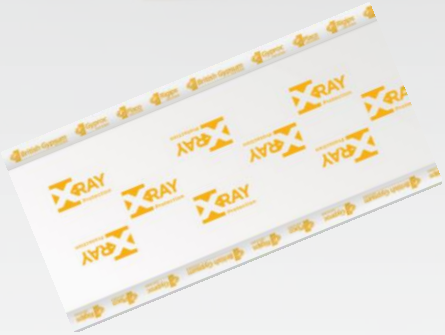
ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

Placo® X-Ray Protection



Completion date: 3th July 2018
Valid until: 3th July 2023
Version: 1.0
Scope: Europe

EPD VERIFIED

EPD®
THE INTERNATIONAL EPD® SYSTEM

The environmental impacts of this product have been assessed over its whole life cycle. Its Environmental Product Declaration has been verified by an independent third party.

DECLARATION NUMBER
S-P 01334

Placo SAINT-GOBAIN

Gyproc SAINT-GOBAIN

British Gypsum SAINT-GOBAIN

Rigips SAINT-GOBAIN

1. General Information

Manufacturer: Saint-Gobain Placo Ibérica
Calle Príncipe de Vergara 132
28002 Madrid

Contact: www.placo.es
Silvia Bailo Marco (silvia.bailo@saint-gobain.com)
Telephone +34 918 087 253

UN CPC Code (42190)
Programme used: International EPD System **http\\www.environdec.com**
EPD registration number/declaration number: S-P-01334
PCR used: The LCA of this current EPD is based on:

- Standard EN 15804:2012 Sustainability of construction works. Environmental product declarations. Core rules for the category of construction products.
- PCR 2012-01 v2.2 Construction products and construction services, dated 2017-05-30. International EPD System CPC Division CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES

Name of product: Placo® X-Ray Protection

Date of verification: 03/07/2018
Date of issue: 03/07/2018
Valid until: 03/07/2023 (period of validity of 5 years)

Verification: An independent verification has been carried out, in accordance with standard ISO 14025:2010. This verification was external and carried out by an independent third party: **Marcel Gómez**. The PCR used have been mentioned above.

Scope: Europe**.**

This LCA is based on 2017 production data belonging to a manufacturing centre situated in Spain: San Martín de la Vega (Madrid).

This DAP includes all stages of the life cycle defined in standard EN 15804: 2012 + A1.

The declared unit is 1 m^2 of Placo® X-Ray Protection plasterboard (nominal thickness of 12.5mm) installed as a single layer in a system with a separation between studs of 600mm.

EPD program operator	**The International EPD® System. Operated by EPD® International AB. www.environdec.com.**
PCR review conducted by	**The Technical Committee of the International EPD® System**
LCA and EPD® performed by PLACO Saint-Gobain Spain	
Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010 **Internal** ☐ **External** ☒	
Verifier accredited by The International EPD® System Marcel Gómez Ferrer Marcel Gómez Consultoría Ambiental (www.marcelgomez.com) Tlf 0034 630 64 35 93 Email: info@marcelgomez.com Approved by: The International EPD® System	
www.placo.es	

Saint-Gobain Placo Ibérica is the leader in manufacturing and marketing plasters, plasterboard and ceilings. Currently Saint-Gobain Placo Ibérica has 7 manufacturing centre, as well as various quarries, throughout the Iberian Peninsula.

The Saint-Gobain Placo Ibérica plaster-based products not only contribute to promoting sustainable architecture, but they also respond to technical demands in terms of fire protection, resistance to humidity and thermic and acoustic insulation, by means of a material that is directly obtained from nature without undergoing substantial alterations and which helps to make our lives more comfortable.

Saint-Gobain Placo Ibérica became the first company in the sector to certify its environmental management system in accordance with the standard ISO 14001, and leads the way in safety by certifying 100% of its manufacturing facilities in OHSAS 18001 through a company accredited by ENAC. Furthermore, applying the standard ISO 14006 of eco-design, we can become aware of and minimise the environmental impacts of our products throughout their lifecycle, right from the design phase.

2. Product description

2.1 Product description and use

Placo® X-Ray Protection is a gypsum plasterboard, 100% lead-free for protection against x-rays, with a special manufacturing design, using barium sulphate. Together with the ProMix sealant, which also contains barium sulphate, Placo® X-Ray Protection provides radiation protection in healthcare buildings requiring it, through wall and ceiling systems.

