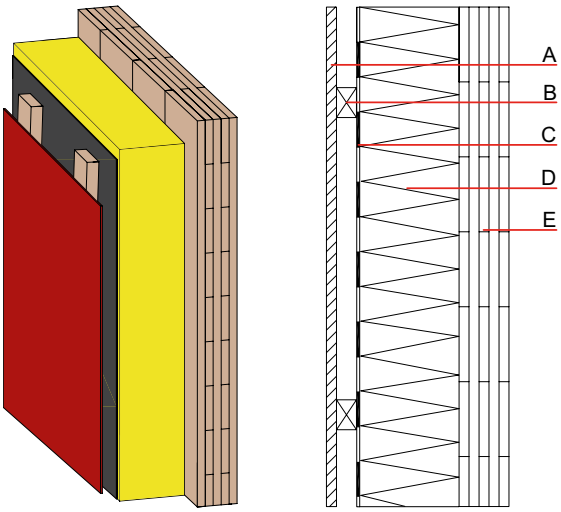
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
978	-7.65	0.307

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated, visual surface quality: AW32 a



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.168
	Sound insulation	R_w [dB]	47
	Ecology	ΔOI3	101

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	9.2	8 mm HPL-boards on 1.2-mm sealing tape	0.3	1,350	B
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	100	CLT BBS, 5-layered	0.12	450	D
Total	**30.92 cm**			**77.02 kg/m²**	

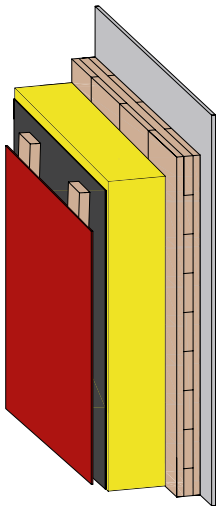
Ecological rating in detail | www.baubook.info/massivholzhandbuch

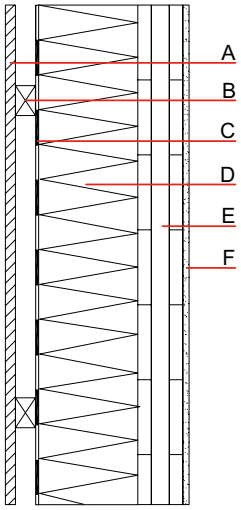
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,154	-3.92	0.475

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated: AW32 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.169
	Sound insulation	R_w [dB]	47
	Ecology	ΔOI3	101

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	9.2	8 mm HPL-boards on 1.2-mm sealing tape	0.3	1,350	B
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**31.17 cm**			**82.52 kg/m²**	

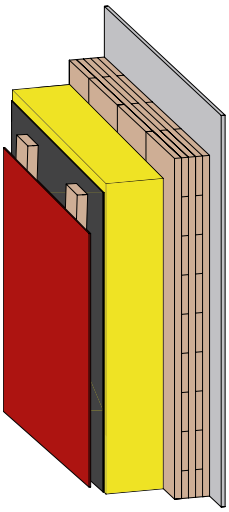
Ecological rating in detail | www.baubook.info/massivholzhandbuch

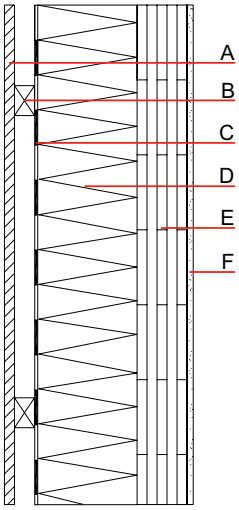
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,152	2.51	0.468

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated: AW32 c





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 18.7 [kN/m]		
	Heat insulation	U [W/m²K]	0.167
	Sound insulation	R_w [dB]	47
	Ecology	ΔOI3	103

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	9.2	8 mm HPL-boards on 1.2-mm sealing tape	0.3	1,350	B
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	100	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**32.17 cm**			**87.02 kg/m²**	

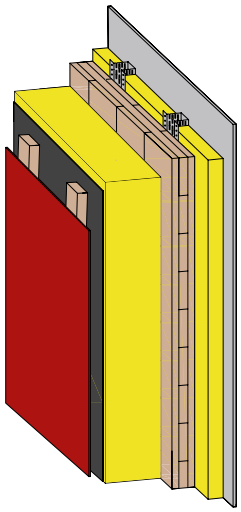
Ecological rating in detail | www.baubook.info/massivholzhandbuch

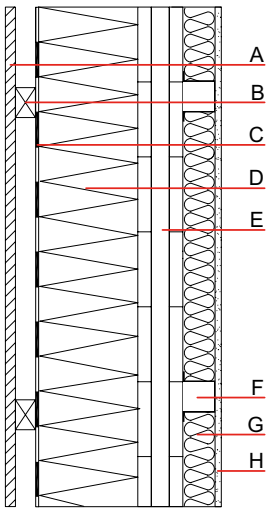
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,189	-2.37	0.479

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW33





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.150
	Sound insulation	R_w [dB]	53
	Ecology	ΔOI3	108

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	9.2	8 mm HPL-boards on 1.2-mm sealing tape	0.3	1,350	B
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	27	Rigips spring rail (e = 625)	—	—	A1
G	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.87 cm**			**84.62 kg/m²**	

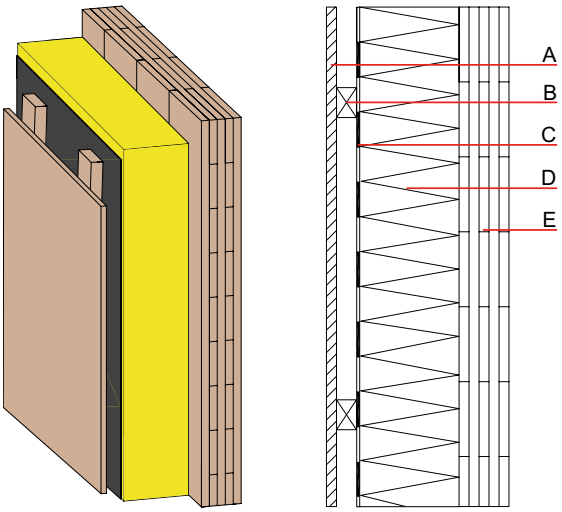
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,224	6.79	0.492

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated: Visible surface quality AW34a



Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.166
	Sound insulation	R_w [dB]	47
	Ecology	ΔOI3	73

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	19	Wooden exterior wall cladding, board-shaped without joints	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	100	CLT BBS, 5-layered	0.12	450	D
Total	**31.90 cm**			**76 kg/m²**	

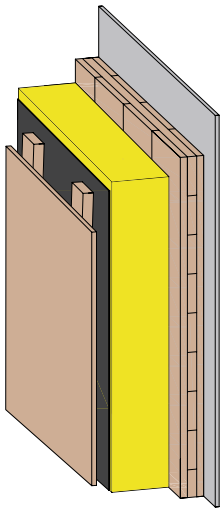
Ecological rating in detail | www.baubook.info/massivholzhandbuch

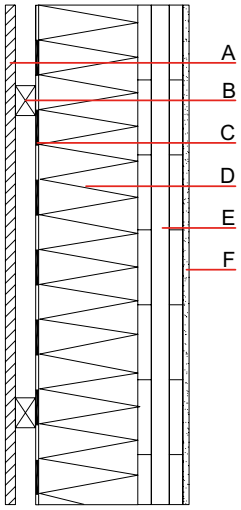
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
792	-31.3	0.387

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated: AW34 b





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.167
	Sound insulation	R_w [dB]	47
	Ecology	ΔOI3	73

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding, board-shaped without joints	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**32.15 cm**			**81.50 kg/m²**	

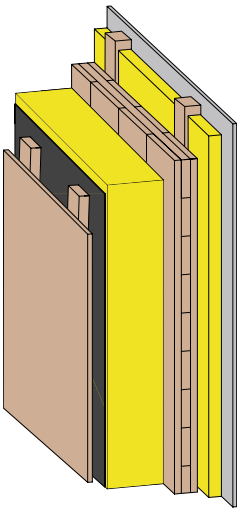
Ecological rating in detail | www.baubook.info/massivholzhandbuch

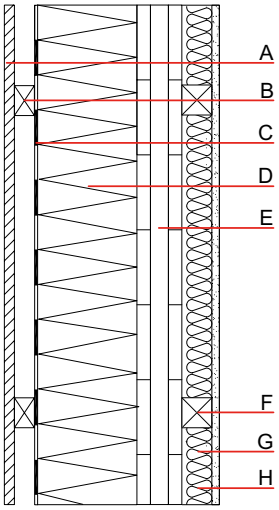
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
793	-24.8	0.380

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW35





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.135
	Sound insulation	R_w [dB]	53
	Ecology	ΔOI3	77

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	19	Wooden exterior wall cladding, board-shaped without joints	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**38.15 cm**			**85.44 kg/m²**	

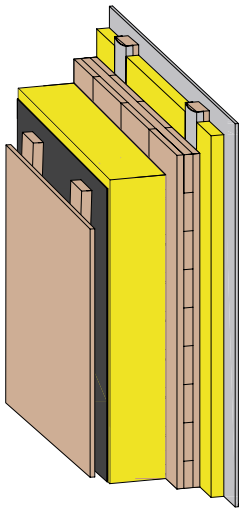
Ecological rating in detail | www.baubook.info/massivholzhandbuch

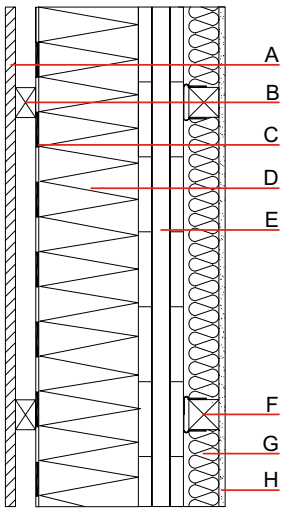
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
850	-26.2	0.400

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW36 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.137
	Sound insulation	R_w [dB]	53
	Ecology	ΔOI3	73

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding, board-shaped without joints	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	90	CLT BBS, 3-layered	0.12	450	D
F	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**39.15 cm**			**85.44 kg/m²**	

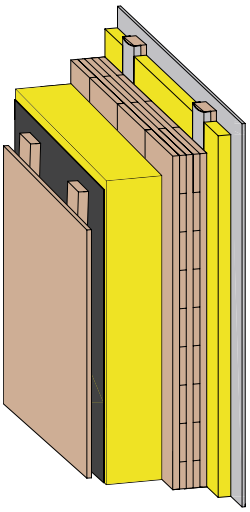
Ecological rating in detail | www.baubook.info/massivholzhandbuch

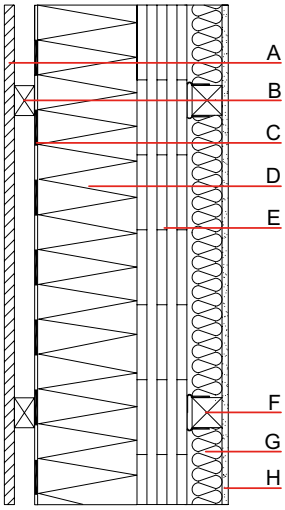
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
817	-30	0.377

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW36 b





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.133
	Sound insulation	R_w [dB]	53
	Ecology	ΔOI3	79

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding, board-shaped without joints	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	100	CLT BBS, 5-layered	0.12	450	D
F	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	15	Rigips RF fire protection board*	0.25	800	A2
Total	**40.40 cm**			**91.94 kg/m²**	

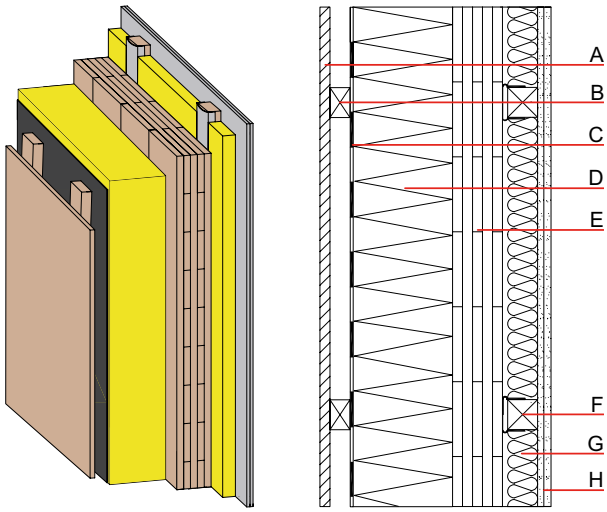
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
892	-31.6	0.411

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Exterior wall – solid timber construction, rear ventilated with installation level: AW37



Building physical and ecological rating

	Fire protection	REI i → o	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.132
	Sound insulation	R_w [dB]	59
	Ecology	ΔOI3	81

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	19	Wooden exterior wall cladding, board-shaped without joints	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	100	CLT BBS, 5-layered	0.12	450	D
F	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**41.40 cm**			**99.94 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
920	-30.3	0.414

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
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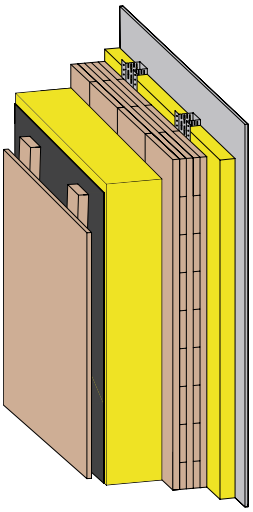
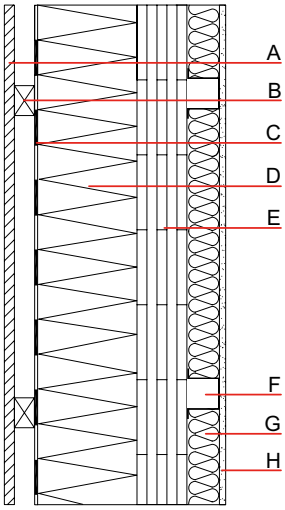
Exterior wall – solid timber construction, rear ventilated with installation level: AW38





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.146
	Sound insulation	R_w [dB]	53
	Ecology	ΔOI3	81

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	19	Wooden exterior wall cladding, board-shaped without joints	0.15	525	D
B	40	Wooden battens (40/60; e = 625)	0.13	475	D
C	—	Sheathing membrane sd ≤ 0.3 m)	—	—	E
D	160	Mineral wool across the full area, e.g. Isover Sillatherm WVP 1-035	0.034	120	A1
E	100	CLT BBS, 5-layered	0.12	450	D
F	27	Rigips spring rail (e = 625)	—	—	A1
G	27	Mineral wool, e.g. Isover Akustic SSP1	0.039	25	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**35.85 cm**			**88.10 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
896	-25.5	0.414

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

1st edition, May 2019

binderholz

Rigips
SAINT-GOBAIN

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INTERIOR & PARTITION WALL

SOLID TIMBER MANUAL 2.0

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1st edition, May 2019

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This publication is targeted at trained specialists. Any illustrations of executing activities contained in it are not understood to be any processing instructions, unless expressly marked as such. Renderings and sectional views of the individual assemblies are not depicted on scale; they serve merely as illustration.

Our products and systems are aligned to each other. Their interaction has been confirmed by internal and external testing. All information is generally based on the exclusive use of our products. Unless described otherwise, the information does not permit any conclusions as to the combinability with third-party systems or exchangeability of individual parts by external products; to this end, no warranty or liability can be extended.

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We are looking forward to a good cooperation and wish you great success with all of our system solutions.

