

ISOVER glass wool For comfortable and sustainable living places



# ISOVER GLASS WOOL PRODUCTS CONTRIBUTE TO COMFORT AND SUSTAINABILITY IN OUR BUILDINGS.

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#### **EDITO**



#### **PASCAL EVEILLARD**

Sustainable Construction
Director

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ISOVER IS THE WORLD LEADING SUPPLIER OF SUSTAINABLE INSULATION SOLUTIONS, IMPROVING WELL-BEING IN LIVING SPACES.

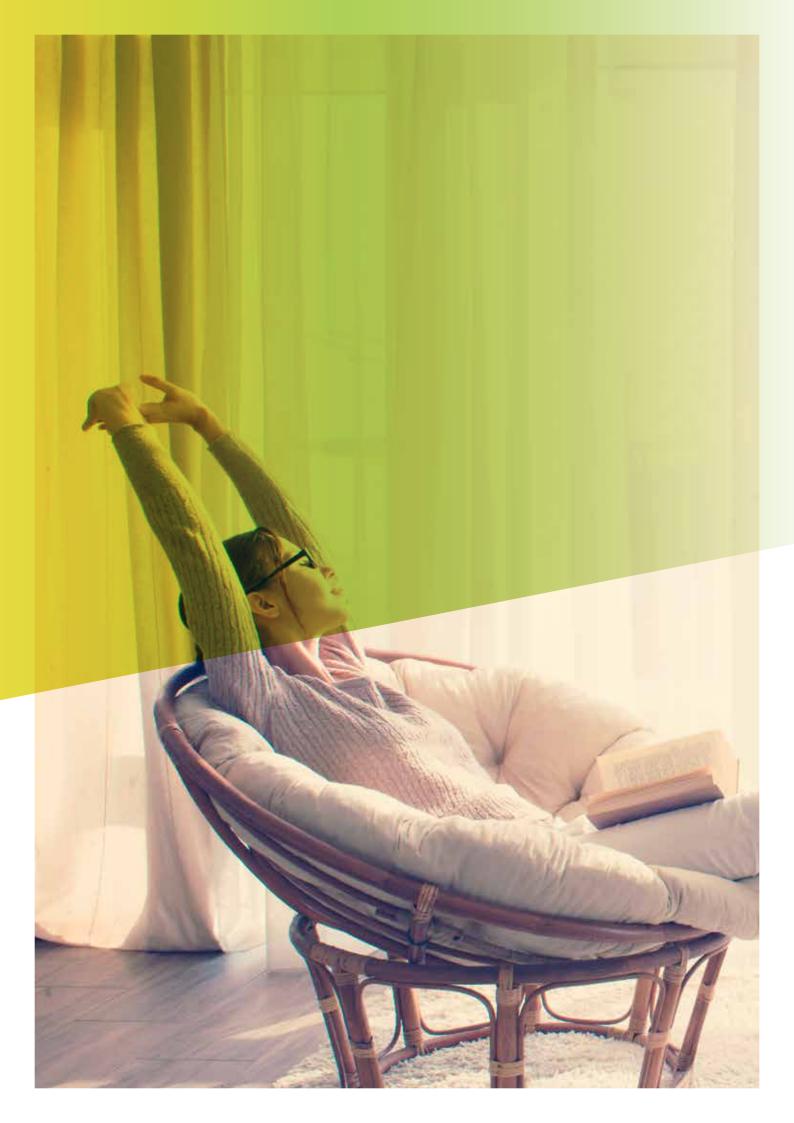
The world is changing at a faster rate than ever before. Whilst advances in science and technology have improved our quality of life, they have also highlighted how balanced is our environment. To address these issues we must change the way we design new buildings and renovate existing ones so that we reduce their negative impacts on the environment. At the same time, people spend 90% of their life indoors: buildings can have a huge impact on their health and wellbeing and this needs to be properly addressed too.

The construction sector has strong potential to protect better the environment, and improve people's life with better comfort and safer buildings: ISOVER wants to take up the challenge. This is the basis of our strong commitment to sustainable construction

Businesses in the Saint-Gobain designs, manufactures and distributes materials which are key ingredients in the wellbeing of each of us and the future of all. ISOVER creates high performance, thermal and acoustical insulation solutions to design and build energy efficient constructions, to provide safe comfort for users and to help protect the environment.

