Environmental Product Declaration

In accordance with EN 15804 and ISO 14025

Glasroc® F FireCase 15mm

Publication Date:	21.05.2014
Validity:	5 years
Revision Date:	20.10.2021
Valid Until:	25.02.2026
Version:	2
Geographical Scope:	United Kingdom

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

The International EPD® System Registration Number: S-P-00471

1. General information

Manufacturer: Saint-Gobain Construction Products UK Limited trading as British Gypsum
Programme used: International EPD System **http://www.environdec.com/**
EPD registration number/declaration number: S-P-00471
PCR identification: The International EPD® System PCR 2012:01 version 2.33 for Construction Products and CPC 54 construction services. And with reference to Institut Bauen und Umwelt e.V., Königswinter (pub.): Product Category Rules for Building-Related Products and Services from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part B: Requirements on the EPD for Plasterboard. Version 1.7, January 2019 and CPC 54 construction services.
Site of manufacture: The production site is Sherburn in Elmet
Owner of the declaration: Saint-Gobain House, East Leake, Loughborough, Leicestershire, LE12 6JU, UK
Product / product family name and manufacturer represented: Glasroc F FireCase 15mm
Publication Date: 21-05-2014
Revision date: 20-10-2021
Valid until: 25-02-2026
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: Yves COQUELET, Sustainability Analyst, Saint-Gobain and Tom Wire, (Systems Project coordinator)
Contact: bgtechnicalenquiries@bpb.com
Scope: The LCA is based on 2019 production data for one site in the United Kingdom
This EPD covers information modules A1 to C4 + module D (cradle to grave) as defined in EN 15804:2012

Declaration of Hazardous substances: (Candidate list of Substances of Very High Concern): Not higher than 0.1% of the weight of the product.

Environmental management systems in place at site:	ISO 14001:2015 Certificate number EMS 543324
Occupational Health and Safety Management:	ISO 45001:2018 Certificate number OHS 550586
Quality management systems in place at site:	ISO 9001:2015 Certificate number FM 550533
Responsible Sourcing of Construction Products:	BES 6001: Issue 3.1 certificate number BES 613170
Energy Management System:	ISO 50001:2018 Certificate number ENMS 606206
Geographical scope of the EPD®:	United Kingdom

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

2. Product description

2.1 Product description:

Glasroc F FireCase 15mm is a high performance, Class A1, non-combustible glass reinforced gypsum board.

2.2 Application

Use it as part of the FireCase frameless structural steel encasement system and the GypLyner Encase system. This product is also suitable for installation in semi-exposed areas before the building envelope is complete.

2.3 Technical data

Glasroc F FireCase 15mm conforms to EN 15283-1:2008+A1:2009, Gypsum boards with fibrous reinforcement – Definitions, requirements and test methods.

Type GM: Gypsum boards with mat reinforcement.

Type F: Gypsum boards with mat reinforcement with improved core adhesion at high temperature.

Type H1: Gypsum boards with mat reinforcement with reduced water absorption rate.

EN Classification	GM-F GM-H1
Nominal Density	The assumed density is 952 kg/m³ (14.28kg/m²) of Glasroc F FireCase 15mm
Thermal Conductivity	0.30 W/mK
Shear Strength	NPD
Water Vapour Resistance	10μ
Class Of Reaction To Fire Performance	A1

2.4 Delivery status

The EPD refers to Glasroc F FireCase 15mm.

