



Environmental Product Declaration

In Accordance to ISO 14025 and EN 15804
Declaration Number: 138/2020

Date of Issue: 30/11/2020
Valid Until: 30/11/2025

Technogips Pro Boards:

- Standard Plasterboard Type A
- Moisture Resistant Plasterboard Type H
- Fire Resistant Plasterboard Type DF
- Fire and Moisture Resistant Plasterboard Type DFH2
- Sound Comfort Extra Type DF
- Titan Board Type DFH1R
- Blue Board Type GMFH1R

Manufacturer:
Formatt Building Products Ltd.
2 Dospat St, 1606 Sofia Bulgaria
sales@technogipspro.com
www.technogipspro.com

EPD Program operator:
Building Research Institute (ITB)
1 Filtrawa St
00-611 Warsaw, Poland
www.itb.pl



General Information



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Formatt Building Products Ltd. Technogips Pro Boards

Declaration (EPD) based on EN 15804 and verified according to ISO 14025. It contains information about the impact of declared construction materials on environment and their aspects verified by the independent Advisory Board according to ISO 14025.

EPD OWNER:	Formatt Building Products Ltd. 2 Dospat Str., Sofia 1606, BULGARIA www.technogipspro.com ; sales@technogipspro.com + 359 2 805 1166
LCA AND EPD PREPARED BY:	Green ReStart OOD 65 Shipchenski prohod Blvd., 1574 Sofia, Bulgaria Dr. Eng. Roumiana Zaharieva (roumiana.zaharieva@gmail.com) Dr. Eng. Yana Kancheva (kancheva@greenrestart.com)
DECLARED UNIT:	1 m ² gypsum plasterboard with thickness 12.5 mm
LIFE CYCLE ANALYSIS (LCA) SCOPE:	Modules A1-A3, C1-C4 and Module D in accordance with EN 15804
PCR:	ITB-EPD General PCR v1.4/2014
DECLARED DURABILITY:	50 years under normal conditions of use
PRODUCT STANDARD:	EN 520:2004 + A1:2009, EN 15283-1:2008
YEAR OF PREPARING THE CHARACTERISTIC:	2020

Basically, a comparison, or evaluation of EPD data is possible only if all the compared data were created according to EN 15804.

About the Company

Technogips Pro is the first Bulgarian brand specialized in production of gypsum plasterboards, dry gypsum mixtures and plasters. The mission of the company is to provide innovative building solutions for safe, healthy and comfortable living environment.

The latest generation technology is used in the manufacturing process and the products satisfy all EU quality and safety requirements. Technogips Pro has a 10-year experience on the market and is present in over 24 countries. The factory of Technogips Pro is certified under ISO 14001:2004 and has a monitoring system for outgoing emissions. Other relevant certifications of the company are issued under ISO 9001:2015 Quality Management System and ISO 45001:2008 Occupational Health and Safety Management.

Product Description

Technogips Pro boards consists of an aerated gypsum core with special additives encased in and firmly bonded to strong FSC® certified paper or glass mat liner. The gypsum core contains various additives based on the product type and intended use. Technogips Pro boards come with the option of either tapered edge or square edge on the long edges and has short edges sawn straight.

Products certified under this EPD include the following products:

Technogips Pro type A plasterboard

Type A is intended for use in interior dry construction systems as partition walls, shaft walls, wall linings and suspended ceilings in areas with normal humidity.

Technogips Pro type H plasterboard

Type H is intended for use in interior dry construction systems as partition walls, shaft walls, wall linings and suspended ceilings in areas with high levels of relative humidity for short periods of time, such as domestic kitchens, bathrooms, laundry rooms, etc.

Technogips Pro type DF plasterboard

Type DF is intended for use in interior dry construction systems as partition walls, shaft walls, wall linings and suspended ceilings in areas with higher requirements for fire protection and sound insulation such as evacuation corridors, stairways, industrial premises, etc.

Technogips Pro type DFH2

Type DFH2 is intended for use in interior dry construction systems as partition walls, shaft walls, wall linings and suspended ceilings in areas with high levels of humidity for short periods and additional high fire protection requirements such as public kitchens, changing rooms, laboratories, etc.

Technogips Pro type DFH1IR plasterboard

Type DFH1IR is a high performance board intended for use in interior premium quality dry construction systems as partition walls, shaft walls, wall linings and suspended ceilings in areas with higher requirements for fire protection, sound insulation, moisture resistance and high levels of robustness of mechanical impacts. The board is ideal for hotels, schools, hospitals, and other large commercial projects.

Technogips Pro type GMFH1IR

Type GMFH1IR is a high performance board intended for use in premium quality dry construction of non-combustible facade systems (walls, claddings, eaves) and partition walls, shaft walls, wall linings in areas with higher requirements for fire protection, sound insulation, moisture resistance and high levels of robustness of mechanical impacts, such as public bathrooms, shower cabins, relax areas, SPA centers and premises with pools.

Technical information

Essential characteristics of plasterboards are listed below as per the Declarations of Performance (DoPs).

	Type A	Type H	Type DF	Type DFH2	Type DFH1IR	Type GMFH1IR
Length, mm	2000-3000	2000-3000	2000-3000	2000-3000	2000-3000	2000-3000
Width, mm	600/1200/ 1250	600/1200/ 1250	600/1200/1250	1200/1250	1200/1250	1200/1250
Thickness, mm	9.5/ 12.5/ 15/18	9.5/ 12.5/ 15/18	12.5/ 15/ 18	12.5/ 15	12.5	12.5
Surface mass, kg/m ²	7.97	8.52	10.40	11.23	12.7	11.0
Flexural strength – F	Compliant	Compliant	Compliant	Compliant	Compliant	Compliant
Shear strength	NPD	NPD	NPD	NPD	NPD	NPD
Reaction to fire – R2F	A2-s1, d0	A2-s1, d0	A2-s1, d0	A2-s1, d0	A2-s1, d0	A1
Thermal conductivity, W/mK	<0.25	<0.25	<0.25	<0.25	<0.25	<0.25
Water vapour resistance, μ	10	10	10	10	10	10
Colour:	Ivory	Green	Pink	Green	Blue	Blue
Sound insulation – R	Not applicable to the product itself. Declared according to its uses- data can be found on www.technogipspro.com					
Sound absorption – α						
Impact resistance - I						
Product standard:	EN 520:2004 + A1:2009					EN 15283-1:2008

Raw materials

Technogips Pro boards covered by this EPD are made from:

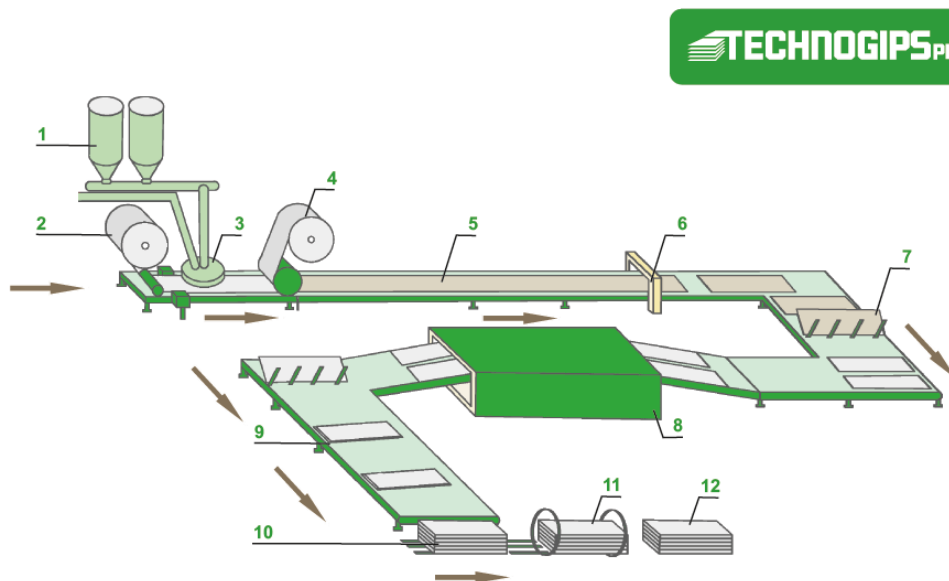
- Gypsum, FGD and recycled: 89- 94%;
- FSC certified (100% recycled) paper or glass mat liner: up to 3-4%;
- Additives: 1-8%.