ISOVER glass wool products have been manufactured and used for more than 80 years in more than 40 countries. Thanks to our R&D capabilities and our eco-innovation know-how, we strive to constantly reduce the environmental impacts of our products over their entire life cycle and we innovate to deliver better products, systems and services to improve the comfort and wellbeing of installers and building occupants.

In this brochure, you will discover why ISOVER glass wool is a highly sustainable insulation material with multiple assets, improving people's lives in buildings while safeguarding the planet for future generations.



# COMFORT INTRODUCTION



That's why buildings, whether residential or commercial, are so important for our **health and wellbeing**: they must be as comfortable as possible and offer a safe indoor environment for their occupants.

Buildings have the potential not just to protect people from negative aspects of the world outside – such as noise, weather and pollutants – but also to make us feel happier and enable us to live, work and play in healthier interior environments.

ISOVER develops and offers solutions that provide both thermal and acoustic comfort. They help maintain a comfortable temperature all around the building. They protect from noise in different applications, such as Heating, Ventilation and Air-Conditioning (HVAC)...





# A MAJOR CONTRIBUTION TO THERMAL COMFORT





#### BE WARM, FEEL COOL

A balanced thermal environment is essential to feeling comfortable. Concentration, manual dexterity and the occurrence of accidents are all influenced by excessively high or low temperatures.

#### WHAT IS THERMAL COMFORT?

Although thermal sensitivity varies from one person to another, according to age (very young and very old people particularly sensitive), gender, dress, activity, cultural habits, etc., the basic principles behind thermal comfort are universal. Three personal and environmental factors must be taken into account:

- » Physiological: the way our bodies work and interact with our environment
- » Physical: the main parameters of the environment around us (air temperature, air humidity, air movement, room surface temperature);
- » Socio-psychological: the way we feel as a whole (for example, if we are tired, stressed, happy...) and the kind of social environment we live in.

A comfortable indoor environment must be adapted to both the location of the building as well as the type of activity performed within the building or the room.

### WHICH FACTORS INFLUENCE THERMAL COMFORT?

Operative temperature and relative humidity in a space determine global thermal comfort conditions, depending on what we are wearing and what we are doing. Our bodies are also sensitive to small variations in factors such as air velocity and temperature gradient. THERMAL COMFORT is determined by:

- » Air temperature
- » Surface temperatures
- » Humidity
- » Air velocity

#### DESIGN OF THE BUILDING ENVELOPE

One of the first things to consider is the design of an efficient building envelope. This acts as a filter between the exterior and the indoor climates. The building envelope can greatly affect the thermal environment indoors, depending on how the following factors are managed:

1. Air tightness and ventilation:
an airtight envelope, together with natural or mechanical ventilation, can control the indoor thermal environment by managing the air exchanges with theexterior.



- **2.** Thermal inertia: The materials used to construct the building (the choice of brick, stone or wood, for example) have an impact on how quickly changes in weather conditions are felt.
- **3. Solar gain:** Through its overall shape, orientation, number and size of windows and the ability of surfaces to reflect heat, the building envelope can control how much heat from the sun is allowed to enter into the building.
- **4. Thermal** Insulation: Adding insulation material to the building envelope and using thermally efficient windows reduce heat loss in winter and heat gains in summer. A well-designed building will keep an ideal indoor temperature all year round using very little energy, have walls that are nice to touch or lean on, regardless of the weather outside, and have no draughts, even through the floor.

#### PRODUCTS AND SOLUTIONS FOR THERMAL COMFORT

ISOVER high-performance glass wool solutions help improve thermal comfort, by reducing heat loss in winter or heat gains in summer. The insulation capacity of ISOVER glass wool is based on the low thermal conductivity of the air which is retained in the matrix of the wool. ISOVER offers a wide range of products, suited to the thermal requirements (thermal resistance values = R values) of almost every part of the building. To obtain good thermal resistance, it is important to choose an insulation material with a low possible thermal conductivity

value describes the rate at which heat passes through the material. Another way to increase the thermal resistance is to increase the thickness of the insulation material with a given lambda value.

Within the ISOVER range, we offer glass wool products with a lambda value as low as 0.030 W/m.K. These offer the same thermal performance as other mineral wool products, but with a lower thickness, which enables space savings, e.g. in occupied attics or walls.

Besides the appropriate solutions for thermal insulation, ISOVER proposes VARIO® airtightness membranes to improve airtightness and manage moisture.

