EPD®

THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

Rigips RF15 mm Fireboard

Date of issue: 01/08/2015
Revision date: 16/10/2020
Validity: 5 years
Valid until: 20/10/2025
Version: 2
Scope of the EPD®: Romania

EPD VERIFIED

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.

Registration number
The International EPD® System:
S-P-00787

Rigips SAINT-GOBAIN

General information

Manufacturer: Saint-Gobain Construction Products Romania, Rigips Business Unit, Fabrica de Placi de Gips Carton, Romania
Programme used: International EPD System http://www.environdec.com/
EPD registration number/declaration number: S-P-00787
PCR identification: EN 15804 Sustainability of construction works – Environmental product declaration - core rules for the product category of construction product and The International EPD® System PCR 2012:01 version 2.33 for Construction products and Construction with reference to the Saint Gobain Environmental Product Declaration Methodological Guide for Construction Products
Owner of the declaration: Saint-Gobain Construction Products Romania, Rigips Business Unit
Product / product family name and manufacturer represented: Rigips RF 15 mm – Fireboard
Declaration issued: 2015-08-01
Revision date: 2020-10-16
Valid until: 2025-10-20
Demonstration of verification: an independent verification of the declaration was made, according to ISO 14025:2010. This verification was external and conducted by the following third party: Andrew NORTON, Renuables, based on the PCR mentioned above.
EPD Prepared by: Carmen Mazilu (SGCPRo Rigips BU), Alina Cismas (SGCPRo) and Patricia Jimenez Diaz (Saint-Gobain)
Contact: Alina Cismas (Alina.Cismas@saint-gobain.com) and Patricia Jimenez Diaz (Patricia.JimenezDiaz@saint-gobain.com)

The declared unit is 1 m² of Rigips RF 15mm – Fireboard with a weight of 13.16 kg/m²

Declaration of Hazardous substances: (Candidate list of Substances of Very High Concern): none

Environmental Management System in place at site: **ISO 14001:2015 certificate N°: 10263182**
Energy Management System in place at site: **ISO 50001/2018 – certificate N°: 10265165**
Quality Management System in place at site: **ISO 9001:2015 - certificate N°: 10263200**
Occupational Health and Safety Management System in place at site: **ISO 45001:2018 – certificate N°:10263220**

Geographical scope of the EPD®: Romania

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

CEN standard EN 15804 serves as the core PCR[a]	
PCR:	PCR 2012:01 Construction products and Construction services, Version 2.33
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent verification of the declaration, according to EN ISO 14025:2010 **Internal ☐ External ☒**	
Third party verifier:	Andrew Norton , Renuables **http://renuables.co.uk**
Accredited or approved by	The International EPD System

Product description

Product description and use:
Rigips RF 15 is a gypsum plasterboard consisting of an aerated gypsum core encased in, and firmly bonded to, strong paper liners. The gypsum core contains mineral fibres and other additives to improve core adhesion at high temperature. Rigips RF 15 is a type F plasterboard conforming to the requirements of EN 520:2004+A1:2009 standard and comes with tapered edge on the long edges and has short edges sawn straight. Further details of product composition are confidential.

Rigips RF 15 is a plasterboard that is suitable for fire-resistant dryline for internal surfaces and for constructing partitions. Rigips plasterboard are part of solutions for modern buildings providing moisture, fire, sound, thermal and impact resistance together with superbly smooth surfaces to create contemporary internal environments.

The high performance linings for walls and ceilings, partitions deliver comfort and safety for all occupants. Excellent durability of plasterboard construction elements makes them last for the building's lifetime, which is assumed to be 50 years (Saint-Gobain Methodological Guide).

Technical data/physical characteristics:

EN CLASSIFICATION	Type F, EN 520:2004+A1:2009
VAPOR RESISTANCE FACTOR	10/4 (dry/wet)
REACTION TO FIRE	A2-s1,d0
THERMAL CONDUCTIVITY	0.24 W/mK

Description of the main components and/or materials for 1 m2 of product for the calculation of the EPD®:

PARAMETER	VALUE (expressed per functional/declared unit)
Quantity for 1 m^2 of product	13.16 kg
Thickness	15 mm
Surfacing	Paper: 346.6 g/m^2
Packaging for the transportation and distribution	Cardboard: 0.5 g PP straps: 0.3 g Innen culls: 41.9 g
Product used for the Installation	Water: 0.165 l/ m^2 Jointing compound: 0.33 kg/ m^2 Jointing tape: 0.0042 kg/ m^2

During the life cycle of the product any hazardous substance listed in the "Candidate List of Substances of Very High Concern (SVHC) for authorization" has not been used in a percentage higher than 0,1% of the weight of the product.