Manufacturing process

A gypsum slurry is made up from calcinated FGD gypsum hemi-hydrate (1), raw FGD gypsum (di-hydrate), water and other additives, in a continuous mixer (3). The rolled face cardboard liner (2) is supplied to the conveyor line (5). This slurry is spread in a uniform stream, from multiple outlet hoses onto a moving rolled face cardboard liner.

The cardboard liner is also incised so that it can be easily folded at the edges. The back cardboard liner roll (4) is then layered from above and applied to the slurry. The front face

cardboard liner is folded at the edges and the gypsum slurry is fully enclosed in cardboard liner. After that, the board is moved along the length of the production line on a series of setting belts, and sections of rollers (5). During this time the setting and hardening processes of the core of the plasterboard occur. This newly formed di-hydrate has better mechanical properties (strength and stiffness). As another result from this reaction the bond between the cardboard liner and the gypsum core is established by the growth of the gypsum crystals into the fibrous pores of the cardboard liner. Also, at this stage some relevant information about the plasterboard is printed. The gypsum has hardened enough before reaching the shear station.



The plasterboard is cut into boards with specific length. The boards are then turned over (7) and processed to a multi-level dryer (8). At the end of the drying process the plasterboard has less than 0.2% moisture content. After the drying process is finished, the boards are trimmed (9) and aligned onto pallets (10). The pallets are covered with plastic foil (11) and are placed for storage in the warehouse or they are sent for direct distribution (12).

Environment and health during manufacturing

With respect to health protection during the manufacturing process the Technogips Pro factory follows and respects the Health and Safety Regulation. The manufacturing process is certified under ISO 45001:2018. Plasterboards are manufactured in a factory permitted by emission law and by external waste recovery in accordance with the Bulgarian regulations. The management system operated by the site is according to the standard ISO 14001:2015. Production waste is internally recycled.

Storage and maintenance

Packaging

Technogips Pro boards are stacked, stored, transported, and delivered to the market on pallets are protected against damage by strapping tape (polyethylene). Packing materials are externally recovered/disposed of.

Product processing/Installation

Store in internal areas, in dry conditions and on firm level ground. The products are processed in accordance with the technical guidelines issued by Technogips Pro and available on www.technogipspro.com.

Condition of use

Technogips Pro boards are suitable for any type of coating (facade plasters for type GMFH1IR and skim coats, wallpaper, paint, tiles for the rest types). No maintenance or repair is required over their service life. The material composition of the product does not change during its use phase. All Technogips Pro boards must not be continuously exposed to excessive high humidity in non-ventilated areas.

Mechanical destruction

Mechanical damage can be repaired using jointing compound, due to the easy repair associated with the plasterboards and without any adverse effects on function. Plasterboards can be easily replaced with new boards in the event of more extensive damage. Besides the need for repair, the destruction will not have any significant environmental impact.

Re-use phase

Once Technogips Pro boards are installed, are not suited for re-use in an unchanged way. Prior to collection, plasterboards Technogips Pro boards should be separated from other used building materials.

Further use

Gypsum plasterboards which are as good as new (e.g. cuttings) can be used after crushing and possibly separating the cardboard and coatings in agreement with the customer as recultivation material in mining areas, for recovery on landfills, as soil conditioner, fertilizer components or acceleration agents for cement, considering any official specifications.

Disposal

Technogips Pro boards must be disposed of in compliance with the following waste codes of the European Waste Catalogue /EWC/: 17 08 02 gypsum-based construction materials.

Further information

Additional information is available at www.technogipspro.com

System boundaries

Product stage: modules A1-A3

Module A1 describes the acquisition of raw materials and manufacturing of pre-products. Gypsum from flue-gas desulphurisation process (FGD gypsum) is the substance that builds the core of the plasterboard. The raw FGD gypsum is considered in this study as a recycling material without environmental burden. The production processes of the other pre-products used (cardboard and additives) are considered using referent data for the ecoinvent v.3.6 database. Production of packaging materials is considered using reference data from ecoinvent v.3.6.

Module A2 refers to the transport of the gypsum within the Technogips Pro factory, transport of the cardboard and other components of the slurry to the Technogips Pro factory and is considered using real data from the manufacturer.

Module A3 takes into account the actual production process. Energy, water and fuel consumption are considered in full based on 1-year consumption data provided by the manufacturer.

End-of-life stage: modules C1-C4

Module C1 describes processing of plasterboards during its deconstruction as part of the deconstruction/demolition process of the entire building. The quantity (per mass) of the plasterboards varies between only 0,5% and 2,0% of the total generated demolition waste of a building and the efforts for their deconstruction, compared to the demolition of the entire building can be neglected. Thus, the impact of this module is assumed as zero.

Module C2 refers to the transport of the plasterboards C&D waste to a facility for waste treatment. The plasterboard waste from demolition activities is transported to a special facility – a dedicated landfill, where the gypsum containing waste can be disposed separately or to a C&DW storage site. The following assumptions are made to calculate the impacts of this module:

- the average distance of transportation is 25 km;
- the loading of waste is done by a loader with bucket capacity 3,6 m³, Euro IV emissions class;
- the transport of waste is by a lorry of the size class 7.5-16 tons, Euro IV emissions class.

Module C3 accounts the environmental impacts during the processing of plasterboards C&D waste at the waste recovery facility. In Bulgaria there is no recycling of plasterboards from demolition/repair works. The reuse of plasterboards is not regulated, so no recovery of plasterboards is done at the present time.

Module C4 considers the effects from gypsum plaster containing C&D waste that is disposed. At the landfill, the waste is unloaded from the lorry at a dedicated place. No additional treatment is required.

Module D

Module D considers the effects and impact of the secondary material derived from the recovery of plasterboard demolition waste. Since at the present time in Bulgaria there are no practices for demolition plasterboard waste recovery at all, plasterboard at the end of its service life cannot be linked to other systems using gypsum. The impacts for module D are assumed to be zero.

LCA Information

CUT-OFF CRITERIA	<p>As per EN 15804, in the case that there is not enough information, the process energy and materials representing less than 1% of the energy and mass used per module can be excluded (if they do not cause significant impacts). The addition of all the inputs and outputs excluded is less than 5% of the whole mass and energy used, as well of the emissions to environment occurred.</p> <p>Flows related to human activities such as employee transport are excluded. In accordance with EN 15804 the construction of plants, production of machines and transportation systems are excluded. Environmental burden of the administrative building is partly considered. Some additives in very small amounts (less than 0.3 %) are excluded due to lack of enough data and negligible potential environmental impacts.</p> <p>The total sum of omitted processes does not exceed 1% of the whole mass of inputs and outputs.</p>
ASSUMPTIONS AND LIMITATIONS	<p>Generic data from ecoinvent v.3.6 database is used to model the gypsum plasterboards components that are delivered by external suppliers and the manufacturer does not have influence on their production processes. Packaging materials and packaging waste are considered in the assessment of all components of the plasterboards.</p>
DATA QUALITY	<p>The information on the production process of the plasters, transport and composition of components is collected from Formatt Building Products EOOD. Information on the production process of additives is accounted as presented in ecoinvent v.3.6 database.</p>
ALLOCATION	<p>The factory of Formatt Building Products EOOD (Technogips Pro factory) in Kovachevo village, Radnevo municipality, Stara Zagora district produces various gypsum construction products for external and internal finishing layers of buildings.</p> <p>The manufacturing processes of all gypsum plasterboards are equivalent with slight variance in terms of working regime of drying and mixing stations. Even though, allocation by mass is done regarding energy and fuel use, and generated waste.</p> <p>Environmental impacts, resource use and waste generation are calculated based on yearly data about the inputs/outputs and the yearly production of gypsum plasterboards for 2019.</p>
GEOGRAPHICAL COVERAGE AND TIME PERIOD	<p>All data related to the gypsum plasterboards is collected from Formatt Building Products EOOD and represents the manufacturing process in 2019.</p> <p>Assessment of transport of all components covers all used transport types, external and internal transport activities.</p>

