ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804:2012+A2:2019 and ISO 14025:2006

RigiStabil (DFRIEH2) 12,5 mm

RigiStabil (DFRIEH2) Activ´Air® 12,5 mm

Date of issue: May 2017
Date of revision: May 2022
Valid until: May 2027
Version: 2

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-22-0390

CERTIFIKAČNÍ ORGÁN PRO EPD VÚPS Certifikační společnost Výzkumný ústav pozemních staveb

Rigips SAINT-GOBAIN

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, Ministry of the Environment of the Czech Republic, 2017. For more information see www.cenia.cz

EPD verification number: 3013EPD-22-0390

PCR identification: EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations (Core rules for the product category of construction products).

Product/product family name and manufacturer represented: RigiStabil (DFRIEH2) and RigiStabil (DFRIEH2) Activ´Air® manufactured by Saint-Gobain Construction Products CZ a.s., divison Rigips in Mělník - Horní Počaply.

Declaration verified/issued: 24.05. 2022

Valid until: 23.05.2027

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

EPD prepared by: Lubos Nobilis, Nesuchyně 12, 270 07, nobilis.lubos@gmail.com

Scope: The LCA is based on 2021 production data for Mělník - Horní Počaply manufacturing site in Czech Republic for 12.5mm RigiStabil (DFRIEH2). This EPD covers information modules A1-A3, C1-C4 and D (cradle to grave with options) as defined in EN 15804:2012+A2:2019 for 12.5 mm RigiStabil (DFRIEH2) plasterboard sold and used in Czech Republic and sold in EU countries, Switzerland and Turkey.

The functional unit is 1m² of installed 12.5 mm thick RigiStabil 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]:
Building Research Institute – Certification Company Ltd.
Pražská 16, 102 00 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+A2, 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.

Product description

Product description

Rigips **RigiStabil (DFRIEH2)** is a structural gypsum plasterboard type DFRIEH2 according to EN 520. RigiStabil is a plasterboard consisting of a special gypsum core reinforced with glass fibres and encased in strong paper liner.
The flexural strength and surface hardness is higher than standard plasterboard. RigiStabil plasterboard is fire resistant and impregnated.
Structural board RigiStabil is plasterboard as per EN 520 type DFRIEH2.
(D = controlled density, F = improved core adhesion at high temperatures, I = enhanced surface hardness, R = with enhanced strength, E = gypsum sheathing board, H2 = reduced water absorption rate).
Surface paper liner is of natural colour– light grey-beige. For easy identification even after the installation, the board name is printed in red colour on one of the long edges and on the face of the board along the other edge. RigiStabil is a 12,5 mm thick board, available in 1250 mm width.
RigiStabil is also available with Activ´Air® technology. **RigiStabil (DFRIEH2) Activ´Air®** plasterboards improve indoor air quality by using a unique technology to remove formaldehydes from the air and convert them into safe, inert compounds that, once captured in the board, cannot be released back into the air.

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

Description of use

Rigips **RigiStabil (DFRIEH2)** is hardened plasterboard for load bearing and non-load bearing constructions.

RigiStabil boards are characterized by high flexural strength and surface hardness, which is ideal for use in conditions where they may be exposed to intensive mechanical stress. The tests demonstrated the effectiveness of the board in statically load bearing frame wall structures, both for vertical and horizontal load for example in timber frame building.
RigiStabil boards are also suitable for dry floors, sheathing of elevator shafts and attack-resistant security systems.
RigiStabil boards can under certain conditions be used in the semi-exposed exterior application (i.e. walls and ceilings in the multi-storey garages, passageways, exposed soffits, eaves), direct exposure of sun and rain must be avoided.

Installation according to Rigips installation instructions.