2.5 Base materials/Ancillary materials

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

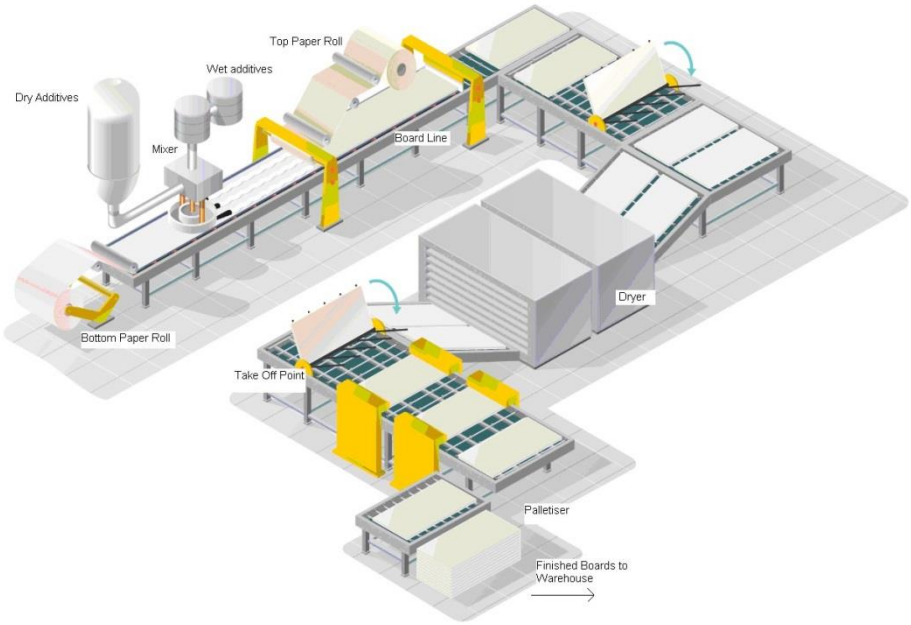
Parameter	Part	Quantity (kg/FU)
Gypsum	94.2%	13.45
Glass Fibre Tissue	1.0%	0.144
Additives	4.8%	0.685
Total	**100%**	**14.28**
Packaging: Wooden Pallet	0.173 kg per m^2 board	0.17
At Installation: Screws	8 per m^2 board	0.015
At Installation: Jointing Compound	0.33 kg per m^2 board	0.35
At Installation: Jointing Tape	1.23 m per m^2 board	0.00063

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 program operator do not make any claim nor have any responsibility of the legality of the product.

2.6 Manufacture

Glasroc F FireCase 15mm is manufactured using a continuous production process.

Manufacturing process flow diagram



The initial materials are homogenously mixed to form a gypsum slurry that is spread via hose outlets onto a glass fiber mat on a moving belt conveyor. A second glass fiber mat is fed onto the production line from above to form the plasterboard. The plasterboard continues along the production line where it is finished, dried, and cut to size.

Construction waste from A5 stage is recycled back into the manufacturing process wherever possible.

British Gypsum plants are managed through ISO 9001:2015 Certificate number FM 550533 certified Quality Management Systems.

2.7 Environment and health during manufacture

At British Gypsum, Health and Safety is a core value. The Company's aim is always to be injury-free. A target of zero accidents at work for employees, visitors and contractors is set by the business.

British Gypsum is managed to ISO 45001:2018 Certificate number OHS 550586 Occupational Health and Safety Management Systems. To ensure that the Company's objectives are achieved, documented safety management systems are employed at each operational site and within the central functions. These include a systematic identification of hazards, assessment of the risks and the development of safe systems of work to eliminate or reduce any risks to an acceptable level. Audits and inspections are used to monitor standards of safety management, adherence to the law and Company procedures.

British Gypsum plants are managed through ISO 14001:2015 Certificate number EMS 543324 certified Environmental Management Systems. Saint-Gobain believes that climate change is one of the major threats to this generation and future generations. The organisation is committed to being part of the solution and consider two important distinct areas: Firstly, to reduce carbon emissions which come from buildings, in particular as they are used. It is currently estimated that between 35-40% of total UK & Irish greenhouse gas emissions come from buildings; and secondly, in reducing direct and indirect emissions which come from the operational footprint and activities.

The building sector produces one third of solid waste each year, and consumes half of Europe's natural resources. Moving away from a culture of take-use-dispose is one of the biggest challenges construction faces, and one of the biggest opportunities. To embrace a circular economy in construction action is needed in a number of areas, in particular: Focussing on deconstruction – not demolition, encouraging selective sorting of waste streams, moving away from landfill – including government legislation to make landfilling waste the least attractive option, training and education of contractors and other construction professionals, and making much greater use of secondary resources.