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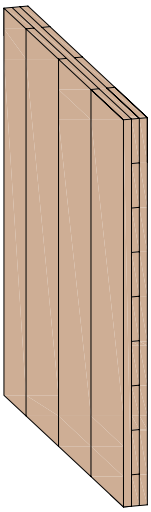

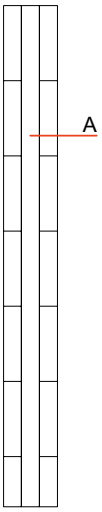

Building physical and ecological rating

	Fire protection	REI	30
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.990
	Sound insulation	R_w [dB]	33
	Ecology	ΔOI3	15

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	90	CLT BBS, 3-layered	0.12	450	D
Total	**9 cm**			**40.50 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
302	-44.7	0.0917

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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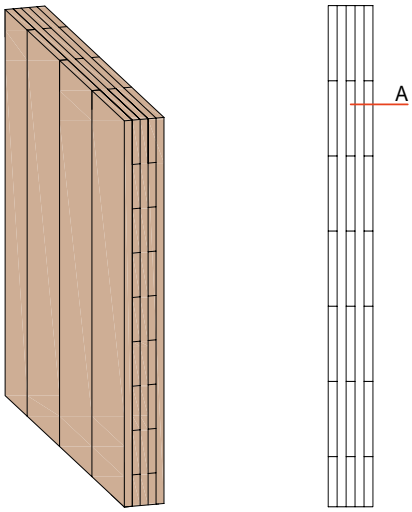
Interior wall – solid timber construction, visual surface quality: IW01 c



Building physical and ecological rating

	Fire protection	REI	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.915
	Sound insulation	R_w [dB]	33
	Ecology	ΔOI3	16

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
Total	**10 cm**			**45 kg/m²**	

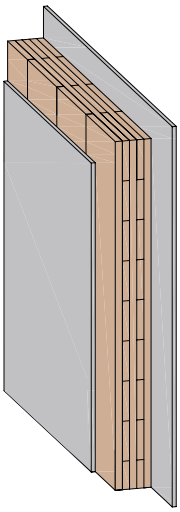
Ecological rating in detail | www.baubook.info/massivholzhandbuch

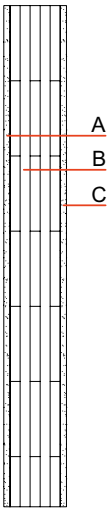
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
336	-49.7	0.102

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction: IW02 c





Building physical and ecological rating

	Fire protection	REI	90
	max. unsupported length l = 3 m; max. load ($q_{fi,\,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.824
	Sound insulation	R_w [dB]	38
	Ecology	ΔOI3	21

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	15	Rigips RF fire protection board*	0.25	800	A2
B	100	CLT BBS, 5-layered	0.12	450	D
C	15	Rigips RF fire protection board*	0.25	800	A2
Total	**13 cm**			**69 kg/m²**	

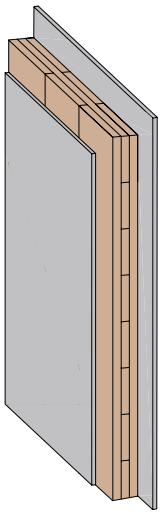
Ecological rating in detail | www.baubook.info/massivholzhandbuch

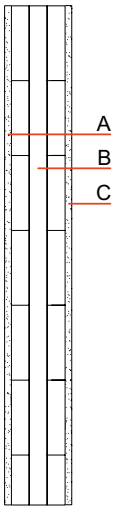
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
420	-45.9	0.111

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction: IW02 d





Building physical and ecological rating

	Fire protection	REI	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.901
	Sound insulation	R_w [dB]	38
	Ecology	ΔOI3	19

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	12.5	Rigips RF fire protection board*	0.25	800	A2
B	90	CLT BBS, 3-layered	0.12	450	D
C	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**11.50 cm**			**60.50 kg/m²**	

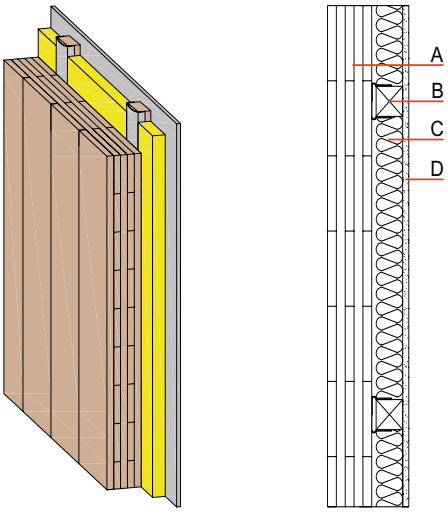
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
372	-41.6	0.0994

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level, visual surface quality: IW03 c



Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 60 [kN/m] max. load ($q_{fi,d}$) = layer D 80 [kN/m]	REI	60 I 60
	Heat insulation	U [W/m²K]	0.393
	Sound insulation	R_w [dB]	51
	Ecology	ΔOI3	23

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
C	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**18.25 cm**			**58.94 kg/m²**	

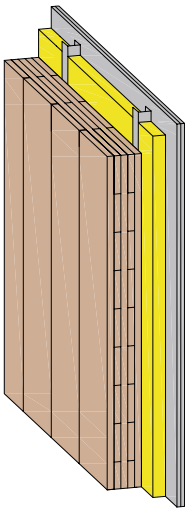
Ecological rating in detail | www.baubook.info/massivholzhandbuch

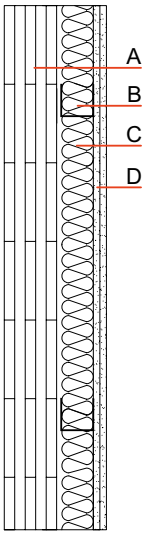
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
429	-50.2	0.125

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level, visual surface quality: IW04 b





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 60 [kN/m] max. load ($q_{fi,d}$) = layer D 80 [kN/m]	REI	60 I 90
	Heat insulation	U [W/m²K]	0.322
	Sound insulation	R_w [dB]	62
	Ecology	ΔOI3	39

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
C	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**21 cm**			**68.84 kg/m²**	

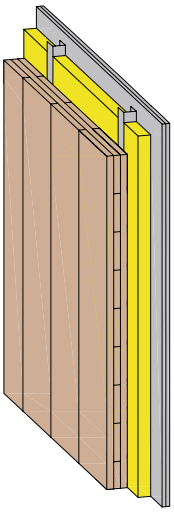
Ecological rating in detail | www.baubook.info/massivholzhandbuch

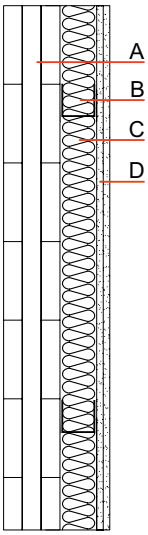
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
615	-33.3	0.180

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level, visual surface quality: IW04 c





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 14.95 [kN/m] max. load ($q_{fi,d}$) = layer D 80 [kN/m]	REI	30 I 60
	Heat insulation	U [W/m²K]	0.331
	Sound insulation	R_w [dB]	62
	Ecology	ΔOI3	37

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	90	CLT BBS, 3-layered	0.12	450	D
B	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
C	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**20 cm**			**64.34 kg/m²**	

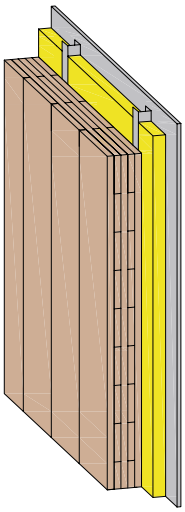
Ecological rating in detail | www.baubook.info/massivholzhandbuch

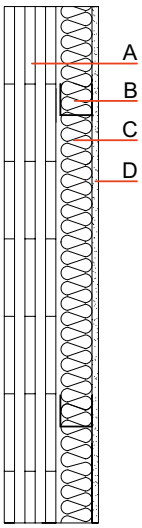
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
581	-28.3	0.170

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level, visual surface quality: IW04 d





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 60 [kN/m] max. load ($q_{fi,d}$) = layer D 80 [kN/m]	REI	60 I 60
	Heat insulation	U [W/m²K]	0.327
	Sound insulation	R_w [dB]	57
	Ecology	ΔOI3	37

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
C	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**19.75 cm**			**58.84 kg/m²**	

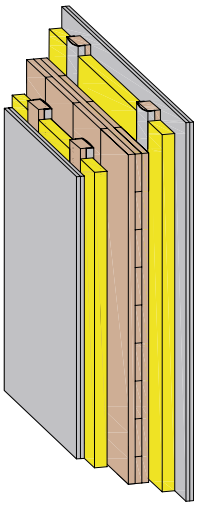
Ecological rating in detail | www.baubook.info/massivholzhandbuch

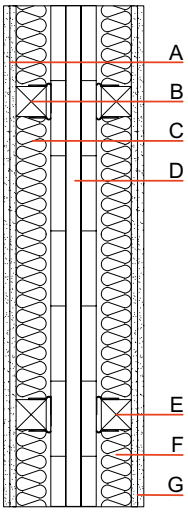
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
580	-34.8	0.176

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level: IW05 c





Building physical and ecological rating

	Fire protection	REI	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 54 [kN/m]		
	Heat insulation	U [W/m²K]	0.248
	Sound insulation	R_w [dB]	69
	Ecology	ΔOI3	33

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
B	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
C	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	90	CLT BBS, 3-layered	0.12	450	D
E	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
F	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
G	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
Total	**29 cm**			**96.37 kg/m²**	

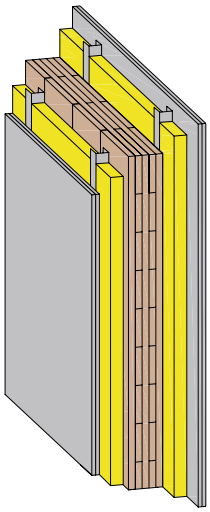
Ecological rating in detail | www.baubook.info/massivholzhandbuch

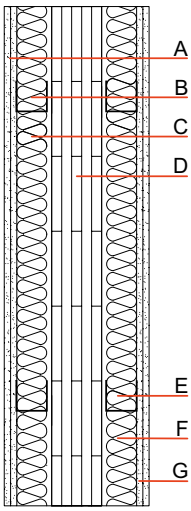
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
586	-41.5	0.150

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level: IW06 b





Building physical and ecological rating

	Fire protection	REI	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.195
	Sound insulation	R_w [dB]	68
	Ecology	ΔOI3	61

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
B	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
C	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	100	CLT BBS, 5-layered	0.12	450	D
E	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
F	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
G	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**32 cm**			**92.68 kg/m²**	

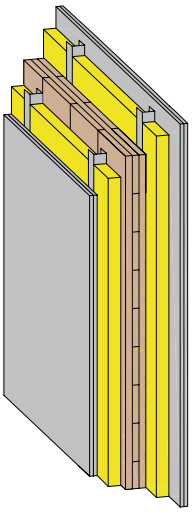
Ecological rating in detail | www.baubook.info/massivholzhandbuch

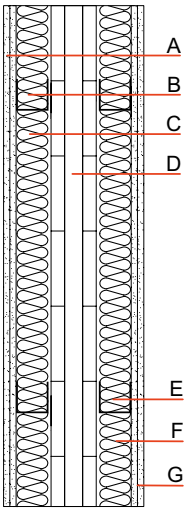
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
894	-16.9	0.258

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level: IW06 c





Building physical and ecological rating

	Fire protection	REI	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.198
	Sound insulation	R_w [dB]	68
	Ecology	ΔOI3	60

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
B	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
C	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	90	CLT BBS, 3-layered	0.12	450	D
E	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
F	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
G	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**31 cm**			**88.18 kg/m²**	

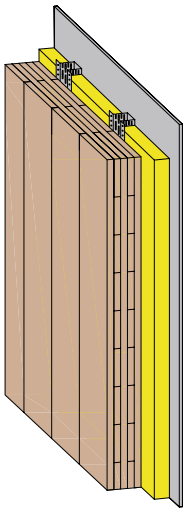
Ecological rating in detail | www.baubook.info/massivholzhandbuch

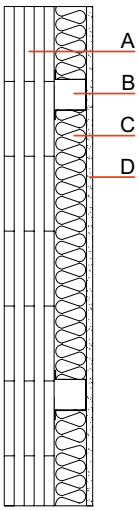
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
860	-11.9	0.248

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level, visual surface quality: IW07





Building physical and ecological rating

	Fire protection	REI	60 I 60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.523
	Sound insulation	R_w [dB]	46
	Ecology	ΔOI3	47

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	27	Rigips spring rail (e = 625)	—	—	A1
C	27	Mineral wool 40 mm compressed in the panel, e.g. Isover Akustic SSP1	0.039	25	A1
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**13.95 cm**			**57.10 kg/m²**	

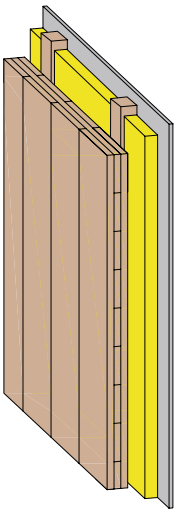
Ecological rating in detail | www.baubook.info/massivholzhandbuch

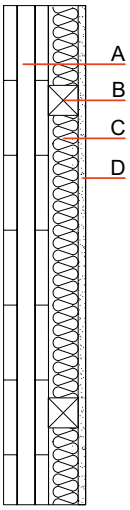
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
690	-26.8	0.214

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level, visual surface quality: IW08 a





Building physical and ecological rating

	Fire protection	REI	30 I 60
	max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 14.95 [kN/m] max. load ($q_{fi,d}$) = layer D 14.95 [kN/m]		
	Heat insulation	U [W/m²K]	0.410
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	21

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	90	CLT BBS 3-layered	0.12	450	D
B	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
C	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**16.25 cm**			**54.44 kg/m²**	

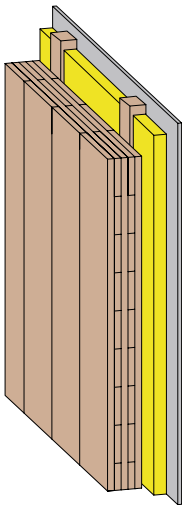
Ecological rating in detail | www.baubook.info/massivholzhandbuch

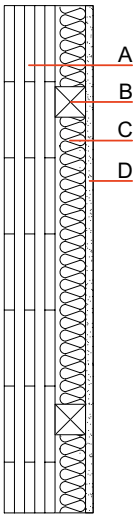
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
394	-44.6	0.115

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level, visual surface quality: IW08 b





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 60 [kN/m] max. load ($q_{fi,d}$) = layer D 80 [kN/m]	REI	60 I 60
	Heat insulation	U [W/m²K]	0.396
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	23

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
C	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**17.25 cm**			**58.94 kg/m²**	

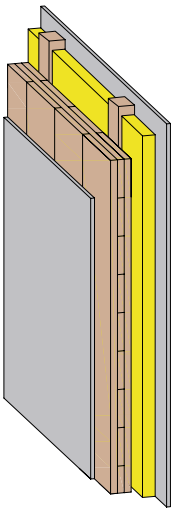
Ecological rating in detail | www.baubook.info/massivholzhandbuch

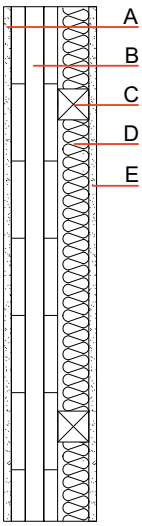
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
428	-49.5	0.125

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level: IW08 c





Building physical and ecological rating

	Fire protection	REI	60 I 60
	max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 80 [kN/m] max. load ($q_{fi,d}$) = layer E 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.402
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	23

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	12.5	Rigips RF fire protection board*	0.25	800	A2
B	90	CLT BBS, 3-layered	0.12	450	D
C	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
D	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
E	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**17.50 cm**			**64.44 kg/m²**	