Placing on the market

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

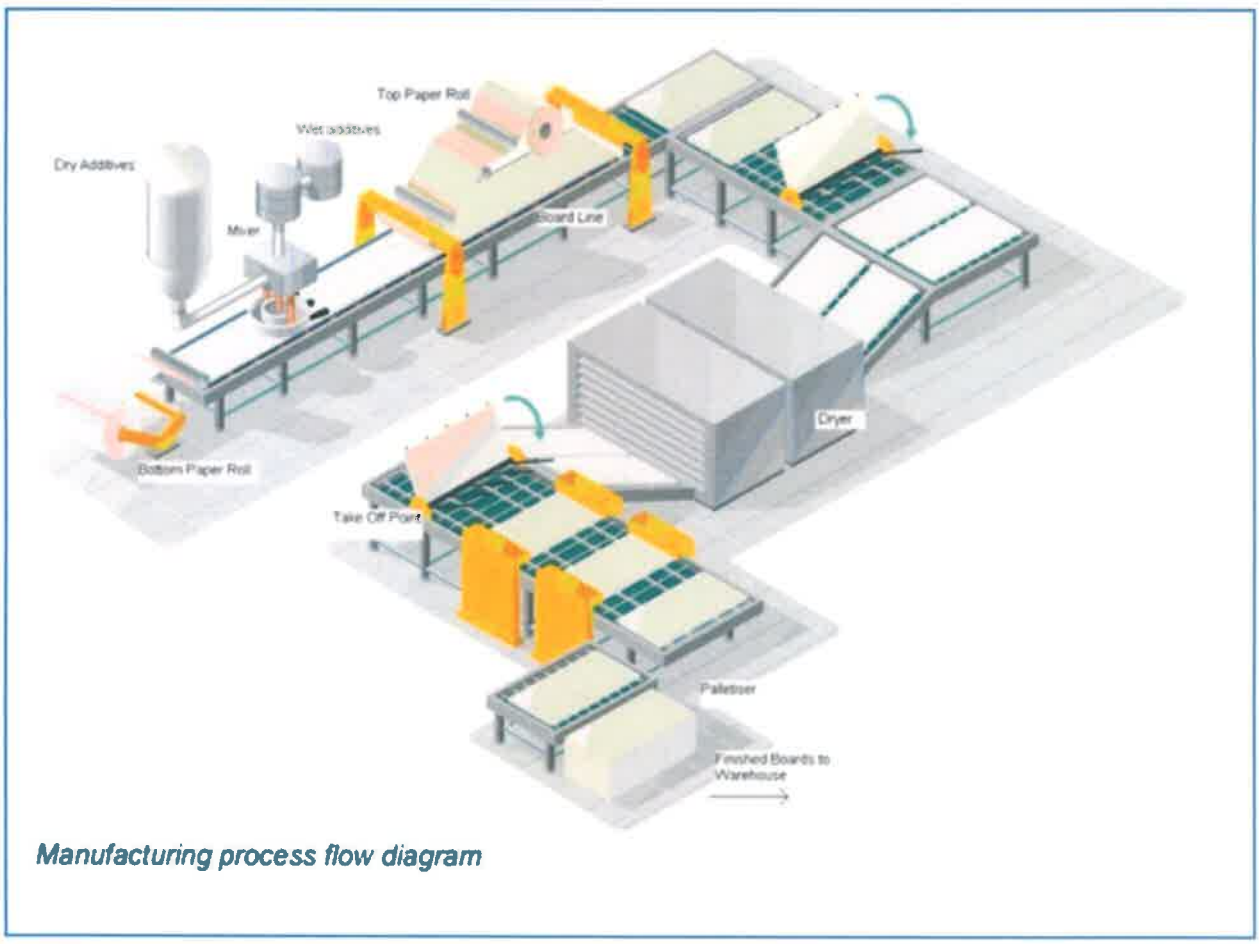
Delivery Status

The EPD refers to 12.5 mm thick Rigips RigiStabil and RigiStabil Activ´Air® Plasterboard.

Base materials/ancillary materials

Material	Part (%)	Substances of Very High Concern
Gypsum (from flue gas desulfurization)	84,4	No Substance of Very High Concern
Paper	3,5	
Ashes	9,4	
Additives	2,7	
Total	100	

Manufacture



Manufacturing process flow diagram

Plasterboard is made up of a gypsum core, mixed with wet and dry additives and encased within Paper or Glass fibre liner.