VARIO® membranes adapt to climate conditions and protect the building's fabric. In winter, they prevent the moisture produced inside rooms from penetrating the building's structure. VARIO® membranes are a perfect complement to ISOVER glass wool products.



# A MAJOR CONTRIBUTION TO ACOUSTIC COMFORT



Special attention must be paid to the heating and ventilation system. By using ducts made of reinforced glass wool, such as ISOVER CLIMAVER® or by insulating the metal ducts with glass wool, acoustic comfort can be significantly improved.



#### LIFE IS BETTER WITHOUT NOISE

Today's world is often noisy. Over half of the global population now lives in cities surrounded by noise-producing transport, equipment and activities

Noise can either be transmitted through the air or through the building fabric itself (through the envelope), vertically (from floor to floor), or laterally (through internal partitions).

The acoustic environment in buildings is affected by various types of noise:

- » Exterior noise (road noise, aircraft...)
- » Indoor airborne noise (TV, loud conversations...)
- » Impact noise (footsteps, sound vibrations through the building structure...)
- » Equipment noise (ventilation systems, electronic equipment, pipes, elevators...)



Source: https://www.saint-gobain.pl/sites/sgpl.master/files/downloads/Comic\_Book.pdf

#### WHAT IS ACOUSTIC COMFORT?

ACOUSTIC COMFORT is the wellbeing provided by a **well-balanced acoustic environment**, blocking out unwanted, harmful noise and enhancing those sounds that we need to hear.

Well-designed sound environments in offices or schools help improve concentration and enable better communication. In hospitals, reducing the stress and sleeplessness created by high noise levels **helps patients recover faster**. In our own homes, noise protection contributes to a sense of security and privacy.

#### HOW DOES SOUND INSULATION WORK?

For many years the acoustic performance of a construction component was directly associated to its density, in line with the mass law: the thicker and denser the better!

Today in contrast, modern acoustic performant solutions are based on the mass-spring-mass principle. It consists of a combination of materials, e.g 2 outer dense material (most commonly gypsum boards) and in between a spring material (a highly absorbent lightweight glass wool).

These systems allow us not only to obtain superior acoustic performance but also to save space and use fewer resources.

Mass-spring-mass systems can be used to block out environmental noise from outside the building envelope, or to prevent noise transmission within the building, through internal walls, floors and ceilings.

#### ROOM ACOUSTICS - ACOUSTIC TREATMENT FOR BETTER LISTENING

Besides having an **environment free of sound pollution** coming from outside the room, there are spaces (like classrooms, conference rooms or opera halls) where it is important to be able to hear sound clearly. Each of these spaces require a **special interior acoustic treatment** to prevent unwanted effects (such as background noise or echoes) and to create the right acoustic environment.

The main indicator of room acoustics is the reverberation time.

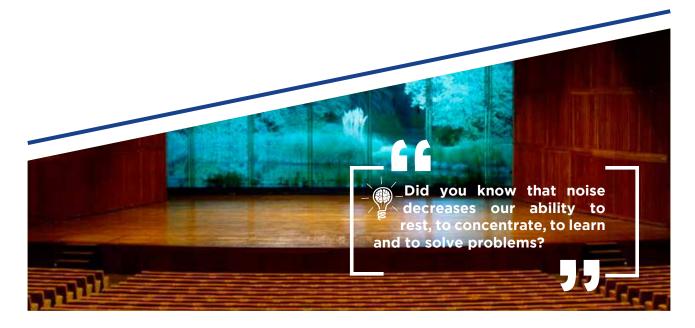
In a classroom each person can hear not only the direct sound from the teacher but also sound reflected from the surrounding room surfaces. If there is a long delay between different reflections, echoes will be created and speech will appear distorted.

- » long reverberation time a lot of echo.
- » shorter reverberation times less or no echo.

By adding sound insulation materials into the wall or ceiling, we decrease the reverberation time. It creates better to create better conditions for speaking and reduces the ambient noise in the room.

#### PRODUCTS AND SOLUTIONS FOR ACOUSTIC COMFORT

ISOVER has developed a range of high-performance lightweight glass wool solutions that have excellent sound absorption properties. They are ideally suited to improve the acoustic comfort in your room and fit partition walls, floors and ceilings. ISOVER glass wool can also be applied via variety of technical environment and equipment.

