ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

RF (DF) 12.5 mm Rigips Fire Protection Plasterboard

RFI (DFH2)12,5 mm Fire Protection and Impregnated Plasterboard

Date of validation: March 2020
Valid until: March 2025
Revision: 1

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.

N° VERIFICATION

3013EPD-20-0103

CERTIFIKAČNÍ ORGÁN PRO EPD VÚPS Certifikační společnost Výzkumný ústav pozemních staveb

Rigips SAINT-GOBAIN

1. General information

Manufacturer: Saint-Gobain Construction Products CZ, division Rigips
Smrčkova 2485/4, 180 00 Prague 8 – Libeň, Czech Republic, IČ: 25029673, DIČ: CZ25029673

About company: International company, enterprising in 64 countries, part of Saint-Gobain group, more then 190 000 employees. Subject of enterprise of Rigips division is to produce and sell plasterboards and its accesories for drywall constructions, acoustic ceiling systems, plasters and providing technical support for marketed solutions.

Programme used: National Eco-labelling Program. For more information see www.cenia.cz

EPD declaration number: 3013EPD-20-0103

PCR identification: EN 15804+A1 Sustainability of construction works – Environmental product declarations (Core rules for the product category of construction products).

Product/product family name and manufacturer represented: Fire Protection Plasterboard and Fire Protection and Impregnated Plasterboard manufactured by Saint-Gobain Construction Products CZ a.s., divison Rigips in Melnik- Horni Pocaply.

Date of validation: 03/2020

Valid until: 03/2025

Owner of the declaration: Saint-Gobain Construction Products CZ a.s., division Rigips, Horni Pocaply, 254, 277 03 Horni Pocaply, Czech Republic.

EPD prepared by: Lubos Nobilis, ECO trend s.r.o., Na Dolinach 128/36, 140 00 Prague 4

Scope: The LCA is based on 2018 production data for Melnik - Horni Pocaply manufacturing site in Czech Republic for 12.5mm RF and RFI Plasterboard. This EPD covers information modules A1 to C4 (cradle to grave) as defined in EN 15804+A1 for 12.5 mm RF and RFI Plasterboard sold and used in Czech Republic.

The functional unit is 1m2 of installed 12.5 mm thick RF and RFI Plasterboard.

CEN standard EN 15804 serves as the core PCR[a]

Independent verification of the declaration, according to EN ISO 14025:2010

☐ **Internal** ☒ **External**

Third party verifier[b]:
Mgr. Barbora Vlasatá
Building Research Institute – Certification Company Ltd.
Head od Certification Body for EPD
Pražská 16, 102 21 Praha 10 – Hostivař
Czech Republic

[a] Product Category Rules
[b] Optional for business-to-business communication; mandatory for business to consumer communication (see EN ISO 14025:2010, 9.4)

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

2. Product description

2.1 Product description

Rigips Fire Protection Plasterboard - RF (DF) provides significantly improved fire protection properties compared to a standard gypsum plasterboard. It shrinks less during a fire and sustains its basic properties better due to a thicker core reinforced with glass fibres, minerals and other additives for dimensional stability and improved core cohesion at high temperatures. It is available in 1200 mm and 1250 mm width for interior solutions.

Rigips Fire Protection and Impregnated Plasterboard – RFI (DFH) is plasterboard with controlled density and reduced water absorption designed for constructions with higher requirements for fire resistance and for areas with higher air humidity, eg bathrooms and showers.

For further details of the Rigips boards properties please see technical data sheet available from www.rigips.cz

2.2 Description of use

Rigips Fire Protection – RF (DF) is a 12,5; 15 and 18 mm thick plasterboard primarily used in interior building applications where normal to high levels of fire resistance is required and for protection to structural steel. It can be used in light weight building systems of 1-3 layers on steel or timber framing where normal structural strength and sound insulation are specified.

Rigips Fire Protection Impregnated Board - RFI (DFH2) is available in 12.5 and 15mm thicknesses and 1200 and 1250mm widths. The board is designed for interior use where it is necessary to achieve higher fire protection, in areas with higher air humidity (eg bathrooms, showers) and for protection of steel structures. Boards can be used in lightweight construction systems in 1-3 layers on steel or timber construction, with specified standard structural strength and sound insulation.

