EPD®

THE INTERNATIONAL EPD® SYSTEM

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

12.5mm Gyproc Habito

Date of issue: 2019-05-03
Validity: 5 years
Valid until: 2024-03-01
Scope of the EPD®: United Kingdom

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-01524

British Gypsum
SAINT-GOBAIN

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-01524
PCR identification The International EPD® System PCR 2012:01 version 2.2 for Construction Products. EN 15804 Sustainability of construction works – Environmental product declaration - core rules for the product category of construction product The International EPD® System PCR 2012:01 version 2.2 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, North Yorkshire**.**
Owner of the declaration: Saint-Gobain Construction Products UK Limited trading as British Gypsum, Saint-Gobain House, Binley Business Park, Coventry. CV3 2TT
Product / product family name and manufacturer represented: 12.5mm Gyproc Habito.
Publication/issue date: 2019-05-03
Valid until: 2024-03-01
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: Rhea Akiens, Sustainability Analyst, British Gypsum.
Contact: (rhea.akiens@saint-gobain.com).
Scope: The LCA is based on September 2017 to August 2018 production data for one site in the United Kingdom for 12.5 mm Gyproc Habito. 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 – EMS 543324**
Occupational Health and Safety Management:	**BS OHSAS 18001:2007 – OHS 550586**
Quality management systems in place at site:	**ISO 9001:2015 – FM 550533**
Responsible Sourcing of Construction Products:	**BES 6001: Issue 3 – BES 613170**
Energy Management System:	**ISO 50001:2011 – EN 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 2.2
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 and use:

Gyproc Habito consists of gypsum encased in paper liners. Gyproc Habito features a high strength engineered core which provides enhanced levels of strength, durability and fixability
Small quantities of chopped glass fibre, micro silica and vermiculite may be added with starch, foam and dispersants.
This plasterboard is one of our products within the range that is certified to BES 6001, achieving a rating of 'Excellent'.

2.2 Application

Designed for use in Gyproc wall and partitions systems where greater levels of impact/duty and fixing capability are required.
Gyproc Habito plasterboard provides more strength than standard plasterboard, with a 5mm (no. 10) woodscrew capable of supporting 15kg without the need for specialist fixings or pattressing.
Gyproc Habito provides the ability to fix heavy and difficult items such as shelves, radiators and TVs, the strength of the board allows fixing straight into the wall surface, not only saving on installation time, it can also reduce the overall cost of build. Its additional durability means walls are more resistant to damage which can reduce maintenance requirements. Suitable for direct decoration or plaster finish.

2.3 Technical data

Gyproc Habito conforms to EN520:2004, A1:2009 Gypsum Plasterboards, definitions, requirements and test methods
Type A: Gypsum plasterboard with a face to which suitable gypsum plasters or decoration may be applied

EN CLASSIFICATION	A
NOMINAL DENSITY	The assumed density is 978 kg/m^3 (12.22kg/m^2) of 12.5mm Gyproc Habito.
THERMAL CONDUCTIVITY	0.25 W/mK
SHEAR STRENGTH	NPD
WATER VAPOUR RESISTANCE	10μ
CLASS OF REACTION TO FIRE PERFORMANCE	A2
FLAMING DROPLETS/PARTICLES	d0
SMOKE PRODUCTION	s1

2.4 Delivery status

The EPD refers to 12.5mm thick Gyproc Habito.

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	98.3%	12.01
PAPER LINER	0.8%	0.09
ADDITIVES	1.0%	0.12
TOTAL	**100%**	**12.22**
PACKAGING: WOODEN PALLET	0.24kg per m^2 board	0.24
AT INSTALLATION: SCREWS	11 per m^2 board	0.015
AT INSTALLATION: JOINTING COMPOUND	0.35kg per m^2 board	0.35
AT INSTALLATION: JOINTING TAPE	1.5m per m^2 board	0.00063

12.5mm Gyproc Habito contains 98.3% gypsum as desulphurised gypsum (DSG) and scrap material.