Packaging

Returnable and non-returnable wooden pallets are used for the packaging and transport of boards. The PE foil are use at the customer's request. For an average DU are used 0.02 g of PE foil and 28.2 g of non-returnable wooden pallets.

Reference service life

The expected reference life of the boards is 50 years without the need for maintenance. The Methodological Guide for Saint Gobain Construction Products sets 50 years as the standard board life, which is used within the EPD as the reference life for all plasterboards, unless otherwise specified by the relevant PCR.

LCA calculation information

DECLARED UNIT	1m² of non-installed board weighing 11,5 kg/m²
SYSTEM BOUNDARIES	Cradle to Grave with options (RSL 50 years): Mandatory stages A1 – A3, C1 – C4 and module D.
ESTIMATES AND ASSUMPTIONS	The electricity production module is country specific – (Czech Republic 2021). Some additives, which exactly data gaps for a unit process, in total amount of weight 0,5 %, were substituted by similar substances in the model.
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 v 3.8 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 has been used for the processes the company cannot influence, where present data modules have been used.
PERIOD UNDER REVIEW	The data are representative of the manufacturing processes of 2021.
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. According to ISO 21930, EPD might not be comparable if they are from different programs.
GEOGRAPHICAL COVERAGE	Scope includes manufacture and sale in Czech Republic, and sales in EU countries, Turkey and Switzerland.

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

The phases are not declared, due to the variable possibilities of using the boards (partitions, soffits, etc.) and the way they are installed (on wooden or steel grids, etc.) and transportation to customers.

Use stage, B1-B7

Phases are not declared, due to variable maintenance options. Plasterboards are by default a passive building element and in the phase of use they can only require painting renewal, for which the type of painting or the frequency of renewal is not specified.

End-of-life stage, C1-C4

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

C1, de-construction, demolition: is not calculated (is not significant and can be do in different place),

C2, transport to waste processing: is calculated as 50 km distance,

C3, waste processing for reuse, recovery and/or recycling; is calculated as recycling 70% of construction waste generated (downcycling),

C4, disposal: is calculated as placing 30% of the generated construction waste in a landfill

The ratio of recycling and landfilling of end-of-life products is based on the objectives of the Waste Management Plan of the Czech Republic 2015-2024.

End-of-life:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	8,05 kg collected separately for recycling per 1 m^2 3,45 Kg collected with mixed construction waste per 1 m^2 Approximately 10% of Gypsum waste is collected in Czech and transported by truck for landfill and recycling.
Recovery system specified by type	70% reused as construction material (downcycling) 8,05 kg for reuse
Disposal specified by type	30 % landfilled, 70 % recycled 3,45 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 50 km for reuse 50 km for landfilling

Benefits and loads beyond the system boundary, D

Beyond the boundaries of the system, it is assumed that 70% of the original product will be recycled. With regard to the nature of the product, however, its use as a full-fledged substitute for a construction product is not considered, but rather only as backfill, etc. material (downcycling). For this reason, benefits are not declared in phase D.

LCA results – RigiStabil 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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

