



PLASTER AND PLASTERBOARD

THE SUSTAINABLE CONSTRUCTION MATERIALS FOR THE 21ST CENTURY

GYPSUM, A NATURAL RESOURCE USED IN CONSTRUCTION FOR CENTURIES

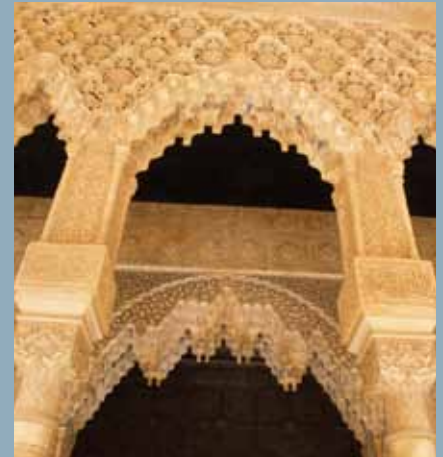
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The European Plaster and Plasterboard Industry resource is Gypsum- an abundant mineral rock -from which you make plaster- commonly found in the earth crust and quarried in many European and non European countries.

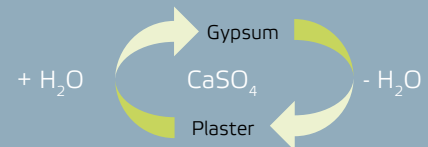
The process to make plaster is easy and requires low temperature, almost 200°C that can be home made in your oven at home! The chemical process is 100% reversible!

In 9000 BC in Asia, the production of plaster indeed started in an oven.... and plaster was used for instance by the ancient Egyptians to plaster the pyramid of Cheops in Gizeh.

During the byzantine period, plaster was used as decoration-stucco arabesque in Alhambra.

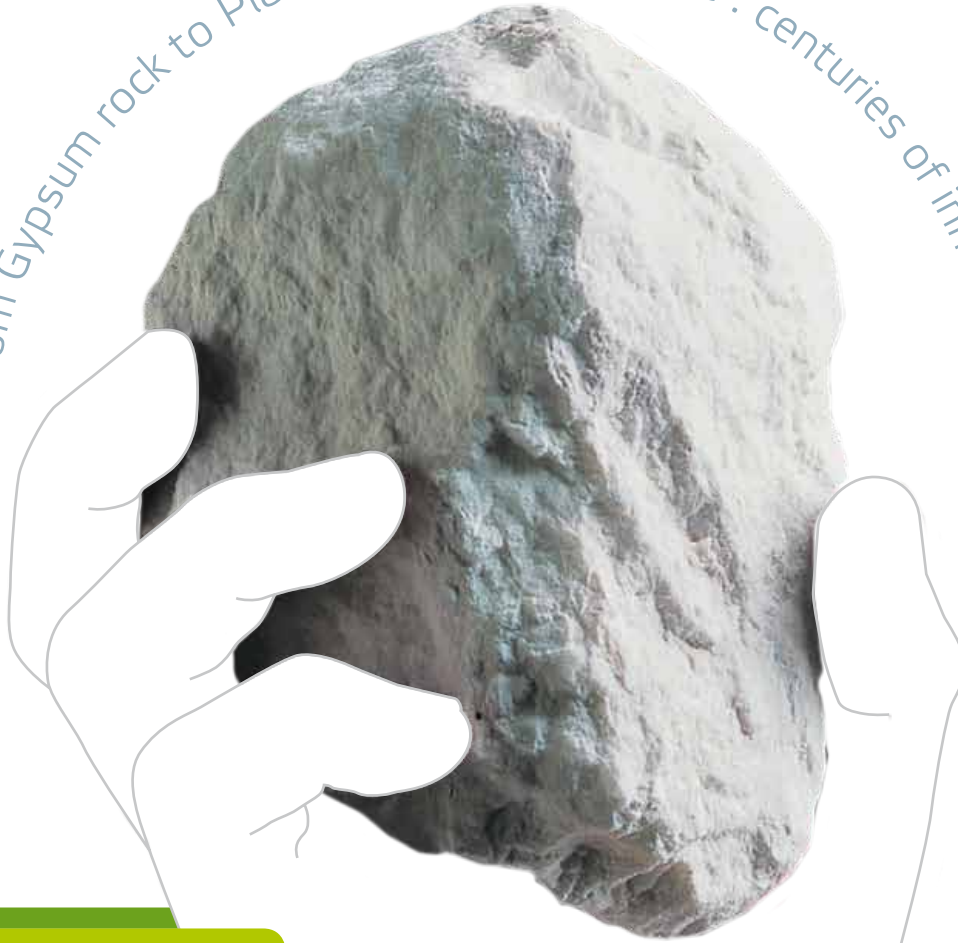


Gypsum powder, scientifically called calcium sulphate is the only natural substance that can be restored to its original rock-like state by the addition of water alone, formed into shape and hardened $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$:



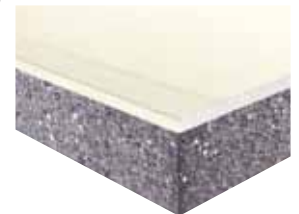
The beauty of Gypsum is its sustainability throughout the life cycle of the product: from extraction to manufacturing, use in construction, renaturation and recycling into the same product; combining furthermore a natural resource with an industrial resource

From Gypsum rock to Plaster and Plasterboard : centuries of innovation



Did you know that ?

Natural Gypsum has an industrial alternative: FGD Gypsum that comes from the flue gas desulphurisation (FGD) process of the power station industry.



FROM TRADITIONAL CONSTRUCTION TO SUSTAINABLE BUILDINGS

PLASTER AND PLASTERBOARD ARE THE BEST PARTNERS

Plaster and plasterboards are sustainable building materials used for creating a healthy and comfortable built habitat. At home or at work, the construction solutions contribute to **people well-being and protection**, also by improving indoor air quality in the built environment.

The best solutions to provide acoustic comfort

Acoustic comfort is defined by two main concepts: sound insulation and sound absorption. Sound insulation is the property to reduce sound transmission between two rooms or between the room and the exterior. Sound absorption is related to the room itself and the nature of its materials: the most the material is absorbing, the less the room is reverberant. The feeling that a room is 'noisy' can be due either to a poor insulation or to a high reverberation level.

- Plasterboard systems are conceived to increase sound insulation: both partition sides are composed by plasterboards formulated to have the correct density to reduce sound waves transmission. Between these two sides an air cavity (with or without mineral wool) interrupts the sound wave. The association of these components provides a damping effect resulting on an insulation level much higher than a solid partition. This is why a typical plasterboard partition in a house is only 75mm thick. A comparable masonry wall would need to be around 110mm thick to achieve the same sound insulation¹. Therefore it is possible to cover a large range of sound insulation levels since 'simple' residential partitions up to systems used in conference rooms, movie theaters and industries.