Installation according to Rigips installation instructions.

2.3 Placing on the market

UN CPC Code: 37530 Articles of plaster or of compositions based on plaster

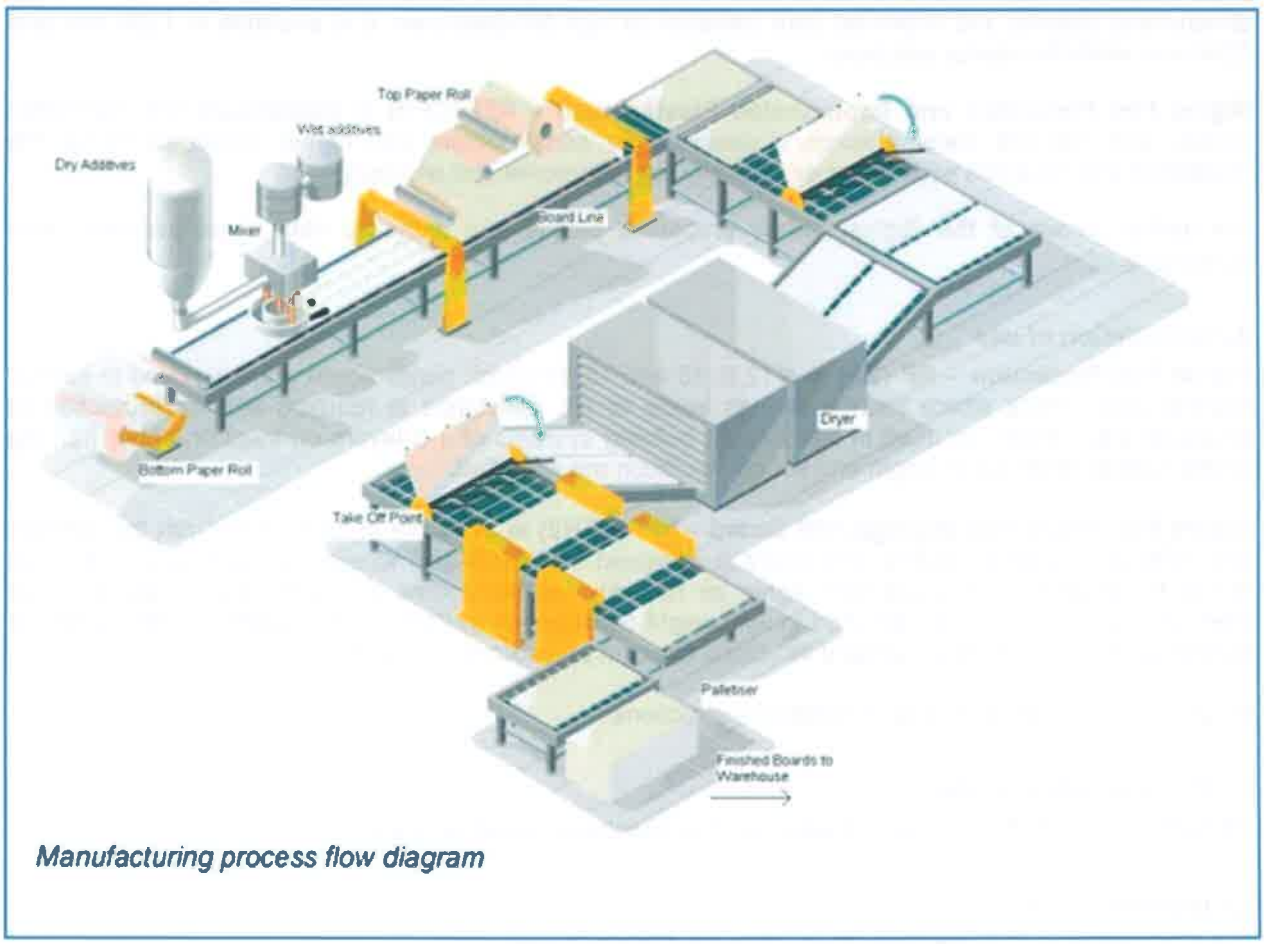
2.4 Delivery Status

The EPD refers to 12.5 mm thick Rigips Standard Plasterboard.