2.8 Product processing/Installation

General
It is important to observe appropriate health and safety legislation when working on site, i.e. personal protective clothing and equipment, etc. The following notes are intended as general guidance only. In practice, consideration must be given to design criteria requiring specific project solutions.

Handling
Please refer to the HSE Manual Handling Operations Regulation for best practice guidance when handling or installing this product.

Cutting
Either cut the board with a plasterboard saw, or score the front face with a sharp knife, snap it over a straightedge. Cut holes for things like socket boxes using a utility saw.

Fixing
Fix the board with the decorative side facing outwards. Install fixings at least 13mm from cut edges and ends. Stagger horizontal and vertical joints between layers by at least 600mm.

2.9 Packaging

Glasroc F FireCase is supplied reusable wooden pallet.

2.10 Condition of use

When installed in accordance with British Gypsum recommendations, Glasroc F FireCase maintains its mechanical and physical properties for its entire useful life. Direct contact with water should be avoided.

2.11 Environment and health during use

Glasroc F FireCase is not classified as hazardous please refer to the SDS at www.british-gypsum.com/literature/safety-data-sheets

2.12 Reference service life

Glasroc F FireCase is expected to last the service life of a building 50 years.

2.13 Extraordinary effects

Fire
Plasterboard linings provide good fire protection owing to the unique behaviour of the non-combustible gypsum core when subjected to high temperatures. For the purposes of the national Building Regulations, Glasroc F FireCase is designated A1 in accordance with BS EN 13501-1:2007 + A1:2009.

Water
Glasroc F FireCase is unsuitable for use in areas subject to continuously damp or humid conditions and must not be used to isolate dampness. Plasterboards are not suitable for use in temperatures above 49°C, but can be subjected to freezing conditions without risk of damage.

Mechanical destruction
Glasroc F FireCase is intended for commercial applications and is a stable product with no significant adverse environmental effects. The products should be installed according to British Gypsum's installation guidelines.

2.14 Re-use phase

Glasroc F FireCase can be recycled through British Gypsum's dedicated Plasterboard Recycling Service: 0800 6335040, bgprs@saint-gobain.com

2.15 Disposal

Recycling of the product through British Gypsum's dedicated Plasterboard Recycling Service is strongly recommended. If a container of gypsum is sent to landfill, it must be deposited in a separate Monocell. The European waste catalogue code is 17 08 02.

2.16 Further information

British Gypsum, East Leake, Loughborough, Leicestershire, LE12 6HX
bgtechnicalenquiries@bpb.com

3. LCA calculation information

	EPD Type Declared	Cradle to Grave
3.1	**Declared Unit**	The declared unit is 1m^2 of Glasroc F FireCase 15mm. The assumed density is 852 kg/m^3 (14.28 kg/m^2).
3.2	**System Boundaries**	Cradle to Gate: stages A1 – A3, A4 – A5, B1 – 7, C1 – 4 and Module D
3.3	**Estimates And Assumptions**	Primary data was gathered from one production site in the UK. The distance to a waste disposal site is assumed to be 32km. The end of life and installation waste handling is taken from the Environment Agency's draft report 'An investigation into the disposal and recovery of gypsum waste'.
3.4	**Cut-Off Criteria**	Life Cycle Inventory data for a minimum of 99% of total inflows to the upstream and core module shall be included.
3.5	**Background Data**	All primary product data was provided by British Gypsum. All secondary data was retrieved using Gabi LCA software using Ecoinvent 3.1 (July 2014) and the Thinkstep Construction Products databases.
3.6	**Data Quality**	Primary data was gathered from British Gypsum production figures from one site in the United Kingdom during the production period 2019. A 2019 fuel mix for electricity usage in the UK was assumed for the production sites.
3.7	**Period Under Review**	The data is representative of the manufacturing processes of 2019.
3.8	**Allocations**	All production, recycling, energy and waste data has been calculated on a mass basis.
3.9	**Comparability**	EPD of construction products may not be comparable if they do not comply with EN15804.