Main characteristics:

- Lead-free composition.
- Quick and easy installation.
- Flexibility in construction that enables it to adapt to most projects requiring protection against x-rays.
- High degree of acoustic insulation.
- Good behaviour against fire.

It is a special board that can be used for interior partitions in buildings as an alternative to lead sheets, for protection against x-rays. Furthermore, it is suitable for areas with x-ray equipment in hospitals, health centres, dentist and veterinary practices.

2.2 Description of the main components and/or constituent materials of plasterboard:

The Placo® X-Ray Protection product consists of gypsum board with double sided cardboard, made principally of barium sulphate, plaster, fibreglass and special additives in the nucleus.

The barium sulphate is an inert mineral that exists in nature, which enjoys environmental characteristics similar to plaster, and consequently, it is a product that can be recycled fully using the same plasterboard production process.

The 12.5 mm thick Placo® X-Ray Protection plasterboards are palletised on flax wedges and are shrink wrapped.

Components of the installation:

PARAMETER	COMPONENT
Installation: screws X-Ray Protection	7 screws/ m^2 board
Installation: Promix sealant	0.8 kg / m^2 board
Installation: joint tape	3 ml / m^2 board

2.3 Technical data

Placo® X-Ray Protection plasterboard is manufactured under standard UNE EN 520:2.005 + A1:2.010 “Laminated gypsum boards. Definitions, specifications and testing methods”.

CLASSIFICATION ACCORDING TO EN STANDARD	TYPE I D F
NOMINAL WEIGHT	18.1 kg/ m^2
THERMAL CONDUCTIVITY	0.25 W/mK
WATER VAPOUR DIFFUSION RESISTANCE (μ)	10
PERFORMANCE AGAINST FIRE (EUROCLASSES)	A2, s1 - d0

The substances contained in the product Placo® X-Ray Protection that are listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” do not exceed 0,1% weight of the product”

3. LCA calculation information

DECLARED UNIT	1 m2 of Placo® X-Ray Protection plasterboard installed as a single layer in a system with a separation between studs of 600mm, of a nominal thickness of 12.5 mm and weight 18.1 kg/ m²
SYSTEM BOUNDARIES	Cradle to Gate with options: stages A1-3, A4-5, B1-7, C1-4 and D.
REFERENCE SERVICE LIFE (RSL)	50 years
CUT-OFF REGULATIONS	They must include a minimum of 99% of the data of the total inflows to the upstream and the core module.
ALLOCATIONS	Production data. Recycling, energy and waste data has been calculated on the basis of the product mass.
DATA QUALITY	The product data has been obtained from the information of the production centre of Saint-Gobain Placo Ibérica situated in San Martín de la Vega (Madrid) during the period of 2017. The electric mix used in the manufacturing stage corresponds to Spain and the year 2017.
SUPPORTING DATA	All of the main data has been obtained from Saint Gobain Placo Ibérica. The secondary data has been obtained using SimaPro software and the Ecobilan and Ecoinvent v.3 databases. The impact model used corresponds to CML 2001 v.4.1.
GEOGRAPHIC COVERAGE **TIME PERIOD**	Scope includes Europe. Specific data was collected at the site for the reference year 2017.

EPD of construction products may not be comparable if they do not comply with EN 15804.

Environmental product declarations within the same product category from different programs may not be comparable.

The verifier and the programme operator do not make any claim nor have any responsibility of the legality of the product.

4. LCA: Life cycle stage and additional technical information

Life cycle stages

Flow diagram of the Life Cycle

Product Stage, A1-A3

Description of the stages:

A1, Raw material extraction and processing

It includes the extraction and processing of all raw materials and energy which occur before the manufacturing process studied.