LCA results

LCA results for gypsum plasterboard type A

Environmental impacts for 1 m ² gypsum plasterboard type A, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ -eq.	8.58E-02	9.53E-02	8.53E-01	0.00E+00	3.29E-02	0.00E+00	1.24E-01	0.00E+00
GWP-fossil	kg CO ₂ -eq.	2.54E-01	9.53E-02	8.52E-01	0.00E+00	3.29E-02	0.00E+00	1.24E-01	0.00E+00
GWP-biogenic	kg CO ₂ -eq.	-1.71E-01	0.00E+00	6.40E-04	0.00E+00	0.00E+00	0.00E+00	8.38E-06	0.00E+00
GWP-luluc	kg CO ₂ -eq.	2.61E-03	7.98E-07	6.53E-07	0.00E+00	2.74E-07	0.00E+00	2.89E-07	0.00E+00
ODP	kg CFC 11-eq.	3.26E-08	2.17E-08	4.04E-08	0.00E+00	7.54E-09	0.00E+00	2.66E-08	0.00E+00
AP	mol H ⁺ -eq.	1.24E-03	2.20E-04	6.03E-03	0.00E+00	7.64E-05	0.00E+00	2.10E-04	0.00E+00
EP-freshwater	kg PO ₄ -eq.	2.00E-04	7.15E-06	1.92E-03	0.00E+00	2.45E-06	0.00E+00	4.47E-06	0.00E+00
EP-marine	kg N-eq.	3.90E-04	3.03E-05	8.90E-04	0.00E+00	1.05E-05	0.00E+00	2.83E-05	0.00E+00
EP-terrestrial	mol N-eq.	2.67E-03	3.20E-04	5.33E-03	0.00E+00	1.10E-04	0.00E+00	3.03E-04	0.00E+00
POCP	kg NMVOC-eq.	7.20E-04	1.60E-04	1.58E-03	0.00E+00	5.54E-05	0.00E+00	1.68E-04	0.00E+00
ADP-minerals & metals	kg Sb-eq.	6.22E-06	2.63E-06	2.33E-06	0.00E+00	8.98E-07	0.00E+00	1.88E-07	0.00E+00
ADP-fossil	MJ	4.21E+00	1.42E+00	1.34E+01	0.00E+00	4.94E-01	0.00E+00	1.67E+00	0.00E+00
WDP	m ³	2.65E+01	1.39E+00	1.87E+02	0.00E+00	4.77E-01	0.00E+00	3.59E-01	0.00E+00

Additional environmental impacts for 1 m ² gypsum plasterboard type A, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw ¹	CTUe	4.33E-01	4.81E-02	4.37E-02	0.00E+00	1.65E-02	0.00E+00	1.00E-02	0.00E+00
HTP-c ²	CTUh	2.09E-10	2.95E-11	2.62E-10	0.00E+00	1.03E-11	0.00E+00	7.82E-11	0.00E+00
HTP-nc ³	CTUh	1.20E-08	1.85E-09	5.03E-08	0.00E+00	6.37E-10	0.00E+00	7.59E-10	0.00E+00
IRP ⁴	kBq U-235-eq.	5.10E-02	7.44E-03	4.17E-01	0.00E+00	2.58E-03	0.00E+00	7.69E-03	0.00E+00
SQP ⁵	-	9.76E+01	1.46E+00	8.59E-01	0.00E+00	5.00E-01	0.00E+00	8.65E-02	0.00E+00
PM ⁶	Disease incidence	4.96E-08	5.94E-09	9.64E-09	0.00E+00	2.18E-09	0.00E+00	5.86E-09	0.00E+00

Resource use for 1 m ² gypsum plasterboard type A, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER ⁷ excluding RPER used as raw materials	MJ	2.76E-01	2.06E-02	1.03E+00	0.00E+00	7.07E-03	0.00E+00	9.16E-03	0.00E+00
RPER used as raw materials	MJ	7.91E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.19E+00	2.06E-02	1.03E+00	0.00E+00	7.07E-03	0.00E+00	9.16E-03	0.00E+00
NRPER ⁸ excluding	MJ	5.06E+00	1.45E+00	2.07E+01	0.00E+00	5.04E-01	0.00E+00	1.68E+00	0.00E+00

¹ ETP-fw – Eco-toxicity freshwater (Potential Comparative Toxic Unit for ecosystems)

² HTP-c - Human toxicity, cancer effects (Potential Comparative Toxic Unit for humans)

³ HTP-nc - Human toxicity, non-cancer effects (Potential Comparative Toxic Unit for humans)

⁴ IRP - Ionizing radiation, human health (Potential Human exposure efficiency relative to U-235)

⁵ SQP - Land use related impacts/ Soil quality (Potential soil quality index)

⁶ PM - Particulate Matter emissions (Potential incidence of disease due to PM emissions)

⁷ RPER – renewable primary energy resources

⁸ NRPER – non-renewable primary energy resources

Resource use for 1 m ² gypsum plasterboard type A, 12.5 mm									
NRPER used as raw materials									
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.06E+00	1.45E+00	2.07E+01	0.00E+00	5.04E-01	0.00E+00	1.68E+00	0.00E+00
Use of secondary material	kg	1.88E-01	5.90E-04	1.44E-03	0.00E+00	2.00E-04	0.00E+00	8.31E-04	0.00E+00
Use of renewable secondary fuels	MJ	2.38E-02	7.40E-04	4.18E-02	0.00E+00	2.50E-04	0.00E+00	2.25E-04	0.00E+00
Use of non-renewable secondary fuels	MJ	3.43E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	5.75E-03	1.10E-04	5.91E-03	0.00E+00	3.61E-05	0.00E+00	4.80E-05	0.00E+00

Output flows and waste categories for 1 m ² gypsum plasterboard type A, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.70E-02	1.48E-03	6.49E-06	0.00E+00	5.10E-04	0.00E+00	1.82E-03	0.00E+00
Non-hazardous waste disposed	kg	5.63E-01	1.02E-01	1.41E-03	0.00E+00	3.49E-02	0.00E+00	1.95E-02	0.00E+00
Radioactive waste disposed	kg	1.74E-05	9.91E-06	1.00E-04	0.00E+00	3.45E-06	0.00E+00	1.19E-05	0.00E+00
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.60E-01	4.90E-04	8.07E-03	0.00E+00	1.70E-04	0.00E+00	8.16E-04	0.00E+00
Materials for energy recovery	kg	4.70E-04	8.18E-06	4.10E-04	0.00E+00	2.80E-06	0.00E+00	2.53E-06	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content	Unit	
Biogenic carbon content in product	kg C	1.70E-01
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

LCA results for gypsum plasterboard type H

Environmental impacts for 1 m ² gypsum plasterboard type H, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ -eq.	1.56E-01	1.10E-01	9.11E-01	0.00E+00	3.52E-02	0.00E+00	1.24E-01	0.00E+00
GWP-fossil	kg CO ₂ -eq.	3.31E-01	1.11E-01	9.10E-01	0.00E+00	3.52E-02	0.00E+00	1.24E-01	0.00E+00
GWP-biogenic	kg CO ₂ -eq.	-1.79E-01	0.00E+00	6.90E-04	0.00E+00	0.00E+00	0.00E+00	8.38E-06	0.00E+00
GWP-luluc	kg CO ₂ -eq.	4.12E-03	9.44E-07	6.97E-07	0.00E+00	2.93E-07	0.00E+00	2.89E-07	0.00E+00
ODP	kg CFC 11-eq.	6.17E-08	2.51E-08	4.32E-08	0.00E+00	8.06E-09	0.00E+00	2.66E-08	0.00E+00
AP	mol H ⁺ -eq.	1.63E-03	2.60E-04	6.44E-03	0.00E+00	8.17E-05	0.00E+00	2.10E-04	0.00E+00
EP-freshwater	kg PO ₄ -eq.	2.30E-04	8.45E-06	2.05E-03	0.00E+00	2.62E-06	0.00E+00	4.47E-06	0.00E+00
EP-marine	kg N-eq.	5.00E-04	3.53E-05	9.50E-04	0.00E+00	1.12E-05	0.00E+00	2.83E-05	0.00E+00
EP-terrestrial	mol N-eq.	3.54E-03	3.70E-04	5.69E-03	0.00E+00	1.18E-04	0.00E+00	3.03E-04	0.00E+00
POCP	kg NMVOC-eq.	9.40E-04	1.90E-04	1.68E-03	0.00E+00	5.92E-05	0.00E+00	1.68E-04	0.00E+00
ADP-minerals & metals	kg Sb-eq.	9.68E-06	3.17E-06	2.48E-06	0.00E+00	9.60E-07	0.00E+00	1.88E-07	0.00E+00
ADP-fossil	MJ	5.12E+00	1.65E+00	1.43E+01	0.00E+00	5.28E-01	0.00E+00	1.67E+00	0.00E+00
WDP	m ³	3.26E+01	1.66E+00	2.00E+02	0.00E+00	5.10E-01	0.00E+00	3.59E-01	0.00E+00