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

LCA calculation information

EPD TYPE DECLARED	Cradle to gate with options
DECLARED UNIT	The declared unit is 1 m² of Rigips RF 15mm –Fireboard with a weight of 13.16 kg/m²
SYSTEM BOUNDARIES	Cradle to gate with options: stages A1 – A3, A4 – A5, B1 – B7, C1 – C4
REFERENCE SERVICE LIFE (RSL)	50 years By default, it corresponds to Standards building design life and value is included in Appendix III of Saint-Gobain Environmental Product Declaration Methodological Guide for Construction Products
CUT-OFF RULES	Life Cycle Inventory data for a minimum of 99% of total inflows to the upstream and core module shall be included
ALLOCATIONS	Production data. Recycling, energy and waste data have been calculated on a mass basis.
GEOGRAPHICAL COVERAGE AND TIME PERIOD	Scope includes: Romania Primary data is collected from one production site at Saint-Gobain Construction Products Romania, Rigips Business Unit Data collected for the year 2019 Background data: Ecoinvent (v3.1 2013 and 3.5 2015) and GaBi (SP37 2019)
PRODUCT CPC CODE	37530 Articles of plaster or of composition based on plaster

According to EN 15804, EPDs of construction products may not be comparable if they do not comply with this standard.
According to ISO 21930, EPDs might not be comparable if they are from different programmes.

Life cycle stages

Flow diagram of the Life Cycle

Product stage, A1-A3

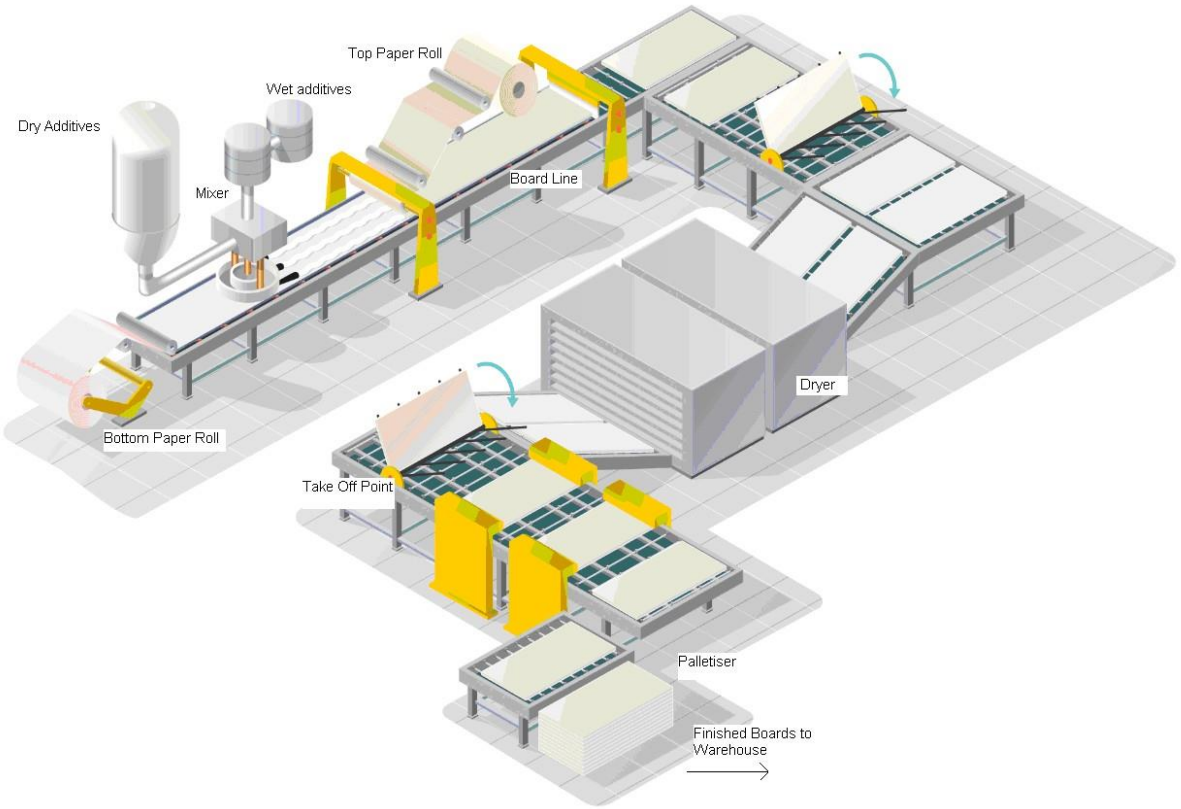
Description of the stage: the product stage of plaster products is subdivided into 3 modules A1, A2 and A3 respectively ″Raw material supply″, ″transport to manufacturer″ and ″manufacturing″.