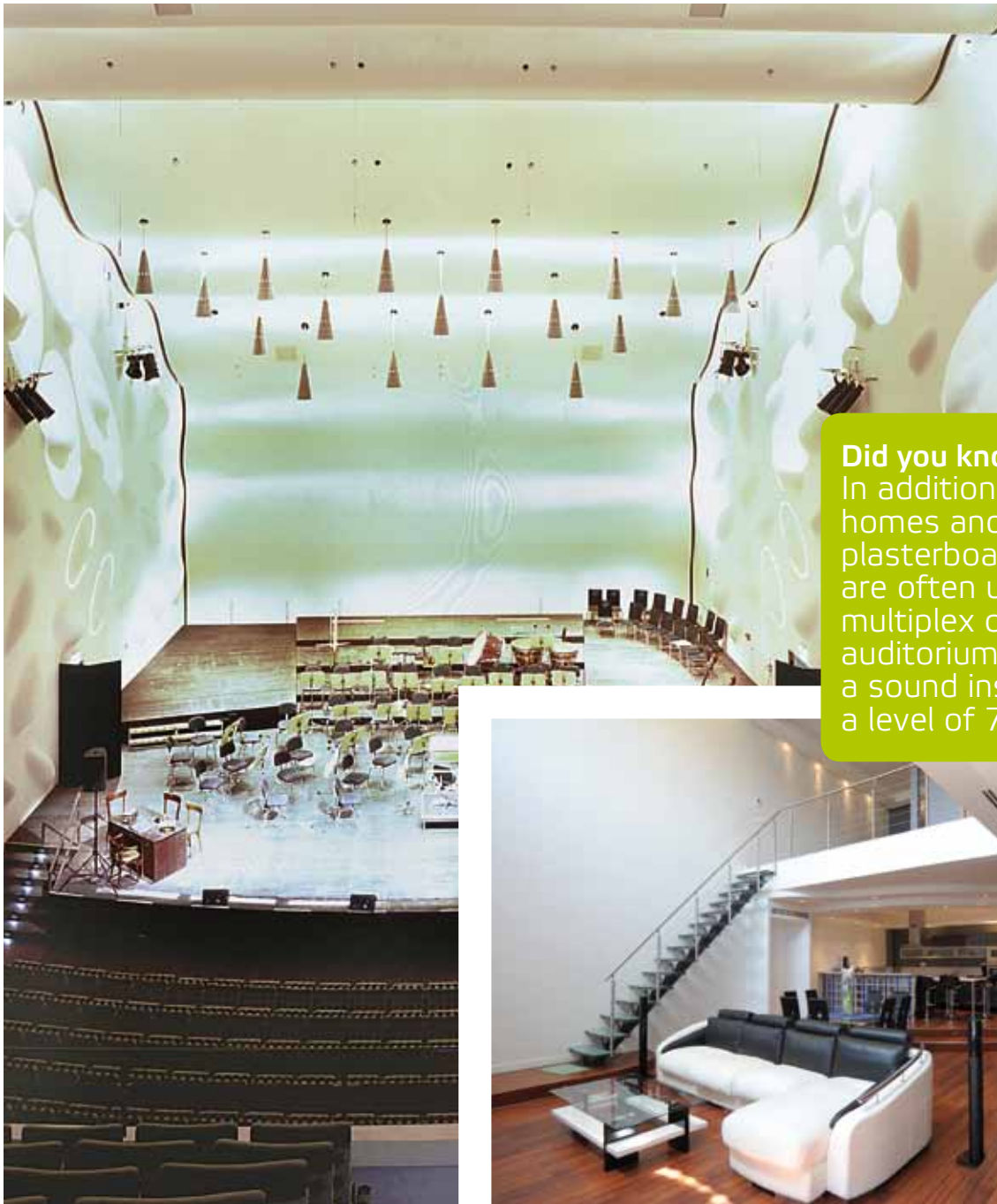
- Regarding sound absorption, we can propose a range of perforated plasterboards, perforated ceiling tiles and plaster casted tiles which allows decreasing the sound reverberation in a room by absorbing the sound waves. The result is a better acoustic comfort within a room, meaning better speech intelligibility between the people present. These solutions are often used in meetings rooms, offices, schools or hotels. These boards are often used in ceilings and can enrich the interior design.

An essential contribution to the thermal comfort

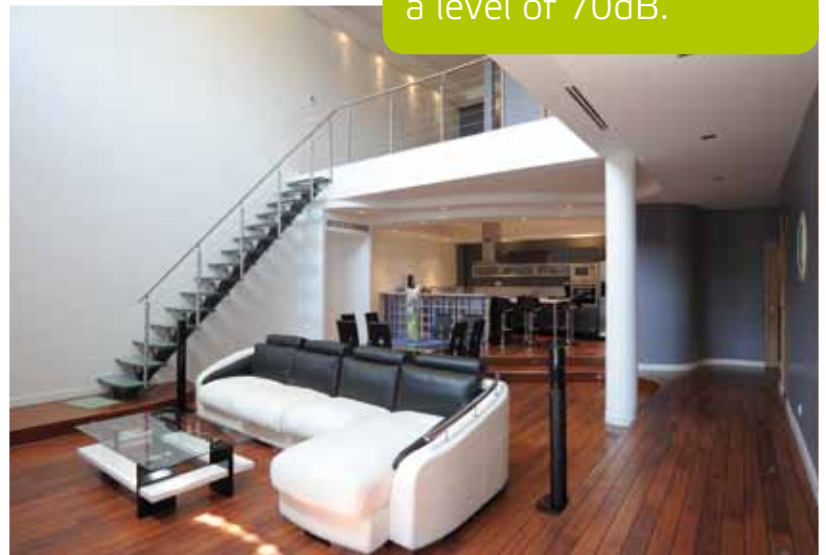
Thanks to its industrial flexibility, plasterboards can also be associated to insulation materials to create the so-called laminated boards. These systems can be easily bonded on the internal wall of your home to provide thermal insulation and to contribute to the energy efficiency of the building.

Plasterboard partitions and ceilings can receive in its cavity mineral wool to increase thermal comfort obtaining maximum performance in less space. Therefore, partitions, ceilings and linings become thermal insulated systems. The plasterboards protect the insulating material and contribute, together with the vapor barrier, in preventing indoor humidity from getting in, or being trapped in the insulation.

1. Drywall Systems- Sound Investment that adds to Home Value – GPDA- 2006



Did you know that ?
In addition to homes and offices, plasterboard partitions are often used in multiplex cinemas and auditorium , providing a sound insulation until a level of 70dB.