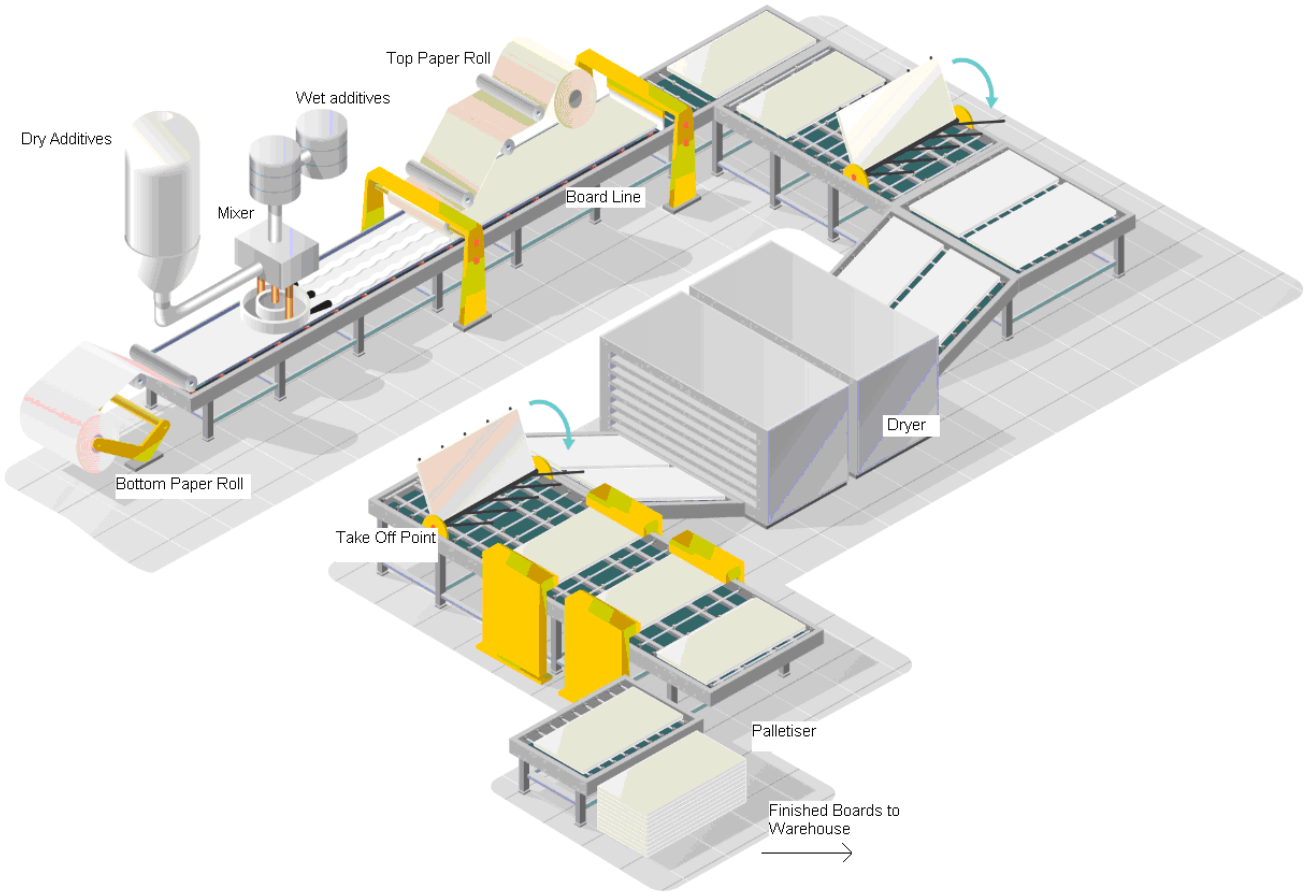
A2, Transport to the manufacturer

The raw materials are transported to the manufacturing plant. In our case, the model used includes transport by road, ship, or train of each one of the raw materials.

A3, Manufacturing

This module includes the manufacture of products and the manufacture of packaging. The production of packaging material is taken into account at this stage. The processing of any waste arising from this stage is also included.

Plasterboard manufacturing process



Manufacturing process

The primary materials are homogenously mixed in the mixer to form the plaster paste, which is discharged through output sections onto a sheet of paper which moves along the conveyor belt. At the same time, a second sheet of paper is fed into the process to form the plasterboard. The plasterboard continues along the production line until it is firm enough to be cut. Subsequently it is dried. Finally, the product is stacked and palletised to form the packaged plasterboard.

If possible, the recycled plasterboard is reintegrated back into the manufacturing process.

Construction process stage, A4-A5

Description of the stage: The construction process is divided into 2 modules: “A4, transport to the building site”, and “A5, installation”.

A4, Transport to the building site

This module includes the transport from the door of the manufacturing plant to the building where the product will be installed.

The transport is calculated on the basis of some characteristic parameters which are described in the following table.

PARAMETER	VALUE (expressed in functional unit/declared unit)
Fuel type and vehicle consumption or means of transport used, for example if it is a long-distance lorry, ship, etc..	Lorry with trailer with an average load of 24 tn and a diesel consumption of 0.38 litres per km
Distance	2515 km by truck, 145 km by ship
Capacity of use (including empty returns)	100 % capacity, in volume
Bulk density of transported products	1451 kg/ m^3 (18.1 kg/ m^2)
Capacity factor of use, by volume	1 (predetermined)

A5, Installation in the building:

This module includes:

- The supply of all materials, products and energy needed for the installation.
- The residues or waste resulting from the products generated during the construction stage and its final treatment or sending to landfill.
- The impacts and aspects related to other losses produced during the construction stage (for example, production, transport, waste processing, and disposal of products and materials).