CORE ENVIRONMENTAL IMPACTS: per 1 m2 of 12,5 mm Rigips RigiStabil											
Parameters per Declared unit of 1 m2 12.5 mm plasterboard	**Unit**	Product stage					End-of-life stage				
		A1 Raw material supply	A2 Transport	A3 Manufacturing	A4-A5 Construction	B1-B7 Use stage	C1 Deconstruction /demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Climate change	kg CO_2 eq	3.52E+00	1.81E-01	2.33E+00	MND	MND	0	1.04E-01	2.66E-02	1.49E-02	0
Climate change - Fossil	kg CO_2 eq	3.53E+00	1.81E-01	2.39E+00	MND	MND	0	1.04E-01	2.65E-02	1.48E-02	0
Climate change - Biogenic	kg CO_2 eq	-1.35E-02	6.20E-05	-5.41E-02	MND	MND	0	4.85E-05	5.07E-06	4.45E-05	0
Climate change - Land use and LU change	kg CO_2 eq	5.37E-03	3.79E-05	3.29E-05	MND	MND	0	3.99E-05	2.35E-06	3.43E-06	0
Ozone depletion	kg CFC11 eq	3.15E-05	2.92E-08	1.49E-09	MND	MND	0	2.35E-08	5.71E-09	7.20E-09	0
Acidification	mol H+ eq	1.87E-02	4.86E-04	8.52E-01	MND	MND	0	4.21E-04	2.77E-04	1.44E-04	0
Eutrophication, freshwater	kg P eq	2.86E-03	7.37E-06	3.27E-06	MND	MND	0	7.42E-06	9.09E-07	1.02E-06	0
Eutrophication, marine	kg N eq	3.88E-03	1.36E-04	9.63E-04	MND	MND	0	1.27E-04	1.22E-04	5.43E-05	0
Eutrophication, terrestrial	mol N eq	3.62E-02	1.48E-03	6.27E-03	MND	MND	0	1.38E-03	1.34E-03	5.96E-04	0
Photochemical ozone formation	kg NMVOC eq	1.05E-02	4.89E-04	2.55E-03	MND	MND	0	4.21E-04	3.68E-04	1.70E-04	0
Resource use, fossils	MJ	7.48E+01	2.76E+00	1.79E-01	MND	MND	0	1.55E+00	3.63E-01	4.76E-01	0
Resource use, minerals and metals	kg Sb eq	5.83E-05	2.27E-06	2.05E-07	MND	MND	0	2.53E-06	4.46E-08	1.39E-07	0
Water use	m^3 depriv.	8.45E-01	4.51E-03	1.10E-03	MND	MND	0	4.71E-03	5.21E-04	1.49E-03	0

ADDITIONAL CORE ENVIRONMENTAL IMPACTS: per 1 m2 of 12,5 mm Rigips RigiStabil											
Parameters per Declared unit of 1 m2 12.5 mm plasterboard	**Unit**	Fáze výroby					Konec životního cyklu				
		A1 Raw material supply	A2 Transport	A3 Manufacturing	A4-A5 Construction	B1-B7 Use stage	C1 Deconstruction /demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Particulate matter	disease inc.	9.93E-08	7.69E-09	2.29E-09	MND	MND	0	7.24E-09	3.92E-08	3.08E-09	0
Human toxicity, non-cancer	CTUh	6.69E-08	1.48E-09	2.53E-10	MND	MND	0	1.34E-09	1.87E-10	1.43E-10	0
Human toxicity, cancer	CTUh	1.73E-09	3.45E-11	2.32E-11	MND	MND	0	3.07E-11	6.63E-12	4.87E-12	0
Ecotoxicity, freshwater	CTUe	1.19E+02	1.67E+00	3.95E-01	MND	MND	0	1.24E+00	2.18E-01	2.63E-01	0
Land use	Pt	1.72E+02	1.42E+00	4.88E+00	MND	MND	0	1.54E+00	7.85E-02	1.08E+00	0
Ionising radiation	kBq U-235 eq	5.97E-01	7.46E-03	1.00E-03	MND	MND	0	8.08E-03	1.66E-03	2.36E-03	0

