

## Environmental Product Declaration



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### EPD program operator

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### Manufacturer

Saint-Gobain Construction Products Polska Sp. z o.o.  
Rigips Office: 9 Cybernetyki St., 02-677 Warsaw  
Factory: Szarbków 73, 28-400 Pińczów  
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## Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 and verified according to ISO 14025 by external auditor. It contains information about the impact of declared construction materials on environment and their aspects verified by the independent Advisory Board according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only

if all the compared data were created according to EN 15804 (see point 5.3 of the norm).

Life cycle: A1-A3 modules in accordance with EN 15804 (Cradle to Gate)

The year of preparing the characteristic: 2014

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Declared durability: Under normal conditions, gypsum blocks have an expected service life well in excess of 60 years.

PCR: PCR-24-PL/EN 15804

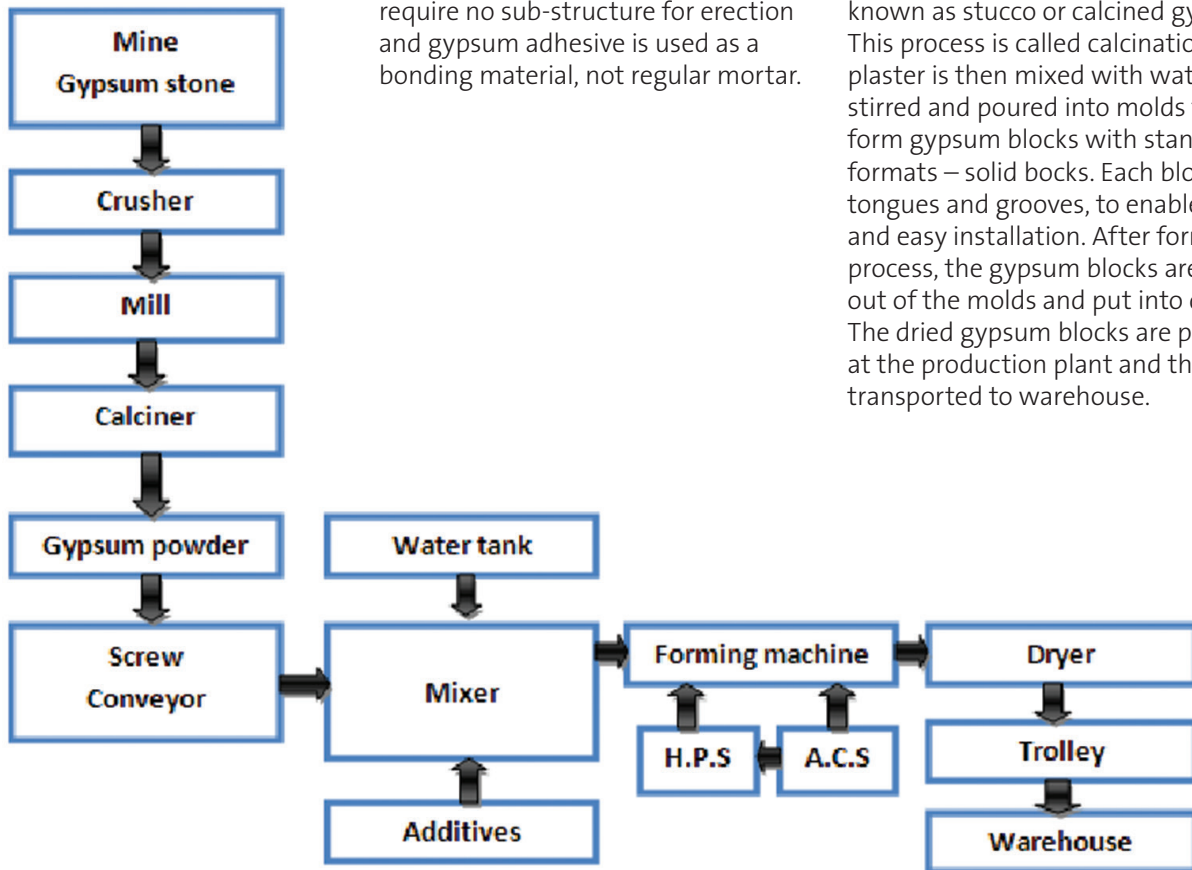
Declared unit : 1 kg of gypsum block

## Manufacturer and Product Information

Rigips exists on the Polish market since 1994 and is engaged in manufacturing gypsum products (from own natural stone mined); plaster - plasterboards and drywall systems: walls, shaft walls, ceilings and other building elements i.e. gypsum blocks.