4. Life cycle stages

Flow diagram of the Life Cycle

Product stage, A1-A3

Description of the stage: the product stage of plasterboard products is subdivided into three 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.

The LCA calculation has been made taking into account the fact that British Gypsum purchase 100% renewable electricity. The origin of the renewable electricity status is evidenced by Guarantee of Origin certificates (GOs), valid for the period chosen in the calculation (2018).

Construction process stage, A4-A5

Description of the stage: the construction process is divided into two 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. The distance quoted is a weighted average from the production site to the building site, calculated using post codes of our customers and quantity of product travelled.

Parameter	Value (expressed per FU)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	44 tonne articulated large goods vehicle (including payload of 24 tonnes) Diesel consumption 38 litres per 100 km travelled
Distance	Truck: 240 km
Capacity utilisation (including empty returns)	100% Capacity (89% empty returns)
Bulk density of transported products	952 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.
Figures quoted in the table are based on the Environment Agency's draft report 'An investigation into the disposal and recovery of gypsum waste'. This states that 83% of construction and demolition waste is sent to landfill with the remaining 17% recycled. British Gypsum encourages recycling construction waste. Construction sites use waste handlers, although we do not have representative data of how construction waste is dealt with. The figures quoted in the table are therefore likely to be a 'worst case scenario'.

Parameter	Value (expressed per FU)
Ancillary materials for installation (specified by materials)	Jointing Compound 0.33 kg Joining Tape 0.00063 kg Screws 0.010 kg
Water use	0.03 litres/m²
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: 0.714 kg (5 %) Jointing Compound: 0.0165 kg Jointing Tape: 0.00003 kg Wooden Pallet: 0.24 kg Screws: 0 kg
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)	Glasroc F FireCase 15mm: 0.714 kg to landfill Jointing Compound: 0.035 kg to landfill Jointing Tape: 0.000063 kg to landfill Pallet: 0.24 kg 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.

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 FU)
Collection process specified by type	14.81 kg collected with mixed de-construction and demolition waste to landfill
Recovery system specified by type	0 kg for recycling
Disposal specified by type	14.81 kg to landfill
Assumptions for scenario development (e.g. transportation)	44 tonne articulated large goods vehicle (including payload of 24 tonnes) Diesel consumption 38 litres per 100 km travelled 32 km from construction/demolition site to waste handler

Reuse/recovery/recycling potential, D

Description of the stage: An end of life recycling rate of 17% has been assumed using the Environment Agency's draft report 'An investigation into the disposal and recovery of gypsum waste'. Figures displayed in Module D account for this recycling.

5. LCA results

Description of the system boundary (X = Included in LCA).

CML 2001 has been used as the impact model. Specific data has been supplied by the plant, and generic data comes 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 installed plasterboard with a weight of 14.28 kg/m² and a density of 852 kg/m³ and with a specified function and an expected average service life of 50 years.

