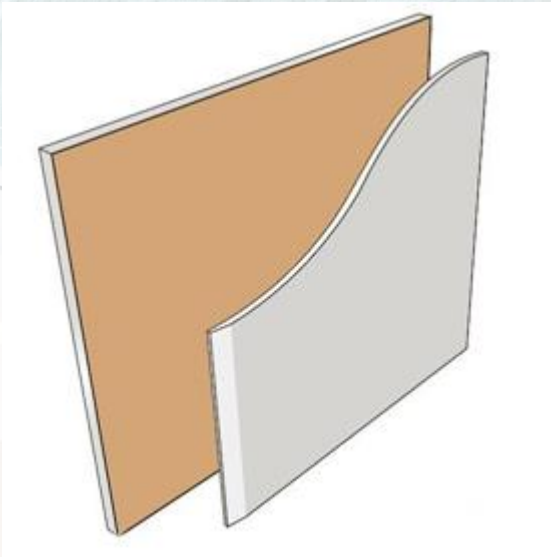
ENVIRONMENTAL PRODUCT DECLARATION

In accordance with EN 15804 and ISO 14025

12.5 mm Gypboard® Plain

Date of issue: 2017-02-06
Valid until: 2019-01-03



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.

EPD®

Declaration Number

S-P-00538

Gyproc
SAINT-GOBAIN

1. General information

Manufacturer: Saint-Gobain Gyproc India

Programme used: The International EPD® System. For more information see www.environdec.com

EPD registration number/declaration number: S-P-00538

PCR identification: EN 15804 as the core PCR + The International EPD® System PCR 2012:01 version 1.2 for Construction Products and CPC 54 construction services. With reference to InstitutBauen und Umwelt e.V. PCR Guidance – Texts for Building-Related Products and Services, Part B: Requirements on the EPD for Plasterboard version 1.5.

Product / product family name and manufacturer represented: Gypboard® Plain, manufactured by Saint-Gobain Gyproc India in Wada

Declaration issued: February 6th 2017

Valid until: January 3rd 2019

Owner of the declaration: Saint-Gobain Gyproc India Ltd, 5th Level, Leela Business Park, Andheri Kurla Road, Andheri (E), Mumbai - 400 05, India.

EPD prepared by: Vikki Holme, SHEAR Systems Manager, Saint-Gobain Gypsum

Scope: The LCA is based on 2011 production data for Wada manufacturing site in India for 12.5mm Gypboard Plain. This EPD covers information modules A1 to C4 (cradle to grave) as defined in EN 15084:2012 for 12.5mm Gypboard Plain sold and used in India.

The declared unit is 1m2 of 12.5mm thick Gypboard Plain. The assumed density is 701kg/m^3 (8.76kg.m^2) of 12.5mm Gypboard Plain.

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]: **Dr Andrew Norton, Renuables**
[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.

2. Product description

2.1 Product description:

Gypboard® Plain plasterboard is a standard gypsum board consisting of an aerated gypsum core encased in and firmly bonded to, strong paper liners. Suitable for use in most system applications where normal fire, structural and acoustic levels are specified. The product is ideal for false ceilings and standard drywall partitions. Gypboard® Plain plasterboard is available in sizes 9.5mm, 12.5mm and 15mm; this EPD applies only to 12.5mm Plain plasterboard.

2.2 Application:

Gyproc plasterboards can be used to partition any interior and are the preferred choice of construction for a range of applications, in homes, hotels, hospitals, schools, theatres, and industry. They are strong and robust and can typically last the lifetime of a building unless they are subjected to abuse or alteration.

2.3 Technical data:

Gypboard® Plain plasterboard conforms to BIS IS 2095-1:2011 Gypsum Plaster Boards - Specification - Part 1: Plain Gypsum Plaster Boards

NOMINAL DENSITY	The assumed density is 701kg/m^3 (8.76kg/m^2) of 12.5mm Gypboard Plain
THERMAL CONDUCTIVITY	0.16 W/Mk
CLASS OF REACTION TO FIRE PERFORMANCE	Class 1

Certifications:

ISO 9001:2008 Quality Management System
ISO 14001:2004 Environmental Management System
BS OHSAS 18001:2007 Occupational Health and Safety Management
BS 476-Part 5 Ignitability Evaluation for Materials
BS 476-Part 6 Method of Evaluation for fire propagation for products
BS 476-Part 7 Method for classification of the surface spread of flame

2.4 Placing on the market / Application rules:

Gypboard® Plain plasterboard conforms to BIS IS 2095-1:2011 Gypsum Plaster Boards - Specification - Part 1: Plain Gypsum Plaster Boards