Gypsum block is a massive building material composed of solid gypsum, for building and non-load partition walls, wall linings and pillar casing indoors including fire resistant systems. Gypsum blocks are composed of gypsum, water and additives. Partition walls made from gypsum blocks require no sub-structure for erection and gypsum adhesive is used as a bonding material, not regular mortar.

The manufacturing process is automated at production plants where raw gypsum from Rigips mine ( $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ ) is ground and dried, then heated up to remove three fourths of the bound water and thus transformed into calcium sulfate hemihydrate ( $\text{CaSO}_4 \cdot \frac{1}{2}\text{H}_2\text{O}$ ), also known as stucco or calcined gypsum. This process is called calcination. The plaster is then mixed with water, stirred and poured into molds to form gypsum blocks with standard formats – solid blocks. Each block has 2 tongues and grooves, to enable quick and easy installation. After forming process, the gypsum blocks are taken out of the molds and put into dryer. The dried gypsum blocks are packaged at the production plant and then transported to warehouse.



Rigips from the beginning of its operation shows continuous concern on issues related to proper working conditions, care for the environment and the highest quality of products. Result of these efforts was the implementation of:

- quality management systems based on ISO 9001
- occupational health and safety based on PN-EN 18001
- environmental protection based on ISO 14001

The mentioned systems have been integrated in 2010 into Integrated Quality Management System after audits carried out by SGS Poland Sp. z o.o.,

which is part of the SGS - the world leader operating in the field of control, verification, testing and certification. Rigips certificates issued by SGS Po-

land are accredited by United Kingdom Accreditation Service (UKAS).

## Product type

Norm: EN 12859, designing and application of the gypsum blocks according to EN 15318:2007,

- For gypsum blocks installation it is necessary to use the adhesive according to EN 12860:

Standard designation	Type of application	Commercial name
Gypsum block	For indoor application. Building non load bearing partitions and wall linings in residential buildings, offices, hospitals, schools etc. and fire protection of columns, lifts, shafts which are finished with paint or wallpaper with no use of traditional plaster.	RIGIROC™ gypsum block (standard)
Gypsum block	For indoor application. Building non load bearing partitions and wall linings in residential buildings, offices, hospitals, schools etc. and fire protection of columns, lifts, shafts which are finished with paint or wallpaper with no use of traditional plaster.	RIGIROC™ gypsum block (water resistant)

## Application for which the product is to be used

RIGIROC™	
Description	<b>gypsum block (standard)</b>
Characteristic	<ul style="list-style-type: none"> <li>• Prefabricated product</li> <li>• Dedicated for use in rooms with relative humidity up to 70%</li> <li>• Made of gypsum and water; can contain glass fiber, aggregates and other admixtures</li> <li>• Solid block with no cavities</li> <li>• Density class: medium (800–1100 kg/m<sup>3</sup>)</li> <li>• Water absorption class: H3</li> <li>• Dimensions (thickness/width/height): 80/666/500 mm 100/666/500 mm</li> <li>• Contains 2 grooves and 2 tongues</li> <li>• Reaction to fire: class A1 (according to EN 13501-1)</li> </ul>
Colour	natural
Description	<b>gypsum block (water resistant)</b>
Characteristic	<ul style="list-style-type: none"> <li>• Prefabricated product</li> <li>• Dedicated for use in rooms exposed to periodic contact with water</li> <li>• Made of gypsum and water; can contain glass fiber, aggregates and other admixtures</li> <li>• Solid block with no cavities</li> <li>• Density class: medium (800–1100 kg/m<sup>3</sup>)</li> <li>• Water absorption class: H1 (max 2,5%)</li> <li>• Dimensions (thickness/width/height): 80/666/500 mm 100/666/500 mm</li> <li>• Contains 2 grooves and 2 tongues</li> <li>• Reaction to fire: class A1 (according to EN 13501-1)</li> </ul>
Colour	green

## Technical parameters

RIGIROC™	
Product	<b>Gypsum block 80 STD &amp; 100 STD</b> , solid M, pH std, H3
Dimension	80/666/500, 100/666/500 mm
Type	Solid
Weight	75 kg/m <sup>2</sup> , 93 kg/m <sup>2</sup>
Water absorption class	H3
Manufacturing site	Szarbków 73, Poland
Product	<b>RIGIROC gypsum block 80 HYDRO &amp; 100 HYDRO</b> , solid M, pH std, H1
Dimension	80/666/500, 100/666/500 mm
Type	Solid
Weight	75 kg/m <sup>2</sup> , 93 kg/m <sup>2</sup>
Water absorption class	H1 (<2,5%)
Manufacturing site	Szarbków 73, Poland

## Allocation

The production of blocks is a single line process separated from the board production. All processes are measured separately. All impacts from mine are allocated into the gypsum stone then all impacts from calcination are allocated in stucco. Stucco is considered as the raw material for gypsum block production (separated EPD). 100% of input product impact (see table 1) is allocated to a final product, no cut offs used. Other Rigips product as plasterboards are inventoried as separated production line. Waste and waste water of whole factory were allocated on the mass basis between all co-products in factory. Electricity and gas consumption was inventoried on every production process separately.