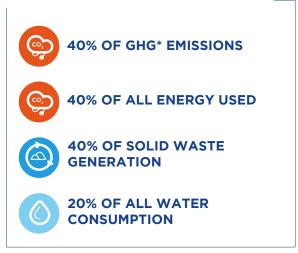




Buildings have a huge impact on the natural environment; but they can play a major role to reduce those impacts and secure a greener and safer indoor and outdoor environment.

Today's buildings account worldwide for:

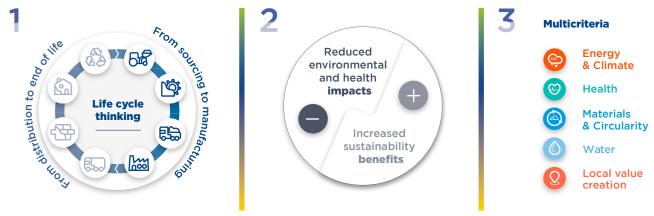
## SUSTAINABILITY INTRODUCTION



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ISOVER's aim is to be recognized by all customers as the innovative worldwide leaderin sustainable insulation solutions. Sustainability is embedded in our innovation policy that incorporates the 3 pillars of eco-innovation defined by Saint-Gobain.

#### THE 3 PILLARS OF ECO-INNOVATION IN SAINT-GOBAIN



 $https://prod-saint-gobain-com.content.saint-gobain.com/sites/sgcom.master/files/score\_infographie\_2\_final.pdf$ 

ISOVER develops and offers innovative solutions for new constructions and renovations to reduce the footprint of the built environment. These solutions make buildings more resource and energy efficient and healthier for people.

We assess the environmental impacts of our products over their entire lifecycle and we deliver transparent information on their environmental performance to our customers by providing third party verified Environmental Product Declarations. We are also committed to installing products that are safe to install and to live with.

\* Greenhouse gas

#### REDUCED ENVIRONMENTAL IMPACTS ...

#### **RAW MATERIAL**

ISOVER glass wool is traditionally manufactured with sand.

To reduce quarry extraction, we increase the use of recycled glass, which helps to protect biodiversity and reduce sand consumption.

The ISOVER glass wool batch contains up to 90% of recycled glass (50% on average).





#### **MANUFACTURING**

Producing glass wool consumes energy, emits greenhouse gases and uses high volumes of water.



We constantly seek to reduce resource use and emissions from our production process and supply chain.

» More than 90% of ISOVER glass wool factories in the world are ISO 14001 certified.



Recycled glass melts at a lower temperature than primary raw materials; its increased use reduces the energy consumption of the melting furnace and related CO<sub>2</sub> emissions.



» Between 75% and 100% of our glass wool production scrap is not landfilled but recycled.



Energy consumption per ton of produced glass wool was reduced by 6% and  ${\rm CO}_2$  emissions by 7% between 2010 and 2017.



»Between 2010 and 2017, fresh water consumption per ton of produced glass wool was reduced by 9%.



### ... THROUGHOUT THE WHOLE LIFE CYCLE

#### **TRANSPORTATION**

Transportation includes the distances covered between the manufacturing plant, the distribution outlets and the sites where the glass wool products are installed.



Transportation inevitably incurs energy consumption and CO<sub>2</sub> emissions.

We use the resilient properties of glass wool products to compress them by a factor of up to 10 at the moment of packaging and palletizing.

» This patented process improves handling, reduces the need for packaging materials and lowers the environmental impact of transportation.



»Moreover, to reduce transportation impacts, ISOVER plants are located close to our markets.

#### **CONSTRUCTION**

the Contractors need products and tween solutions which are easy to handle the and to install, safe to use, with resistes duced environmental impacts on the jobsite.