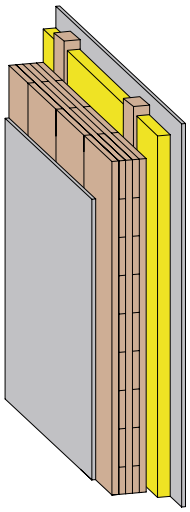
Ecological rating in detail | www.baubook.info/massivholzhandbuch

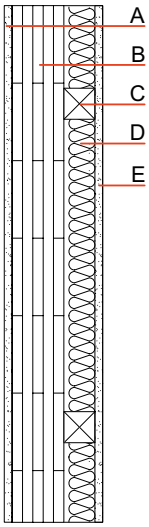
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
429	-43	0.119

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level: IW08 d





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 80 [kN/m] max. load ($q_{fi,d}$) = layer E 80 [kN/m]	REI	90 I 90
	Heat insulation	U [W/m²K]	0.386
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	25

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	15	Rigips RF fire protection board*	0.25	800	A2
B	100	CLT BBS, 5-layered	0.12	450	D
C	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
D	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
E	15	Rigips RF fire protection board*	0.25	800	A2
Total	**19 cm**			**72.94 kg/m²**	

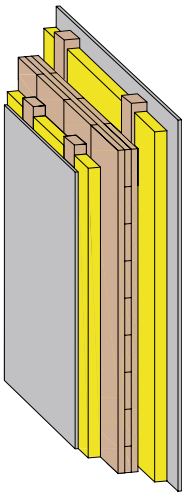
Ecological rating in detail | www.baubook.info/massivholzhandbuch

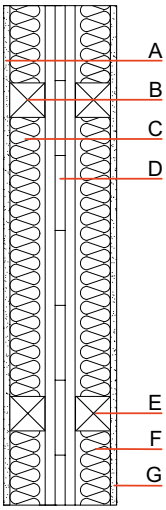
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
477	-47.4	0.130

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level: IW09 a





Building physical and ecological rating

	Fire protection	REI	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.261
	Sound insulation	R_w [dB]	50
	Ecology	ΔOI3	27

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	12.5	Rigips RF fire protection board*	0.25	800	A2
B	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
C	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	90	CLT BBS, 3-layered	0.12	450	D
E	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
F	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
G	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**23.50 cm**			**68.37 kg/m²**	

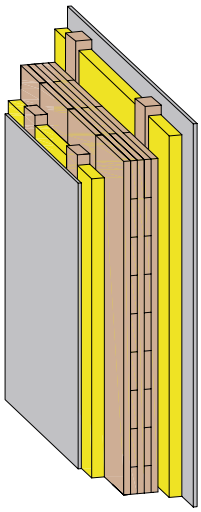
Ecological rating in detail | www.baubook.info/massivholzhandbuch

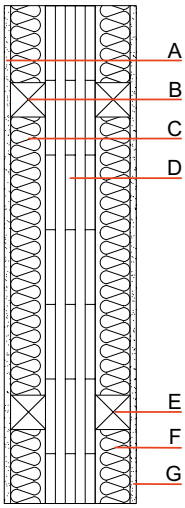
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
486	-44.5	0.138

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Interior wall – solid timber construction with installation level: IW09 b





Building physical and ecological rating

	Fire protection	REI	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 80 [kN/m]		
	Heat insulation	U [W/m²K]	0.253
	Sound insulation	R_w [dB]	50
	Ecology	ΔOI3	30

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	15	Rigips RF fire protection board*	0.25	800	A2
B	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
C	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	100	CLT BBS, 5-layered	0.12	450	D
E	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
F	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
G	15	Rigips RF fire protection board*	0.25	800	A2
Total	**25 cm**			**76.87 kg/m²**	

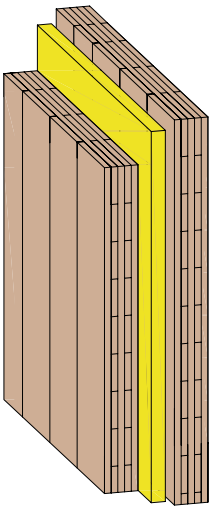
Ecological rating in detail | www.baubook.info/massivholzhandbuch

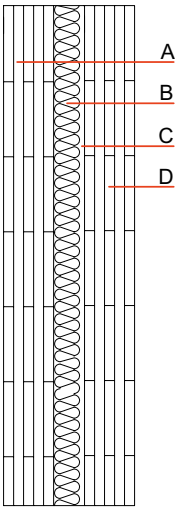
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
534	-48.8	0.150

Inspection by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Partition wall – solid timber construction, visual surface quality: IW10 b





Building physical and ecological rating

	Fire protection	REI	60
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 60 [kN/m]		
	Heat insulation	U [W/m²K]	0.283
	Sound insulation	R_w [dB]	52
	Ecology	ΔOI3	38

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
C	10	Air space	0	—	—
D	100	CLT BBS, 5-layered	0.12	450	D
Total	**26 cm**			**91.20 kg/m²**	

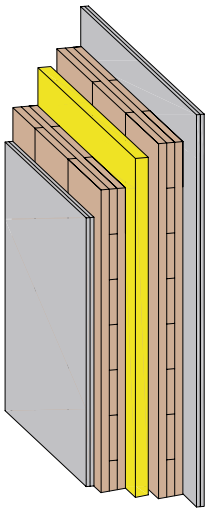
Ecological rating in detail | www.baubook.info/massivholzhandbuch

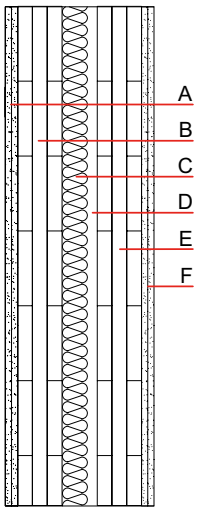
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
727	-96.4	0.222

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Partition wall – solid timber construction: IW11 b





Building physical and ecological rating

	Fire protection	REI	90
	max. unsupported length l = 3 m; max. load ($q_{fi,d}$) = 12 [kN/m]		
	Heat insulation	U [W/m²K]	0.280
	Sound insulation	R_w [dB]	58
	Ecology	ΔOI3	42

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
B	90	CLT BBS, 3-layered	0.12	450	D
C	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	10	Air space	0	—	—
E	90	CLT BBS, 3-layered	0.12	450	D
F	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**29 cm**			**122.20 kg/m²**	

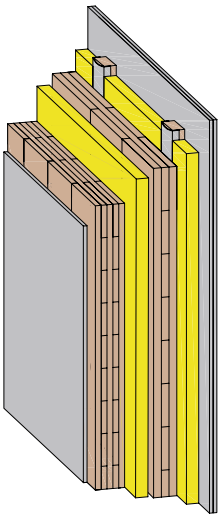
Ecological rating in detail | www.baubook.info/massivholzhandbuch

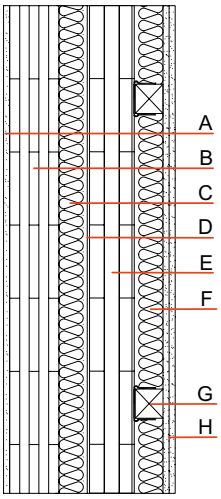
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
800	-80.2	0.217

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Partition wall – solid timber construction with installation level: IW12 b





Building physical and ecological rating

	Fire protection	REI	90 I 90
	max. unsupported length l = 3 m max. load ($q_{fi,d}$) layer A = 18.7 [kN/m] max. load ($q_{fi,d}$) layer H = 54 [kN/m]		
	Heat insulation	U [W/m²K]	0.198
	Sound insulation	R_w [dB]	65
	Ecology	ΔOI3	47

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	12.5	Rigips RF fire protection board*	0.25	800	A2
B	100	CLT BBS, 5-layered	0.12	450	D
C	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	10	Air space	0	—	—
E	90	CLT BBS, 3-layered	0.12	450	D
F	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
G	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
Total	**36.25 cm**			**124.64 kg/m²**	

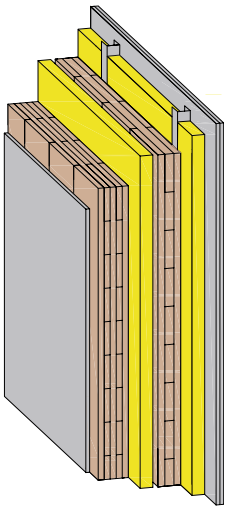
Ecological rating in detail | www.baubook.info/massivholzhandbuch

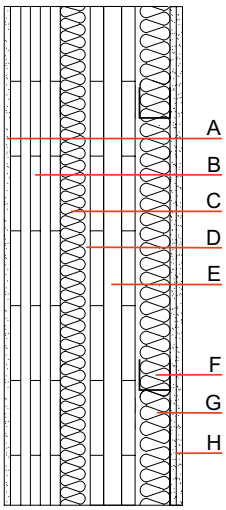
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
870	-88.3	0.245

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Partition wall – solid timber construction with installation level: IW13 c





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 18.7 [kN/m] max. load ($q_{fi,d}$) = layer H 54 [kN/m]	REI	90 I 90
	Heat insulation	U [W/m²K]	0.180
	Sound insulation	R_w [dB]	65
	Ecology	ΔOI3	61

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	12.5	Rigips RF fire protection board*	0.25	800	A2
B	100	CLT BBS, 5-layered	0.12	450	D
C	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	10	Air space	0	—	—
E	90	CLT BBS, 3-layered	0.12	450	D
F	85	Free-standing facing formwork (Rigips Rigiprofil CW 75)	—	—	A1
G	60	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
H	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
Total	**37.75 cm**			**124.54 kg/m²**	

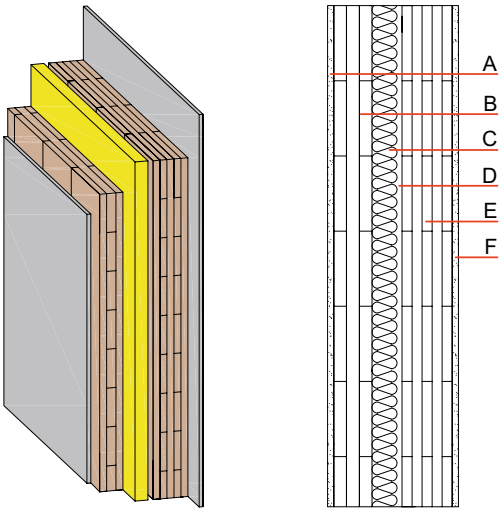
Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,021	-72.9	0.296

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Partition wall – solid timber construction: IW14



Building physical and ecological rating

	Fire protection	REI	60 I 90
	max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 14.95 [kN/m] max. load ($q_{fi,d}$) = layer F 18.70 [kN/m]		
	Heat insulation	U [W/m²K]	0.281
	Sound insulation	R_w [dB]	58
	Ecology	ΔOI3	40

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	12.5	Rigips RF fire protection board*	0.25	800	A2
B	90	CLT BBS, 3-layered	0.12	450	D
C	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	10	Air space	0	—	—
E	100	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**27.50 cm**			**106.70 kg/m²**	

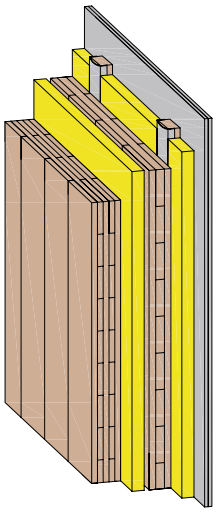
Ecological rating in detail | www.baubook.info/massivholzhandbuch

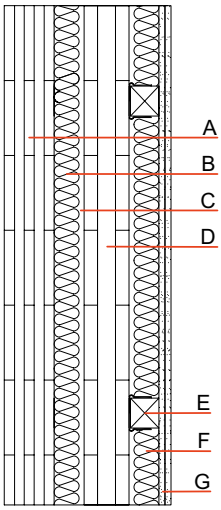
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
763	-88.3	0.220

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Partition wall – solid timber construction with installation level, visual surface quality: IW15





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 60 [kN/m] max. load ($q_{fi,d}$) = layer G 80 [kN/m]	REI	60 I 60
	Heat insulation	U [W/m²K]	0.201
	Sound insulation	R_w [dB]	70
	Ecology	ΔOI3	44

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
C	10	Air space	0	—	—
D	90	CLT BBS, 3-layered	0.12	450	D
E	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
F	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
G	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**34.50 cm**			**110.64 kg/m²**	

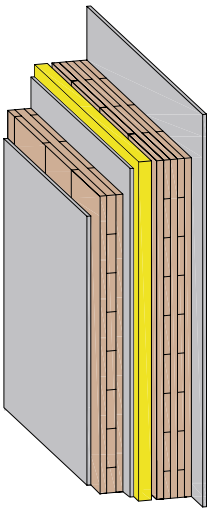
Ecological rating in detail | www.baubook.info/massivholzhandbuch

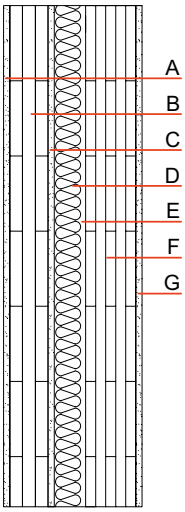
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
822	-90.4	0.239

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Partition wall – solid timber construction: IW18





Building physical and ecological rating

	Fire protection	REI	60 I 90
	max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 80 [kN/m] max. load ($q_{fi,d}$) = layer G 18.7 [kN/m]		
	Heat insulation	U [W/m²K]	0.277
	Sound insulation	R_w [dB]	58
	Ecology	ΔOI3	42

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	12.5	Rigips RF fire protection board*	0.25	800	A2
B	90	CLT BBS, 3-layered	0.12	450	D
C	12.5	Rigips RF fire protection board*	0.25	800	A2
D	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
E	10	Air space	0	—	—
F	100	CLT BBS, 5-layered	0.12	450	D
G	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**28.75 cm**			**116.70 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
798	-86.7	0.224

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
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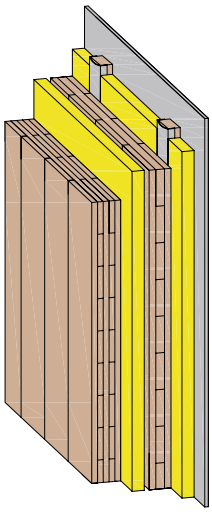
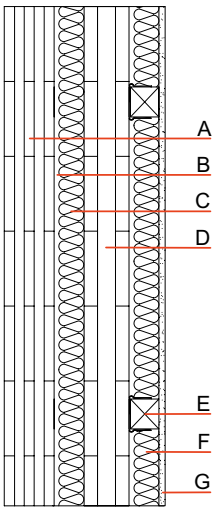
Partition wall – solid timber construction with installation level, visual surface quality: IW19





Building physical and ecological rating

	Fire protection max. unsupported length l = 3 m max. load ($q_{fi,d}$) = layer A 60 [kN/m] max. load ($q_{fi,d}$) = layer G 80 [kN/m]	REI	60 I 60
	Heat insulation	U [W/m²K]	0.203
	Sound insulation	R_w [dB]	67
	Ecology	ΔOI3	42

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	100	CLT BBS, 5-layered	0.12	450	D
B	10	Air space	0	—	—
C	50	Mineral wool secured in position, e.g. Isover Kontur KP 1-035	0.034	24	A1
D	90	CLT BBS, 3-layered	0.12	450	D
E	70	Wooden battens (60/60; e = 625) on Rigips adjustment vibration mounts	0.13	475	D
F	50	Mineral wool, e.g. Isover Kontur KP 1-035	0.034	24	A1
G	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.25 cm**			**100.64 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
787	-92	0.235

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

1st edition, May 2019

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Rigips
SAINT-GOBAIN

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ROOF

SOLID TIMBER MANUAL 2.0

binderholz

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1st edition, May 2019

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This publication is targeted at trained specialists. Any illustrations of executing activities contained in it are not understood to be any processing instructions, unless expressly marked as such. Renderings and sectional views of the individual assemblies are not depicted on scale; they serve merely as illustration.