Additional environmental impacts for 1 m ² gypsum plasterboard type H, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw ⁹	CTUe	6.03E-01	5.46E-02	4.67E-02	0.00E+00	1.76E-02	0.00E+00	1.00E-02	0.00E+00
HTP-c ¹⁰	CTUh	3.09E-10	3.48E-11	2.80E-10	0.00E+00	1.10E-11	0.00E+00	7.82E-11	0.00E+00
HTP-nc ¹¹	CTUh	2.09E-08	2.18E-09	5.37E-08	0.00E+00	6.81E-10	0.00E+00	7.59E-10	0.00E+00
IRP ¹²	kBq U-235-eq.	6.12E-02	8.64E-03	4.45E-01	0.00E+00	2.76E-03	0.00E+00	7.69E-03	0.00E+00
SQP ¹³	-	9.89E+01	1.66E+00	9.17E-01	0.00E+00	5.34E-01	0.00E+00	8.65E-02	0.00E+00
PM ¹⁴	Disease incidence	5.35E-08	6.76E-09	1.03E-08	0.00E+00	2.33E-09	0.00E+00	5.86E-09	0.00E+00

Resource use for 1 m ² gypsum plasterboard type H, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER ¹⁵ excluding RPER used as raw materials	MJ	4.49E-01	2.45E-02	1.09E+00	0.00E+00	0.00E+00	0.00E+00	9.16E-03	0.00E+00
RPER used as raw materials	MJ	7.91E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.36E+00	2.45E-02	1.09E+00	0.00E+00	7.56E-03	0.00E+00	9.16E-03	0.00E+00
NRPER ¹⁶ excluding NRPER used as raw materials	MJ	6.16E+00	1.68E+00	2.21E+01	0.00E+00	5.39E-01	0.00E+00	1.68E+00	0.00E+00

⁹ ETP-fw – Eco-toxicity freshwater (Potential Comparative Toxic Unit for ecosystems)

¹⁰ HTP-c - Human toxicity, cancer effects (Potential Comparative Toxic Unit for humans)

¹¹ HTP-nc - Human toxicity, non-cancer effects (Potential Comparative Toxic Unit for humans)

¹² IRP - Ionizing radiation, human health (Potential Human exposure efficiency relative to U-235)

¹³ SQP - Land use related impacts/ Soil quality (Potential soil quality index)

¹⁴ PM - Particulate Matter emissions (Potential incidence of disease due to PM emissions)

¹⁵ RPER – renewable primary energy resources

¹⁶ NRPER – non-renewable primary energy resources



Resource use for 1 m ² gypsum plasterboard type H, 12.5 mm									
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	6.16E+00	1.68E+00	2.21E+01	0.00E+00	5.39E-01	0.00E+00	1.68E+00	0.00E+00
Use of secondary material	kg	1.89E-01	7.00E-04	1.53E-03	0.00E+00	2.14E-04	0.00E+00	8.31E-04	0.00E+00
Use of renewable secondary fuels	MJ	2.95E-02	8.80E-04	4.46E-02	0.00E+00	2.67E-04	0.00E+00	2.25E-04	0.00E+00
Use of non-renewable secondary fuels	MJ	4.50E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	8.47E-03	1.20E-04	6.31E-03	0.00E+00	3.86E-05	0.00E+00	4.80E-05	0.00E+00

Output flows and waste categories for 1 m ² gypsum plasterboard type H, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.05E-02	1.75E-03	6.94E-06	0.00E+00	5.45E-04	0.00E+00	1.82E-03	0.00E+00
Non-hazardous waste disposed	kg	6.72E-01	1.17E-01	1.50E-03	0.00E+00	3.73E-02	0.00E+00	1.95E-02	0.00E+00
Radioactive waste disposed	kg	2.06E-05	1.15E-05	1.10E-04	0.00E+00	3.68E-06	0.00E+00	1.19E-05	0.00E+00
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.60E-01	5.80E-04	8.61E-03	0.00E+00	1.82E-04	0.00E+00	8.16E-04	0.00E+00
Materials for energy recovery	kg	6.20E-04	9.72E-06	4.40E-04	0.00E+00	3.00E-06	0.00E+00	2.53E-06	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content	Unit	
Biogenic carbon content in product	kg C	1.70E-01
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

LCA results for gypsum plasterboard type DF

Environmental impacts for 1 m ² gypsum plasterboard type DF, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ -eq.	1.27E-01	1.56E-01	1.11E+00	0.00E+00	4.30E-02	0.00E+00	1.24E-01	0.00E+00
GWP-fossil	kg CO ₂ -eq.	2.95E-01	1.56E-01	1.11E+00	0.00E+00	4.30E-02	0.00E+00	1.24E-01	0.00E+00
GWP-biogenic	kg CO ₂ -eq.	-1.70E-01	0.00E+00	8.40E-04	0.00E+00	0.00E+00	0.00E+00	8.38E-06	0.00E+00
GWP-luluc	kg CO ₂ -eq.	2.55E-03	1.37E-06	8.52E-07	0.00E+00	3.57E-07	0.00E+00	2.89E-07	0.00E+00
ODP	kg CFC 11-eq.	3.76E-08	3.52E-08	5.27E-08	0.00E+00	9.84E-09	0.00E+00	2.66E-08	0.00E+00
AP	mol H ⁺ -eq.	1.52E-03	3.60E-04	7.87E-03	0.00E+00	9.97E-05	0.00E+00	2.10E-04	0.00E+00
EP-freshwater	kg PO ₄ -eq.	2.20E-04	1.23E-05	2.50E-03	0.00E+00	3.20E-06	0.00E+00	4.47E-06	0.00E+00
EP-marine	kg N-eq.	4.40E-04	5.00E-05	1.16E-03	0.00E+00	1.37E-05	0.00E+00	2.83E-05	0.00E+00
EP-terrestrial	mol N-eq.	3.21E-03	5.30E-04	6.95E-03	0.00E+00	1.44E-04	0.00E+00	3.03E-04	0.00E+00
POCP	kg NMVOC-eq.	8.90E-04	2.60E-04	2.06E-03	0.00E+00	7.22E-05	0.00E+00	1.68E-04	0.00E+00
ADP-minerals & metals	kg Sb-eq.	1.30E-05	4.75E-06	3.03E-06	0.00E+00	1.17E-06	0.00E+00	1.88E-07	0.00E+00
ADP-fossil	MJ	4.94E+00	2.32E+00	1.74E+01	0.00E+00	6.45E-01	0.00E+00	1.67E+00	0.00E+00
WDP	m ³	2.93E+01	2.45E+00	2.44E+02	0.00E+00	6.23E-01	0.00E+00	3.59E-01	0.00E+00