PARAMETER	VALUE (expressed in functional unit/declared unit)
Secondary materials for installation (specified by type)	Sealant 0.8 kg/ m^2 of board, joint tape 3 ml/ m^2 of board, screws 7 per m^2 of board
Water consumption	0.4536litres/ m^2 of board
Consumption of other resources	None
Quantitative description of energy type (regional mix) and its consumption during the installation process	Not required
Wastage of materials in the work site, before waste processing, generated by the product’s installation (specified by type)	Placo® X-Ray Protection Plasterboard: 0.907 kg Sealant: 0,04 kg Joint tape: 0,001kg
Outflows of materials (specified by type) resulting from waste processing in the work site, for example during the collection for recycling, energy recovery, or disposal (specifying the route)	Placo® X-Ray Protection Plasterboard: 0.635 kg to landfill Placo® X-Ray Protection Plasterboard: 0.272kg to recycling Sealant: 0,04kg to landfill Joint tape: 0,001kg to landfill
Direct emissions to air, soil and water	None

Usage phase (excluding potential savings), B1-B7

Description of the stage:

The product does not present any impact during the usage stage since it does not require any treatment or use of resources.

The product usage stage is subdivided into the following modules:

- B1: Use or application of the installed product
- B2: Maintenance
- B3: Repair
- B4: Replacement
- B5: Refurbishment, including provision and transport of all primary materials and products, energy and water consumption and the processing or final disposal of waste during the use stage. These information modules also include the impacts and aspects related to the losses produced during part of the usage stage (for example, production, transport and processing or disposal of waste of all products and materials).
- B6: Use of operational energy
- B7: Use of operational water

Description of the settings and additional technical information:

The product has a lifespan of 50 years. This means that the product can stay in place inside the building without the need for maintenance, repair, replacement, or refurbishment for this period of time, under normal conditions of use. The Saint-Gobain Placo Ibérica Plasterboard is a passive product inside the building, therefore, it does not have an impact during this stage of the life cycle.

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End of life stage, C1-C4

Description of the stage: this phase includes the different modules as detailed below:

C1, Deconstruction, dismantling, demolition

C2, Transport to waste processing

C3, Processing of waste for its reuse, recovery and/or recycling

C4, Disposal (elimination), physical pre-treatment and management, including the supply and transport of all materials and products, as well as the associated use of energy and water.

End of life:

PARÁMETER	VALUE/DESCRIPTION
Waste collection process specified by type	100% to landfill, collected and mixed with the rest of the construction waste
Recovery system specified by type	30% recycled
Disposal specified by type	70% landfilled
Assumptions for scenario development (e.g. transport)	On average, the plaster waste is transported 32km by lorry from the construction./demolition site to the final treatment or disposal site.

Reuse/recovery/recycling potential, D

Description of the stage:

Module D includes potential reuse, recovery and/or recycling processes, expressed as net impacts and benefits.

The loads and benefits derived from the recycling of X-Ray® Protection plasterboard in the manufacture of the plasterboard product in natural gypsum mineral substitution have been considered.

5. LCA results

Description of the boundaries of the system (X= included in the LCA, MND= module not declared)

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND RESPONSIBILITIES BEYOND THE SYSTEM LIMITS
Raw materials supply	Transport	Manufacturing	Transport	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction-demolition	Transport	Waste treatment	Disposal	Reuse-recovery
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