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	X

Environmental Impacts

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy	B7 Operational water	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Global Warming Potential (GWP 100) - *kg CO_2 equiv./FU*	3,73E+00	1,93E-01	2,57E-01	0	0	0	0	0	0	0	6,49E-02	7,07E-02	0	2,31E-01	0
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*	1,72E-07	2,95E-17	8,60E-09	0	0	0	0	0	0	0	8,84E-18	1,75E-17	0	1,29E-15	0
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*	1,24E-02	7,71E-04	7,93E-04	0	0	0	0	0	0	0	2,28E-04	2,86E-04	0	1,32E-03	0
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*	6,62E-03	1,88E-04	3,54E-04	0	0	0	0	0	0	0	1,33E-05	7,28E-05	0	1,50E-04	0
Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.															
Photochemical ozone creation (POPC) *kg Ethylene equiv./FU*	5,87E-04	2,82E-05	1,07E-04	0	0	0	0	0	0	0	1,53E-05	1,17E-05	0	1,09E-04	0
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*	1,38E-05	2,57E-09	2,59E-06	0	0	0	0	0	0	0	1,61E-09	6,13E-09	0	7,86E-08	0
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	6,05E+01	2,69E+00	3,92E+00	0	0	0	0	0	0	0	8,08E-01	9,55E-01	0	3,08E+00	0
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*	1,45E+01	6,18E-02	8,39E-01	0	0	0	0	0	0	0	2,63E-03	5,70E-02	0	4,05E-01	0
Use of renewable primary energy used as raw materials *MJ/FU*	2,77E-01	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	1,48E+01	6,18E-02	8,39E-01	0	0	0	0	0	0	0	2,63E-03	5,70E-02	0	4,05E-01	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	6,32E+01	2,70E+00	4,25E+00	0	0	0	0	0	0	0	8,11E-01	9,60E-01	0	3,19E+00	0
Use of non-renewable primary energy used as raw materials *MJ/FU*	3,13E+00	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - *MJ/FU*	6,63E+01	2,70E+00	4,25E+00	0	0	0	0	0	0	0	8,11E-01	9,60E-01	0	3,19E+00	0
Use of secondary material *kg/FU*	0	0	2,34E-04	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels - *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of non-renewable secondary fuels - *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Use of net fresh water - *m³/FU*	6,04E-02	2,06E-05	3,40E-03	0	0	0	0	0	0	0	4,83E-06	9,61E-05	0	8,02E-04	0

Waste Categories

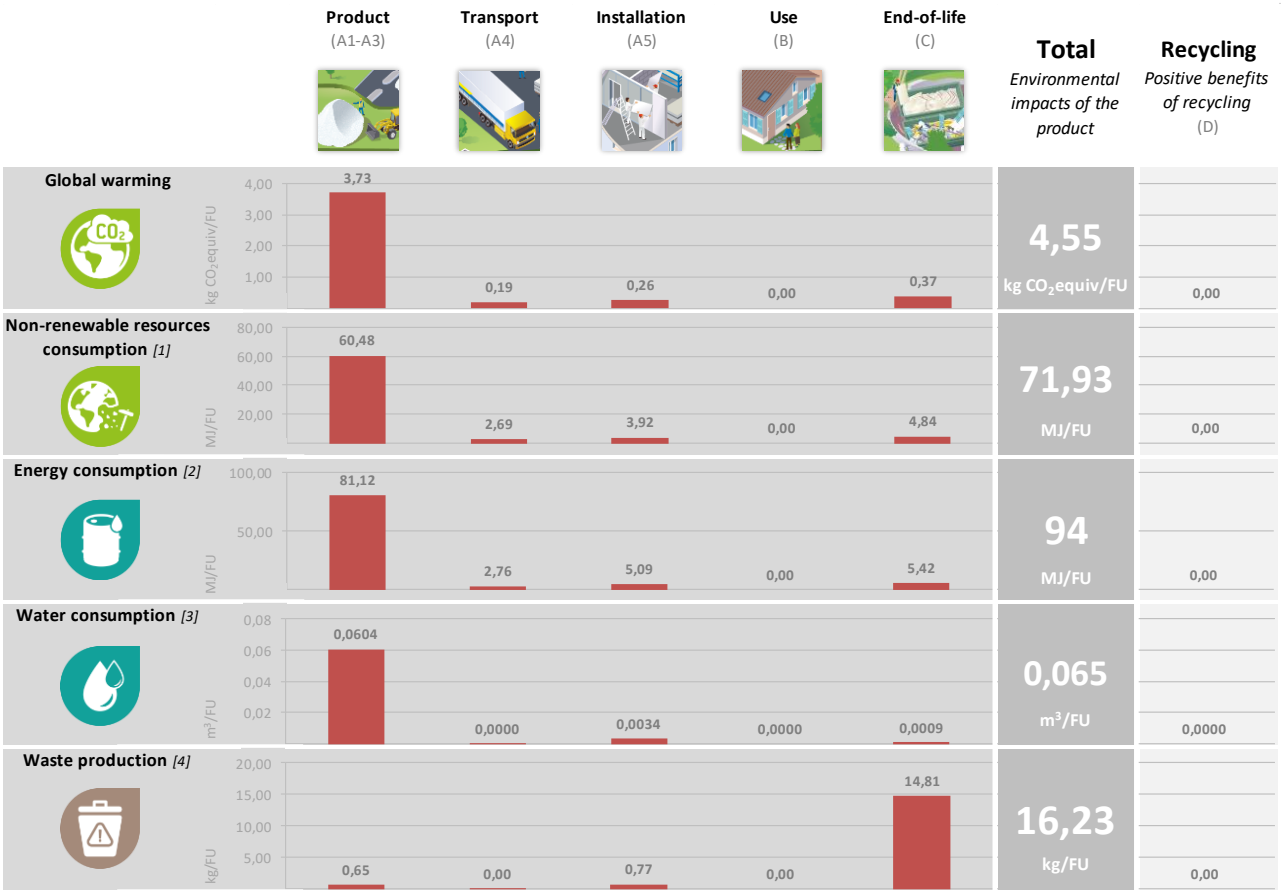
Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				D Reuse, recovery, recycling
	A1 / A2 / A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	
Hazardous waste disposed *kg/FU*	4,41E-08	9,67E-09	8,19E-09	0	0	0	0	0	0	0	9,99E-11	5,33E-08	0	5,43E-08	0
Non-hazardous (excluding inert) waste disposed *kg/FU*	6,45E-01	3,27E-05	7,73E-01	0	0	0	0	0	0	0	1,19E-04	8,09E-05	0	1,48E+01	0
Radioactive waste disposed *kg/FU*	7,04E-05	3,15E-06	1,59E-05	0	0	0	0	0	0	0	1,00E-06	1,97E-06	0	4,23E-05	0