#### **User-friendly products**

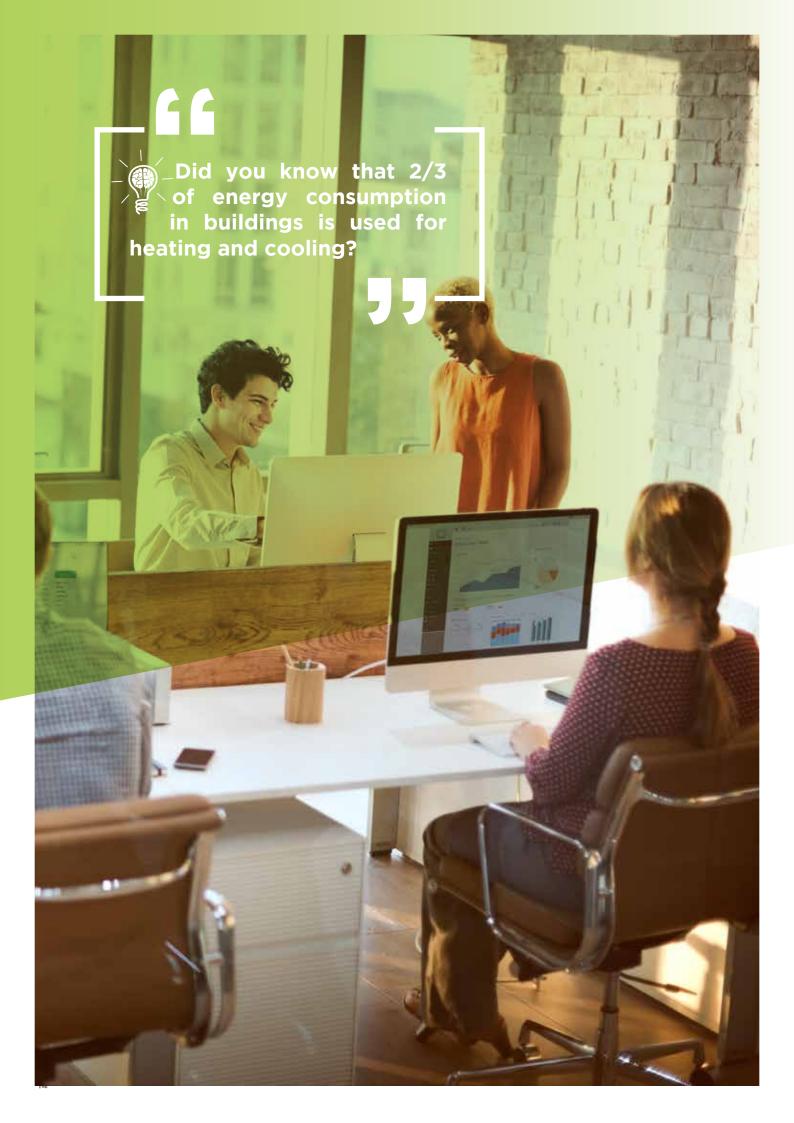
» Installing ISOVER glass wool insulation products requires neither heavy tools nor use of additional materials.



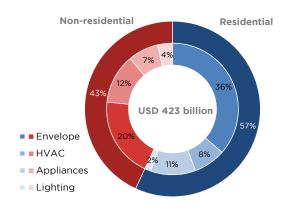
» Off-cuts during installation are very limited (less than 3%) and can be shipped back for recycling.







#### Total energy efficiency spending, 2017



<u>Source</u>: 2018 Global Status Report, Global Alliance for Buildings Construction

#### USE



#### Insulated buildings reduce the world energy consumption

Buildings account for around 40% of our energy use in the industrialised world: the potential savings in making them more energy-efficient are huge. Insufficient air-tightness and a poorly insulated building envelope means that much of this energy is wasted.

Reducing their energy consumption and  ${\rm CO_2}$  emissions while improving the indoor environment and comfort should be a priority.

#### **Energy and climate savers**

Up to 80% of the energy used for heating or cooling can be saved by insulating.

Over its installed life (usually 50 years), a typical ISOVER glass wool insulation product can save up to 300 times the energy consumed and the  $\mathrm{CO}_2$  emitted in its production, transport and disposal. The energy and  $\mathrm{CO}_2$  balance switches to positive just **three months after installation.** 

We develop and offer affordable and cost-effective solutions to reduce greenhouse gas emissions and lower the energy bills. We advocate for increasing the requirements for energy efficiency in building regulations. By providing durable energy-efficient products and system solutions, we contribute to better energy design and performance for buildings and processes.

Insulation is the most cost effective way to reduce energy consumption in buildings and cut associated greenhouse gas emissions. The cheapest energy is energy we don't use.



#### **DECONSTRUCTION,** SELECTIVE DEMOLITION AND RECYCLING

#### Glasswool is 100% recyclable

replacement... at the end of its life, either new glass wool or other a glass wool insulation product products such as bricks. becomes waste.

#### Fostering recycling

Glass back services to properly

collect, sort and process end-of-Demolition, dismantling, insulation life waste, in order to manufacture

ISOVER supports the development of recycling companies, and works wool insulation with them whenever possible. products are recyclable: We use as much as possible ISOVER develops take- recycled content in our product.