2.5 Base materials/ancillary materials – RF / RFI

Material	Part (%)	Quantity used in product (kg/m^2)	Substances of Very High Concern
Gypsum (from flue gas desulfurization)	89,55 / 88,90	9,89 / 10,12	
Paper liner	2,82 / 2,96	0,32 / 0,33	
Lignite ash	10,48 / 11,12	1,19 / 1,24	
Additives	0,01 / 0,02	0,07 / 0,13	No Substance of Very High Concern
Total	100 / 100	11,74 / 11,62	
At installation screws	8 pc	0,33	
At installation jointing compound	-	0,0005	
At installation jointing tape	-	0,001	

2.6 Manufacture



Manufacturing process flow diagram

Plasterboard is made up of a gypsum core, mixed with wet and dry additives and encased within paper liner.

2.7 Packaging

Wooden pallets, PE foil and PET tape are used for packaging for the distribution and transportation of plasterboards.

2.8 Reference service life

The Reference Service Life (RSL) of the Gypsum product is considered to be 50 years. In accordance with the Plasterboard is expected to last 50 years in a building with no maintenance, before be removed and replaced as part of refurbishment work. The Saint Gobain Methodological Guide for Construction Products sets out 50 years as the standard life expectancy of the board, to be used as the Reference Service Life in all Saint-Gobain Plasterboard EPD's, unless otherwise provided by an alternative PCR.

3. LCA calculation information

DECLARED UNIT	1m² of 12,5 mm thick installed board weighing 10,5 kg/m^2
SYSTEM BOUNDARIES	Cradle to Grave (RSL 50 years): Mandatory stages A1 – 3, B1 – 7, C1 – 4.
ESTIMATES AND ASSUMPTIONS	The electricity production module is country specific – (Czech Republic 2018). The transport model is based on real evidence and expert estimates. Recyclation of 14% product volume is modeled.
CUT-OFF RULES	All inputs and outputs to a (unit) process for which data is available are included in the calculation. In case of insufficient input data or data gaps for a unit process, the cut-off criteria is set at 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process.
BACKGROUND DATA	Background data used is of less than 10 years old wherever possible. Data modules are used from the Ecoinvent database.
DATA QUALITY	Specific data has been used for the processes Saint-Gobain Construction products CZ a.s., division Rigips has influence over. Generic data from Ecoinvent database has been used for the processes the company cannot influence.
PERIOD UNDER REVIEW	The data are representative of the manufacturing processes of 2018.
ALLOCATIONS	Production data has been calculated on a mass and square basis. The main input – gypsum from flue gas desulfurization was modelled on basis of economic value of thermal power plant operations.
COMPARABILITY	A comparison or an evaluation of EPD data is only possible where EN 15804 has been followed and the same building context and product specific characteristics of performance are taken into account and the same stages have been included in the system boundary. According to EN 15804, EPD of construction products may not be comparable if they do not comply with this standard.
GEOGRAPHICAL COVERAGE	Scope includes manufacture and sale in Czech Republic.

4. Life cycle stages

Flow diagram of the Life Cycle

Product stage, A1-A3

Description of the stage:

The product stage of the plasterboard products is subdivided into three modules: A1, A2 and A3 respectively "raw material supply", "transport" and "manufacturing".

A1, raw material supply

This includes raw material extraction and processing, processing of secondary material input (e.g. recycling processes) and energy.

A2, transport to the manufacturer

Raw materials are transported to the manufacturing site; this includes modelling of road, boat and or train transport (with average values) for each raw material.

A3, manufacturing

The module includes manufacture of product and packaging material. Waste processing up to the end-of–waste state or disposal of final residues during the product stage is also included.

Construction process stage, A4-A5

Description of the stage:

The construction process stage is divided into two modules: A4, transport to the building site and A5, installation of the product in the building.

A4, transport to the building site

The table below quantifies the parameters for transporting the product from production gate to the building site. The distance quoted is a weighted average, calculated using customer information and the quantity of product transported.