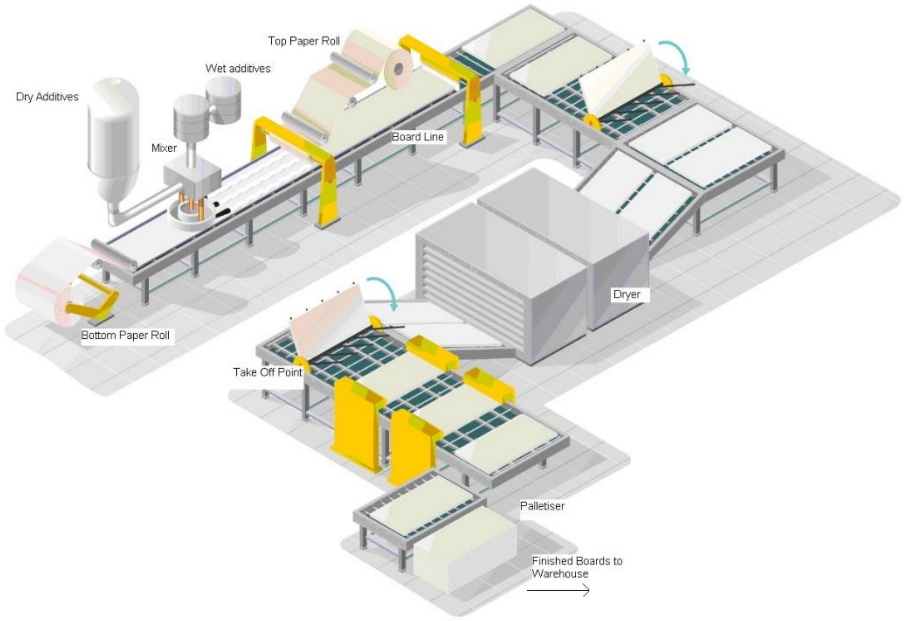
During the life cycle of the product any hazardous substance listed in the “Candidate List of Substances of Very High Concern (SVHC) for authorization” has not been used in a percentage higher than 0.1% of the weight of the product.

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

2.6 Manufacture

12.5mm Gyproc Habito 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 paper liner on a moving belt conveyor. A second paper liner 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 ISO9001 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 BS OHSAS 18001 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 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
Manual off-loading of this product should be carried out with care to avoid unnecessary strain. For further information please refer to the Manual Handling and Lifting section of the SITE BOOK, also available to download from http://www.british-gypsum.com

Cutting
This product may be cut using a plasterboard saw or by scoring with a sharp knife and snapping the board over a straight edge. Holes for switch or socket boxes should be cut out before the boards are fixed using a utility saw or sharp knife. When cutting boards, power and hand tools should be used with care and in accordance with the manufacturers' recommendations. Power tools should only be used by people who have been instructed and trained to use them safely. Appropriate personal protective equipment should be used.

Fixing
Fix boards with decorative side out to receive joint treatment or a skim plaster finish. Lightly butt boards together. Never force boards into position. Install fixings not closer than 13mm from cut edges and 10mm from bound edges. Position cut edges to internal angles whenever possible, removing paper burrs with fine sandpaper. Stagger horizontal and vertical board joints between layers by a minimum of 600mm. Locate boards to the centre line of framing where this supports board edges or ends.

2.9 Packaging

Gyproc Habito is supplied on returnable 100% recyclable pallets. All pallets are FSC certified.

2.10 Condition of use

When installed in accordance with British Gypsum recommendations, Gyproc Habito 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

Gyproc Habito is not classified as hazardous according to the Classification, Labelling and Packaging (CLP) Regulations

2.12 Reference service life

Gyproc Habito plasterboard is expected to last the service life of a building (60 years), as documented in Code for Sustainable Homes.