#### ISOVER RECYCLING, A PIONEER IN GLASS WOOL **RECYCLING!**

ISOVER France has launched ISOVER Recycling, the first closed-loop recycling service for construction and demolition glass wool waste. This new service has been developed in partnership with recycling specialists; it aims at diverting glass wool waste from landfilling and increasing the proportion of recycled content in ISOVER glass wool insulation products.

The ISOVER Recycling service is currently being deployed in two pilot regions, and is planned to be rolled-out across the whole country. Other countries like Switzerland, Denmark and Sweden already offer construction site waste recycling services.

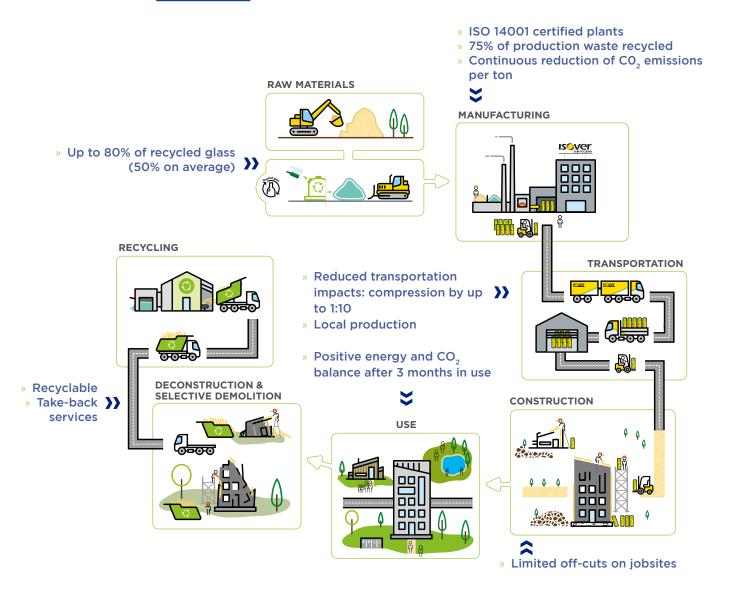




#### LIFE CYCLE ASSESSMENT

Reducing environmental impacts throughout the glass wool lifecycle is crucial.

That's why we have a life cycle approach supported by a Life Cycle Assessment (LCA) and verified Environmental Product Declarations (EPDs).



#### WHAT IS A LIFE CYCLE ASSESSMENT (LCA)?

It is considered as the state-of-theart methodology for assessing all relevant environmental impacts of a construction product, system or building over its entire life cycle. Following international standards (EN15804), an LCA calculates in a rigorous and scientific manner the use of energy, water and natural resources, the emissions and releases into the air, ground and water, and waste generation. These inputs and outputs are calculated at each stage of the building's life cycle 'from cradle to grave'. » LCAs are a powerful tool to help improving the environmental features of products through eco-innovation. Considering multiple indicators over the entire life cycle avoids impact shifting (reducing one impact but increasing another) and allows fact-based assessment.





#### WHAT ARE THE BENEFITS OF USING LCAs?

» LCAs ensure fact-based information about the environmental performance of products and prevent green washing.

More and more building assessment schemes (LEED, BREEAM, HQE, DGNB,...) require the consolidated LCA results of different construction products to assess the environmental impacts of a whole building.

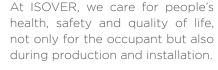
#### What is an EPD?

The results of a Life Cycle Assessment are presented in the form of an Environmental Product Declaration (EPD) that can be verified by an independent third party. This process ensures the quality and reliability of the results.

At ISOVER, all EPDs and LCAs have been made according to the French standard NF P01-010 and have undergone third party verification.



#### SAFE USE AND INSTALLATION





ISOVER continuously innovates to improve the softness of its glass wool products, to reduce their level of dust and to increase the level of installation comfort while maintaining their superior mechanical and technical properties.

# ISOVER GLASS WOOL FIBRES HAVE NO RESTRICTION OF USE.



ISOVER glass wool fibres are neither classified as carcinogenic, mutagenic, toxic for reproduction (CMR) nor as a Substance of Very High Concern (SVHC).

ISOVER glass wool products do not contain and have never contained asbestos.

ISOVER glass wool fibres are not classified under any criteria of the European regulation<sup>1.</sup> They are exonerated from the carcinogenic classification<sup>2</sup>; this exoneration is regularly checked and certified by the European Certification Board for mineral wool (EUCEB)<sup>3</sup>:



Under the European Regulation REACH<sup>4</sup>, ISOVER glass wool fibres are not a Substance of Very High Concern (SVHC).