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We are looking forward to a good cooperation and wish you great success with all of our system solutions.

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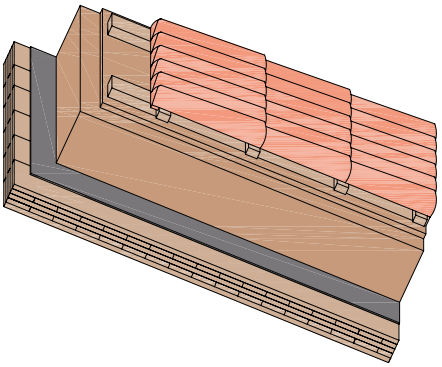
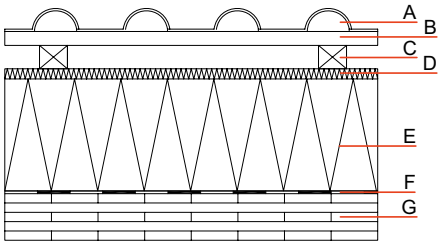




Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.131
	Sound insulation	R_w [dB]	54
	Ecology	ΔOI3	53

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Concrete roofing tiles	—	2,100	A1
B	30	Wooden battens (30/50)	0.13	475	D
C	50	Wooden counter battens (min 50 mm)	0.13	475	D
D	22	Under-ceiling board, wood fibre insulation panel	0.05	250	E
E	240	Wood fibre insulation panel	0.04	110	E
F	—	Sealing sheet	—	—	E
G	100	CLT BBS, 5-layered	0.12	450	D
Total	**49.20 cm**			**136.18 kg/m²**	

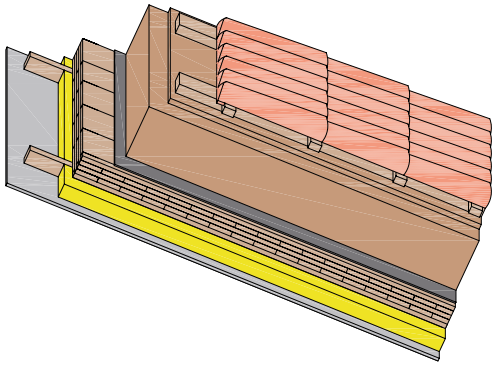
Ecological rating in detail | www.baubook.info/massivholzhandbuch

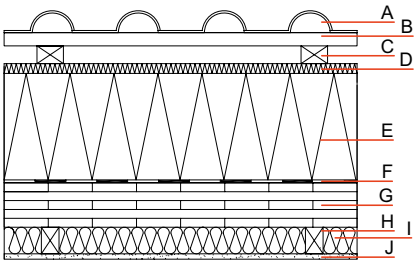
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
909	-67.6	0.257

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Steel roof – solid timber construction, rear ventilated: DA01 k





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.110
	Sound insulation	R_w [dB]	62
	Ecology	ΔOI3	59

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Concrete roofing tiles	—	2,100	A1
B	30	Wooden battens (30/50)	0.13	475	D
C	50	Wooden counter battens (min 50 mm)	0.13	475	D
D	22	Under-ceiling board, wood fibre insulation panel	0.05	250	E
E	240	Wood fibre insulation panel	0.04	110	E
F	—	Sealing sheet	—	—	E
G	100	CLT BBS, 5-layered	0.12	450	D
H	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
I	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
J	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**56.45 cm**			**149.96 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
993	-67.6	0.277

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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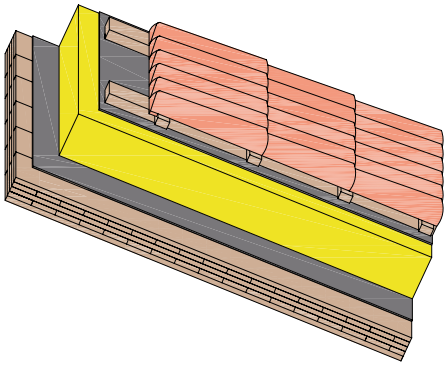
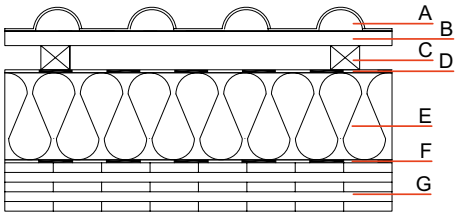
Steep roof – solid timber construction, visual surface quality, rear ventilated: DA02 k





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.130
	Sound insulation	R_w [dB]	52
	Ecology	ΔOI3	96

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Concrete roofing tiles	—	2,100	A1
B	30	Wooden battens (30/50)	0.13	475	D
C	50	Wooden counter battens (min 50 mm)	0.13	475	D
D	—	Sheathing membrane (laminated; sd ≤ 0.12 m)	—	—	E
E	220	Mineral wool above-rafter insulation system, e.g. Isover Integra Basic	0.034	110	A1
F	—	Sealing sheet	—	—	E
G	100	CLT BBS, 5-layered	0.12	450	D
Total	**45 cm**			**128.48 kg/m²**	

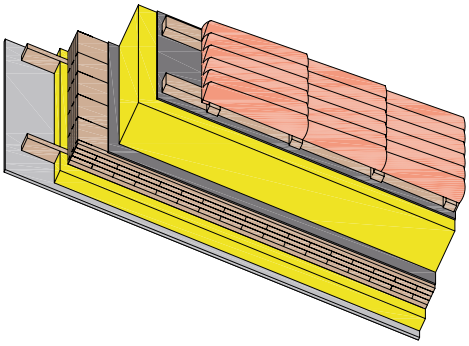
Ecological rating in detail | www.baubook.info/massivholzhandbuch

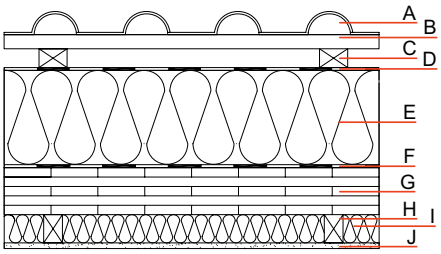
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
967	4.87	0.471

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Steel roof – solid timber construction, rear ventilated: DA02 I





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.109
	Sound insulation	R_w [dB]	59
	Ecology	ΔOI3	101

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Concrete roofing tiles	—	2,100	A1
B	30	Wooden battens (30/50)	0.13	475	D
C	50	Wooden counter battens (min 50 mm)	0.13	475	D
D	—	Sheathing membrane (laminated; sd ≤ 0.12 m)	—	—	E
E	220	Mineral wool above-rafter insulation system, e.g. Isover Integra Basic	0.034	110	A1
F	—	Sealing sheet	—	—	E
G	100	CLT BBS, 5-layered	0.12	450	D
H	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
I	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
J	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**52.25 cm**			**142.26 kg/m²**	

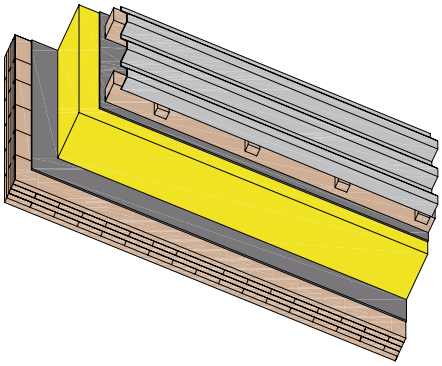
Ecological rating in detail | www.baubook.info/massivholzhandbuch

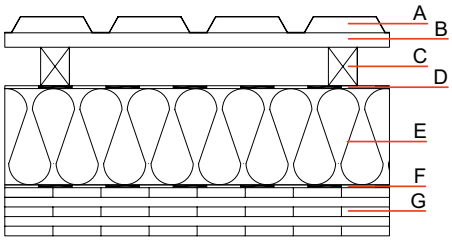
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,053	4.64	0.492

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Steep roof – solid timber construction, visual surface quality, rear ventilated: DA04 k





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.130
	Sound insulation	R_w [dB]	45
	Ecology	ΔOI3	123

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	20	Profiled sheeting	—	7,800	A1
B	30	Wooden battens (30/50)	0.13	475	D
C	80	Wooden counter battens	0.13	475	D
D	—	Sheathing membrane (laminated; sd ≤ 0.12 m)	—	—	E
E	220	Mineral wool above-rafter insulation system, e.g. Isover Integra Basic	0.034	110	A1
F	—	Sealing sheet	—	—	E
G	100	CLT BBS, 5-layered	0.12	450	D
Total	**45 cm**			**86.66 kg/m²**	

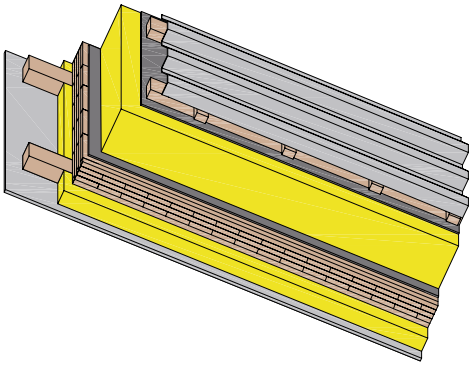
Ecological rating in detail | www.baubook.info/massivholzhandbuch

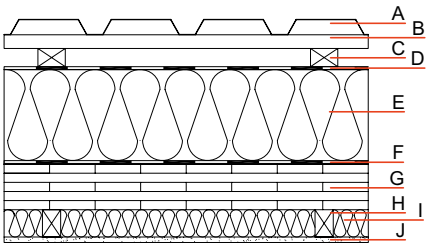
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,265	18.3	0.584

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Steel roof – solid timber construction, rear ventilated: DA04 I





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.109
	Sound insulation	R_w [dB]	52
	Ecology	ΔOI3	129

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	20	Profiled sheeting	—	7,800	A1
B	30	Wooden battens (30/50)	0.13	475	D
C	80	Wooden counter battens	0.13	475	D
D	—	Sheathing membrane (laminated; sd ≤ 0.12 m)	—	—	E
E	220	Mineral wool above-rafter insulation system, e.g. Isover Integra Basic	0.034	110	A1
F	—	Sealing sheet	—	—	E
G	100	CLT BBS, 5-layered	0.12	450	D
H	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
I	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
J	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**52.25 cm**			**100.44 kg/m²**	

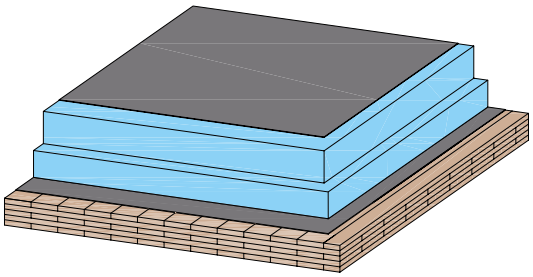
Ecological rating in detail | www.baubook.info/massivholzhandbuch

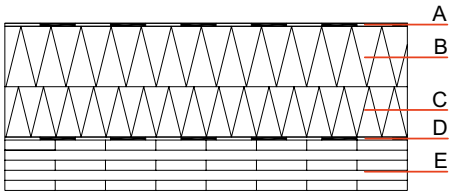
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,348	18.4	0.604

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA05 a





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.138
	Sound insulation	R_w [dB]	39
	Ecology	ΔOI3	65

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Expanded polystyrol (pitch insulation)	0.032	30	E
C	100	Expanded polystyrol	0.038	30	E
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
Total	**32.25 cm**			**53.30 kg/m²**	

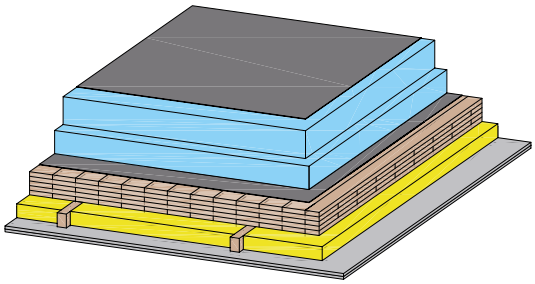
Ecological rating in detail | www.baubook.info/massivholzhandbuch

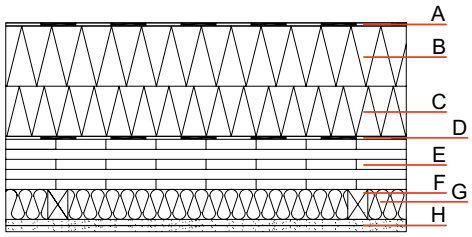
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,159	-17	0.220

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, suspended: DA05 c





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.114
	Sound insulation	R_w [dB]	43
	Ecology	ΔOI3	73

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Expanded polystyrol (pitch insulation)	0.032	30	E
C	100	Expanded polystyrol	0.038	30	E
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
F	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
G	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
H	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
Total	**41.25 cm**			**81.09 kg/m²**	

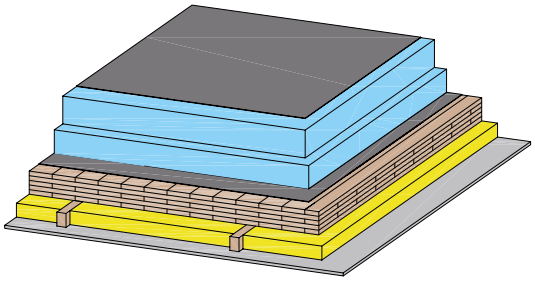
Ecological rating in detail | www.baubook.info/massivholzhandbuch

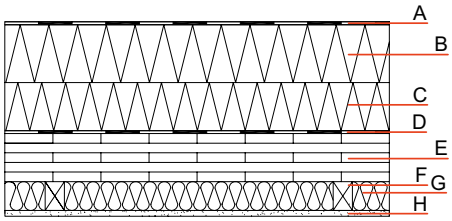
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,294	-15.1	0.246

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, suspended: DA05 f





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.115
	Sound insulation	R_w [dB]	43
	Ecology	ΔOI3	71

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Expanded polystyrol (pitch insulation)	0.032	30	E
C	100	Expanded polystyrol	0.038	30	E
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
F	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
G	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**39.50 cm**			**67.09 kg/m²**	

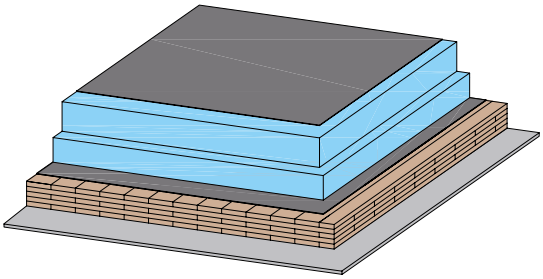
Ecological rating in detail | www.baubook.info/massivholzhandbuch

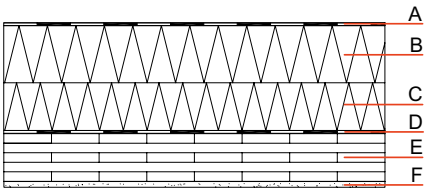
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,245	-17.2	0.241

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction: DA05 g





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.137
	Sound insulation	R_w [dB]	39
	Ecology	ΔOI3	67

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Expanded polystyrol (pitch insulation)	0.032	30	E
C	100	Expanded polystyrol	0.038	30	E
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.50 cm**			**63.30 kg/m²**	