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, plasterboard is designated a 'material of limited combustibility' (UK Building Regulations, 2006, Approved Document B).

CLASS OF REACTION TO FIRE PERFORMANCE	A2
FLAMING DROPLETS/PARTICLES	d0
SMOKE PRODUCTION	s1

Water

Gyproc Habito 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

Gyproc Habito 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

Gyproc Habito 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
0115 945 1000
http://www.british-gypsum.com

3. LCA calculation information

	EPD TYPE DECLARED	Cradle to Grave
3.1	DECLARED UNIT	The declared unit is 1m^2 of 12.5mm thick Gyproc Habito. The assumed density is 978 kg/m^3 (12.22kg/m^2) of 12.5mm Habito.
3.2	SYSTEM BOUNDARIES	Cradle to Grave: stages A1 – 3, 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 September 2017 to August 2018. A 2017-2018 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 September 2017 to August 2018.
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 functional/declared unit)
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: 139 km
Capacity utilisation (including empty returns)	100% Capacity (79% empty returns)
Bulk density of transported products	978 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 for 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 functional/declared unit)
Ancillary materials for installation (specified by materials)	Jointing Compound 0.35kg Joining Tape 0.00063 kg Screws 0.015 kg
Water use	0.165 litres/m^2
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: 1.222 kg (10%) Jointing Compound: 0.035kg Jointing Tape: 0.000063 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)	12.5mm Gyproc Habito: 0.208 kg to recycling 12.5mm Gyproc Habito: 1.015 kg to landfill Jointing Compound: 0.035 kg to recycling 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 60 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	2.08 kg collected separately and down-cycled 10.15kg collected with mixed de-construction and demolition waste to landfill
Recovery system specified by type	2.08 kg for recycling
Disposal specified by type	10.15kg 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 12.22 kg/m² and a density of 978 kg/m^3 and with a specified function and an expected average service life of 60 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 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*	3.20	0.0794	0.389	0	0	0	0	0	0	0	0.0555	0.0162	0.00217	0.167	-0.0107
	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*	4.23E-08	1.41E-15	4.23E-09	0	0	0	0	0	0	0	1.25E-15	7.25E-16	3.47E-11	3.74E-14	-1.40E-13
	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 SO_2 equiv/FU*	9.83E-03	3.18E-04	1.21E-03	0	0	0	0	0	0	0	1.94E-04	6.63E-05	1.81E-05	9.93E-04	1.91E-05
	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*	4.66E-03	7.79E-05	4.95E-04	0	0	0	0	0	0	0	1.14E-05	1.67E-05	3.78E-06	1.37E-04	5.88E-06
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *kg Ethylene equiv/FU*	4.34E-04	1.16E-05	1.24E-04	0	0	0	0	0	0	0	1.29E-05	2.67E-06	1.15E-06	8.11E-05	6.16E-06
	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*	4.29E-06	1.23E-09	3.24E-06	0	0	0	0	0	0	0	1.48E-09	1.42E-09	2.83E-08	6.28E-08	3.37E-09
Abiotic depletion potential for fossil ressources (ADP-fossil fuels) - *MJ/FU*	63.80	1.10	7.10	0	0	0	0	0	0	0	0.692	0.220	0.026	2.17	-0.154
	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*	13.10	0.0356	1.55	0	0	0	0	0	0	0	0.00213	0.0116	0.079	0.279	0.901
Use of renewable primary energy used as raw materials *MJ/FU*	1.86	0	0.169	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*	16.76	0.0356	1.72	0	0	0	0	0	0	0	0.00213	0.0116	0.079	0.279	0.901
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	64.6	1.1	7.32	0	0	0	0	0	0	0	0.695	0.221	0.0266	2.25	-0.147
Use of non-renewable primary energy used as raw materials *MJ/FU*	9.15	0	0.832	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*	73.8	1.1	8.15	0	0	0	0	0	0	0	0.695	0.221	0.0266	2.25	-0.147
Use of secondary material *kg/FU*	0.318	0	0.0321	0	0	0	0	0	0	0	0	0	0	0	0
Use of renewable secondary fuels- *MJ/FU*	1.25E-08	5.4E-31	1.2E-09	0	0	0	0	0	0	0	0	1.1E-30	0	3.4E-23	1.0E-09
Use of non-renewable secondary fuels - *MJ/FU*	0.000000147	8.3E-30	1.4E-08	0	0	0	0	0	0	0	0	1.6E-29	0	4.0E-22	1.2E-08
Use of net fresh water - m^3/*FU*	0.0264	1.1E-05	2.9E-03	0	0	0	0	0	0	0	4.4E-06	2.1E-05	8.6E-06	4.3E-04	1.2E-04