ENVIRONMENTAL IMPACTS

Parameters	Product Stage	Construction Process Stage		Use Stage							End of Life Stage				D Reuse, Recovery, Recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/ Demolition	C2 Transport	C3 Waste processing	C4 Waste disposal	
Global Warming Potential (GWP) *kg CO_2 equiv/UF*	4,7E+00	4,1E+00	1,4E+00	0	0	0	0	0	0	0	0	2,7E-01	0	5,4E-02	-3,5E-03
	Total contribution to global warming resulting from the emission of one unit of gas to the atmosphere relative to one unit of the reference gas, carbon dioxide which is assigned a value of 1.														
Depletion of the Ozone Layer (ODP) *kg CFC 11 equiv/UF*	6,1E-07	7,8E-07	2,3E-07	0	0	0	0	0	0	0	0	4,8E-08	0	2,2E-08	-2,1E-10
	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation (harmful to life). This process of destruction of the ozone is caused b the breakdown of certain compounds that contain chlorine and bromine (chlorofluorocarbons or halons) when they reach the stratosphere, causing the catalytic breakdown of the ozone molecules.														
Acidification Potential of the ground and the water Resources (AP) *kg SO_2 equiv/UF*	1,3E-02	1,4E-02	4,8E-03	0	0	0	0	0	0	0	0	8,6E-04	0	4,0E-04	-4,8E-06
	Acid rain has negative impacts on the natural ecosystems and the environment. The main sources of emissions of acidifying substances are agriculture and fossil fuel combustion used for producing electricity, heating and transport.														
Eutrophication Potential (EP) *kg $(PO_4)^{3-}$ equiv/UF*	4,5E-03	3,1E-03	1,2E-03	0	0	0	0	0	0	0	0	1,9E-04	0	8,8E-05	-5,0E-06
	Adverse biological effects derived from the excessive enrichment of water with nutrients and continental surfaces.														
Tropospheric Ozone Formation Potential (POPC) *Kg ethylene equiv/UF*	6,6E-04	6,9E-04	2,4E-04	0	0	0	0	0	0	0	0	4,4E-05	0	1,5E-05	3,2E-08
	Chemical reactions caused by light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.														
Abiotic depletion Potential for Non-Fossil Resources (ADP-elements) *kg Sb equiv/UF*	1,1E-05	7,8E-06	3,6E-06	0	0	0	0	0	0	0	0	7,9E-07	0	5,8E-08	-2,2E-08
Abiotic depletion Potential for Fossil Resources (ADP-fossil fuels) *MJ/UF*	6,9E+01	6,4E+01	2,0E+01	0	0	0	0	0	0	0	0	4,0E+00	0	1,8E+00	-2,5E-02
	Consumption of non-renewable resources with the consequent reduction in availability for future generations.														

RESOURCES USE															
Parameters	Product Stage	Construction Process Stage		Use Stage							End of Life Stage				D Reuse, Recovery and Recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction /Demolition	C2 Transport	C3 Waste processing	C4 Waste disposal	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/UF*	7,3E+00	9,5E-01	1,5E+00	0	0	0	0	0	0	0	0	5,1E-02	0	2,4E-02	7,8E-03
Use of renewable primary energy used as raw materials - *MJ/UF*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total use of renewable primary energy (primary energy and renewable primary energy resources used as raw materials) - *MJ/UF*	7,3E+00	9,5E-01	1,5E+00	0	0	0	0	0	0	0	0	5,1E-02	0	2,4E-02	7,8E-03
Use of non-renewable primary energy excluding non-renewable primary energy resources sued as raw materials - *MJ/UF*	6,9E+01	6,4E+01	2,0E+01	0	0	0	0	0	0	0	0	4,0E+00	0	1,8E+00	-2,5E-02
Use of non-renewable primary energy used as raw materials - *MJ/UF*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Total use of non-renewable primary energy (primary energy and non-renewable primary energy resources used as raw materials) - *MJ/UF*	6,9E+01	6,4E+01	2,0E+01	0	0	0	0	0	0	0	0	4,0E+00	0	1,8E+00	-2,5E-02
Use of secondary materials - *kg/UF*	2,4E-01	0	6,6E-02	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels - *MJ/UF*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Use of non-renewable secondary fuels - *MJ/UF*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Net use of fresh water resources - *m^3/UF*	3,7E-01	1,4E-02	3,8E-02	0	0	0	0	0	0	0	0	8,0E-04	0	2,2E-03	-4,7E-05

WASTE CATEGORIES														
Parameters	Product Stage	Construction Process Stage		Use Stage							End of Life Stage				D Reuse, Recovery and Recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction /Demolition	C2 Transport	C3 Waste processing	C4 Waste disposal	
Hazardous waste disposed of *kg/UF*	8,6E-05	3,7E-05	2,0E-05	0	0	0	0	0	0	0	0	2,5E-06	0	6,2E-07	1,1E-08
Non-hazardous waste disposed of *kg/UF*	1,4E+00	5,6E+00	1,7E+00	0	0	0	0	0	0	0	0	1,9E-01	0	1,3E+01	7,5E-05
Radioactive waste disposed of *kg/UF*	2,0E-04	4,4E-04	1,2E-04	0	0	0	0	0	0	0	0	2,7E-05	0	1,2E-05	1,3E-07