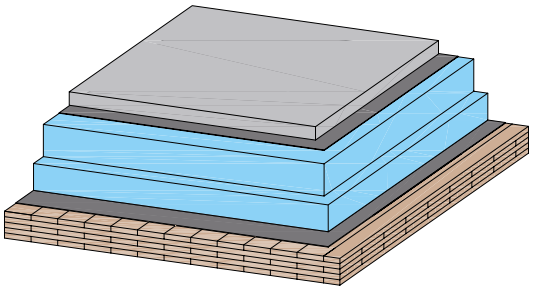
Ecological rating in detail | www.baubook.info/massivholzhandbuch

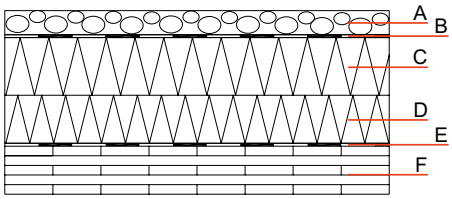
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,194	-15.4	0.223

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA06 a





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.136
	Sound insulation	R_w [dB]	55
	Ecology	ΔOI3	85

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Expanded polystyrol (pitch insulation)	0.032	30	E
D	100	Expanded polystyrol	0.038	30	E
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
Total	**37.25 cm**			**128.30 kg/m²**	

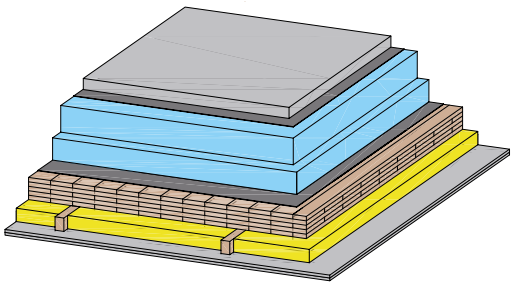
Ecological rating in detail | www.baubook.info/massivholzhandbuch

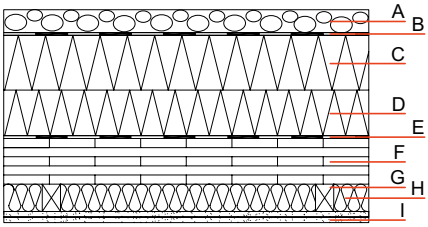
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,356	9.61	0.283

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, suspended: DA06 c





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.113
	Sound insulation	R_w [dB]	61
	Ecology	ΔOI3	93

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Expanded polystyrol (pitch insulation)	0.032	30	E
D	100	Expanded polystyrol	0.038	30	E
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
G	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
H	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
I	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
Total	**46.25 cm**			**156.09 kg/m²**	

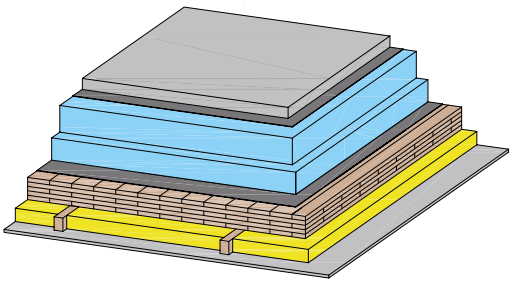
Ecological rating in detail | www.baubook.info/massivholzhandbuch

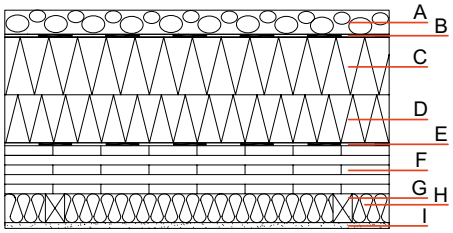
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,490	11.6	0.310

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, suspended: DA06 f





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.114
	Sound insulation	R_w [dB]	61
	Ecology	ΔOI3	90

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Expanded polystyrol (pitch insulation)	0.032	30	E
D	100	Expanded polystyrol	0.038	30	E
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
G	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
H	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
I	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**44.50 cm**			**142.09 kg/m²**	

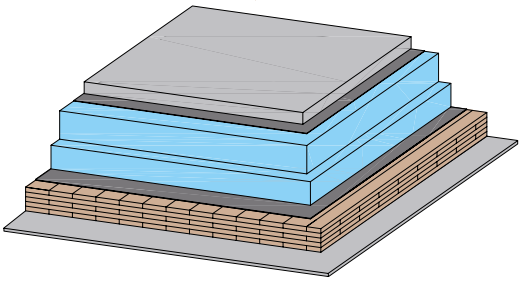
Ecological rating in detail | www.baubook.info/massivholzhandbuch

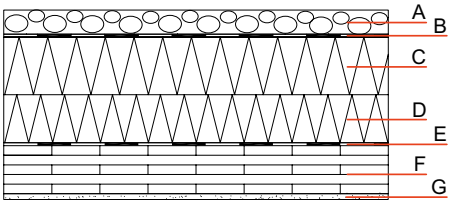
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,441	9.39	0.304

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction: DA06 g





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.135
	Sound insulation	R_w [dB]	55
	Ecology	ΔOI3	87

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Expanded polystyrol (pitch insulation)	0.032	30	E
D	100	Expanded polystyrol	0.038	30	E
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
G	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**38.50 cm**			**138.30 kg/m²**	

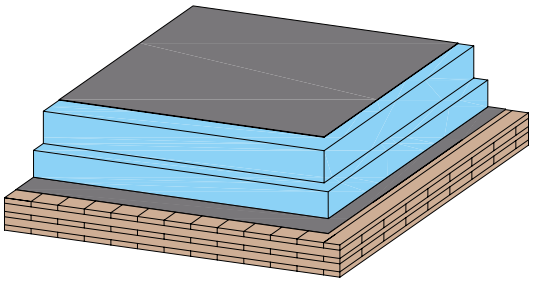
Ecological rating in detail | www.baubook.info/massivholzhandbuch

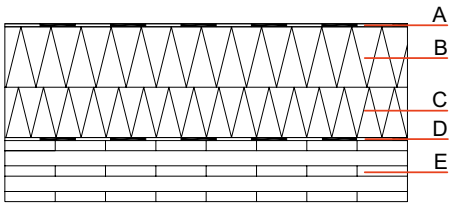
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,391	11.2	0.287

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA07 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.135
	Sound insulation	R_w [dB]	39
	Ecology	ΔOI3	68

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Expanded polystyrol (pitch insulation)	0.032	30	E
C	100	Expanded polystyrol	0.038	30	E
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	120	CLT BBS, 5-layered	0.12	450	D
Total	**34.25 cm**			**62.30 kg/m²**	

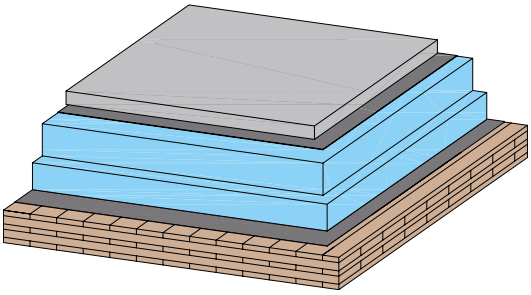
Ecological rating in detail | www.baubook.info/massivholzhandbuch

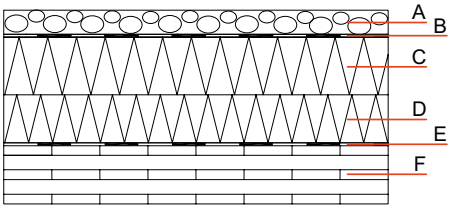
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,227	-26.9	0.240

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA08 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.133
	Sound insulation	R_w [dB]	55
	Ecology	ΔOI3	88

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Expanded polystyrol (pitch insulation)	0.032	30	E
D	100	Expanded polystyrol	0.038	30	E
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	120	CLT BBS, 5-layered	0.12	450	D
Total	**39.25 cm**			**137.30 kg/m²**	

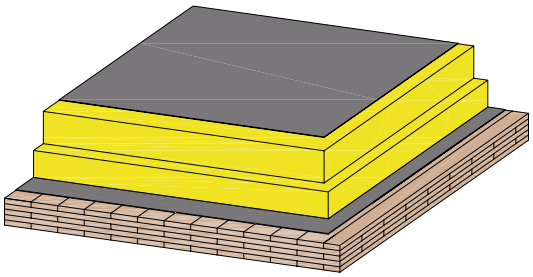
Ecological rating in detail | www.baubook.info/massivholzhandbuch

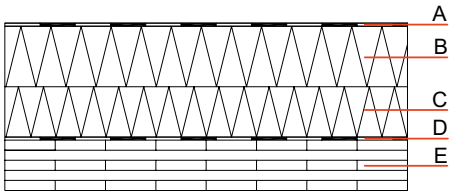
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,423	-0.316	0.304

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA09 a





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.151
	Sound insulation	R_w [dB]	48
	Ecology	ΔOI3	122

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
C	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
Total	**32.25 cm**			**79.70 kg/m²**	

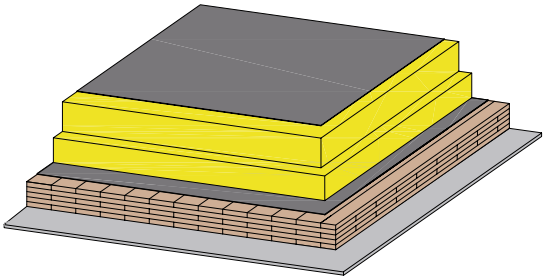
Ecological rating in detail | www.baubook.info/massivholzhandbuch

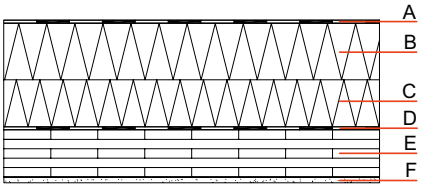
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,212	19.3	0.587

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction: DA09 b





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.150
	Sound insulation	R_w [dB]	48
	Ecology	ΔOI3	124

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
C	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.50 cm**			**89.70 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,247	20.9	0.591

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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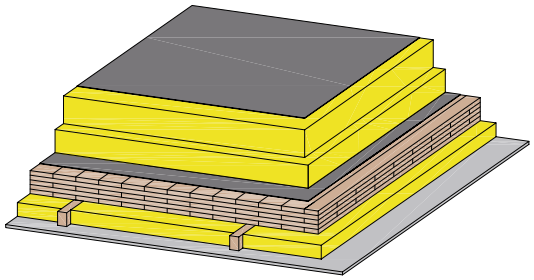
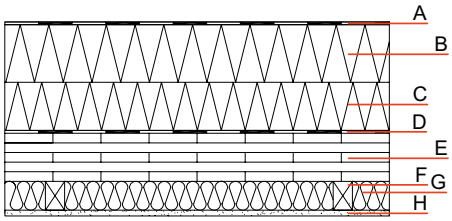
Flat roof – solid timber construction, suspended: DA09 c





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.124
	Sound insulation	R_w [dB]	54
	Ecology	ΔOI3	128

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
C	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
F	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
G	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**39.50 cm**			**93.49 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,297	19.1	0.608

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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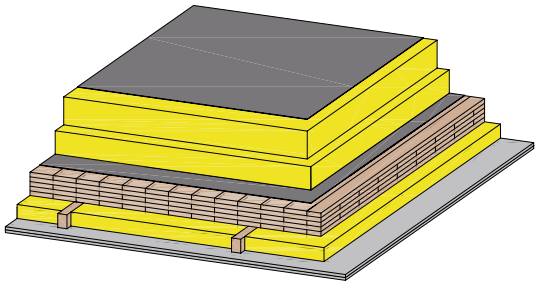
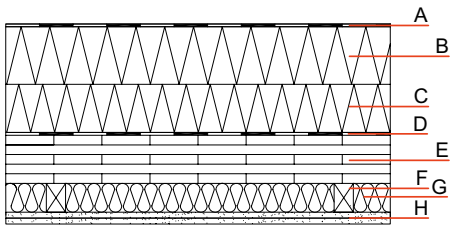
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, suspended: DA09 d





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.123
	Sound insulation	R_w [dB]	54
	Ecology	ΔOI3	130

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
C	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	100	CLT BBS, 5-layered	0.12	450	D
F	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
G	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
H	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
Total	**41.25 cm**			**107.49 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,346	21.3	0.614

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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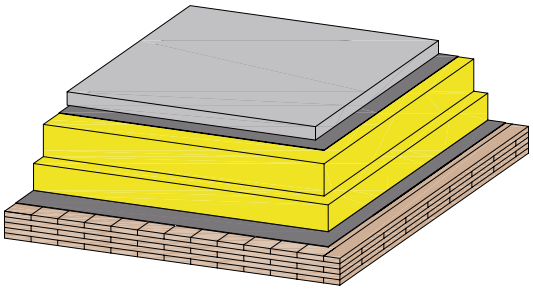
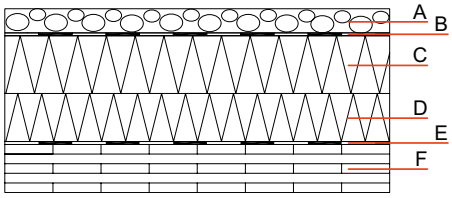
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA10 a





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.149
	Sound insulation	R_w [dB]	56
	Ecology	ΔOI3	141

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
D	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
Total	**37.25 cm**			**154.70 kg/m²**	

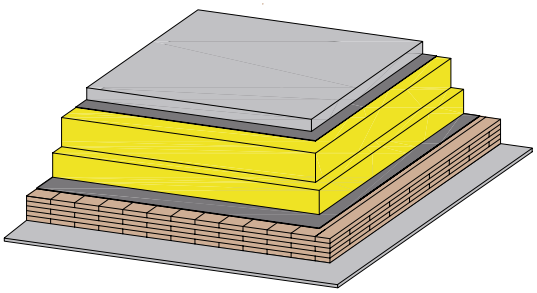
Ecological rating in detail | www.baubook.info/massivholzhandbuch

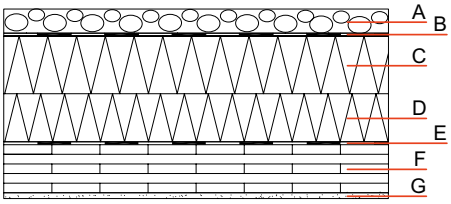
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,408	45.9	0.651

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction: DA10 b





Building physical and ecological rating

	Fire protection	REI i → o	30
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.148
	Sound insulation	R_w [dB]	56
	Ecology	ΔOI3	143

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
D	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
G	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**38.50 cm**			**164.70 kg/m²**	

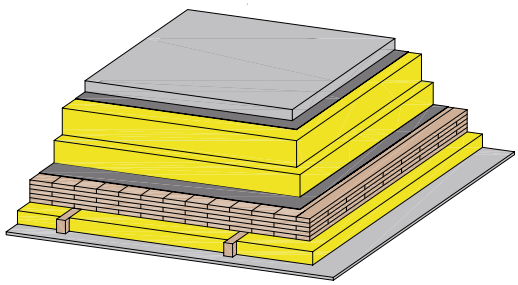
Ecological rating in detail | www.baubook.info/massivholzhandbuch

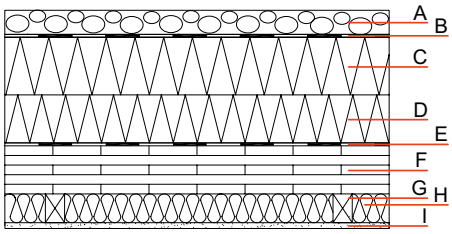
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,443	47.5	0.655

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, suspended: DA10 c





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.123
	Sound insulation	R_w [dB]	62
	Ecology	ΔOI3	147