Regulation EC n° 1272/2008 on the Classification, the Labelling and the Packaging (CLP) of hazardous substances and mixtures. Official Journal of the European Union L353, December 31st, 2008

<sup>2</sup>If they fulfil requirements defined in the Note Q of the European Regulation EC n° 1272/2008. Exoneration criteria refer to the dimensions of the fibres but also to their chemical composition and their bio persistence.

<sup>3</sup>The Mineral Wool industry has initiated a voluntary independent certification scheme (EUCEB) ensuring that all certified products placed in the market are in conformity with all EU regulatory requirements, including bio-solubility. To ensure that fibres comply with the Note Q criteria, all tests and supervision procedures are conducted by independent and qualified experts and institutions.

<sup>4</sup>Regulation EC n° 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH). European official journal L396, December 30th, 2006.



#### **EASY TO HANDLE**

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

And finally, ISOVER products contribute to better ergonomics, being easier to handle and lighter in weight.



#### SAFETY RULES FOR INSTALLATION

When handling glass wool, temporary mechanical itching may occur. This is not a chemical reaction and causes no allergy, disappearing after rinsing with water.

Pictogrammes for packaging have been developed to communicate responsibly:



Clean area using vacuum equipment.



Rinse in cold water before washing.



Wear goggles when working overhead.



Cover exposed skin. When working in unventilated area wear disposable face mask.



Waste should be disposed of according to local regulations.





#### INDOOR AIR QUALITY









The best way to provide a good indoor air quality is first to remove or minimise the emissions of primary and secondary pollutants at source, while also improving the indoor air renewal (ventilation) and purifying the air (capture of pollutants). Formaldehyde and VOCs (Volatile Organic Compounds) are among the main pollutants in the indoor air.

Formaldehyde was reclassified in 2004 by the International Agency for Research on Cancer (IARC) as a carcinogen. This had increased the focus on building products which contain or release formaldehyde.

Even if a large number of tests conducted by independent expert laboratories in many countries have shown that glass wool products are an insignificant source of formaldehyde and VOCs in buildings, ISOVER is committed to keep on innovating to reduce their emissions to a very minimum. Tested according to ISO 16000 standards, ISOVER glass wool products prove to release a very low amount of formaldehyde and VOCs.

In several countries, the very low level of formaldehyde and

VOCs emissions from ISOVER glass wool products are certified by independent third parties labels such as Indoor Air Comfort by Eurofins in Europe or GreenGuard by UL in North America. According to the mandatory French labelling on the emissions of VOCs & formaldehyde from construction products (introduced in April 2011), ISOVER glasswool products rank highest, scoring an A+.

A new generation of ISOVER glass wool products has been launched since 2014 that release virtually zero formaldehyde into the indoor air environment thanks to an innovative plant based binder free from formaldehyde, phenols or acrylics; these glass wool products meet the industry's most stringent standards related to indoor air quality.



#### A FIRE SAFE SOLUTION

It is critical to use incombustible materials which do not fuel fire.

Glass wool has the highest possible Euroclass A classification (A1 & A2 s1d0). meaning that it neither fuels nor helps spread fire.





#### CONTRIBUTION TO LABELLING SCHEMES

Glass wool insulation plays a key role in sustainable buildings. It contributes to 8 key areas representing up to 60% of the total score that can be archieved in the 4 most commonly used international building rating schemes (HQE, BREEAM, DGNB, LEED) in Europe.



#### **GLASS WOOL INSULATION CONTRIBUTES TO**

Key area	Glass wool contribution	Maximum contribution of the key area amongst building rating scheme
Energy and climate	maximising energy saving potential and reducing carbon emissions	27,3%
Thermal comfort	delivering thermal comfort, avoiding cold walls	6,3%
Acoustic	providing acoustic comfort from outdoor and indoor noise	9,9%
Air quality	improving outdoor and indoor air quality combined with ventilation	4,5%
Life-cycle cost	lowering life cycle costs for constructing and operating the builiding	11,3%
Life-cycle impact	reducing life cycle environmental impacts	15,8%
Construction waste	recycling construction waste: highly recyclable product	4,1%
Sustainable sourcing	responsible sourcing: abundant materials and recycled content	9%

Source: EURIMA

#### THE POSITIVE CONTRIBUTION OF GLASS WOOL TO SUSTAINABLE CONSTRUCTION

Glass wool products can contribute to up to 48 points for BREEAM and 37 points for LEED.