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*	6.77E-08	5.90E-09	1.29E-08	0	0	0	0	0	0	0	9.07E-11	1.16E-08	1.57E-11	3.87E-08	2.83E-09
Non-hazardous (excluding inert) waste disposed *kg/FU*	0.0149	1.38E-05	1.07	0	0	0	0	0	0	0	1.02E-04	1.80E-05	3.89E-06	10.60	-0.099
Radioactive waste disposed *kg/FU*	1.00E-04	1.20E-06	3.00E-05	0	0	0	0	0	0	0	8.54E-07	5.11E-07	4.28E-08	3.22E-05	2.83E-06

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*	0.638	0	0.508	0	0	0	0	0	0	0	0	0	2.16	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 a weight of 12.22 kg/m² and a density of 978 kg/m^3 and with a specified function and an expected average service life of 60 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 analysing the above figure for GWP, it can clearly be seen that the majority (over 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 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. The contribution to this impact from the other modules is very small and primarily due to the non – renewable resources consumed during installation.

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 usage 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 here 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. Requisite evidence

VOC emissions
The standards used widely in Europe to evaluate VOC levels in plasterboard products are EN13419 & ISO16000. Based upon indicative testing of a sample of plasterboard products, Gyproc plasterboard is estimated not to contain a VOC content or Formaldehyde content which exceeds the requirements of European voluntary labelling schemes connected with indoor air quality.

8. References

PCR
The International EPD® System PCR 2012:01 version 2.2 for Construction Products and CPC 54 construction services.

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 A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report, 1.2, April 2013.

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

1. EPD International (2017) General Programme Instructions for the International EPD® System. Version 3.0, dated 2017-12-11. www.environdec.com.
2. EN 15804:2012 + A1:2013 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
3. ISO 21930:2007 Sustainability in building construction – Environmental declaration of building products
4. ISO 14025:2011-10 Environmental labels and declarations – Type III environmental declarations – Principles and procedures
5. ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework
6. ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines
7. European Chemical Agency, Candidate List of substances of very high concern for Authorisation. http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp
8. International Energy Agency IEA World Energy Balances 2013
9. EN 520:2004 + A1:2009 Gypsum plasterboards – Definitions, requirements and test methods

Standards:

BES 6001: Issue 3	Responsible sourcing of construction products.
BS:OHSAS 18001:2007	Occupational Health and Safety Management
EA 2012 Draft Report	An investigation into the disposal and recovery of gypsum waste. Environment Agency.
EN 13419 series	Indoor Air – superseded by ISO 16000
EN 15804:2012-04	Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products.
ISO 9001:2015	Quality management systems - Requirements.
ISO 14001:2015	Environmental management systems – Requirements with guidance for use.
ISO 16000 series	Indoor Air

Regulations:

The Building Regulations, 2006 edition incorporating 2010 and 2013 amendments
Schedule 1, Approved Document B (Fire Safety) Volume 1 Dwelling House

The Building Regulations, 2006 edition incorporating 2007, 2010 and 2013 amendments
Schedule 1, Approved Document B (Fire Safety) Volume 2 Buildings other than Dwelling Houses

Code for Sustainable Homes Technical Guide November 2010