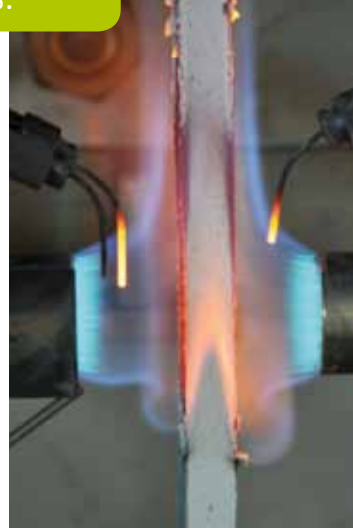




Irène Dewalke, home owner

At home with 3 children, it can be difficult sometimes for each person of the family to find some calm and rest. Especially when I want to practice my instrument... I work from home and that's the reason why we took a specific care to require a good sound insulation when we built our new house. Now everyone can practice his hobbies without annoying the others.

Did you know that ? Pure gypsum contains two molecules of water. It is per nature non combustible and a powerful fire retardant element in construction, with the ability to delay the spread of fire up to 3 hours.



Plasterboard solutions can improve the indoor air quality

Volatile Organic Compounds (VOC) is harmful for human health. The Industry produces plasterboards which are able to absorb and transform some types of VOC to harmless molecules. Those plasterboards are an excellent option for all projects where a good air quality is required by the developers or designers. Their use is optimal in hospitals, schools and areas where children live.

High levels of robustness against impacts

The Gypsum Industry provides plasterboards, gypsum fibreboards and plaster blocks with a degree of hardness equivalent to a thick wall heavy masonry construction used mainly in schools, offices and hospitals. These solutions can be combined with fire and water resistant performances.

The uncontested material to keep building fire safety

Gypsum rock has two molecules of water in its structure. These molecules are present also in all gypsum products despite of its shape. When fire attacks plasterboard, these molecules are released and retard fire spread. Based on this natural advantage, the gypsum industry has developed new boards with especial chemicals to increase even more fire performance. Therefore, it is possible to conceive boards and systems to resist several hours under fire conditions. Ideal for emergency exits and all areas receiving people such as auditoriums, these systems are as easy to be installed as standard ones and have tested and guaranteed performance against fire.



INSTALLING PLASTERBOARDS SYSTEMS

A REVOLUTION FOR INSTALLERS/CONTRACTORS, PROVIDING THEM WITH CONSTRUCTION PRODUCTS SAFER AND EASIER TO INSTALL

Safe to install

In comparison with other construction products, plasterboards are light weight (about 10-15% the weight of conventional brick walls on the floor) and thus easier to handle reducing the risks of injuries. Moreover, the light weight characteristic of the plasterboard allows designers to adopt lighter structures, which results in savings in foundations costs.

Though straight forward, it does not mean that the erection of a wall or a suspended ceiling is simple. You need skilled labour to achieve the fire and energy-efficiency performance of the wall, ceiling or floor and to have a smooth and perfect finish of the plasterboard once erected.

Easy and fast to install

- Since the mid-1980s, plasterboard sales in Western Europe have risen by around 5% per year. One of the principal reasons for this rapidly growing popularity is ease of installation. To construct an internal wall, for example, a frame is erected, plasterboard is fitted to it, joints are filled, and the wall is created. The operation is clean, dry and uncomplicated.

Did you know that ?

- Around 1,600 million m² of European interior surfaces are covered with plasterboards every year.
- Around 5 million tons of plaster are used in Europe for interior lining.



- The gypsum industry leads training centers and developed partnership with several vocational institutions across Europe to teach the right way to install plasterboard systems. Thanks to the high level of industrialization and precision of plasterboards system, installers' skills are also technically well oriented.

Easy to dismantle

The way plasterboards are erected enable their disassembly and recycling if the building is properly dismantled according to modern demolition techniques.



Xavier Janvier, contractor, independent

I have founded my company 10 years ago and now I have 12 employees working for me. We are specialized in drywall installation and we work on different types of projects, from houses refurbishment to small buildings construction sites. The market is evolving really fast in particular on energy efficiency and new plasterboard solutions appear every year with more performance in fire protection, acoustic insulation or even new systems for big height partitions for instance. Because our job is technical and complex, we need to update our skills quite often and I have sent many times my team to get technical support in the training academies offered by plasterboard manufacturers.