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
D	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
G	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
H	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
I	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**44.50 cm**			**168.49 kg/m²**	

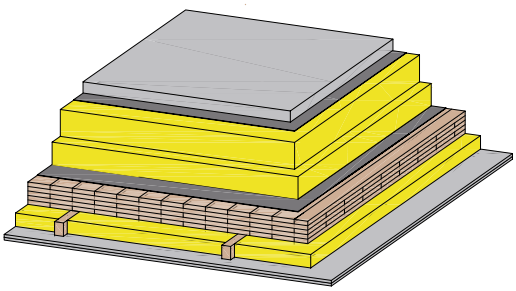
Ecological rating in detail | www.baubook.info/massivholzhandbuch

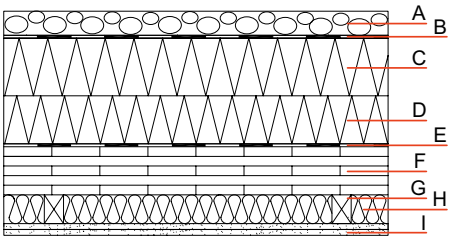
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,494	45.7	0.672

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, suspended: DA10 d





Building physical and ecological rating

	Fire protection	REI i → o	90
	max. width l = 4 m; max. load ($q_{fi,d}$) = 6.95 [kN/m²]		
	Heat insulation	U [W/m²K]	0.121
	Sound insulation	R_w [dB]	62
	Ecology	ΔOI3	150

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
D	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	100	CLT BBS, 5-layered	0.12	450	D
G	60	Wooden battens (60/60; e = 625) directly bolted on	0.13	475	D
H	50	Mineral wool, e.g. Isover Integra UKF 035	0.034	21	A1
I	30	Rigips RF fire protection board* (2 x 15 mm)	0.25	800	A2
Total	**46.25 cm**			**182.49 kg/m²**	

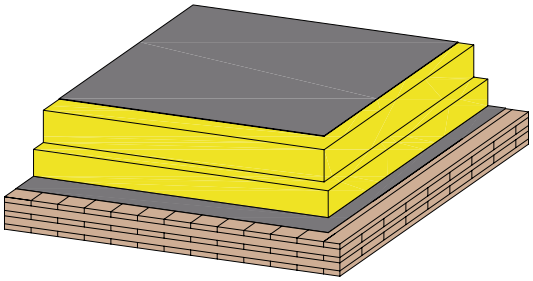
Ecological rating in detail | www.baubook.info/massivholzhandbuch

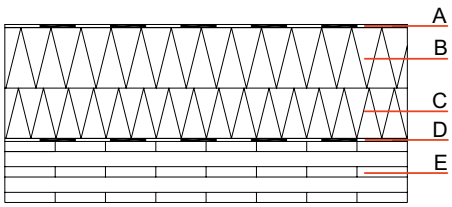
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,542	47.9	0.678

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA11 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.147
	Sound insulation	R_w [dB]	48
	Ecology	ΔOI3	125

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
B	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
C	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
D	—	Sealing sheet (sd ≥ 220 m)	—	—	E
E	120	CLT BBS, 5-layered	0.12	450	D
Total	**34.25 cm**			**88.70 kg/m²**	

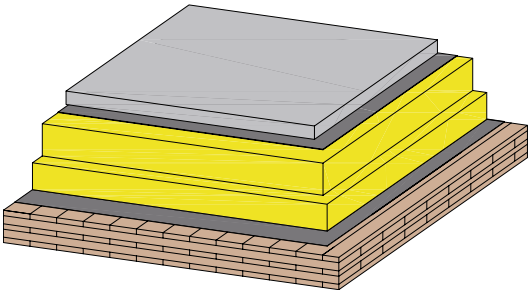
Ecological rating in detail | www.baubook.info/massivholzhandbuch

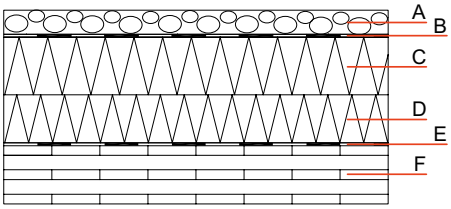
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,279	9.39	0.608

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Flat roof – solid timber construction, visual quality: DA12 a





Building physical and ecological rating

	Fire protection	REI i → o	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.146
	Sound insulation	R_w [dB]	56
	Ecology	ΔOI3	145

Building material specifications for construction, layer structure | from the inside to the outside

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	50	Gravel	0.7	1,500	A1
B	2.5	Fabric-reinforced plastic welded sheeting (> 1.7 kg/m²)	—	680	E
C	120	Mineral wool flat roof insulation (pitch insulation), e.g. Isover Metac FLP 1	0.039	150	A1
D	100	Mineral wool flat roof insulation, e.g. Isover Metac FLP 1	0.039	150	A1
E	—	Sealing sheet (sd ≥ 220 m)	—	—	E
F	120	CLT BBS, 5-layered	0.12	450	D
Total	**39.25 cm**			**163.70 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,475	36	0.672

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

1st edition, May 2019

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Rigips
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CEILING

SOLID TIMBER MANUAL 2.0

binderholz

Rigips
SAINT-GOBAIN

1st edition, May 2019

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This publication is targeted at trained specialists. Any illustrations of executing activities contained in it are not understood to be any processing instructions, unless expressly marked as such. Renderings and sectional views of the individual assemblies are not depicted on scale; they serve merely as illustration.

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We are looking forward to a good cooperation and wish you great success with all of our system solutions.

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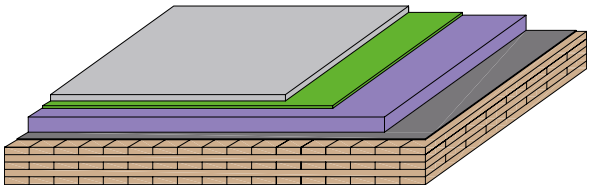
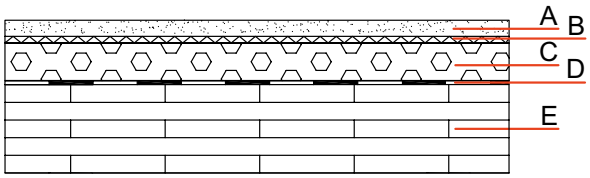
CONTENT

Ceiling – solid timber construction, visual surface quality, dry: DE01 b





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 7 [kN/m²]		
	Heat insulation	U [W/m²K]	0.445
	Sound insulation	R_w [dB]	56
		$L_{n,w}$ [dB]	62
	Ecology	ΔOI3	46

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigidur or Rigiplan screed element	0.35	1,200	A2
B	10	Footfall sound insulation MW-T, s' ≤ 35 MN/m³, laminated or loose	0.035	185	A2
C	60	Rigips loose balancing filling	0.16	460	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
Total	**23.50 cm**			**122.45 kg/m²**	

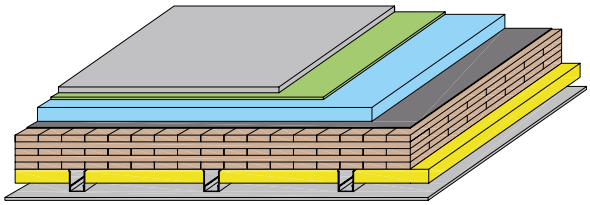
Ecological rating in detail | www.baubook.info/massivholzhandbuch

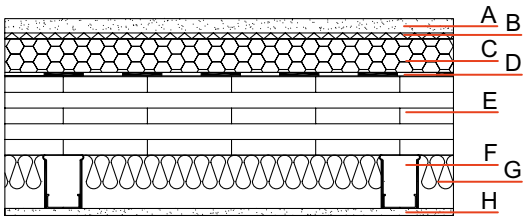
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
732	-54.8	0.228

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspended, dry: DE06 e





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 5 m; max. load ($q_{fi,d}$) = 7 [kN/m²]		
	Heat insulation	U [W/m²K]	0.247
	Sound insulation	R_w [dB]	76
		$L_{n,w}$ [dB]	38
	Ecology	ΔOI3	83

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigidur screed element	0.35	1,200	A2
B	12	Footfall sound insulation s' ≤ 26 MN/m³, e.g. Isover Akustic EP3*	0.039	150	A1
C	60	Lime chippings filling, bonded	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**34.45 cm**			**197.24 kg/m²**	

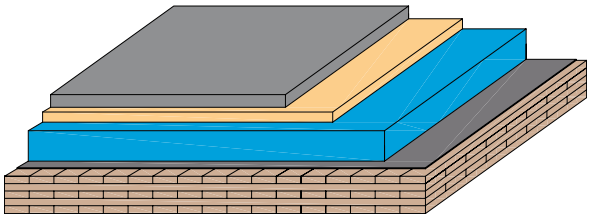
Ecological rating in detail | www.baubook.info/massivholzhandbuch

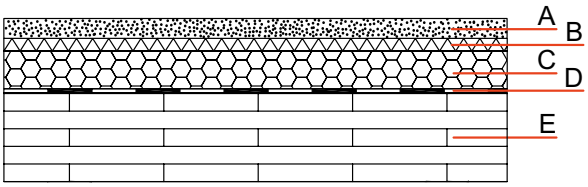
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,137	-17.4	0.358

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE07 b





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 7 [kN/m²]		
	Heat insulation	U [W/m²K]	0.349
	Sound insulation	R_w [dB]	77
		$L_{n,w}$ [dB]	40
	Ecology	ΔOI3	84

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	40	Footfall sound insulation Isover Akustic EP1 s' ≤ 7 MN/m³	0.032	80	A1
C	100	Lime chippings filling, bonded with Köhnke K101	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
Total	**34 cm**			**336.20 kg/m²**	

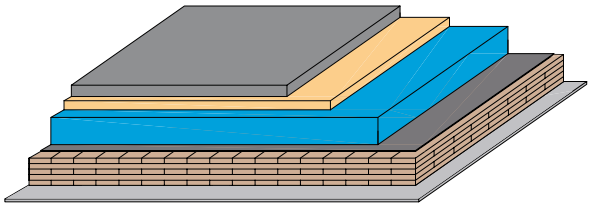
Ecological rating in detail | www.baubook.info/massivholzhandbuch

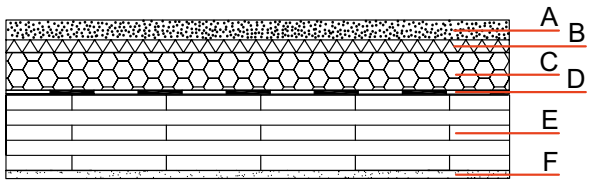
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,110	4.72	0.345

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, wet: DE07 c





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.7 m; max. load ($q_{fi,d}$) = 5 [kN/m²]		
	Heat insulation	U [W/m²K]	0.343
	Sound insulation	R_w [dB]	77
		$L_{n,w}$ [dB]	40
	Ecology	ΔOI3	86

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	40	Footfall sound insulation Isover Akustic EP1 s' ≤ 7 MN/m³	0.032	80	A1
C	100	Lime chippings filling, bonded with Köhnke K101	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**35.25 cm**			**346.20 kg/m²**	

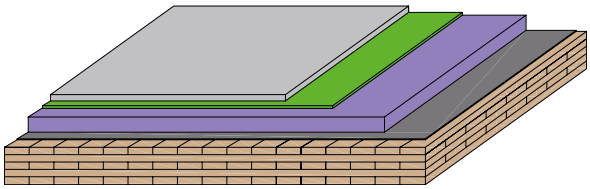
Ecological rating in detail | www.baubook.info/massivholzhandbuch

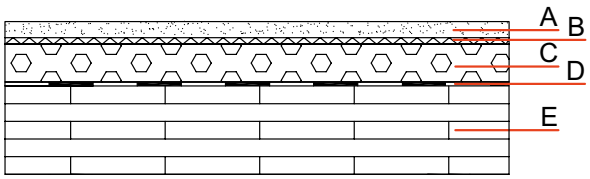
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,145	6.27	0.349

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, dry: DE11 b





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.429
	Sound insulation	R_w [dB]	56
		$L_{n,w}$ [dB]	60
	Ecology	ΔOI3	47

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	Building material	Heat conductivity λ [W/(m · K)]	Gross density ρ [kg/m³]	Flammability class EN 13501-1
A	25	Rigidur or Rigiplan screed element	0.35	1,200	A2
B	10	Footfall sound insulation MW-T, s' ≤ 35 MN/m³, laminated or loose	0.035	185	A2
C	60	Rigips loose balancing filling	0.16	460	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**24.50 cm**			**126.95 kg/m²**	

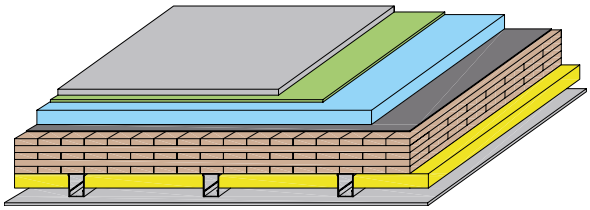
Ecological rating in detail | www.baubook.info/massivholzhandbuch

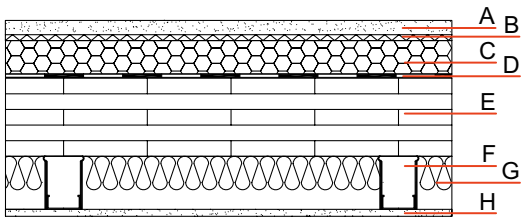
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
765	-59.8	0.238

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspended, dry: DE16 e





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 5 m; max. load ($q_{fi,d}$) = 9.75 [kN/m²]		
	Heat insulation	U [W/m²K]	0.242
	Sound insulation	R_w [dB]	76
		$L_{n,w}$ [dB]	36
	Ecology	ΔOI3	84

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigidur screed element	0.35	1,200	A2
B	12	Footfall sound insulation s' ≤ 26 MN/m³, e.g. Isover Akustic EP3*	0.039	150	A1
C	60	Lime chippings filling, bonded	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**35.45 cm**			**201.74 kg/m²**	

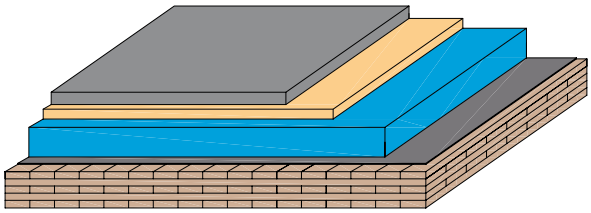
Ecological rating in detail | www.baubook.info/massivholzhandbuch

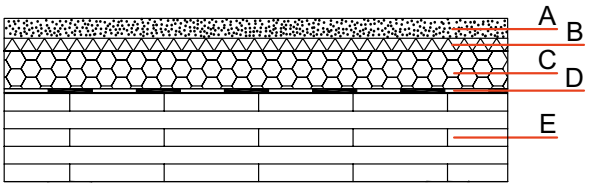
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,170	-22.4	0.368

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE17 b





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.339
	Sound insulation	R_w [dB]	77
		$L_{n,w}$ [dB]	38
	Ecology	ΔOI3	85

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	40	Footfall sound insulation Isover Akustic EP1 s' ≤ 7 MN/m³	0.032	80	A1
C	100	Lime chippings filling, bonded with Köhnke K101	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**35 cm**			**340.70 kg/m²**	

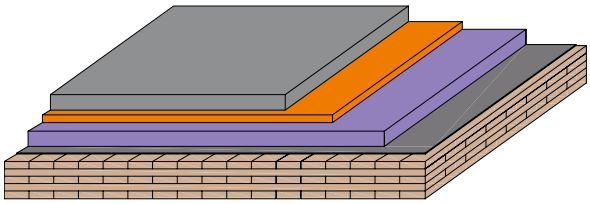
Ecological rating in detail | www.baubook.info/massivholzhandbuch