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	0
Materials for recycling *kg/FU*	1,55E-02	0	3,72E-01	0	0	0	0	0	0	0	0	0	0	0	0
Materials for energy recovery *kg/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Exported energy, detailed by energy carrier *MJ/FU*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

6. LCA results interpretation

The following figure refers to a declared unit of 1 m² installed building plasterboard with an expected average service life of 50 years.



[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 (approximately 80%) of contribution to this environmental impact is from the production modules (A1 – A3). CO_2 is released on site by the combustion of natural gas. Installation (A5) will generate the second highest percentage of greenhouse gas emissions primarily due to the use of jointing materials at this stage.

Non-renewable resources consumptions
We can see for consumption of non – renewable resources that the majority of contribution to this environmental impact is from the production modules (A1 – A3). This is because a large quantity of natural gas is consumed within the factory. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during installation (A5).

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. However, British Gypsum buy renewable electricity so there is no impact from this in non-renewable resources consumption.

Water Consumption
Water is used within the manufacturing facility and therefore we see the highest contribution in the production phase. However, British Gypsum's production methods maximise the use of recovered water, such as mine-water and leachate. Water abstracted from boreholes and reservoirs is also utilised so that water withdrawn from the public network is relatively low. The second highest contribution occurs in the installation site due to the water used in the jointing 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 83% of the product is assumed to be sent to landfill once it reaches the end of life state. The remaining 17% is recycled. The very small impact associated with installation is due to the loss rate of product during implementation.

7. Additional information

Thickness conversion factor
This EPD includes figures for Glasroc F FireCase 15mm. For others thicknesses, from 20 to 30 mm, a multiplication factor can be used to obtain the environmental performance of every thickness.

The following table shows the multiplication factor for each individual thickness in the product family. In order to determine the environmental impacts associated with a determinate product thickness, the results indicated in this EPD must be multiplies by the corresponding multiplication factor. To obtain this factor, a conservative principle has been followed for all the indicator.

Product Thickness (mm)	Multiplication Factor
20	1.33
25	1.67
30	2.00

8. References

PCR
The International EPD® System PCR 2012:01 version 2.33 for Construction Products and CPC 54 construction services.

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