Additional environmental impacts for 1 m ² gypsum plasterboard type DF, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw ¹⁷	CTUe	4.37E-01	7.44E-02	5.70E-02	0.00E+00	2.15E-02	0.00E+00	1.00E-02	0.00E+00
HTP-c ¹⁸	CTUh	2.54E-10	5.05E-11	3.42E-10	0.00E+00	1.34E-11	0.00E+00	7.82E-11	0.00E+00
HTP-nc ¹⁹	CTUh	1.54E-08	3.13E-09	6.57E-08	0.00E+00	8.31E-10	0.00E+00	7.59E-10	0.00E+00
IRP ²⁰	kBq U-235-eq.	5.69E-02	1.22E-02	5.43E-01	0.00E+00	3.37E-03	0.00E+00	7.69E-03	0.00E+00
SQP ²¹	-	9.79E+01	2.25E+00	1.12E+00	0.00E+00	6.52E-01	0.00E+00	8.65E-02	0.00E+00
PM ²²	Disease incidence	5.21E-08	9.27E-09	1.26E-08	0.00E+00	2.85E-09	0.00E+00	5.86E-09	0.00E+00

Resource use for 1 m ² gypsum plasterboard type DF, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER ²³ excluding RPER used as raw materials	MJ	3.11E-01	3.58E-02	1.34E+00	0.00E+00	9.23E-03	0.00E+00	9.16E-03	0.00E+00
RPER used as raw materials	MJ	7.91E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.23E+00	3.58E-02	1.34E+00	0.00E+00	9.23E-03	0.00E+00	9.16E-03	0.00E+00
NRPER ²⁴ excluding NRPER used as raw materials	MJ	5.89E+00	2.37E+00	2.69E+01	0.00E+00	6.58E-01	0.00E+00	1.68E+00	0.00E+00

¹⁷ ETP-fw – Eco-toxicity freshwater (Potential Comparative Toxic Unit for ecosystems)

¹⁸ HTP-c - Human toxicity, cancer effects (Potential Comparative Toxic Unit for humans)

¹⁹ HTP-nc - Human toxicity, non-cancer effects (Potential Comparative Toxic Unit for humans)

²⁰ IRP - Ionizing radiation, human health (Potential Human exposure efficiency relative to U-235)

²¹ SQP - Land use related impacts/ Soil quality (Potential soil quality index)

²² PM - Particulate Matter emissions (Potential incidence of disease due to PM emissions)

²³ RPER – renewable primary energy resources

²⁴ NRPER – non-renewable primary energy resources



Resource use for 1 m ² gypsum plasterboard type DF, 12.5 mm									
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.89E+00	2.37E+00	2.69E+01	0.00E+00	6.58E-01	0.00E+00	1.68E+00	0.00E+00
Use of secondary material	kg	1.89E-01	1.03E-03	1.87E-03	0.00E+00	2.61E-04	0.00E+00	8.31E-04	0.00E+00
Use of renewable secondary fuels	MJ	2.66E-02	1.28E-03	5.45E-02	0.00E+00	3.26E-04	0.00E+00	2.25E-04	0.00E+00
Use of non-renewable secondary fuels	MJ	2.82E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	6.14E-03	1.80E-04	7.71E-03	0.00E+00	4.71E-05	0.00E+00	4.80E-05	0.00E+00

Output flows and waste categories for 1 m ² gypsum plasterboard type DF, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	1.92E-02	2.53E-03	8.47E-06	0.00E+00	6.65E-04	0.00E+00	1.82E-03	0.00E+00
Non-hazardous waste disposed	kg	6.40E-01	1.62E-01	1.84E-03	0.00E+00	4.56E-02	0.00E+00	1.95E-02	0.00E+00
Radioactive waste disposed	kg	1.97E-05	1.61E-05	1.30E-04	0.00E+00	4.50E-06	0.00E+00	1.19E-05	0.00E+00
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.60E-01	8.40E-04	1.05E-02	0.00E+00	2.22E-04	0.00E+00	8.16E-04	0.00E+00
Materials for energy recovery	kg	5.00E-04	1.42E-05	5.40E-04	0.00E+00	3.66E-06	0.00E+00	2.53E-06	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content	Unit	
Biogenic carbon content in product	kg C	1.70E-01
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

LCA results for gypsum plasterboard type DFH2

Environmental impacts for 1 m ² gypsum plasterboard type DFH2, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ -eq.	2.45E-01	1.78E-01	1.20E+00	0.00E+00	4.64E-02	0.00E+00	1.24E-01	0.00E+00
GWP-fossil	kg CO ₂ -eq.	4.18E-01	1.78E-01	1.20E+00	0.00E+00	4.64E-02	0.00E+00	1.24E-01	0.00E+00
GWP-biogenic	kg CO ₂ -eq.	-1.76E-01	0.00E+00	9.10E-04	0.00E+00	0.00E+00	0.00E+00	8.38E-06	0.00E+00
GWP-luluc	kg CO ₂ -eq.	3.54E-03	1.58E-06	9.19E-07	0.00E+00	3.86E-07	0.00E+00	2.89E-07	0.00E+00
ODP	kg CFC 11-eq.	7.83E-08	4.00E-08	5.69E-08	0.00E+00	1.06E-08	0.00E+00	2.66E-08	0.00E+00
AP	mol H ⁺ -eq.	2.23E-03	4.20E-04	8.49E-03	0.00E+00	1.08E-04	0.00E+00	2.10E-04	0.00E+00
EP-freshwater	kg PO ₄ -eq.	2.60E-04	1.42E-05	2.70E-03	0.00E+00	3.45E-06	0.00E+00	4.47E-06	0.00E+00
EP-marine	kg N-eq.	5.90E-04	5.71E-05	1.25E-03	0.00E+00	1.48E-05	0.00E+00	2.83E-05	0.00E+00
EP-terrestrial	mol N-eq.	4.64E-03	6.10E-04	7.50E-03	0.00E+00	1.55E-04	0.00E+00	3.03E-04	0.00E+00
POCP	kg NMVOC-eq.	1.30E-03	3.00E-04	2.22E-03	0.00E+00	7.80E-05	0.00E+00	1.68E-04	0.00E+00
ADP-minerals & metals	kg Sb-eq.	2.25E-05	5.52E-06	3.28E-06	0.00E+00	1.27E-06	0.00E+00	1.88E-07	0.00E+00
ADP-fossil	MJ	6.90E+00	2.64E+00	1.88E+01	0.00E+00	6.96E-01	0.00E+00	1.67E+00	0.00E+00
WDP	m ³	3.82E+01	2.83E+00	2.64E+02	0.00E+00	6.73E-01	0.00E+00	3.59E-01	0.00E+00

Additional environmental impacts for 1 m ² gypsum plasterboard type DFH2, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw ²⁵	CTUe	5.45E-01	8.38E-02	6.16E-02	0.00E+00	2.32E-02	0.00E+00	1.00E-02	0.00E+00
HTP-c ²⁶	CTUh	3.78E-10	5.81E-11	3.69E-10	0.00E+00	1.45E-11	0.00E+00	7.82E-11	0.00E+00
HTP-nc ²⁷	CTUh	2.41E-08	3.59E-09	7.09E-08	0.00E+00	8.98E-10	0.00E+00	7.59E-10	0.00E+00
IRP ²⁸	kBq U-235-eq.	7.30E-02	1.40E-02	5.86E-01	0.00E+00	3.64E-03	0.00E+00	7.69E-03	0.00E+00
SQP ²⁹	-	9.92E+01	2.53E+00	1.21E+00	0.00E+00	7.04E-01	0.00E+00	8.65E-02	0.00E+00
PM ³⁰	Disease incidence	5.80E-08	1.05E-08	1.36E-08	0.00E+00	3.07E-09	0.00E+00	5.86E-09	0.00E+00

Resource use for 1 m ² gypsum plasterboard type DFH2, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER ³¹ excluding RPER used as raw materials	MJ	8.31E+00	4.12E-02	1.44E+00	0.00E+00	9.96E-03	0.00E+00	9.16E-03	0.00E+00
RPER used as raw materials	MJ	1.24E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.44E+00	4.12E-02	1.44E+00	0.00E+00	9.96E-03	0.00E+00	9.16E-03	0.00E+00
NRPER ³² excluding NRPER used as raw materials	MJ	8.14E+00	2.70E+00	2.91E+01	0.00E+00	7.11E-01	0.00E+00	1.68E+00	0.00E+00

²⁵ ETP-fw – Eco-toxicity freshwater (Potential Comparative Toxic Unit for ecosystems)

²⁶ HTP-c - Human toxicity, cancer effects (Potential Comparative Toxic Unit for humans)

