ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and ISO 14044

Gyptone BIG Boards 12,5 mm with Activ'Air

Verification Date : 20 September 2013

Version : 1.0

Valid until : 19 September 2018

EPD VERIFIED

VERIFICATION N°

A028512-2

Gyproc SAINT-GOBAIN

ENVIRONMENTAL PRODUCT

DECLARATION

IN ACCORDANCE WITH THE SAINT GOBAIN PCR

GYPTONE BIG BOARDS 12.5 mm with ACTIV'AIR

Cradle to Gate only – April 2010

Gyptone acoustic ceilings are based on a 12.5 mm specialized gypsum board suitable for most interior building applications where normal levels of fire resistance, structural strength and sound insulation are specified. Gyptone ceilings are produced with Activ'Air[1], a patented technology designed to degrade VOC emissions from emitting building materials, paint, furniture, carpets etc. Activ'Air degrades VOC's, like formaldehyde, into non harmful inert compounds. Activ'Air can reduce formaldehyde concentrations with up to 70 %. Gyptone ceiling can be mounted in suspended grid system with exposed or concealed grid as demountable or non-demountable boards with smooth surfaces. Gyptone ceilings are easy to install and have a robust surface with high impact resistance. Gyptone ceilings are available in many formats and edges for optimal design options.

[1] Activ'Air is standard on all BIG Boards

CONTENTS

FOREWORD

This document constitutes a suitable framework for presenting the environmental and sanitary characteristics of building products in accordance with the requirements of the Saint-Gobain PCR.

A project report of the declaration was drawn up. It can be consulted, under agreement of confidentiality with the head office of Gyproc A/S.

Contact:

Gyproc A/S

Hareskovvej 12

4400 Kalundborg

Data producer (SG PCR §8.2)

Compliancy with requirements concerning the information to be supplied (SG PCR §8.2)

Notes

- Example of reading: -4,2 E-06 = -4,2 X 10^{-6}

1 Product characterisation in accordance with SG PCR § 8.4

1.1 Definition of the functional unit (FU)

Provide a decorative function on 1 m² of installed Gyptone BIG Board with an expected average service life of 50 years (packaging included).

1.2 Product mass required for the functional unit (FU)

Quantity of product contained in the functional unit on the basis of a reference service life

Product : The product studied is the Gyptone BIG Board 12,5 mm with Activ'Air

Average thickness per m² of product: 12.5 mm

Total weight of product : 7.7 kg / m²

Amount of plaster used: 7.18 kg / m²

Surfacing: Paint, acoustic paper, tissue and vinyl adhesive 205.36 g / m²

Distribution packaging

Polyethylene: 43 g / m²

Wooden pallet: 224.2 g / m²

Justification of quantities supplied

The rate of scrap during the installation is: 5%

Maintenance (including partial replacement if necessary): No maintenance, or replacement.

1.3 Useful technical characteristics not contained in the definition of the functional unit

The life cycle inventory data set out below have been calculated for the functional unit defined in 1.1 and 1.2

2 Inventory and other data in accordance with SG PCR § 9 Comments relating to the environmental effects of the product

2.1 Consumption of natural resources (SG PCR § 9.3)

2.1.1 Consumption of natural energy resources and energy indicators

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Wood	kg	0.00716	0.00716	0.358
Coal	kg	0.00741	0.00741	0.370
Lignite	kg	0.00151	0.00151	0.0755
Natural gas	kg	0.0132	0.0132	0.659
Oil	kg	0.00561	0.00561	0.281
Uranium	kg	1.44 E-07	1.44 E-07	7.18 E-06
Energy indicators				
Total Primary Energy	MJ	1.14	1.14	57.2
Renewable Energy	MJ	0.123	0.123	6.15
Non-renewable Energy	MJ	1.02	1.02	51.2
Fuel Energy	MJ	0.941	0.941	47.1
Feedstock Energy	MJ	0.203	0.203	10.2
Electricity	kWh	0.0370	0.0370	1.85

Comments relating to consumption of energy resources

Energy is mainly used during the production phase. Natural gas, which is the main resource, is used for calcination and board drying.

Energy indicators must be used carefully; they add up energies with various origins, which do not have the same environmental impacts (see elementary flows).