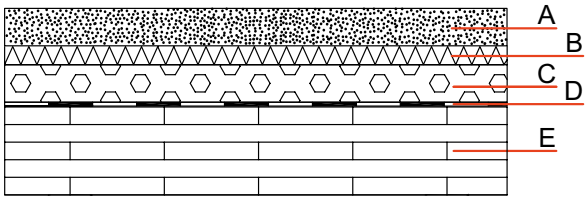
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,143	-0.246	0.355

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE19 a





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 7 [kN/m²]		
	Heat insulation	U [W/m²K]	0.381
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	57
	Ecology	ΔOI3	54

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
Total	**29 cm**			**223.50 kg/m²**	

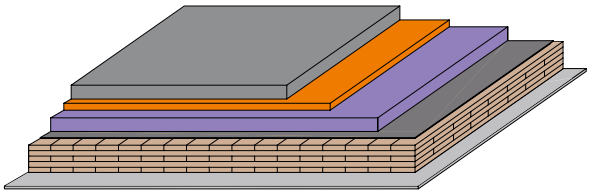
Ecological rating in detail | www.baubook.info/massivholzhandbuch

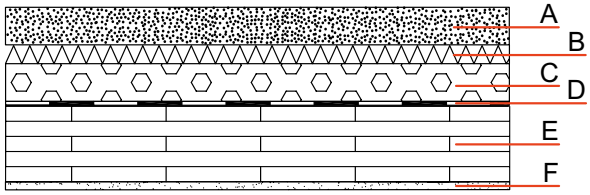
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
768	-35.1	0.260

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

Equal fire resistance and sound insulation when using ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, wet: DE19 b





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.7 m; max. load ($q_{fi,d}$) = 5 [kN/m²]		
	Heat insulation	U [W/m²K]	0.374
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	57
	Ecology	ΔOI3	56

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**30.25 cm**			**233.50 kg/m²**	

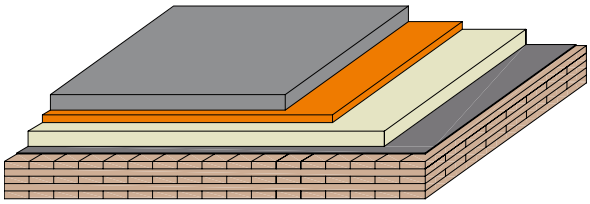
Ecological rating in detail | www.baubook.info/massivholzhandbuch

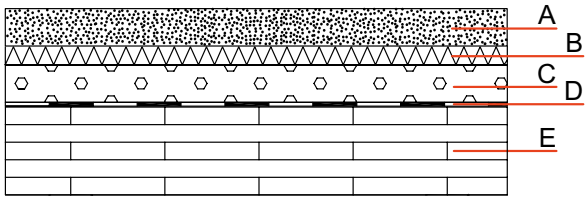
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
803	-33.5	0.263

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE20 a





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 7 [kN/m²]		
	Heat insulation	U [W/m²K]	0.324
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	58
	Ecology	ΔOI3	51

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Balancing filling weber.floor 4520, cement-bonded	0.05	165	E
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
Total	**29 cm**			**197.40 kg/m²**	

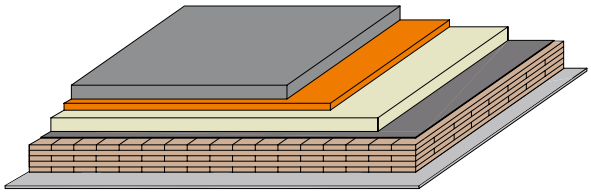
Ecological rating in detail | www.baubook.info/massivholzhandbuch

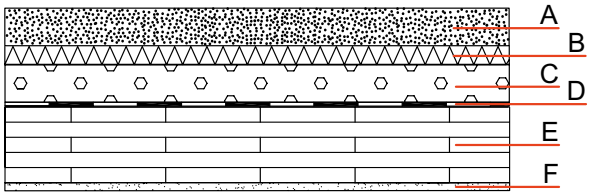
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
759	-41.3	0.244

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

Equal fire resistance and sound insulation when using ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, wet: DE20 b





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.7 m; max. load ($q_{fi,d}$) = 5 [kN/m²]		
	Heat insulation	U [W/m²K]	0.319
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	58
	Ecology	ΔOI3	53

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Balancing filling weber.floor 4520, cement-bonded	0.05	165	E
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**30.25 cm**			**207.40 kg/m²**	

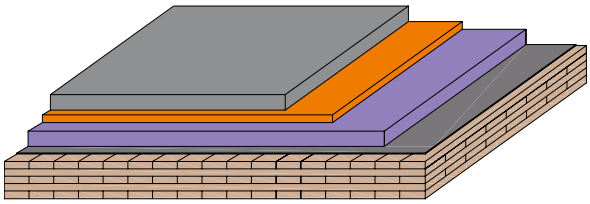
Ecological rating in detail | www.baubook.info/massivholzhandbuch

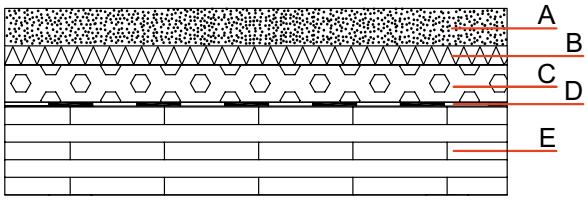
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
794	-39.8	0.248

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE21 a





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.370
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	55
	Ecology	ΔOI3	56

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**30 cm**			**228 kg/m²**	

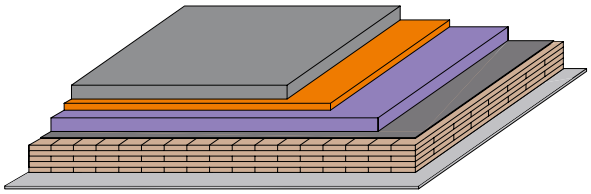
Ecological rating in detail | www.baubook.info/massivholzhandbuch

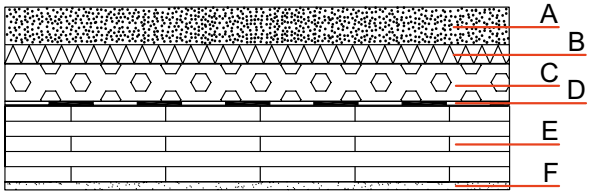
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
802	-40	0.270

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

Equal fire resistance and sound insulation when using ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, wet: DE21 b





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,\,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.363
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	55
	Ecology	ΔOI3	58

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**31.25 cm**			**238 kg/m²**	

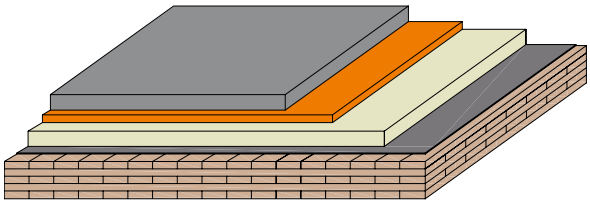
Ecological rating in detail | www.baubook.info/massivholzhandbuch

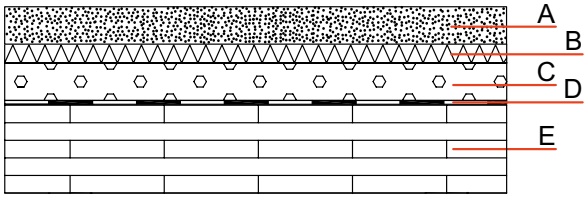
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
836	-38.5	0.274

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE22





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.315
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	56
	Ecology	ΔOI3	53

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Balancing filling weber.floor 4520, cement-bonded	0.05	165	E
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**30 cm**			**201.90 kg/m²**	

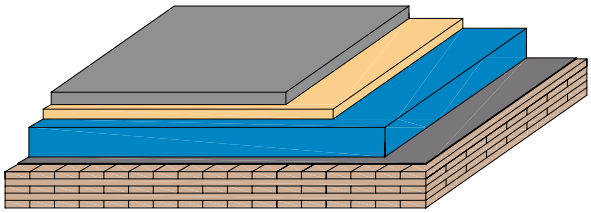
Ecological rating in detail | www.baubook.info/massivholzhandbuch

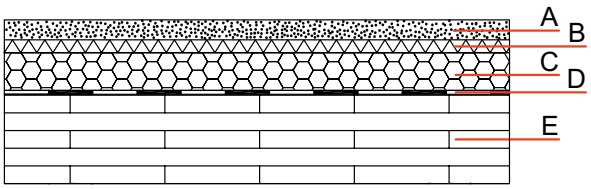
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
792	-46.3	0.254

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

Equal fire resistance and sound insulation when using ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE23





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.339
	Sound insulation	R_w [dB]	73
		$L_{n,w}$ [dB]	42
	Ecology	ΔOI3	85

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	40	Footfall sound insulation Isover Akustic EP1 s' ≤ 7 MN/m³	0.032	80	A1
C	100	Lime chippings filling, bonded with StoPrefa Coll SB	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**35 cm**			**340.70 kg/m²**	

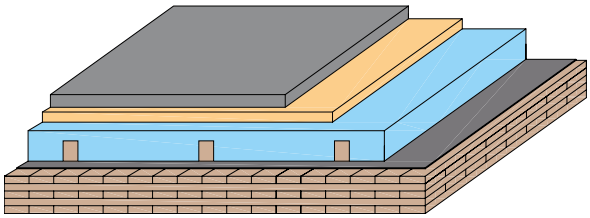
Ecological rating in detail | www.baubook.info/massivholzhandbuch

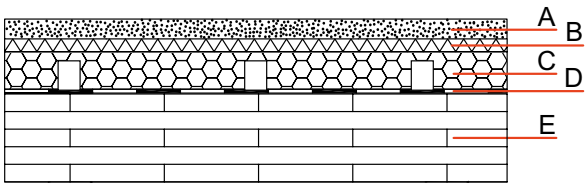
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,143	-0.246	0.355

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE24 a





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.336
	Sound insulation	R_w [dB]	77
		$L_{n,w}$ [dB]	38
	Ecology	ΔOI3	82

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	40	Footfall sound insulation Isover Akustic EP1 s' ≤ 7 MN/m³	0.032	80	A1
C	100	Lime chippings filling in squared timber 60 x 80 (e = 660 mm)	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**35 cm**			**340.70 kg/m²**	

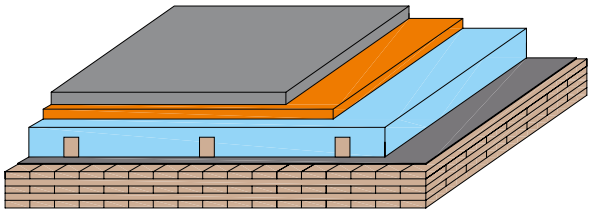
Ecological rating in detail | www.baubook.info/massivholzhandbuch

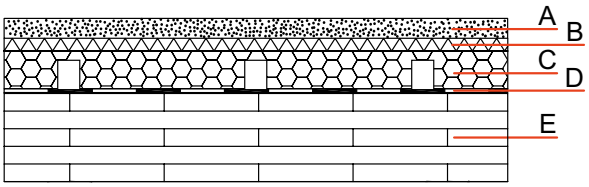
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,119	-11.6	0.347

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE24 b





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.389
	Sound insulation	R_w [dB]	75
		$L_{n,w}$ [dB]	43
	Ecology	ΔOI3	82

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	100	Lime chippings filling in squared timber 60 x 80 (e = 660 mm)	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**34 cm**			**342 kg/m²**	

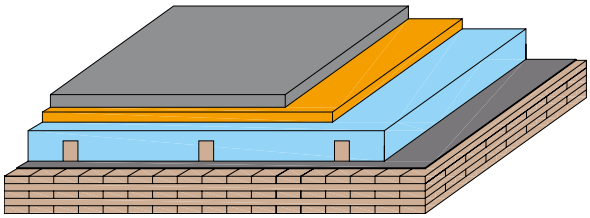
Ecological rating in detail | www.baubook.info/massivholzhandbuch

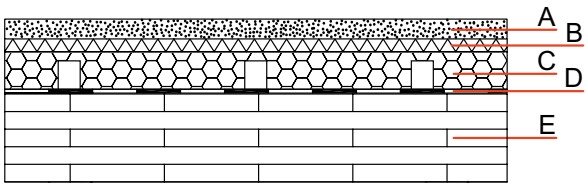
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,075	-10.9	0.359

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

Equal fire resistance and sound insulation when using ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, wet: DE24 c





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.381
	Sound insulation	R_w [dB]	76
		$L_{n,w}$ [dB]	39
	Ecology	ΔOI3	79

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover TDPS s' ≤ 7 MN/m³	0.033	80	A2
C	100	Lime chippings filling in squared timber 60 x 80 (e = 660 mm)	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**34 cm**			**339.90 kg/m²**	

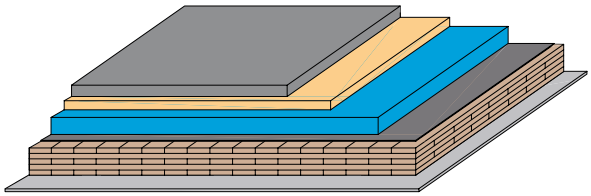
Ecological rating in detail | www.baubook.info/massivholzhandbuch

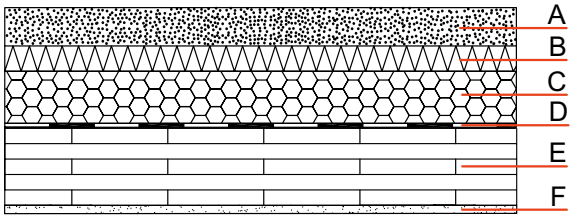
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,093	-12.9	0.339

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, wet: DE25





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.369
	Sound insulation	R_w [dB]	70
		$L_{n,w}$ [dB]	47
	Ecology	ΔOI3	75

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	40	Footfall sound insulation Isover Akustic EP1 s' ≤ 7 MN/m³	0.032	80	A1
C	80	Lime chippings filling, bonded with Köhnke K101	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	120	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**31.25 cm**			**307.20 kg/m²**	

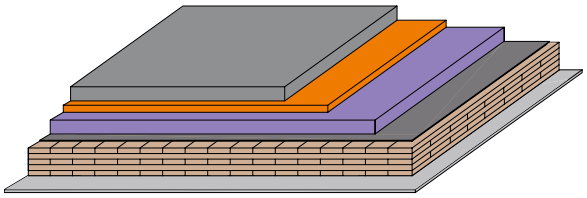
Ecological rating in detail | www.baubook.info/massivholzhandbuch

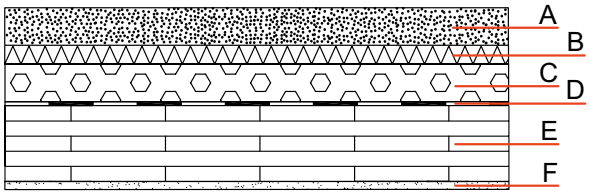
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
999	5.55	0.303

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, wet: DE26





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.399
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	57
	Ecology	ΔOI3	53

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	120	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**28.25 cm**			**224.50 kg/m²**	

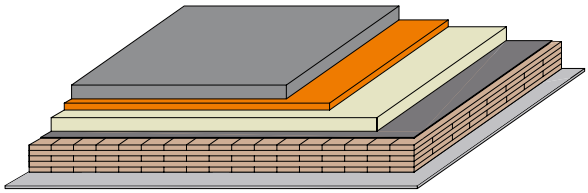
Ecological rating in detail | www.baubook.info/massivholzhandbuch