Transport to the building site:

PARAMETER	VALUE
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Average truck trailer with a 28t payload, diesel consumption 0,0356 kg/tkm, EURO V class
Distance	130 km
Capacity utilisation (including empty returns)	100 % of the capacity in volume 30 % of empty returns Due to the shape and nature of the plasterboard product it is easy to stack and therefore fits efficiently into the shape and space of a lorry container.
Bulk density of transported products	785 kg/m3
Volume capacity utilisation factor	1 (by default)

A5, installation into the building

The accompanying tab le quantifies the parameters for installing the product at the building site. All installation materials and their waste processing are included.

Installation in the building

PARAMETER	VALUE
Ancillary materials for installation (specified by material	0,33 kg Jointing compound, 1,23 m jointing tape (glass fibre), 8 screws (3,5x25 mm)
Water use	0,000165 m^3
Other resource use	None
Qualitative description of energy type (regional mix) and consumption during the installation process	None modelled
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	5 % (Gypsum product, jointing compound and jointing tape. It is assumed that there is no wastage of screws) 0,525 kg scrap plasterboard, and 0,0006 kg scrap jointing tape
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)	The packaging material is 80% separately collected and recycled. Gypsum waste is 14 % recycled and 86% landfilled Jointing tape waste is 100% landfilled
Direct emissions to ambient air, soil, water	None

These information modules also include all impacts and aspects related to any losses during this construction process stage (i.e. production, transport, and waste processing and disposal of the lost products and materials).

Use stage (excluding potential savings), B1-B7

Description of the stage:
The use stage is divided into the following:

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. Rigips plasterboard is a passive building product; therefore it has no impact at this stage.

End-of-life stage C1-C4

Description of the stage:
The end-of-life stage includes:

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.

The Gypsum product is on average 86 % landfilled and 14 % recycled at end of life

End-of-life:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	1,47 kg collected separately for recycling per 1 m^2 9,03 Kg collected with mixed construction waste per 1 m^2 Gypsum waste is collected and transported by truck for landfill and recycling.
Recovery system specified by type	14% (1,47 kg) recovered into other plasterboard products
Disposal specified by type	86% landfilled 9.03 kg for final deposition
Assumptions for scenario development (e.g. transportation)	Average truck trailer with a 28t payload, diesel consumption 0,0356 kg/tkm, EURO V class 180 km distance for recycling 50 km distance for landfilling

5. LCA results – Glasroc X/H/ 12.5mm

Description of the system boundary (X = included in the LCA, MND = Module Not Declared)

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	MND

ENVIRONMENTAL IMPACTS: per 1 m2 of 12,5 mm Rigips RF (DF)

Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 Manufacturing	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) - *kg CO2 equiv/FU*	2,9E+00	2,3E-01	1,1E-01	0	0	0	0	0	0	0	0	1,2E-01	5,2E-03	3,9E-02	MND
	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*	4,4E-07	4,2E-08	9,4E-09	0	0	0	0	0	0	0	0	2,2E-8	8,9E-10	1,5E-08	MND
	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 (chlorofluorocarbonsor halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) - *kg SO2 equiv/FU*	8,9E-03	8,2E-04	6,3E-04	0	0	0	0	0	0	0	0	4,3E-04	4,9E-05	3,4E-04	MND
	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 (PO4)3- equiv/FU*	1,4E-02	1,7E-04	2,1E-04	0	0	0	0	0	0	0	0	8,7E-05	1,1E-05	6,0E-05	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POCP) - *kg Ethylene equiv/FU*	7,0E-03	9,1E-04	5,1E-04	0	0	0	0	0	0	0	0	4,8E-04	6,8E-05	4,4E-04	MND
	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 resources (ADP-elements) - *kg Sb equiv/FU*	2,4E-06	6,2E-7	5,3E-07	0	0	0	0	0	0	0	0	3,2E-07	2,7E-09	4,4E-08	MND
Abiotic depletion potential for fossil resources (ADP-fossil fuels) - *MJ/FU*	4,1E+01	3,4E+00	1,3E+00	0	0	0	0	0	0	0	0	1,8E-00	7,5E-02	1,3E+00	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