A1, raw material supply.
This includes the extraction and processing of all raw materials and energy which occur upstream from the manufacturing process.

A2, transport to the manufacturer.
The raw materials are transported to the manufacturing site. The modelling includes road, boat and/or train transportations of each raw material.

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.

Manufacturing process flow diagram



Manufacturing in detail:
Rigips gypsum plasterboards are manufactured in a highly automated continuous process. Natural and recycled gypsum waste are milled and calcined in a hammer mill in order to produce plaster powder. Plaster powder (stucco), solid & liquid additives and pre-generated foam are mixed in a high-speed mixer to form homogeneous slurry. The slurry is then spread via multiple hose outlets onto a paper liner on a moving conveyor belt. A second paper liner is fed onto the production line from above to form the plasterboard. The sandwich passes through the extruder to be compressed to the specific thickness. At the end of forming belt, the mother board has a sufficient strength and is cut into panels of specific length. These boards are turned over, feed through a long multi-level dryer to evaporate excess water and get strength. The dried plasterboard is trimmed and bundled for shipment.

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 in the building

A4, transport to the building site.

This module includes transport from the production gate to the building site. Transport is calculated on the basis of a scenario with the parameters described in the following table.

PARAMETER	VALUE (expressed per functional/declared unit)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Truck, maximum load weight of 24 t and consumption of 0.39 liters per km
Distance	380 km
Capacity utilisation (including empty returns)	90% (16% of empty return)
Bulk density of transported products	841 kg/m^3
Volume capacity utilisation factor	1

A5, installation into the building.
The accompanying table quantifies the parameters for installing the product at the building site. All installation materials and their waste processing are included.

PARAMETER	VALUE (expressed per functional/declared unit)
Ancillary materials for installation (specified by materials)	Jointing compound 0.33kg/m^2 board, tape 1.23m /m^2 board, screws 8 /m^2 board
Water use	0.165 litres/m^2 board
Other resource use	None
Quantitative description of energy type (regional mix) and consumption during the installation process	None
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	Plasterboard: 0,658 kg (5%) Screws: 0 kg Jointing Compound: 0.0165 kg Jointing Tape: 0.00021 kg Cardboard: 0.5 g PP straps: 0.3 g Innen culls: 41.9 g
Output materials (specified by type) as results of waste processing at the building site e.g. of collection for recycling, for energy recovering, disposal (specified by route)	Plasterboard: 0,658 kg to landfill Screws: 0 kg Jointing Compound: 0.0165 kg to landfill Jointing Tape: 0.00021 kg to landfill Cardboard: 0.5 g to recycling PP straps: 0.3 g to recycling Innen culls: 41.9 g to recycling
Direct emissions to ambient air, soil and water	None

Use stage (excluding potential savings), B1-B7

Description of the stage:
The use stage, related to the building fabric includes:

B1, use or application of the installed product;
B2, maintenance;
B3, repair;
B4, replacement;
B5, refurbishment;
B6, operational energy use
B7, operational water use

Description of scenarios and additional technical information:
The product has a reference service life of 50 years. This assumes that the product will last in situ with no requirements for maintenance, repair, replacement or refurbishment throughout this period. Therefore, it has no impact at this stage.