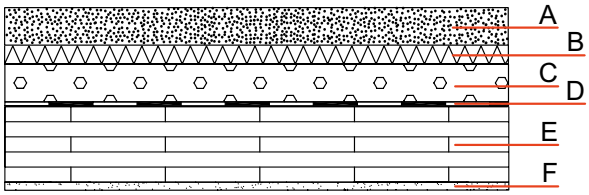
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
736	-23.6	0.243

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, wet: DE27





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.336
	Sound insulation	R_w [dB]	64
		$L_{n,w}$ [dB]	58
	Ecology	ΔOI3	50

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Balancing filling weber.floor 4520, cement-bonded	0.05	165	E
D	—	Penetration shielding	0.2	636	E
E	120	CLT BBS, 5-layered	0.12	450	D
F	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**28.25 cm**			**198.40 kg/m²**	

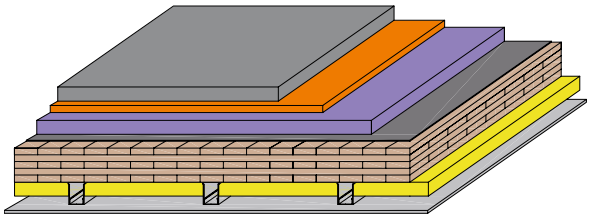
Ecological rating in detail | www.baubook.info/massivholzhandbuch

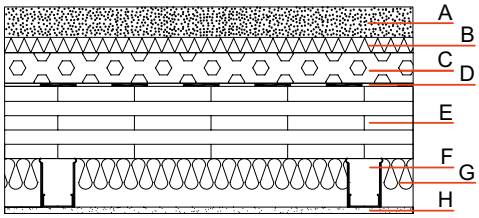
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
727	-29.9	0.228

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspendedy, wet: DE28





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.70 m; max. load ($q_{fi,d}$) = 5 [kN/m²]		
	Heat insulation	U [W/m²K]	0.210
	Sound insulation	R_w [dB]	75
		$L_{n,w}$ [dB]	40
	Ecology	ΔOI3	61

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**39.75 cm**			**235.94 kg/m²**	

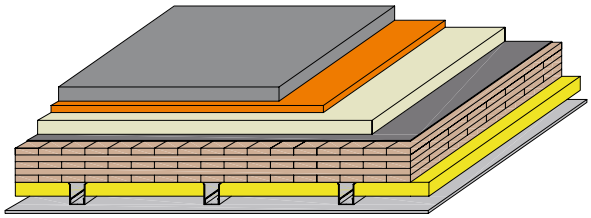
Ecological rating in detail | www.baubook.info/massivholzhandbuch

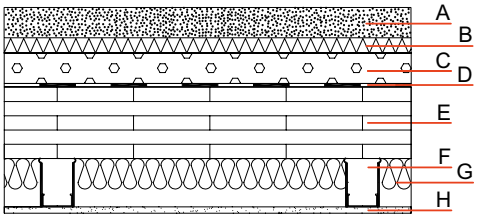
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
858	-30.5	0.282

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspendedy, wet: DE29





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.70 m; max. load ($q_{fi,d}$) = 5 [kN/m²]		
	Heat insulation	U [W/m²K]	0.191
	Sound insulation	R_w [dB]	75
		$L_{n,w}$ [dB]	40
	Ecology	ΔOI3	58

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Balancing filling weber.floor 4520, cement-bonded	0.05	165	E
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**39.75 cm**			**209.84 kg/m²**	

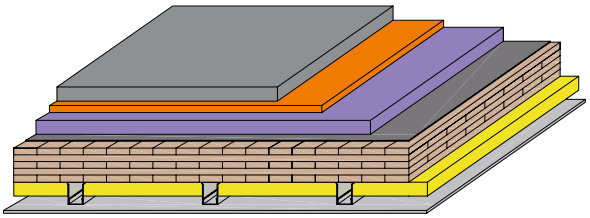
Ecological rating in detail | www.baubook.info/massivholzhandbuch

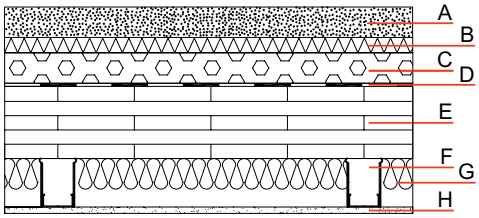
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
849	-36.8	0.266

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspendedy, wet: DE30





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 5 m; max. load ($q_{fi,d}$) = 9.75 [kN/m²]		
	Heat insulation	U [W/m²K]	0.206
	Sound insulation	R_w [dB]	75
		$L_{n,w}$ [dB]	38
	Ecology	ΔOI3	63

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**40.75 cm**			**240.44 kg/m²**	

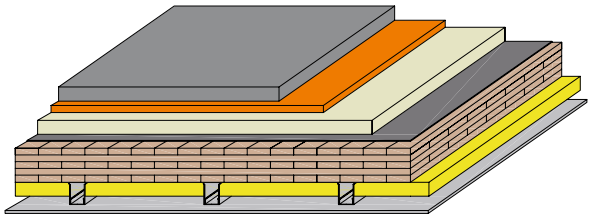
Ecological rating in detail | www.baubook.info/massivholzhandbuch

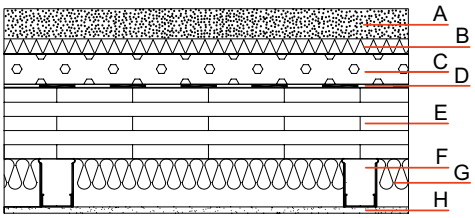
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
892	-35.5	0.292

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspendedy, wet: DE31





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 5 m; max. load ($q_{fi,d}$) = 9.75 [kN/m²]		
	Heat insulation	U [W/m²K]	0.188
	Sound insulation	R_w [dB]	75
		$L_{n,w}$ [dB]	38
	Ecology	ΔOI3	59

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Balancing filling weber.floor 4520, cement-bonded	0.05	165	E
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**40.75 cm**			**214.34 kg/m²**	

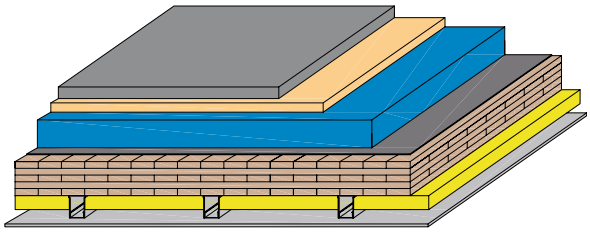
Ecological rating in detail | www.baubook.info/massivholzhandbuch

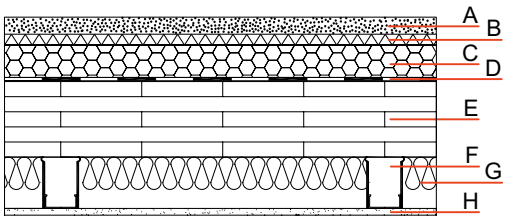
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
883	-41.8	0.277

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspendedy, wet: DE32





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 5 m; max. load ($q_{fi,\,d}$) = 9.75 [kN/m²]		
	Heat insulation	U [W/m²K]	0.197
	Sound insulation	R_w [dB]	75
		$L_{n,w}$ [dB]	38
	Ecology	ΔOI3	92

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	40	Footfall sound insulation Isover Akustic EP1 s' ≤ 7 MN/m³	0.032	80	A1
C	100	Lime chippings filling, bonded with StoPrefa Coll SB	0.7	1,500	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**45.75 cm**			**353.14 kg/m²**	

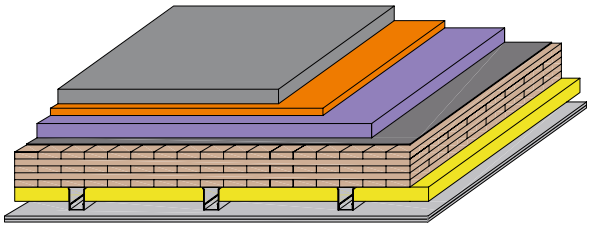
Ecological rating in detail | www.baubook.info/massivholzhandbuch

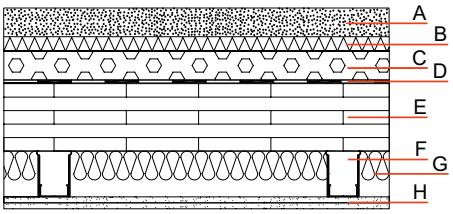
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
1,234	4.28	0.377

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, suspendedy, wet: DE33





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 5 m; max. load ($q_{fi,d}$) = 9.75 [kN/m²]		
	Heat insulation	U [W/m²K]	0.204
	Sound insulation	R_w [dB]	75
		$L_{n,w}$ [dB]	33
	Ecology	ΔOI3	65

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	60	Concrete floor screed (alternatively calcium sulphate screed with the same mass)	1.4	2,000	A1
B	30	Footfall sound insulation Isover Akustic EP2 s' ≤ 15 MN/m³*	0.035	150	A1
C	60	Rigips loose or cement-bonded balancing filling	0.16	600	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	25	Rigips RF fire protection board* (2 x 12.5 mm)	0.25	800	A2
Total	**42 cm**			**229.50 kg/m²**	

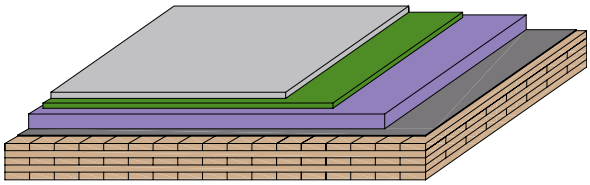
Ecological rating in detail | www.baubook.info/massivholzhandbuch

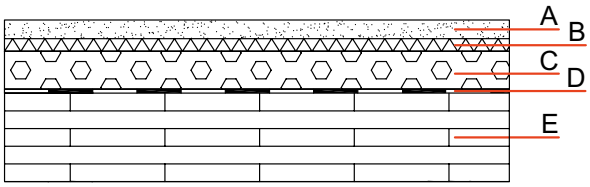
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
926	-33.9	0.296

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen [Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slabs or ISOVER footfall sound insulation boards TDPS.
The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, dry: DE34





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,d}$) = 7 [kN/m²]		
	Heat insulation	U [W/m²K]	0.428
	Sound insulation	R_w [dB]	55
		$L_{n,w}$ [dB]	64
	Ecology	ΔOI3	53

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigidur or Rigiplan screed element	0.35	1,200	A2
B	20	Footfall sound insulation s' ≤ 50 MN/m³, e.g. Isover Akustic EP3	0.039	150	A1
C	60	Rigips loose balancing filling	0.16	460	A1
D	—	Penetration shielding	0.2	636	E
E	140	CLT BBS, 5-layered	0.12	450	D
Total	**24.50 cm**			**123.60 kg/m²**	

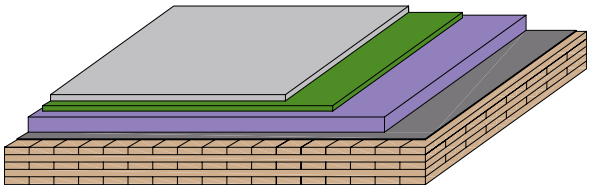
Ecological rating in detail | www.baubook.info/massivholzhandbuch

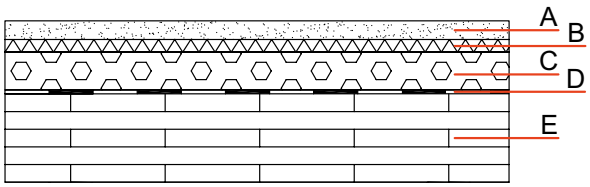
PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
792	-48.3	0.260

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

The assemblies shown were rated by accredited testing institutes on behalf of binderholz and Saint-Gobain Rigips Austria.

Ceiling – solid timber construction, visual surface quality, dry: DE35





Building physical and ecological rating

	Fire protection	REI	90
	max. width l = 4.55 m; max. load ($q_{fi,d}$) = 4.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.413
	Sound insulation	R_w [dB]	55
		$L_{n,w}$ [dB]	62
	Ecology	ΔOI3	55

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigidur or Rigiplan screed element	0.35	1,200	A2
B	20	Footfall sound insulation s' ≤ 50 MN/m³, e.g. Isover Akustic EP3	0.039	150	A1
C	60	Rigips loose balancing filling	0.16	460	A1
D	—	Penetration shielding	0.2	636	E
E	150	CLT BBS, 5-layered	0.12	450	D
Total	**25.50 cm**			**128.10 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
825	-53.3	0.270

Rating by MFPA Leipzig – Gesellschaft für Materialforschung und Prüfungsanstalt für das Bauwesen Society for Material Research and Testing Institute for the Construction Industry], D-04319 Leipzig
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

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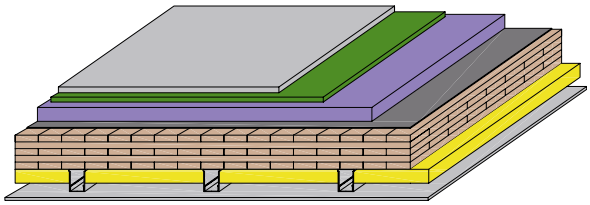
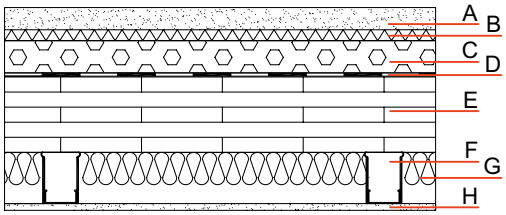
Ceiling – solid timber construction, suspended, dry: DE36





Building physical and ecological rating

	Fire protection	REI	60
	max. width l = 5 m; max. load ($q_{fi,\,d}$) = 5.50 [kN/m²]		
	Heat insulation	U [W/m²K]	0.232
	Sound insulation	R_w [dB]	55
		$L_{n,w}$ [dB]	60
	Ecology	ΔOI3	56

Building material specifications for construction, layer structure | from top to bottom

	Thickness [mm]	**Building material**	**Heat conductivity** λ [W/(m · K)]	**Gross density** ρ [kg/m³]	**Flammability class** EN 13501-1
A	25	Rigidur or Rigiplan screed element	0.35	1,200	A2
B	20	Footfall sound insulation s' ≤ 50 MN/m³, e.g. Isover Akustic EP3	0.039	150	A1
C	60	Rigips loose balancing filling	0.16	460	A1
D	—	Penetration shielding	0.2	636	E
E	120	CLT BBS, 5-layered	0.12	450	D
F	95	U-suspending bracket with vibration decoupling and Rigips CD profile	—	—	A1
G	75	Mineral wool, e.g. Isover partition wall felt	0.039	12.5	A1
H	12.5	Rigips RF fire protection board*	0.25	800	A2
Total	**33.25 cm**			**127.04 kg/m²**	

Ecological rating in detail | www.baubook.info/massivholzhandbuch

PENRT [MJ/m²]	**GWP100 total** [kg CO_2/m²]	**AP** [kg SO_2/m²]
815	-33.9	0.262

Classification by IBS – Institut für Brandschutztechnik und Sicherheitsforschung [Institute for Fire Protection Technology and Safety Research], A-4020 Linz
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna
Rated by ift Rosenheim – Schallschutzzentrum [Sound Insulation Centre], D-83026 Rosenheim and respectively Holzforschung Austria, A-1030 Vienna
Calculation by IBO – Österreichisches Institut für Bauen und Ökologie [Austrian Institute for Construction and Ecology], A-1090 Vienna

*Equal fire resistance and sound insulation when using Rigidur H gypsum fibre boards or Riduro wooden building slab.
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binderholz

Rigips
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