## System limits

The life cycle analysis of the examined products covers A1-A3 modules (Cradle to Gate) in accordance with EN 15804+A1. It includes production, including: mixing of gypsum with additives, forming the blocks, drying, paleting. All raw materials and energy consumption inventoried in Factory, all sub products were included in calculation. Office impacts were also taken into consideration.

## Data collection period

The data for manufacture of the examined products refer to the year 2013. The life cycle assessments were prepared for Poland as reference area (officially published statistical national electricity mix for 2013).

## Data quality

The values determined to calculate the LCIA originate from verified LCI RIGIPS inventory data. This data was verified by ISO auditor.

## Assumptions and estimates

Impacts for each product stage and factory process were inventoried and calculated separately. All raw material consumption, emission water used were specific. Emission into air from gas heat production was estimated using formal conversion factors.

## Databases

The data for the A1 processes come from the following databases: Gypsum (EPD Rigips), Paper (specific), LCI questionnaire (Energy, Waste, Water, Emissions), Ecoinvent (additives), ITB (additives, sand, glass fiber), Ullmann's (additives), Tauron (Electricity), Heat (Górzyński) and other scientific literature sources (Sugar). Data quality analysis was a part of external audit.

## Note

Specific information on application and other actions with these products are described in detail in the technical data sheet available on the producers website.

## Raw materials and energy

**Table 1. Raw materials**

No	Name of raw material	Total used in production kg	Approx. in product kg/kg
1	Gypsum stone calcinated 0-100	12 869 909,0	1,1
2	Silicone	5 650,0	0,0005
3	Oils	1 395,0	0,0001
4	Pallets	206 800,0	0,02
5	Foil captures	7 567,0	0,001
6	EPS	7 305,0	0,001
7	Pigment	2 139,0	0,0002
8	Biocide	770,0	0,0001

**Table 2. Energy consumption**

No	Name of raw material	Total used in production	Approx. on kg of product
1	Electricity	282010 kWh	0,03kWh
2	Gas	699 631 m <sup>3</sup>	0,070 m <sup>3</sup>

## Emissions (LCI) and their impact on the environment

**Table 3. Emissions into air generated during production stage A3** **Table 4. Emissions into water generated during production stage A3**

Air emission	Unit	Used on product kg/kg
CO <sub>2</sub>	kg	0,16
SO <sub>2</sub>	kg	E-04
NO <sub>x</sub>	kg	2E-05

Water emission	Unit	Total
Water consumption	m <sup>3</sup>	6662
Waste water	m <sup>3</sup>	6662
BOD	mg/l	19,0
COD	mg/l	67,5
Suspended matter	mg/l	36

**Table 5. Waste generated in the phase of product manufacturing A3**

Waste code	Unit	Total in production [Mg]	Destination
150102	Mg	10,47	Recycling
101306	Mg	0,36	Recycling
170201	Mg	5,3	Energy recovery
170407	Mg	3,94	Recycling
190802	Mg	34,3	Landfil
160213	Mg	0,156	Dangerous
150110	Mg	0,43	Dangerous
160304	Mg	0,4	Landfil
190805	Mg	4,0	Landfil
101381	Mg	705,5	Recycling/landfil

## Environmental characteristics (LCA)

**Table 6. Environmental characteristic for RIGIROC™ gypsum block (1kg)**

Environmental assessment information (MND – Module not declared, MD – Module Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Environmental impacts: 1 kg					
Indicator	Unit	A1	A2	A3	A1-A3
Global warming potential	[kg CO <sub>2</sub> eq.]	0,154	4,00E-04	0,164	0,319
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1,20E-08	1,70E-09	1,39E-09	1,51E-08
Acidification potential of soil and water	[kg SO <sub>2</sub> eq.]	4,27E-04	2,90E-06	3,39E-04	7,96E-04
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> eq.]	8,74E-05	5,12E-07	2,43E-05	1,12E-04
Formation potential of tropospheric ozone	[kg Ethene eq.]	1,31E-05	2,12E-07	1,44E-05	2,77E-05
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1,48E-03	1,92E-05	1,40E-03	0,003
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	2,057	2,19E-02	2,340	4,419