Maintenance:

PARAMETER	VALUE (expressed per functional/declared unit)
Maintenance process	None required during product lifetime
Maintenance cycle	None required during product lifetime
Ancillary materials for maintenance (e.g. cleaning agent, specify materials)	None required during product lifetime
Wastage material during maintenance (specify materials)	None required during product lifetime
Net fresh water consumption during maintenance	None required during product lifetime
Energy input during maintenance (e.g. vacuum cleaning), energy carrier type, (e.g. electricity) and amount, if applicable and relevant	None required during product lifetime

Repair:

PARAMETER	VALUE (expressed per functional/declared unit)
Repair process	None required during product lifetime
Inspection process	None required during product lifetime
Repair cycle	None required during product lifetime
Ancillary materials (e.g. lubricant, specify materials)	None required during product lifetime
Wastage material during repair (specify materials)	None required during product lifetime
Net fresh water consumption during repair	None required during product lifetime
Energy input during repair (e.g. crane activity), energy carrier type, (e.g. electricity) and amount if applicable and relevant	None required during product lifetime

Replacement:

PARAMETER	VALUE (expressed per functional/declared unit)
Replacement cycle	None required during product lifetime
Energy input during replacement (e.g. crane activity), energy carrier type, (e.g. electricity) and amount if applicable and relevant	None required during product lifetime
Exchange of worn parts during the product's life cycle (e.g. zinc galvanized steel sheet), specify materials	None required during product lifetime

Refurbishment:

PARAMETER	VALUE (expressed per functional/declared unit)
Refurbishment process	None required during product lifetime
Refurbishment cycle	None required during product lifetime
Material input for refurbishment (e.g. bricks), including ancillary materials for the refurbishment process (e.g. lubricant, specify materials)	None required during product lifetime
Wastage material during refurbishment (specify materials)	None required during product lifetime
Energy input during refurbishment (e.g. crane activity), energy carrier type, (e.g. electricity) and amount	None required during product lifetime
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants)	None required during product lifetime

Use of energy and water:

PARAMETER	VALUE (expressed per functional/declared unit)
Ancillary materials specified by material	None required during product lifetime
Net fresh water consumption	None required during product lifetime
Type of energy carrier (e.g. electricity, natural gas, district heating)	None required during product lifetime
Power output of equipment	None required during product lifetime
Characteristic performance (e.g. energy efficiency, emissions, variation of performance with capacity utilisation etc.)	None required during product lifetime
Further assumptions for scenario development (e.g. frequency and time period of use, number of occupants)	None required during product lifetime

End-of-life stage C1-C4

Description of the stage: This stage includes the next modules:

C1, de-construction, demolition;
C2, transport to waste processing;
C3, waste processing for reuse, recovery and/or recycling;
C4, disposal, including provision and all transport, provision of all materials, products and related energy and water use.

Description of the scenarios and additional technical information for the end-of-life:

PARAMETER	VALUE (expressed per functional/declared unit)
Collection process specified by type	13.16 kg collected with mixed construction waste
Recovery system specified by type	none
Disposal specified by type	100% landfilled
Assumptions for scenario development (e.g. transportation)	On average, gypsum waste is transported 80 km to the landfill facility.

Reuse/recovery/recycling potential, D

Description of the stage: module D has not been taken into account.

LCA results

Description of the system boundary (X = Included in LCA, MNA = Module Not Assessed)

CML 2001 has been used as the impact model. Specific data has been supplied by the plant, and generic data come from GABI and Ecoinvent databases.
All emissions to air, water, and soil, and all materials and energy used have been included.

All figures refer to a declared unit of 1 m² of Rigips RF 15mm – Fireboard with a weight of 13.16 kg/m².