2.5 Delivery Status:

The EPD refers to 12.5mm thick Gypboard® Plain plasterboard

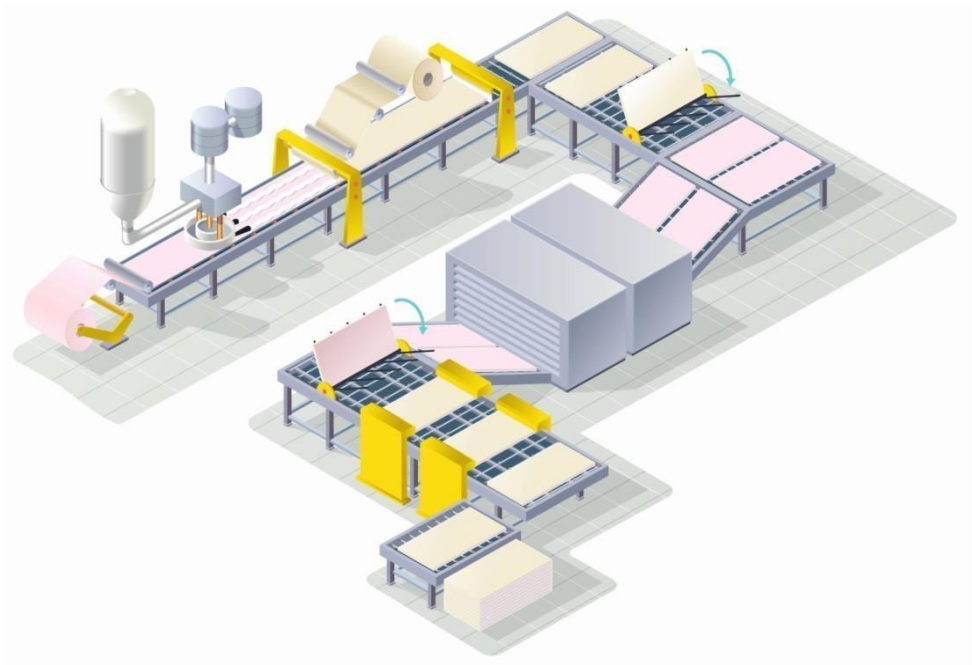
2.6 Base materials / Ancillary materials:

PARAMETER	PART	QUANTITY (kg/FU)
GYPSUM	95.21%	8.34
PAPER LINER	3.96%	0.35
ADDITIVES	0.82%	0.07
TOTAL	**100%**	**8.76**
PACKAGING:	None	None
AT INSTALLATION: SCREWS	8 per m2 of board	0.010
AT INSTALLATION: JOINTING COMPOUND	0.33kg per m2 of board	0.33
AT INSTALLATION: JOINTING TAPE:	1.23m per m2 of board	0.00052

No additives used are classed as substances of concern; substances are not listed specifically to protect proprietary information.

2.7 Manufacture:

Gypboard® Plain plasterboard is manufactured using a continuous production process:



Raw materials are homogeneously mixed to form a gypsum slurry that is spread via hose outlets onto a paper liner on a moving belt conveyor. As second paper line 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.

2.8 Environment and Health during manufacture:

At Gyproc, 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.

In all aspects of the Company's activities, the Health and Safety rules and relevant regulations must be complied with. In addition there are a number of definitive Company Safety Procedures and

together these determine the minimum standards expected by the Company. In order to achieve this, close co-operation with representatives of the relevant enforcement agencies is ensured.

To ensure that the Company's objectives are achieved, documented safety management systems are employed at 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.

Gyproc plants are managed through ISO 14001 and BS OHSAS 18001 certified systems. Saint-Gobain launched a Group-wide Water Policy in 2011. The aim of the policy is to extract minimum resources and work towards 'zero discharge' of industrial process water in liquid form, while avoiding the creation of new impacts on other environments or stakeholders.

2.9 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.

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 as per specifications. Locate boards to the centre line of framing where this supports board edges or ends.

2.10 Packaging:

No pallets or other packaging material are used for transporting Gypboard® Plain plasterboard in India, it is loaded & unloaded individually in a manual manner.

2.11 Condition of use:
When installed in accordance with the recommendations of Saint-Gobain Gyproc India, Gypboard® Plain plasterboard maintains its mechanical and physical properties for its entire useful life.

2.12 Environment and health during use:

Gypboard® Plain is not classified as dangerous as per the local rules and regulations.

2.13 Reference service life:

Gypboard® Plain plasterboard is expected to last the service life of a building. In accordance with the Saint-Gobain Methodological Guide for Construction Products, the Reference Service Life (RSL) is 50 years.

2.14 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.

Water

Gypboard® Plain is unsuitable for use in areas which are 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

Gypboard® Plain is intended for commercial applications and is a stable product with no significant adverse environmental effects. The products should be installed according to Gyproc's installation guidelines.