ENVIRONMENTAL IMPACTS: per 1 m2 of 12,5 mm Rigips RFI (DFH2)

Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 Manufacturing	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) - *kg CO2 equiv/FU*	3,2E+00	2,3E-01	1,1E-01	0	0	0	0	0	0	0	0	1,2E-01	5,2E-03	3,9E-02	MND
	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*	5,0E-07	4,2E-08	9,4E-09	0	0	0	0	0	0	0	0	2,2E-8	8,9E-10	1,5E-08	MND
	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 (chlorofluorocarbonsor halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.														
Acidification potential (AP) - *kg SO2 equiv/FU*	9,9E-03	8,2E-04	6,3E-04	0	0	0	0	0	0	0	0	4,3E-04	4,9E-05	3,4E-04	MND
	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 (PO4)3- equiv/FU*	1,4E-02	1,7E-04	2,3E-04	0	0	0	0	0	0	0	0	8,7E-05	1,1E-05	6,2E-05	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POCP) - *kg Ethylene equiv/FU*	8,3E-03	9,1E-04	5,2E-04	0	0	0	0	0	0	0	0	4,8E-04	6,8E-05	4,4E-04	MND
	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 resources (ADP-elements) - *kg Sb equiv/FU*	2,9E-06	6,2E-7	5,3E-07	0	0	0	0	0	0	0	0	3,2E-07	2,7E-09	4,4E-08	MND
Abiotic depletion potential for fossil resources (ADP-fossil fuels) - *MJ/FU*	4,4E+01	3,4E+00	1,3E+00	0	0	0	0	0	0	0	0	1,8E-00	7,5E-02	1,3E+00	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESOURCE USE: per 1 m2 of 12,5 mm Rigips RF (DF)

Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 Manufacturing	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*	6.17E-01	1.36E-01	7.04E-04	0	0	0	0	0	0	0	0	7.13E-02	0	0	MND
Use of renewable primary energy used as raw materials *MJ/FU*	4.52E+00	0.00E+00	8.02E-04	0	0	0	0	0	0	0	0	0	0	0	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	5.13E+00	1.36E-01	1.51E-03	0	0	0	0	0	0	0	0	7.13E-02	0	0	MND
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	3.32E+01	3.41E+00	1.30E+00	0	0	0	0	0	0	0	0	1.78E+00	7.54E-02	1.26E+00	MND
Use of non-renewable primary energy used as raw materials *MJ/FU*	7.34E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	4.05E+01	3.41E+00	1.30E+00	0	0	0	0	0	0	0	0	1.78E+00	7.54E-02	1.26E+00	MND
Use of secondary material - *kg/FU*	1.12E+01	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Use of renewable secondary fuels – MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Use of non renewable secondary fuels – MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Use of net fresh water m^3/FU	1.65E-02	6.40E-04	1.02E-03	0	0	0	0	0	0	0	0	3.35E-04	2.68E-05	1.52E-03	MND

RESOURCE USE: per 1 m2 of 12,5 mm Rigips RFI (DFH2)															
	Product stage	Construction process stage		Use stage							End-of-life stage				
Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	A1 Raw material A2 Transport A3 Manufacturing	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	D Reuse, recovery, recycling
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	6.13E-01	1.36E-01	1.13E-03	0	0	0	0	0	0	0	0	7.13E-02	0	0	MND
Use of renewable primary energy used as raw materials *MJ/FU*	4.75E+00	0	1.57E-03	0	0	0	0	0	0	0	0	0	0	0	MND
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	5.37E+00	1.36E-01	2.70E-03	0	0	0	0	0	0	0	0	7.13E-02	0	0	MND
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	3.30E+01	3.41E+00	1.30E+00	0	0	0	0	0	0	0	0	1.78E+00	7.54E-02	1.26E+00	MND
Use of non-renewable primary energy used as raw materials *MJ/FU*	1.06E+01	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	4.36E+01	3.41E+00	1.30E+00	0	0	0	0	0	0	0	0	1.78E+00	7.54E-02	1.26E+00	MND
Use of secondary material - *kg/FU*	1.10E+01	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Use of renewable secondary fuels – MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Use of non renewable secondary fuels – MJ/FU	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND
Use of net fresh water m^3/FU	2.11E-02	6.40E-04	1.02E-03	0	0	0	0	0	0	0	0	3.35E-04	2.68E-05	1.52E-03	MND