²⁷ HTP-nc - Human toxicity, non-cancer effects (Potential Comparative Toxic Unit for humans)

²⁸ IRP - Ionizing radiation, human health (Potential Human exposure efficiency relative to U-235)

²⁹ SQP - Land use related impacts/ Soil quality (Potential soil quality index)

³⁰ PM - Particulate Matter emissions (Potential incidence of disease due to PM emissions)

³¹ RPER – renewable primary energy resources

³² NRPER – non-renewable primary energy resources

Resource use for 1 m ² gypsum plasterboard type DFH2, 12.5 mm									
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	8.14E+00	2.70E+00	2.91E+01	0.00E+00	7.11E-01	0.00E+00	1.68E+00	0.00E+00
Use of secondary material	kg	1.89E-01	1.18E-03	2.02E-03	0.00E+00	2.82E-04	0.00E+00	8.31E-04	0.00E+00
Use of renewable secondary fuels	MJ	3.50E-02	1.48E-03	5.88E-02	0.00E+00	3.52E-04	0.00E+00	2.25E-04	0.00E+00
Use of non-renewable secondary fuels	MJ	3.98E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	9.66E-03	2.10E-04	8.32E-03	0.00E+00	5.09E-05	0.00E+00	4.80E-05	0.00E+00

Output flows and waste categories for 1 m ² gypsum plasterboard type DFH2, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.56E-02	2.91E-03	9.14E-06	0.00E+00	7.19E-04	0.00E+00	1.82E-03	0.00E+00
Non-hazardous waste disposed	kg	8.36E-01	1.84E-01	1.98E-03	0.00E+00	4.92E-02	0.00E+00	1.95E-02	0.00E+00
Radioactive waste disposed	kg	2.50E-05	1.83E-05	1.50E-04	0.00E+00	4.86E-06	0.00E+00	1.19E-05	0.00E+00
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.61E-01	9.70E-04	1.14E-02	0.00E+00	2.40E-04	0.00E+00	8.16E-04	0.00E+00
Materials for energy recovery	kg	6.40E-04	1.64E-05	5.80E-04	0.00E+00	3.95E-06	0.00E+00	2.53E-06	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content	Unit	
Biogenic carbon content in product	kg C	1.70E-01
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

LCA results for gypsum plasterboard type DFH1IR

Environmental impacts for 1 m ² gypsum plasterboard type DFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ -eq.	2.31E-01	1.76E-01	1.36E+00	0.00E+00	5.25E-02	0.00E+00	1.24E-01	0.00E+00
GWP-fossil	kg CO ₂ -eq.	4.04E-01	1.76E-01	1.36E+00	0.00E+00	5.25E-02	0.00E+00	1.24E-01	0.00E+00
GWP-biogenic	kg CO ₂ -eq.	-1.75E-01	0.00E+00	1.02E-03	0.00E+00	0.00E+00	0.00E+00	8.38E-06	0.00E+00
GWP-luluc	kg CO ₂ -eq.	3.19E-03	1.56E-06	1.04E-06	0.00E+00	4.37E-07	0.00E+00	2.89E-07	0.00E+00
ODP	kg CFC 11-eq.	7.71E-08	3.96E-08	6.44E-08	0.00E+00	1.20E-08	0.00E+00	2.66E-08	0.00E+00
AP	mol H ⁺ -eq.	2.12E-03	4.10E-04	9.60E-03	0.00E+00	1.22E-04	0.00E+00	2.10E-04	0.00E+00
EP-freshwater	kg PO ₄ -eq.	2.50E-04	1.40E-05	3.05E-03	0.00E+00	3.90E-06	0.00E+00	4.47E-06	0.00E+00
EP-marine	kg N-eq.	5.70E-04	5.66E-05	1.42E-03	0.00E+00	1.67E-05	0.00E+00	2.83E-05	0.00E+00
EP-terrestrial	mol N-eq.	4.40E-03	6.00E-04	8.48E-03	0.00E+00	1.75E-04	0.00E+00	3.03E-04	0.00E+00
POCP	kg NMVOC-eq.	1.24E-03	2.90E-04	2.51E-03	0.00E+00	8.82E-05	0.00E+00	1.68E-04	0.00E+00
ADP-minerals & metals	kg Sb-eq.	1.95E-05	5.45E-06	3.70E-06	0.00E+00	1.43E-06	0.00E+00	1.88E-07	0.00E+00
ADP-fossil	MJ	6.73E+00	2.62E+00	2.13E+01	0.00E+00	7.87E-01	0.00E+00	1.67E+00	0.00E+00
WDP	m ³	3.68E+01	2.80E+00	2.98E+02	0.00E+00	7.61E-01	0.00E+00	3.59E-01	0.00E+00

Additional environmental impacts for 1 m ² gypsum plasterboard type DFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw ³³	CTUe	5.27E-01	8.31E-02	6.96E-02	0.00E+00	2.62E-02	0.00E+00	1.00E-02	0.00E+00
HTP-c ³⁴	CTUh	3.63E-10	5.74E-11	4.18E-10	0.00E+00	1.64E-11	0.00E+00	7.82E-11	0.00E+00
HTP-nc ³⁵	CTUh	2.27E-08	3.55E-09	8.01E-08	0.00E+00	1.02E-09	0.00E+00	7.59E-10	0.00E+00
IRP ³⁶	kBq U-235-eq.	7.04E-02	1.38E-02	6.63E-01	0.00E+00	4.11E-03	0.00E+00	7.69E-03	0.00E+00
SQP ³⁷	-	9.90E+01	2.51E+00	1.37E+00	0.00E+00	7.96E-01	0.00E+00	8.65E-02	0.00E+00
PM ³⁸	Disease incidence	5.72E-08	1.04E-08	1.53E-08	0.00E+00	3.47E-09	0.00E+00	5.86E-09	0.00E+00

Resource use for 1 m ² gypsum plasterboard type DFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER ³⁹ excluding RPER used as raw materials	MJ	8.39E+00	4.08E-02	1.63E+00	0.00E+00	1.13E-02	0.00E+00	9.16E-03	0.00E+00
RPER used as raw materials	MJ	1.86E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.41E+00	4.08E-02	1.63E+00	0.00E+00	1.13E-02	0.00E+00	9.16E-03	0.00E+00
NRPER ⁴⁰ excluding NRPER used as raw materials	MJ	7.93E+00	2.67E+00	3.29E+01	0.00E+00	8.04E-01	0.00E+00	1.68E+00	0.00E+00

³³ ETP-fw – Eco-toxicity freshwater (Potential Comparative Toxic Unit for ecosystems)

³⁴ HTP-c - Human toxicity, cancer effects (Potential Comparative Toxic Unit for humans)

³⁵ HTP-nc - Human toxicity, non-cancer effects (Potential Comparative Toxic Unit for humans)

³⁶ IRP - Ionizing radiation, human health (Potential Human exposure efficiency relative to U-235)

³⁷ SQP - Land use related impacts/ Soil quality (Potential soil quality index)

³⁸ PM - Particulate Matter emissions (Potential incidence of disease due to PM emissions)

³⁹ RPER – renewable primary energy resources

⁴⁰ NRPER – non-renewable primary energy resources

Resource use for 1 m ² gypsum plasterboard type DFH1IR, 12.5 mm									
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	7.93E+00	2.67E+00	3.29E+01	0.00E+00	8.04E-01	0.00E+00	1.68E+00	0.00E+00
Use of secondary material	kg	1.89E-01	1.17E-03	2.29E-03	0.00E+00	3.19E-04	0.00E+00	8.31E-04	0.00E+00
Use of renewable secondary fuels	MJ	3.35E-02	1.46E-03	6.65E-02	0.00E+00	3.98E-04	0.00E+00	2.25E-04	0.00E+00
Use of non-renewable secondary fuels	MJ	3.72E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	9.48E-03	2.10E-04	9.41E-03	0.00E+00	5.75E-05	0.00E+00	4.80E-05	0.00E+00