RESOURCE USE: per 1 m2 of 12,5 mm Rigips RigiStabil											
Parameters per Declared unit of 1 m2 12.5 mm plasterboard	**Unit**	Product stage			A4-A5 Construction	B1-B7 Use stage	End-of-life stage				D Reuse, recovery, recycling
		A1 Raw material supply	A2 Transport	A3 Manufacturing			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/DU	4.82E+00	2.24E-02	6.70E-01	MND	MND	0	2.34E-02	2.04E-03	7.48E-03	0
Use of renewable primary energy used as raw materials	MJ/DU	0.00E+00	0.00E+00	0.00E+00	MND	MND	0	0.00E+00	0.00E+00	0.00E+00	0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ/DU	4.82E+00	2.24E-02	6.70E-01	MND	MND	0	2.34E-02	2.04E-03	7.48E-03	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ/DU	8.14E+01	2.99E+00	1.91E-01	MND	MND	0	1.65E+00	3.86E-01	5.06E-01	0
Use of non-renewable primary energy used as raw materials	MJ/DU	0.00E+00	0.00E+00	0.00E+00	MND	MND	0	0.00E+00	0.00E+00	0.00E+00	0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ/DU	8.14E+01	2.99E+00	1.91E-01	MND	MND	0	1.65E+00	3.86E-01	5.06E-01	0
Use of secondary material	*kg/DU*	1.20E+01	0.00E+00	0.00E+00	MND	MND	0	0.00E+00	0.00E+00	0.00E+00	0
Use of renewable secondary fuels	MJ/DU	0.00E+00	0.00E+00	0.00E+00	MND	MND	0	0.00E+00	0.00E+00	0.00E+00	0
Use of non renewable secondary fuels –	MJ/DU	0.00E+00	0.00E+00	0.00E+00	MND	MND	0	0.00E+00	0.00E+00	0.00E+00	0
Use of net fresh water	*m^3/DU*	8.45E-01	4.51E-03	1.10E-03	MND	MND	0	4.71E-03	5.21E-04	1.49E-03	0

WASTE CATEGORIES: per 1 m2 of 12,5 mm Rigips RigiStabil											
Parametry na deklarovanou jednotku – 1 m² sádrokartonové desky, tloušťky 12.5 mm	**Unit**	Product stage			A4-A5 Construction	B1-B7 Use stage	End-of-life stage				D Reuse, recovery, recycling
		A1 Raw material supply	A2 Transport	A3 Manufacturing			C1 Deconstruction /demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed	kg/DU	1.83E-04	1.72E-04	4.61E-06	MND	MND	0	3.82E-07	4.00E-06	9.85E-07	0
Non-hazardous waste disposed	kg/DU	4.17E+00	4.64E-01	6.66E-02	MND	MND	0	1.21E-01	7.45E-02	4.65E-04	0
Radioactive waste disposed	kg/DU	1.92E-04	1.65E-04	9.65E-06	MND	MND	0	7.11E-07	1.06E-05	2.53E-06	0

OUTPUT FLOWS: per 1 m2 of 12,5 mm Rigips RigiStabil											
Parametry na deklarovanou jednotku – 1 m² sádrokartonové desky, tloušťky 12.5 mm	**Unit**	Product stage			A4-A5 Construction	B1-B7 Use stage	End-of-life stage				D Reuse, recovery, recycling
		A1 Raw material supply	A2 Transport	A3 Manufacturing			C1 Deconstruction /demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Components for re-use	kg/DU	0	0	0	MND	MND	0	0	0	0	0
Materials for recycling	kg/DU	0	0	4.02E-03	MND	MND	0	0	0	8.40E+00	0
Materials for energy recovery	kg/DU	0	0	4.00E-04	MND	MND	0	0	0	0	0
Exported energy	MJ/energy carrier	0	0	0	MND	MND	0	0	0	0	

BIOGENIC CARBON CONTENT: per 1 m^2 of 12,5 mm Rigips RigiStabil	
Biogenic carbon content in product	0,18 kg (surface paper)
Biogenic carbon content in accompanying packaging	0,01 kg (non-returnable pallets)
NOTE 1 kg biogenic carbon is equivalent 44/12 kg CO_2	

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 RigiStabil Plasterboard.

RigiStabil 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.

It is clear from the figure that the phase of extraction and preparation of inputs for production mainly contributes to the results of the assessment of the above-mentioned parameters.

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. More information can be found on the producer's website: https://www.rigips.cz/dokumentace/certifikaty+iso.

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.

References

Rules for National Eco-labelling programme, Ministry of the Environment of Czech Republic, 2007

EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products

ISO 21930:2017 Sustainability in building construction – Environmental declaration of building 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

European Chemical Agency, Candidate List of substances of very high concern for Authorization. https://echa.europa.eu/candidate-list-table

Ecoinvent LCI database, v3.8, 2021, https://ecoinvent.org/