WASTE CATEGORIES: per 1 m2 of 12,5 mm Rigips RF (DF)

Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 Manufacturing	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	1.33E-04	2.05E-06	3.40E-06	0	0	0	0	0	0	0	0	1.07E-06	4.99E-08	4.29E-07	MND
Non-hazardous waste disposed - kg / FU	3.05E-01	1.64E-01	1.00E+00	0	0	0	0	0	0	0	0	8.58E-02	1.47E+00	1.81E+01	MND
Radioactive waste disposed kg / FU	1.11E-04	2.34E-05	4.84E-06	0	0	0	0	0	0	0	0	1.22E-05	4.81E-07	8.82E-06	MND

WASTE CATEGORIES: per 1 m2 of 12,5 mm Rigips RFI (DFH2)

Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 Manufacturing	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	1.39E-04	2.05E-06	3.40E-06	0	0	0	0	0	0	0	0	1.07E-06	4.99E-08	4.29E-07	MND
Non-hazardous waste disposed - kg / FU	3.53E-01	1.64E-01	1.03E+00	0	0	0	0	0	0	0	0	8.58E-02	1.47E+00	1.81E+01	MND
Radioactive waste disposed kg / FU	1.23E-04	2.34E-05	4.85E-06	0	0	0	0	0	0	0	0	1.22E-05	4.81E-07	8.82E-06	MND

OUTPUT FLOWS: per 1 m2 of 12,5 mm Rigips RF (DF)

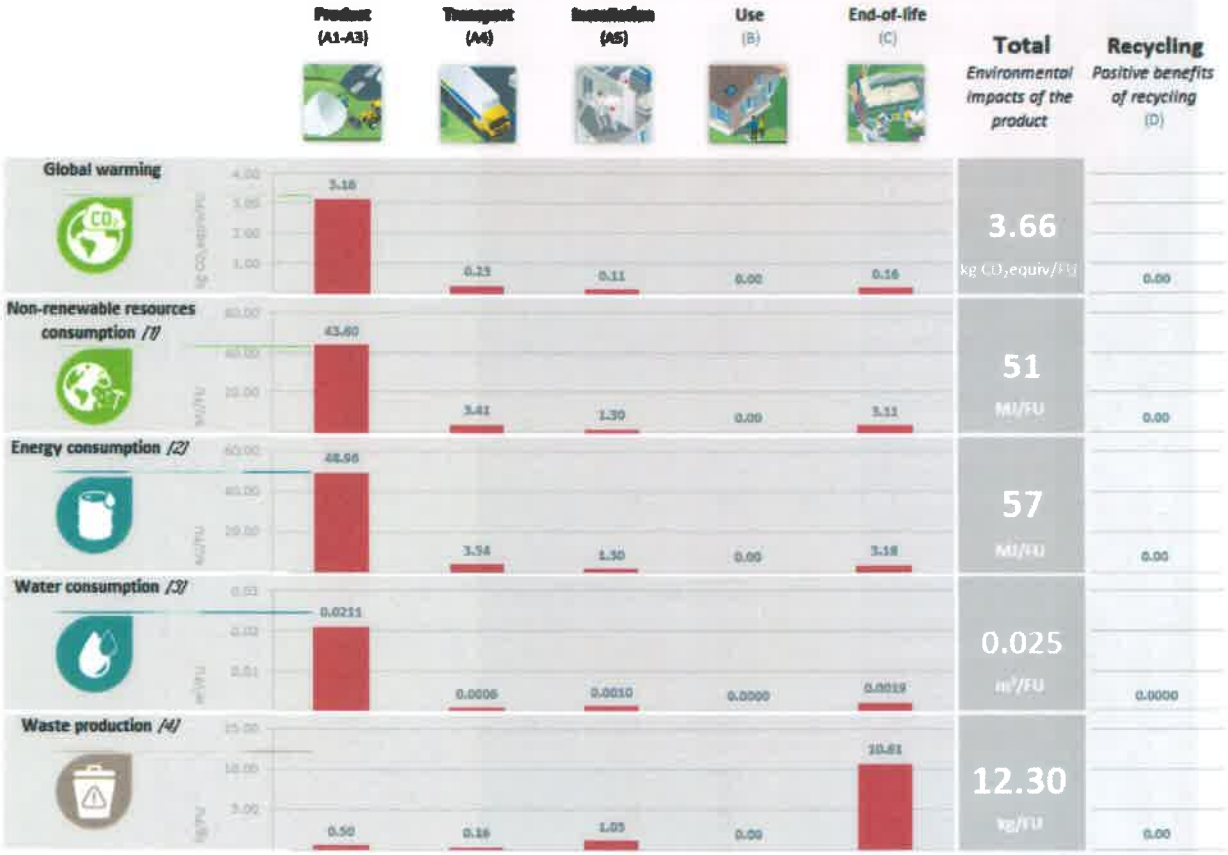
Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 Raw material A2 Transport A3 Manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 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	MND
Materials for recycling *kg/FU*	3.95E-03	0	7.36E-02	0	0	0	0	0	0	0	0	1.47E+00	0	0	MND
Materials for energy recovery *kg/FU*	0	0	8.35E-05	0	0	0	0	0	0	0	0	0	0	0	MND
Exported energy *MJ per energy carrier*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND

OUTPUT FLOWS: per 1 m2 of 12,5 mm Rigips RFI (DFH2)															
	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
Parameters per Declared unit of 1 m^2 installed 12.5 mm plasterboard	A1 Raw material A2 Transport A3 Manufacturing	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	MND
Materials for recycling *kg/FU*	3.95E-03	0	7.45E-02	0	0	0	0	0	0	0	0	1.47E+00	0	0	MND
Materials for energy recovery *kg/FU*	0	0	1.32E-02	0	0	0	0	0	0	0	0	0	0	0	MND
Exported energy *MJ per energy carrier*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	MND

6. LCA results interpretation

The image below demonstrates the impact of each life cycle stage on 5 key parameters, producing a **clear view of how each stage contributes to the overall environmental** impacts of 12.5 mm thick Rigips RF (DF).

Rigips RF (DF) results interpretation



[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.

7. Environmental contribution

The plant constantly works on increasing energy efficiency and environmental impact reduction. **ISO 9001, ISO 14001 implementation and WCM** (World class manufacturing programme) helps increase environmental efficiency.

The main fuel used for production of the boards is natural gas. It accounts for over 80 % of energy usage. Significant portion (600 kW) of waste heat from production is being recovered:

1. To be re-used it in production (e.g DSG preheating)
2. To heat up plant and adjacent offices (including hot utility water supply)

Benefit from use of waste heat is about 2 % savings

De Sulphurised Gypsum, the main raw material is by-product from flue gas desulphurization plant, which is part of near power station. This secondary product is transported from power station by about 800 m long belt conveyor system, it means, there is lower environmental impact from the transport.

Production methods maximize the use of water from local sources, such as borehole abstraction, which make up 97 % of production requirements. Less than 3 % of water is taken from the public network.

The plant makes wide range of the plasterboard products, so the need for transport from distant production facilities is minimized.

All the gypsum waste generated during production is directly recycled on the site, so no gypsum waste is landfilled.

VOC emissions

The standards used widely in Europe to evaluate VOC levels in plasterboard products are EN13419 & ISO 16000. Based upon indicative testing of a sample of plasterboard products, Rigips plasterboard is estimated not to contain a VOC content or Formaldehyde content which exceeds the requirements of European voluntary labeling schemes connected with indoor air quality.

8. References

EN 15804:2012+A1

Sustainability of construction works - Environmental Product declarations - Core rules for the product category of construction products

ISO 14025:2006

Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO 14040:2006

Environmental management – Life Cycle Assessment – Principles and framework

ISO 14044:2006

Environmental management – Life Cycle Assessment – Requirements and guidelines

Rules for National Eco-labelling programme, Ministry of the Environment of Czech Republic, 2017