Output flows and waste categories for 1 m ² gypsum plasterboard type DFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.49E-02	2.88E-03	1.03E-05	0.00E+00	8.13E-04	0.00E+00	1.82E-03	0.00E+00
Non-hazardous waste disposed	kg	8.09E-01	1.82E-01	2.24E-03	0.00E+00	5.56E-02	0.00E+00	1.95E-02	0.00E+00
Radioactive waste disposed	kg	2.43E-05	1.81E-05	1.60E-04	0.00E+00	5.49E-06	0.00E+00	1.19E-05	0.00E+00
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.61E-01	9.60E-04	1.28E-02	0.00E+00	2.71E-04	0.00E+00	8.16E-04	0.00E+00
Materials for energy recovery	kg	6.00E-04	1.63E-05	6.50E-04	0.00E+00	4.47E-06	0.00E+00	2.53E-06	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content	Unit	
Biogenic carbon content in product	kg C	1.70E-01
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

LCA results for gypsum plasterboard type GMFH1IR

Environmental impacts for 1 m ² gypsum board type GMFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
GWP-total	kg CO ₂ -eq.	-2.45E-01	2.53E-01	1.18E+00	0.00E+00	4.54E-02	0.00E+00	1.24E-01	0.00E+00
GWP-fossil	kg CO ₂ -eq.	6.90E-01	2.53E-01	1.18E+00	0.00E+00	4.54E-02	0.00E+00	1.24E-01	0.00E+00
GWP-biogenic	kg CO ₂ -eq.	-9.40E-01	0.00E+00	8.90E-04	0.00E+00	0.00E+00	0.00E+00	8.38E-06	0.00E+00
GWP-luluc	kg CO ₂ -eq.	3.94E-03	2.15E-06	9.01E-07	0.00E+00	3.78E-07	0.00E+00	2.89E-07	0.00E+00
ODP	kg CFC 11-eq.	1.33E-07	5.75E-08	5.58E-08	0.00E+00	1.04E-08	0.00E+00	2.66E-08	0.00E+00
AP	mol H ⁺ -eq.	3.43E-03	5.90E-04	8.33E-03	0.00E+00	1.05E-04	0.00E+00	2.10E-04	0.00E+00
EP-freshwater	kg PO ₄ -eq.	3.70E-04	1.93E-05	2.65E-03	0.00E+00	3.38E-06	0.00E+00	4.47E-06	0.00E+00
EP-marine	kg N-eq.	8.80E-04	8.08E-05	1.23E-03	0.00E+00	1.45E-05	0.00E+00	2.83E-05	0.00E+00
EP-terrestrial	mol N-eq.	7.31E-03	8.60E-04	7.35E-03	0.00E+00	1.52E-04	0.00E+00	3.03E-04	0.00E+00
POCP	kg NMVOC-eq.	2.34E-03	4.20E-04	2.18E-03	0.00E+00	7.64E-05	0.00E+00	1.68E-04	0.00E+00
ADP-minerals & metals	kg Sb-eq.	2.41E-05	7.19E-06	3.21E-06	0.00E+00	1.24E-06	0.00E+00	1.88E-07	0.00E+00
ADP-fossil	MJ	1.13E+01	3.78E+00	1.84E+01	0.00E+00	6.82E-01	0.00E+00	1.67E+00	0.00E+00
WDP	m ³	5.29E+01	3.78E+00	2.58E+02	0.00E+00	6.59E-01	0.00E+00	3.59E-01	0.00E+00

Additional environmental impacts for 1 m ² gypsum board type GMFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
ETP-fw ⁴¹	CTUe	1.15E+00	1.26E-01	6.04E-02	0.00E+00	2.27E-02	0.00E+00	1.00E-02	0.00E+00
HTP-c ⁴²	CTUh	9.69E-10	7.95E-11	3.62E-10	0.00E+00	1.42E-11	0.00E+00	7.82E-11	0.00E+00
HTP-nc ⁴³	CTUh	5.23E-08	4.97E-09	6.95E-08	0.00E+00	8.79E-10	0.00E+00	7.59E-10	0.00E+00
IRP ⁴⁴	kBq U-235-eq.	1.04E-01	1.98E-02	5.75E-01	0.00E+00	3.56E-03	0.00E+00	7.69E-03	0.00E+00
SQP ⁴⁵	-	2.61E+02	3.82E+00	1.19E+00	0.00E+00	6.89E-01	0.00E+00	8.65E-02	0.00E+00
PM ⁴⁶	Disease incidence	9.20E-08	1.56E-08	1.33E-08	0.00E+00	3.01E-09	0.00E+00	5.86E-09	0.00E+00

Resource use for 1 m ² gypsum board type GMFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
RPER ⁴⁷ excluding RPER used as raw materials	MJ	1.96E+01	5.57E-02	1.42E+00	0.00E+00	9.76E-03	0.00E+00	9.16E-03	0.00E+00
RPER used as raw materials	MJ	4.29E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.96E+01	5.57E-02	1.42E+00	0.00E+00	9.76E-03	0.00E+00	9.16E-03	0.00E+00
NRPER ⁴⁸ excluding NRPER used as raw materials	MJ	1.30E+01	3.86E+00	2.85E+01	0.00E+00	6.96E-01	0.00E+00	1.68E+00	0.00E+00

⁴¹ ETP-fw – Eco-toxicity freshwater (Potential Comparative Toxic Unit for ecosystems)

⁴² HTP-c - Human toxicity, cancer effects (Potential Comparative Toxic Unit for humans)

⁴³ HTP-nc - Human toxicity, non-cancer effects (Potential Comparative Toxic Unit for humans)

⁴⁴ IRP - Ionizing radiation, human health (Potential Human exposure efficiency relative to U-235)

⁴⁵ SQP - Land use related impacts/ Soil quality (Potential soil quality index)

⁴⁶ PM - Particulate Matter emissions (Potential incidence of disease due to PM emissions)

⁴⁷ RPER – renewable primary energy resources

⁴⁸ NRPER – non-renewable primary energy resources

Resource use for 1 m ² gypsum board type GMFH1IR, 12.5 mm									
NRPER used as raw materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.30E+01	3.86E+00	2.85E+01	0.00E+00	6.96E-01	0.00E+00	1.68E+00	0.00E+00
Use of secondary material	kg	2.49E-01	1.60E-03	1.98E-03	0.00E+00	2.76E-04	0.00E+00	8.31E-04	0.00E+00
Use of renewable secondary fuels	MJ	4.80E-02	2.00E-03	5.77E-02	0.00E+00	3.45E-04	0.00E+00	2.25E-04	0.00E+00
Use of non-renewable secondary fuels	MJ	1.20E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	1.43E-02	2.80E-04	8.16E-03	0.00E+00	4.98E-05	0.00E+00	4.80E-05	0.00E+00

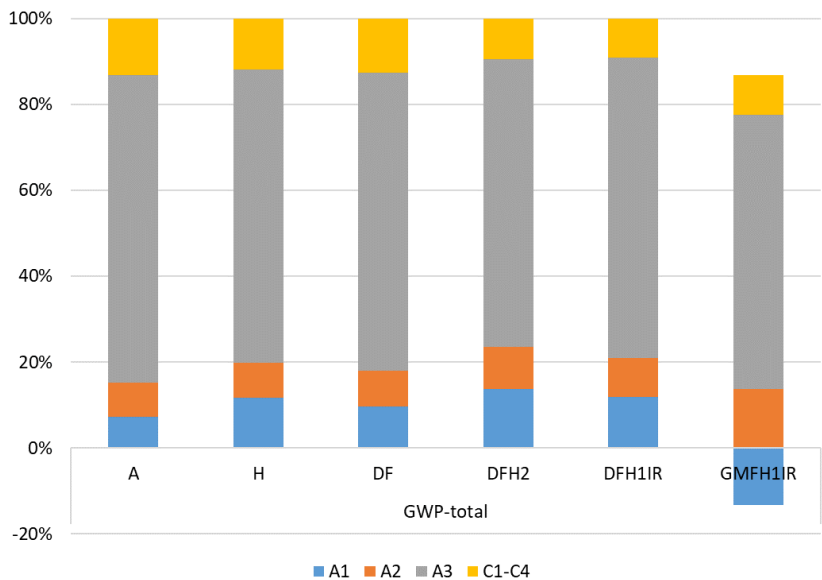
Output flows and waste categories for 1 m ² gypsum board type GMFH1IR, 12.5 mm									
Indicator	Unit	A1	A2	A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	4.16E-02	3.99E-03	8.96E-06	0.00E+00	7.04E-04	0.00E+00	1.82E-03	0.00E+00
Non-hazardous waste disposed	kg	1.27E+00	2.69E-01	1.94E-03	0.00E+00	4.82E-02	0.00E+00	1.95E-02	0.00E+00
Radioactive waste disposed	kg	3.77E-05	2.63E-05	1.40E-04	0.00E+00	4.76E-06	0.00E+00	1.19E-05	0.00E+00
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	2.12E-01	1.32E-03	1.11E-02	0.00E+00	2.35E-04	0.00E+00	8.16E-04	0.00E+00
Materials for energy recovery	kg	8.20E-04	2.21E-05	5.70E-04	0.00E+00	3.87E-06	0.00E+00	2.53E-06	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic carbon content	Unit	
Biogenic carbon content in product	kg C	2.20E-01
Biogenic carbon content in accompanying packaging	kg C	0.00E+00