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY
Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	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	MNA

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 Disposal	
Global Warming Potential (GWP 100) - *kg CO_2 equiv/FU*	3,1E+00	2,6E-01	2,0E-01	0	0	0	0	0	0	0	6,0E-02	5,2E-02	0	2,1E-01	MNA
The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.															
Ozone Depletion (ODP) *kg CFC 11 equiv/FU*	3,2E-08	4,0E-17	1,6E-09	0	0	0	0	0	0	0	8,2E-18	1,3E-17	0	1,2E-15	MNA
Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life, This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules,															
Acidification potential (AP) *kg SO_2 equiv/FU*	7,2E-03	1,0E-03	5,1E-04	0	0	0	0	0	0	0	2,1E-04	2,1E-04	0	1,2E-03	MNA
Acid depositions have negative impacts on natural ecosystems and the man-made environment incl, buildings, The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport,															
Eutrophication potential (EP) *kg $(PO_4)^{3-}$ equiv/FU*	2,7E-03	2,5E-04	1,5E-04	0	0	0	0	0	0	0	1,2E-05	5,4E-05	0	1,4E-04	MNA
Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects,															
Photochemical ozone creation (POPC) *kg Ethylene equiv/FU*	3,6E-04	3,8E-05	6,5E-05	0	0	0	0	0	0	0	1,4E-05	8,7E-06	0	1,0E-04	MNA
Chemical reactions brought about by the 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 ressources (ADP-elements) - *kg Sb equiv/FU*	7,0E-06	3,4E-09	2,2E-06	0	0	0	0	0	0	0	1,5E-09	4,5E-09	0	7,3E-08	MNA
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	4,6E+01	3,6E+00	2,8E+00	0	0	0	0	0	0	0	7,5E-01	7,1E-01	0	2,9E+00	MNA
Consumption of non-renewable resources, thereby lowering their availability for future generations.															

RESOURCE USE

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 Disposal	
Use of renewable primary energy excluding renewable primary energy resources used as raw materials *MJ/FU*	1,94E+01	8,3E-02	1,2E+00	0	0	0	0	0	0	0	2,4E-03	4,2E-02	0	3,7E-01	MNA
Use of renewable primary energy used as raw materials *MJ/FU*	7,15E+00	0	3,4E-01	0	0	0	0	0	0	0	0	0	0	0	MNA
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	2,65E+01	8,3E-02	1,6E+00	0	0	0	0	0	0	0	2,4E-03	4,2E-02	0	3,7E-01	MNA
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	4,76E+01	3,6E+00	2,9E+00	0	0	0	0	0	0	0	7,5E-01	7,1E-01	0	3,0E+00	MNA
Use of non-renewable primary energy used as raw materials *MJ/FU*	2,10E+00	0	1,0E-01	0	0	0	0	0	0	0	0	0	0	0	MNA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	4,97E+01	3,6E+00	3,0E+00	0	0	0	0	0	0	0	7,5E-01	7,1E-01	0	3,0E+00	MNA
Use of secondary material *kg/FU*	1,23E-01	0	7,7E-03	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of renewable secondary fuels - *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of non-renewable secondary fuels - *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Use of net fresh water - *m^3/FU*	4,25E-02	2,8E-05	2,4E-03	0	0	0	0	0	0	0	4,5E-06	7,1E-05	0	7,4E-04	MNA

WASTE CATEGORIES

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 Disposal	
Hazardous waste disposed *kg/FU*	2,8E-05	1,3E-08	1,4E-06	0	0	0	0	0	0	0	9,2E-11	3,9E-08	0	5,0E-08	MNA
Non-hazardous (excluding inert) waste disposed *kg/FU*	2,5E-01	4,4E-05	7,0E-01	0	0	0	0	0	0	0	1,1E-04	6,0E-05	0	1,4E+01	MNA
Radioactive waste disposed *kg/FU*	7,2E-04	4,2E-06	5,0E-05	0	0	0	0	0	0	0	9,3E-07	1,5E-06	0	3,9E-05	MNA

OUTPUT FLOWS

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 Disposal	
Components for re-use *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Materials for recycling *kg/FU*	4,6E-02	0	4,5E-02	0	0	0	0	0	0	0	0	0	0	0	MNA
Materials for energy recovery *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA
Exported energy, detailed by energy carrier *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MNA

LCA results interpretation

The following figure refers to a declared unit of 1 m² of Rigips RF 15mm – Fireboard with a weight of 13.16 kg/m².

[1] This indicator corresponds to the abiotic depletion potential of fossil resources.

[2] This indicator corresponds to the total use of primary energy.

[3] This indicator corresponds to the use of net fresh water.