Also refer to section 2.3 Technical data.

2.15 Re-use phase: It is not currently feasible to recycle plasterboard and other gypsum products in India

2.16 Disposal: Gypboard® Plain may be landfilled under normal conditions

2.17 Further information:
Further information can be found through the enquiry desk:
1800 103 7897 (toll free)
(Office Hours: Mon To Sat - 10am to 6pm)
E- mail: gyprocindia@saint-gobain.com
http://www.gyproc.in

3. LCA calculation rules

3.1	FUNCTIONAL UNIT / DECLARED UNIT	The declared unit is 1m² of 12.5 mm thick Gypboard® Plain plasterboard. The assumed density is 701kg/m^3 (8.76kg/m^2).
3.2	SYSTEM BOUNDARIES	Cradle to Grave (RSL 50 years): Mandatory stages A1 – 3, B1 – 7, C1 – 4.
3.3	ESTIMATES AND ASSUMPTIONS	Primary data was gathered from the manufacturing site. The distance to waste disposal was assumed to be 40km. The end of life and installation waste handling information is taken from The Ministry of Urban Development, Government of India, Guidance Note: 'Municipal Solid Waste Management on a Regional Basis'
3.4	CUT-OFF RULES	Data for recycling waste (waste that is not landfilled or incinerated) is not included in this model, only data for the transport to the waste recycling centre. Waste recycled in the product stage (A1-A3) is below the cut off limit (1%).
3.5	BACKGROUND DATA	All primary product data was provided by Saint-Gobain Gyproc India (2011). All secondary data was retrieved using TEAM software, with Ecoinvent 2.2 (2010) and DEAM (2010) databases.
3.6	DATA QUALITY	Primary data was gathered from Saint-Gobain Gyproc India production figures during the 2011 calendar year. A 2011 fuel mix for electricity usage in India was assumed for the production site
3.7	PERIOD UNDER REVIEW	The data is representative of the manufacturing processes of 2011
3.8	ALLOCATIONS	All production data has been calculated on a mass basis.
3.9	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 programmes.

4. LCA: Scenarios and additional technical information

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 the manufacture of product and packaging materials. 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.

PARAMETER	VALUE (expressed per functional/declared unit)
Fuel type and consumption of vehicle or vehicle type used for transport e.g. long distance truck, boat, etc.	Truck Transport using 0.38 litres of diesel fuel per km.
Distance	241 (km) average by Truck to all markets.
Capacity utilisation (including empty returns)	100 % volume capacity 30% empty returns
Bulk density of transported products	701 kg/m^3
Volume capacity utilisation factor	1

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

PARAMETER	VALUE (expressed per functional/declared unit)
Ancillary materials for installation (specified by materials)	Jointing compound: 0.33kg Jointing tape: 0.00052kg (1.23m) Screws: 0.010kg (8)
Water use	0.0002m^3
Other resource use	None
Quantitative description of energy type (regional mix) and consumption during the installation process	None required.
Wastage of materials on the building site before waste processing, generated by the product's installation (specified by type)	12.5mm Gypboard® Plain plasterboard: 0.05kg Screws: 0kg Jointing compound: 0.0165kg Jointing tape: 0.000026kg
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 Gypboard® Plain plasterboard: 0.05kg to landfill Screws: 0kg Jointing compound: 0.0165kg to landfill Jointing tape: 0.000026kg to landfill

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. Gypboard® Plain 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

End-of-life:

PARAMETER	VALUE (expressed per functional/declared unit) / DESCRIPTION
Collection process specified by type	8.76kg collected and transported by truck for landfill.
Recovery system specified by type	None
Disposal specified by type	100% of waste is landfilled
Assumptions for scenario development (e.g. transportation)	Diesel consumption 38 litres per 100 km travelled; 40 km from demolition site to waste handler

5. LCA results (Declared Unit 1m^2)

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	Re-use - 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

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT: per m2 of 12.5mm Gypboard® Plain plasterboard

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) - *kg CO_2 equiv/FU*	3.8E+00	1.3E-01	1.3E-01	0	0	0	0	0	0	0	0	5.7E-02	0	0	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*	2.0E-06	8.7E-08	3.5E-08	0	0	0	0	0	0	0	0	3.9E-08	0	0	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 SO_2 equiv/FU*	5.4E-02	7.6E-04	7.5E-04	0	0	0	0	0	0	0	0	3.4E-04	0	0	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 $(PO_4)^{3-}$ equiv/FU*	1.7E-03	1.8E-04	1.3E-04	0	0	0	0	0	0	0	0	8.4E-05	0	5.7E-04	MND
	Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.														
Photochemical ozone creation (POPC) *kg Ethene equiv/FU*	2.3E-03	1.7E-05	3.8E-05	0	0	0	0	0	0	0	0	7.7E-06	0	0	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*	5.0E-08	6.1E-11	5.9E-09	0	0	0	0	0	0	0	0	2.8E-11	0	0	MND
Abiotic depletion potential for fossil resources (ADP-fossil resources) - *MJ/FU*	5.1E+01	1.5E+00	2.1E+00	0	0	0	0	0	0	0	0	7.0E-01	0	0	MND
	Consumption of non-renewable resources, thereby lowering their availability for future generations.														