OUTPUT FLOWS															
Parameters	Product Stage	Construction Process Stage		Use Stage							End of Life Stage				D Potential for Reuse, Recovery and Recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction/ Demolition	C2 Transport	C3 Waste processing	C4 Waste disposal	
Components for re-use *Kg/UF*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Materials for recycling *kg/UF*	0	0	6,6 E-02	0	0	0	0	0	0	0	0	0	0	0	0
Materials for energy recovery (energy recovery) *kg/UF*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Exported energy (electrical, thermal, etc). *MJ/UF*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6. LCA Interpretation

The main impacts occur during the production and transport stages, except for the waste production, whose greatest impact is generated in the end of life stage.

During the product stage, water consumption account for 86,6% of the total impact; between 43 and 46% due to Global Warming, non-renewable resources and energy consumptions.

In the transport stage, important impacts related to Global Warming, non-renewable resources and energy consumptions, which represent between 38 and 41% of these impacts.

At the installation stage of the product, the impacts are mainly due to the manufacturing of the products due to wastage and constitute less than 14% of the impacts.

There are no impacts associated with the usage stage since plasterboard is a passive product inside the building and does not have an impact in this stage of the life cycle.

During the end of life stage, the main associated impact is the generation of waste, which accounts for 60% of its total impact.

(1) This indicator corresponds to the potential for the depletion of abiotic resources (fossil fuels).
(2) This indicator corresponds to the total use of primary energy.
(3) This indicator corresponds to the net use of running water resources.
(4) This indicator corresponds to the amount of waste (hazardous, non-hazardous and radioactive)

7. Health information

COV emission

None of the ingredients included in the Placo® X-Ray Protection contains volatile organic compounds (VOCs) that exceed the requirements of European voluntary labelling schemes related to indoor air quality.

More information www.placo.es

8. Positive contribution to the environment

Placo® X-Ray Protection Plasterboard is manufactured by Saint-Gobain Placo Ibérica in Spain are made giving priority to the environmental aspects throughout the Life Cycle of the Product. To achieve this, we work constantly on the development of projects to minimise these environmental impacts, both of the product as well as the manufacturing process, through a World Class Manufacturing continuous improvement system. Furthermore, there is continuous work on the part of Saint-Gobain Placo Ibérica with suppliers, contracts and customers to improve the global environmental impact of the product.

We have a plasterboard recycling process that allows us to incorporate the internal rejections of the production line and in future to extend this process to the recycling of site waste. This is possible thanks to the capacity for the plaster to be infinitely recycled, without losing its properties, which permits a potentially eternal life cycle.

Saint-Gobain Placo Ibérica, with this strong commitment to the environment, also works on the restauration of its old quarries and in the sustainable development of their surroundings, and Saint-Gobain Placo Ibérica has received several national awards because of this.

Saint-Gobain Placo Ibérica is the first company in Spain to achieve ISO 14.001 environmental certification for its plasterboard production centres in San Martín de la Vega and Quinto de Ebro, also opting for the Eco-design ISO 14.006.

We have also been the first company in the sector at a European level to have registered calcium sulphate under the European Regulation (EC) nº: 1907/2006 – REACH. REACH is based on the principle that corresponds to manufacturers, importers and downstream users to guarantee that they only manufacture, market or use substances that do not negatively affect human health or the environment.

9. Source of information

Area: Europe.

Period: 2.017

The baseline information has been obtained from the Ecobilan and Ecoinvent v.3 databases.

RAW MATERIALS	Generic databases
PRODUCTION	Own data
TRANSPORT	Generic or specific information
APPLICATION	Generic or specific information
LIFE IN USE	Generic information
END OF LIFE	Generic information
SERVICE LIFE	Spanish or European average

10. References

1. EN 15.804, Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products. (2.012).

2. ISO 14.025, Environmental labels and declarations – Type III environmental declarations – Principles and procedures (2.010).

3. ISO 14.040, Environmental Management – Lifecycle assessment – Principles and framework (2.006).

4. ISO 14. 044, Environmental Management – Lifecycle assessment – Requirements and guidelines (2.006).

5. International EPD System CPC Division CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES, dated 2017-05-30 Version 2.2

6. GPI v 2.5 "General Programme Instructions for The International EPD® System v 2.5 (2013)".

7. Environmental Product Declaration Methodological Guide for Construction Products.

8. ISO 21.930:2007 Sustainability in building construction - Environmental declaration of building products.

9. EDP Project Report Placo® X-Ray Protection (2018).