[4] This indicator corresponds to the sum of hazardous, non-hazardous and radioactive waste disposed.

Global Warming Potential (Climate Change) (GWP)

When analyzing the above figure for GWP, it can clearly be seen that the majority of contribution to this environmental impact is from the production modules (A1 – A3). This is primarily because the sources of greenhouse gas emissions are predominant in this part of the life cycle. CO_2 is generated upstream from the production of electricity and is also released on site by the combustion of natural gas. We can see that other sections of the life cycle also contribute to the GWP; however the production modules contribute to over 80% of the contribution. Combustion of fuel in transport vehicles will generate the second highest percentage of greenhouse gas emissions.

Non-renewable resources consumptions

We can see that the consumption of non – renewable resources is once more found to have the highest value in the production modules. This is because a large quantity of natural gas is consumed within the factory, and non – renewable fuels such as natural gas and coal are used to generate the large amount of electricity we use. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during transportation.

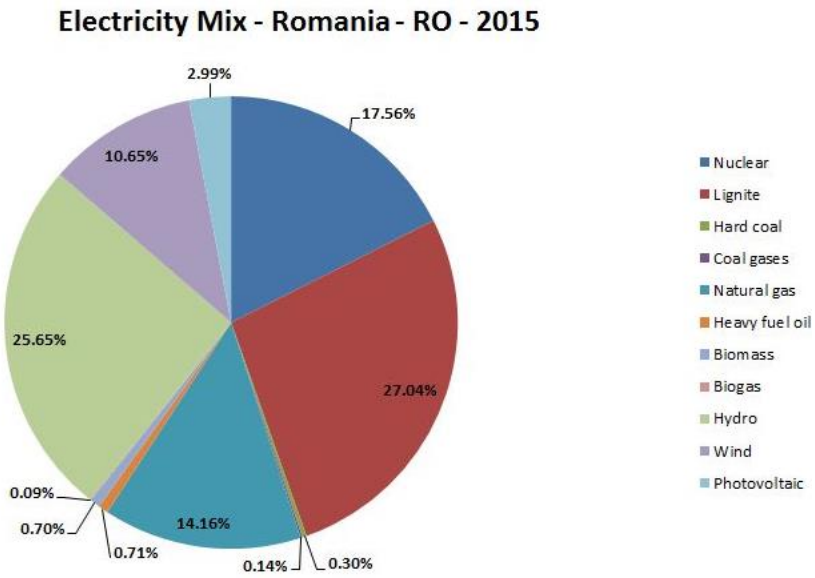
Energy Consumptions
As we can see, modules A1 – A3 have the highest contribution to total energy consumption. Energy in the form of electricity and natural gas is consumed in a vast quantity during the manufacture of plasterboard so we would expect the production modules to contribute the most to this impact category.
Water Consumption
Water is used within the manufacturing facility and therefore we see the highest contribution in the production phase. However, we recycle a lot of the water on site so the contribution is still relatively low. The second highest contribution occurs in the installation site due to the water used on the joint components.

Waste Production
Waste production does not follow the same trend as the above environmental impacts. The largest contributor is the end of life module. This is because the 100% of the product is assumed here to be sent to landfill once it reaches the end of life state. The very small impact associated with installation is due to the loss rate of product during implementation.

Additional information

Electricity description

TYPE OF INFORMATION	DESCRIPTION
Location	Representative of average production in Romania
Geographical representativeness description	Split of energy sources in Romania - Nuclear: 17.56% - Lignite: 27.04% - Hard coal: 0.30% - Coal gases: 0.14% - Natural gas: 14.16% - Heavy fuel oil: 0.71% - Biomass: 0.70% - Biogas: 0.09% - Hydro: 25.65 - Wind: 10.65% - Photovoltaic: 2.99%
Reference year	2016
Type of data set	Cradle to gate from Thinkstep database
Source	Gabi database v2020 from International Energy Agency -2015
CO_2 emission kg CO_2 eq. / kWh	0,462



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4. ISO 21930:2017 Sustainability in building construction – Environmental declaration of building products
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13. ISO 45001:2018 Occupational health and safety management systems. Requirements with guidance for use
14. EN ISO 50001:2018 Energy management systems. Requirements with guidance for use