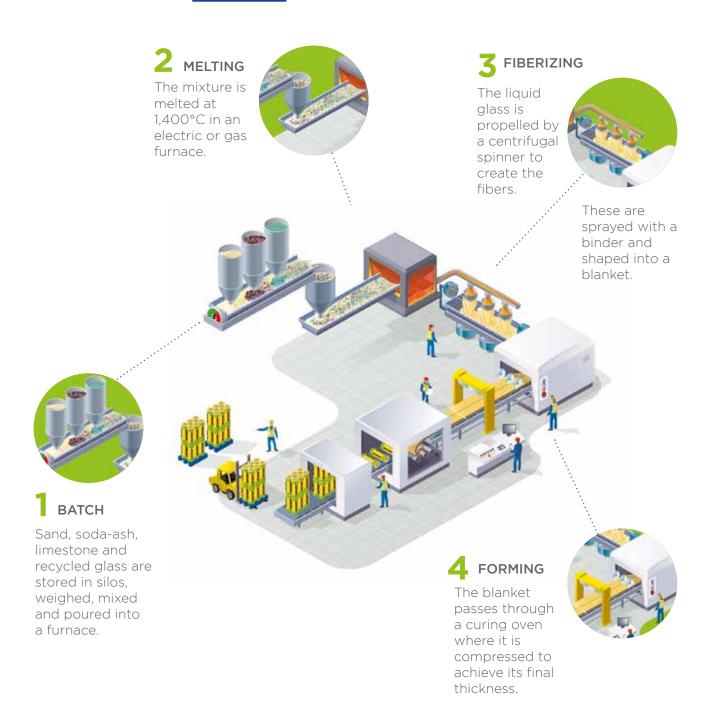
Check the Saint-Gobain website presenting labelling schemes and demonstrating how Saint-Gobain products and solutions can contribute in achieving credits:

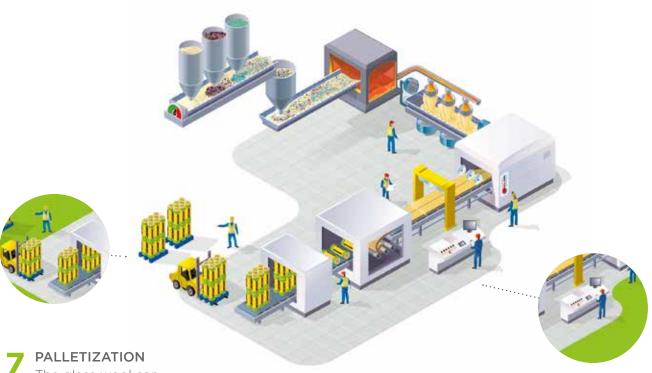
https://www.greenbuilding.saint-gobain.com/





### ABOUT GLASS WOOL THE MANUFACTURING PROCESS





7 PALLETIZATION
The glass wool can
be compressed to
up to a tenth of its
volume. A total of 36
rolls of glass can be
packed onto a single
pallet.



PACKAGING
The end of the line is equipped with a rolling machine for mats and a stacking machine for boards.

The blanket is cut to the required width. Off-cuts are recycled. A facing can eventually be glued to the blanket.



### A UBIQUITOUS MATERIAL



#### ABOUT ISOVER

#### A WORLDWIDE LEADER IN INSULATION SOLUTIONS

ISOVER is the insulation activity of the Saint-Gobain Group and the world's leading supplier of sustainable insulation solutions for all major application areas in both residential and non-residential buildings. ISOVER glass wool products have been produced and used for more than 80 years in more than 40 countries and extensively studied by recognised scientists.

They are probably among the most well-documented and tested building materials on the construction market.

We also create high-performance insulation for the process industry and marine markets as well as solutions for the horticultural sector.

Our strategy is global but its implementation remains local, based on our strong local presence:

- » Over 10.000 employees worldwide, in 40 countries
- » 51 consolidated companies
- » 63 production sites, in 30 countries
- » 8 licensees with their own production sites

Since it was founded in 1937, ISOVER has constantly invested in sales & marketing, R&D and production, allowing us to optimally serve local market needs.

# SAINT-GOBAIN, YOUR KEY PARTNER FOR SUSTAINABLE CONSTRUCTION



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