Did you know that ? The Guggenheim museum in Bilbao was lined with 180,000 m² of plasterboard. The plasterboard work lasted 20 months with a maximum height of 65 meters in the central hall, and with curves of up to 60cm. Some plasterboard had curves in three different directions.

As architect, my role is to imagine and create the best architecture possible for the people who are going to use and live in the building. Each project is specific in the way of organizing the volumes, designing the spaces and regarding the construction materials, flexibility is the motto. This freedom, this richness of forms, I only get it with plasterboard partitions, like curved partitions for instance, with gypsum ceilings but also with stucco elements for the decoration. Definitely, gypsum solutions allow unleashing my creativity, meeting at the same time the demands of my clients looking to remain within an affordable budget



Jonas Tomqvist,
architect and designer



ARCHITECTS, DEVELOPERS, MAIN CONTRACTORS,...

GYPSUM SOLUTIONS CREATE FREEDOM
IN CONTEMPORARY INTERIOR ARCHITECTURE.

How do you wish to shape your interior lifestyle? Plasterboard systems in architectural design provide flexibility in dividing space and allow to experiment with shapes and sizes as well as contributing to the energy efficiency of the building.



An efficient way of reducing carbon emissions by improving building .

The Gypsum Industry has developed innovative, technological, energy-efficient solutions for building interiors, with a complete offering for walls, floors and ceilings. Internal insulation is very effective in case of renovation and refurbishment. However, we should not forget that substantial energy savings can also be achieved with new building. 90% energy savings can be obtained with the use of internal insulation techniques.

The most flexible construction thanks to plasterboard solutions

Plasterboards allow renovating the building while living in it. Homeowners can renovate and redesign the interior layouts within a short time. This feature is especially appreciated when thinking on the building evolution and its use during the next years: a residential tower can be turned into hotel; a school can become an office building, etc. Future changes can be planned since the first project by placing 'fixed' elements such a stairs and lifts, all partitioning can be easily modified whenever the project requires which is not often possible for others than gypsum board systems.

A source of inspiration for designers

- A richness of forms is created when using plasterboard systems. Thanks to its malleability, plasterboard system provides freedom to create new design. The creation never ends. Ceilings can combine lighting elements, sound absorption boards among other many components and partitions can take several forms, right, curves, incorporating niches, furniture, etc.
- Several types of gypsum boards are available to be used in dry or wet areas. Therefore, all internal spaces can be conceived by delivering high technical performances on moisture resistance, fire protection and sound/thermal insulation.
- The use of Gypsum as a material for interior decorating has accompanied the history of architecture since time immemorial. Its extraordinary ductility has made it possible to develop functions able to satisfy the decorative requirements of any area with high social, historical and artistic values.

Allowing surface optimization

The plasterboard system is slim and thus creates more usable space for the rooms.

Plasterboard systems deliver interior wall thinner than other conventional construction products. This feature allows savings on floor area, an advantage for all actors in the construction chain, from the developer to the end user.

Providing efficiency in project timing for contractors

The installer saves time, increases productivity which decreases the building costs for the developer or home owner. This also optimizes the efficiency in the construction project timing for the main contractors and the material is readily available from building merchants.





Did you know that ?

The Reichstag in Berlin is covered by 8,500 m² acoustic ceiling tiles in the plenary room and by 6,000 m² acoustic and refrigerant ceiling tiles in the Parliamentary group meeting rooms.

DRY CONSTRUCTION TECHNOLOGY,

THE WAY TO FUTURE SUSTAINABLE CONSTRUCTION ...
CONTRIBUTING TO BUILDING VALUE FOR SOCIETY

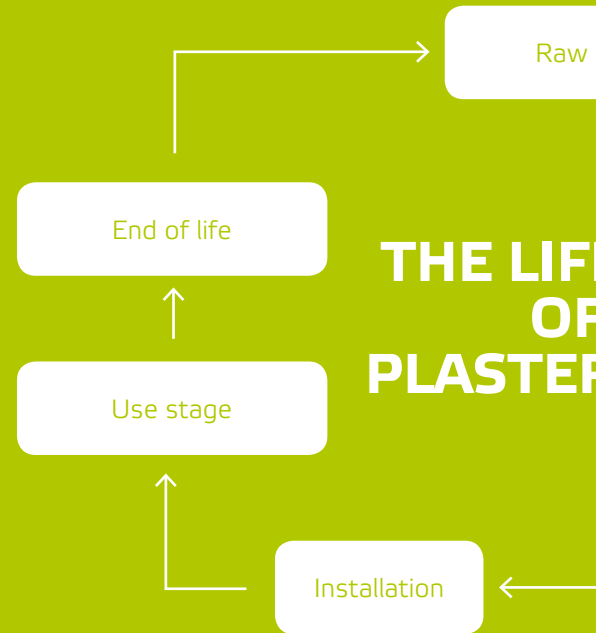
A low environmental footprint

The plaster and plasterboard products and solutions used every day are designed to:

- Be manufactured using by-products and recycled materials;
- Be manufactured with low energy consumption;
- Be manufactured with low emissions. The main emission of the production process is water steam;
- Process water and production wastes are recycled internally within the factory;
- Use little packaging;
- Be recycled at the end of their life cycle;
- Extend the lifetime of a building thus enhancing overall sustainability.

Plasterboard is indefinitely recyclable

Gypsum products can be counted amongst the very few construction materials where "closed-loop" recycling is possible, i.e. where the waste is used to make the same product again. Gypsum as such is 100% and eternally recyclable. You can always reuse gypsum because the chemical composition of the raw material in plasterboards and blocks always remains the same.

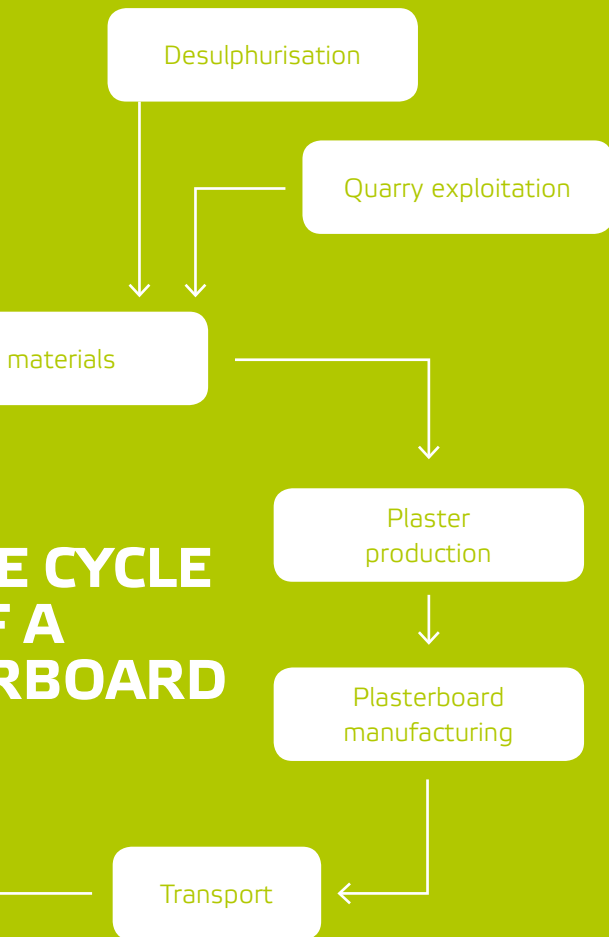


THE LIFE OF PLASTER

Generic plasterboard EPD available
on www.eurogypsum.org



THE CYCLE OF A PLASTERBOARD



Quarries are fully rehabilitated during and after use

Gypsum is extracted from open-cast mines or underground mines using room and pillars mining methods. The extraction process implies an unavoidable impact on the landscape and the natural environment. However, human activity does not necessarily mean loss of biodiversity and danger for eco-systems. Human activity can also result in a richer biodiversity. The development of a gypsum quarry creates indeed the favorable conditions that provide habitats for rare species. Through careful management, quarries significantly enhance the biodiversity of an area and provide much needed habitats and refuges for wildlife.

The carbon foot print of the manufacturing process is low

The low carbon footprint of plasterboard is partly explained by the fact that it has zero CO₂ process emissions apart from the fuel burnt during production for calcining and drying.

Since the 40s, energy efficiency in the manufacturing process increased by 70% for calcining and by 48% for drying through machines design, process optimization, excess water reduction in plasterboard and heat recovery systems. ● ● ●

Did you know that ? The Gypsum Industry, Gypsum recyclers, demolition companies and universities – in total 17 partners- are engaged on the project Life+ starting in January 2013 for a period of three years ending in December 2015. This project is an incentive to recycle more. Its innovation lies in considering the supply chain (demolishers, recyclers, manufacturers) to create a recycling and resource efficient economy.





EUROXGYPSUM
THE VOICE OF THE EUROPEAN GYPSUM INDUSTRY

www.eurogypsum.org