Interpretation

Production processes of all plasterboards use the same technology and production facilities. Comparing the results for the product stage, it can be noticed that the least environmental impacts are observed at the type A, which comprise more than 90% of the manufactured plasterboards. The results for the other products are higher depending on their composition and additives used, but types H and DF show similar results on most indicators with around 10% increase. The highest impact is observed at GM-FH1-IR as it is a product with specific composition required to fit its purpose. The share of the impacts from production of raw materials and pre-products (module A1) varies among the indicators. For example, module A1 is responsible for 20-30% of the fossil-related CO₂ emissions, ADPF, 35-40% of the ODP, POCP, EPs, 20% of AP and PENRT, 60-70% of the ADPE, 90% of PERT and around 50% of the total water use. Transport (module A2) has small impact for all plasterboards. On most indicators the contribution from transport is less than 10%, except for indicators that are specifically related to transport – ODP and ADPE, where the share of A2 is around 20%. The production

process (module A3) is the most significant source of environmental impacts – more than 50-60% of most indicators. The environmental impact of modules C1-C4 is comparatively small. The indicators of importance where the end-of-life activities are the abiotic depletion potential for fossil resources (ADPF) and the use of non-renewable resources (PENRT) and, to a smaller extent, the carbon footprint (GWP), i.e. indicators related to fuels use. The chart below presents the contributions to the GWP-total indicators per modules.



EPD verification

The process of verification of an EPD is in accordance with EN ISO14025, clause 8 and ISO 21930, clause 9. After verification this EPD is valid for a 5 years period. EPD does not have to be recalculated after 5 years, if the underlying data has not changed significantly.

CEN standard EN 15804 serves as the core PCR along with ITB PCR A
Independent verification corresponding to ISO 14025 & 8.3.1. <input checked="" type="checkbox"/> external <input type="checkbox"/> internal
External verification of EPD: Ph.D. Eng. Halina Prejzner LCA, LCI audit and input data verification: Ph.D. Eng. Michał Piasecki, m.piasecki@itb.pl Verification of LCA: Ph.D. Eng. Justyna Tomaszewska, j.tomaszewska@itb.pl

References

- [1] ITB PCR A- General Product Category Rules for Construction Products
- [2] BDS EN 15804:2012+A1:2014 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- [3] ITB PCR A- General Product Category Rules for Construction Products
- [4] BDS EN ISO 14025:2006, Environmental management – Type III environmental declarations – Principles and procedure
- [5] BDS EN ISO 14040:2006, Environmental management -- Life cycle assessment -- Principles and framework

- [6] BDS EN ISO 14044:2006, Environmental management – Life cycle assessment – Requirements and guidelines
- [7] BDS EN 15942:2011, Sustainability of construction- Environmental product declarations. Communication format business-to-business
- [8] BDS EN 520:2004+A1:2009 Gypsum plasterboards – definitions, requirements and test methods
- [9] BDS EN 520: 2004+A1:2009/NA Gypsum plasterboards – definitions, requirements and test methods – National Annex to BDS EN 520:2004+A1:2009
- [10] БДС EN 15283-1:2008+A1:2009 Gypsum boards with fibrous reinforcement - Definitions, requirements and test methods - Part 1: Gypsum boards with mat reinforcement
- [11] REGULATION (EU) No 305/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC
- [12] Declaration of Performance CPR 022576 TG PL 110/01.05.2020 for gypsum plasterboard type A
- [13] Declaration of Performance CPR 022576 TG PL 120/01.05.2020 for gypsum plasterboard type H
- [14] Declaration of Performance CPR 022576 TG PL 130/01.05.2020 for gypsum plasterboard type DF
- [15] Declaration of Performance CPR 022576 TG PL 132/01.05.2020 for gypsum plasterboard type DFH2
- [16] Declaration of Performance PL171/01.05.2020 for gypsum plasterboard type DFH1IR
- [17] Declaration of Performance CPR 022576 TG PL 141/01.05.2020 for gypsum board type GM-FH1-IR
- [18] Data safety sheet for gypsum plasterboard type A– 01.07.2019
- [19] Data safety sheet for gypsum plasterboard type H– 01.07.2019
- [20] Data safety sheet for gypsum plasterboard type DF – 01.07.2019
- [21] Data safety sheet for gypsum plasterboard type DFH2 – 01.07.2019
- [22] Data safety sheet for gypsum plasterboard type DFH2 v.2 – 01.07.2019
- [23] Data safety sheet for gypsum plasterboard type GM-FH1-IR – 01.07.2019
- [24] Certificate No. 4410020320226 under ISO 9001:2015
- [25] Certificate No. 4410420320226 under ISO 14001:2015
- [26] Certificate No. 4412620320226 under ISO 45001:2018
- [27] International Energy Agency, www.iea.org (last visited March 21, 2019)
- [28] Candidate List of substances of very high concern for Authorisation, editor: European Chemicals Agency (ECHA), Helsinki (FI), last update 25/02/2019, <https://echa.europa.eu/candidate-list-table>
- [29] Bulgarian Law on Environmental protection, State Gazette No 91 dated 25.09.2002, last amend. SG No 98 dated 27.11.2018 (Закон за опазване на околната среда)
- [30] Bulgarian Waste Management Act, State Gazette No 91 dated 25.09.2002, last amend. SG No 53 dated 13.07.2012 (Закон за управление на отпадъците)
- [31] Bulgarian Waters Act, State Gazette No 67 dated 27.07.1999, last amend. SG No 25 dated 26.03.2019 (Закон за водите)
- [32] Bulgarian Ordinance No.6 for construction and use of landfills and other facilities for waste recovery and disposal, State Gazette No 80 dated 13 Sept 2013г., last amend. SG No 13 dated 7.02.2017 (Наредба № 6 от 27 август 2013 г. за условията и изискванията)

за изграждане и експлоатация на депа и на други съоръжения и инсталации за оползотворяване и обезвреждане на отпадъци).

- [33] Bulgarian Ordinance No 1 on the procedure and forms for providing information about the activities on waste and procedures for keeping the public registers, State Gazette No 51 dated 20 June 2014, last amend. SG No 51 dated 19 June 2018 (Наредба № 1 от 04 юни 2014 г. за реда и образците, по които се предоставя информация за дейностите по отпадъците, както и реда за водене на публични регистри)



Instytut Techniki Budowlanej

00-611 Warsaw, Filtrów 1

Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

CERTIFICATE No 138/2020 of TYPE III ENVIRONMENTAL DECLARATION

Product:

Technogips Pro Boards

Manufacturer:

Formatt Building Products Ltd.

2 Dospat St, 1606 Sofia, Bulgaria

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

PN-EN 15804+A1

Sustainability of construction works.

Environmental product declarations.

Core rules for the product category of construction products.

This certificate, issued for the first time on 30th November 2020 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Deputy Head of the Thermal Physic, Acoustics
and Environment Department

Agnieszka Winkler-Skalna, PhD



Deputy Director
for Research and Innovation

Krzysztof Kućzyński, PhD

Warsaw, November 2020