Environmental aspects on resource use: 1 kg					
Indicator	Unit	A1	A2	A3	A1-A3
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	0,103	0,000	0,002	0,105
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	2,160	2,30E-02	2,34	4,523
Use of secondary material	[kg]	0,000	0,000	0,00	0,000
Use of renewable secondary fuels	[MJ]	0,000	0,000	0,00	0,000
Use of non-renewable secondary fuels	[MJ]	0,000	0,000	0,00	0,000
Net use of fresh water	[dm <sup>3</sup> ]	0,030	0,000	0,6000	0,630

Other environmental information describing waste categories: 1 kg					
Indicator	Unit	A1	A2	A3	A1-A3
Hazardous waste disposed	[kg]	2,20E-07	0,00E+00	2,00E-06	2,22E-06
Non-hazardous waste disposed	[kg]	3,43E-03	7,83E-05	5,00E-03	8,51E-03
Radioactive waste disposed	[kg]	0,000	0,00	0,000	0,000
Components for re-use	[kg]	0,000	0,00	0,000	0,000
Materials for recycling	[kg]	0,000	0,00	0,002	2,29E-03
Materials for energy recovery	[kg]	0,000	0,00	0,000	3,69E-04
Exported energy	[MJ]	0,000	0,00	0,000	0,00

**Table 7. Environmental characteristic for RIGIROC™ gypsum block (1m<sup>2</sup>)**

Environmental assessment information (MND – Module not declared, MD – Module Declared, INA – Indicator Not Assessed)																
Product stage			Construction process		Use stage							End of life				Benefits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse-recovery-recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
MD	MD	MD	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Environmental impacts: 1 m <sup>2</sup>					
Indicator	Unit	A1	A2	A3	A1-A3
Global warming potential	[kg CO <sub>2</sub> eq.]	12,970	3,36E-02	13,753	26,757
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1,01E-06	1,43E-07	1,17E-07	1,27E-06
Acidification potential of soil and water	[kg SO <sub>2</sub> eq.]	3,59E-02	2,43E-04	2,85E-02	0,065
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> eq.]	7,35E-03	4,30E-05	2,04E-03	9,43E-03
Formation potential of tropospheric ozone	[kg Ethene eq.]	1,10E-03	1,78E-05	1,21E-03	2,33E-03
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1,24E-01	1,62E-03	1,18E-01	0,244
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	172,798	1,84E+00	196,560	371,200

Environmental aspects on resource use: 1 m <sup>2</sup>					
Indicator	Unit	A1	A2	A3	A1-A3
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	8,640	0,000	0,197	8,836
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	181,438	1,934	196,560	379,932
Use of secondary material	[kg]	0,000	0,000	0,000	0,000
Use of renewable secondary fuels	[MJ]	0,000	0,000	0,000	0,000
Use of non-renewable secondary fuels	[MJ]	0,000	0,000	0,000	0,000
Net use of fresh water	[dm <sup>3</sup> ]	2,520	0,000	50,400	52,920

Other environmental information describing waste categories: 1 m <sup>2</sup>					
Indicator	Unit	A1	A2	A3	A1-A3
Hazardous waste disposed	[kg]	0,000	0,000	0,000	0,000
Non-hazardous waste disposed	[kg]	0,288	0,007	0,420	0,714
Radioactive waste disposed	[kg]	0,000	0,000	0,000	0,000
Components for re-use	[kg]	0,000	0,000	0,000	0,000
Materials for recycling	[kg]	0,001	0,000	0,192	0,192
Materials for energy recovery	[kg]	0,000	0,000	0,031	0,031
Exported energy	[MJ]	0,000	0,000	0,000	0,000

**Note:** RIGIPS blocks are designed and estimated not to contain VOC content or formaldehyde which exceed the requirements of European voluntary labeling schemes established for the indoor air quality (IAQ) assessment.

## Verification

The process of verification of an EPD is in accordance with EN ISO 14025, clause 8 and ISO 21930, clause 9. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804	
Independent verification corresponding to ISO 14025 & 8.3.1.	<input checked="" type="checkbox"/> external <input type="checkbox"/> internal
Verification of EPD: dr eng. Aleksander Panek (PKN KT 307 President)/prof. Dariusz Heim	
LCI audit and input data verification: msc eng. Dominik Bekierski	
LCA: dr eng. Michał Piasecki	
Verification of procedures and declaration: dr eng. Halina Prejzner	

## Normative references

- ISO 14025:2006, Environmental management – Type III environmental declarations – Principles and procedure
- ISO 21930:2007, Sustainability in building and construction – Environmental declaration of building products
- ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines
- ISO 15686-1:2000, Buildings and constructed assets – Service life planning – Part 1: General principles
- ISO 15686-8:2008, Buildings and constructed assets – Service life planning – Part 8: Reference service life
- EN 15804:2012+A1:2013, Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
- EN15942:2011, Sustainability of construction – Environmental product declarations. Communication format business-to-business