RESULTS OF THE LCA - RESOURCE USE: per m2 of 12.5mm Gypboard® Plain plasterboard

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 as energy carrier (PERE) - *MJ/FU*	6.6E-01	1.0E-03	4.9E-01	0	0	0	0	0	0	0	0	4.7E-04	0	0	MND
Use of renewable primary energy used as material utilization (PERM) - *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MND
Total use of renewable primary energy resources (PERT) - *MJ/FU*	1.8E+00	6.6E-01	1.0E-03	4.9E-01	0	0	0	0	0	0	0	0	4.7E-04	0	0
Use of non-renewable primary energy as energy carrier (PENRE) - *MJ/FU*	4.9E+01	1.6E+00	2.2E+00	0	0	0	0	0	0	0	0	7.1E-01	0	0	MND
Use of non-renewable primary energy as material utilization (PENRM) - *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MND
Total use of non-renewable primary energy (PENRT) - *MJ/FU*	2.4E+01	4.9E+01	1.6E+00	2.2E+00	0	0	0	0	0	0	0	0	7.1E-01	0	0
Use of secondary material (SM) *kg/FU*	1.6E-03	0	2.0E-02	0	0	0	0	0	0	0	0	0	0	0	MND
Use of renewable secondary fuels (RSF) - *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MND
Use of non-renewable secondary fuels (NRSF) - *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MND
Use of net fresh water (FW) - m^3/FU	1.2E-02	1.5E-04	1.4E-03	0	0	0	0	0	0	0	0	6.7E-05	0	0	MND

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: per m2 of 12.5mm Gypboard® Plain plasterboard

Parameters	Product stage	Construction process stage		Use stage							End-of-life stage				
	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	D Reuse, recovery, recycling
Hazardous waste disposed (HWD) - *kg/FU*	2.1E-03	3.5E-05	4.7E-04	0	0	0	0	0	0	0	0	1.6E-05	0	0	MND
Non-hazardous(including inert) waste disposed (NHWD) - *kg/FU*	1.4E-01	4.1E-04	9.7E-01	0	0	0	0	0	0	0	0	1.8E-04	0	8.8E+00	MND
Radioactive waste disposed (RWD) - *kg/FU*	5.7E-04	2.5E-05	1.0E-05	0	0	0	0	0	0	0	0	1.1E-05	0	0	MND
Components for re-use (CRU) - *kg/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MND
Materials for recycling (MFR) - *kg/FU*	4.8E-02	1.6E-06	4.0E-03	0	0	0	0	0	0	0	0	7.3E-07	0	0	MND
Materials for energy recovery (MER) - *kg/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	MND
Exported electrical energy (EEE) - *MJ/FU*	1.1E-06	3.8E-09	5.5E-08	0	0	0	0	0	0	0	0	1.7E-09	0	0	MND
Exported thermal energy (EET) - *MJ/FU*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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 12.5mm Gypboard® Plain plasterboard.

49.79MJ of the total primary energy comes from the Product stage of the life cycle. The main fuel used at Saint-Gobain Gyproc India in Wada is heavy oil, which makes up 79% of the energy used in the manufacture of 12.5mm Gypboard® Plain plasterboard.

The finished product is transported relatively short distances though India by truck, and accounts for very little of the impacts over the products life cycle.

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

[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. Requisite evidence

Based upon indicative testing as per EN13419 of a sample of plasterboard products, Gypboard® Plain plaster board is estimated not to contain a VOC content or Formaldehyde content.

8. References

General principles
The International EPD® System PCR 2012:01 version 1.2 for Construction Products and CPC 54 construction services

PCR
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 1.5, October 2013.

Standards:

EN 15804:2012-04
Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products.

EN 13419
Indoor Air

ISO 14025:2011-10
Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

BIS IS 2095-1:2011
Gypsum Plaster Boards - Specification - Part 1: Plain Gypsum Plaster Boards

BS:OHSAS 18001:2007
Occupational Health and Safety Management

ISO 14001:2004
Environmental management systems – Requirements with guidance for use

ISO 9001:2008
Quality management systems – Requirements

BS 476-Part 5
Ignitability Evaluation for Materials

BS 476-Part 6
Method of Evaluation for fire propagation for products

BS 476-Part 7
Method for classification of the surface spread of flame