2.1.2 Consumption of non-energy natural resources

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Antimony (Sb)	kg	0	0	0
Silver (Ag)	kg	9.82 E-11	9.82 E-11	4.91 E-09
Clay	kg	0.000188	0.000188	0.00939
Arsenic (As)	kg	0	0	0
Bauxite (Al2O3)	kg	3.56 E-05	3.56 E-05	0.00178
Bentonite	kg	1.98 E-06	1.98 E-06	9.92 E-05
Bismuth (Bi)	kg	0	0	0
Boron (B)	kg	0	0	0
Cadmium (Cd)	kg	0	0	0
Limestone	kg	0.000974	0.000974	0.0487
Sodium Carbonate (Na2CO3)	kg	0	0	0
Potassium Chloride (KCl)	kg	4.84 E-05	4.84 E-05	0.00242
Sodium Chloride (NaCl)	kg	8.12 E-05	8.12 E-05	0.00406
Chrome (Cr)	kg	1.24 E-08	1.24 E-08	6.19 E-07
Cobalt (Co)	kg	0	0	0
Copper (Cu)	kg	1.98 E-08	1.98 E-08	9.89 E-07
Dolomite	kg	5.34 E-08	5.34 E-08	2.67 E-06
Tin (Sn)	kg	0	0	0
Feldspar	kg	2.16 E-12	2.16 E-12	1.08 E-10
Iron (Fe)	kg	6.50 E-05	6.50 E-05	0.00325
Fluorite (CaF2)	kg	4.52 E-09	4.52 E-09	2.26 E-07
Gravel*	kg	2.93 E-05	2.93 E-05	0.00146
Gypsum (CaSO4)	kg	0.0272	0.0272	1.36
Lithium (Li)	kg	0	0	0
Kaolin (Al2O3, 2SiO2,2H2O)	kg	9.44 E-05	9.44 E-05	0.00472
Magnesium (Mg)	kg	1.69 E-13	1.69 E-13	8.45 E-12
Manganese (Mn)	kg	2.26 E-09	2.26 E-09	1.13 E-07
Mercury (Hg)	kg	1.69 E-13	1.69 E-13	8.47 E-12
Molybdenum (Mo)	kg	0	0	0
Nickel (Ni)	kg	1.32 E-09	1.32 E-09	6.60 E-08
Gold (Au)	kg	0	0	0

Palladium (Pd)	kg	0	0	0
Platinum (Pt)	kg	0	0	0
Lead (Pb)	kg	1.04 E-08	1.04 E-08	5.20 E-07
Rhodium (Rh)	kg	0	0	0
Rutile (TiO2)	kg	0	0	0
Sand	kg	7.33 E-06	7.33 E-06	0.000367
Silica (SiO2)	kg	0	0	0
Sulphur (S)	kg	0.000266	0.000266	0.0133
Barium Sulphate (BaSO4)	kg	2.03 E-05	2.03 E-05	0.00101
Titanium (Ti)	kg	8.90 E-08	8.90 E-08	4.45 E-06
Tungsten (W)	kg	0	0	0
Vanadium (V)	kg	0	0	0
Zinc (Zn)	kg	1.51 E-10	1.51 E-10	7.56 E-09
Zirconium (Zr)	kg	0	0	0
Vegetal raw materials not specified above	kg	4.24 E-08	4.24 E-08	2.12 E-06
Animal raw materials not specified above	kg	0	0	0
Intermediate products not integrated upstream (total)	kg	0.000462	0.000462	0.0231

2.1.3 Consumption of water

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Water : Lake	litre	0	0	0
Water : Sea	litre	0.000173	0.000173	0.00866
Water : Water table	litre	1.81 E-07	1.81 E-07	9.07 E-06
Water : Unspecified source	litre	0.180	0.180	9.00
Water: River	litre	3.99 E-06	3.99 E-06	0.000199
Drinking Water (network)	litre	0.115	0.115	5.73
Consumed Water (total)	litre	0.295	0.295	14.7

2.1.4 Consumption of recovered energy, recovered material

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Recovered Energy (stock)	MJ	0	0	0
Recovered Material (stock) : Total	kg	0.115	0.115	5.73
Recovered Material (stock) : Steel	kg	0.000129	0.000129	0.00647
Recovered Material (stock) : Aluminium	kg	0	0	0
Recovered Material (stock) : Metal (unspecified)	kg	0	0	0
Recovered Material (stock) : Paper-Cardboard	kg	0.0155	0.0155	0.773
Recovered Material (stock) : Plastic	kg	0	0	0
Recovered Material (stock) : gypsum	kg	0.0990	0.0990	4.95
Recovered Material (stock) : Biomass	kg	0	0	0
Recovered Material (stock): Mineral	kg	0	0	0
Recovered Material (stock) : Unspecified	kg	0	0	0

Comments relating to the consumption of recovered energy and materials

Use of desulfogypsum (a by-product of flue gas desulphurisation at power stations) represents more than 86% of the non-energy recovered resources consumed. Desulfogypsum is used in the manufacture of the product.

2.2 Emissions in the environment (water, air and soil) (SG PCR § 9.4)

2.2.1 Emissions in the air

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Hydrocarbons (unspecified)	g	0.0145	0.0145	0.725
Hydrocarbons (unspecified, except methane)	g	0.0768	0.0768	3.84
PAHs (unspecified)	g	6.11 E-06	6.11 E-06	0.000305
Methane (CH4)	g	0.113	0.113	5.66
Volatile organic compounds (e.g. acetone, acetate…)	g	0.000486	0.000486	0.0243
Carbon Dioxide (CO2)	kg	60.7	60.7	3 037
Carbon Monoxide (CO)	g	0.0995	0.0995	4.97
Nitrogen oxides (NOx in NO2)	g	0.149	0.149	7.46
Nitrous Oxide (N2O)	g	0.00555	0.00555	0.277
Ammonium Hydroxide (NH3)	g	0.00430	0.00430	0.215
Dust (unspecified)	g	0.0988	0.0988	4.94
Sulphur oxides (SOx in SO2)	g	0.183	0.183	9.17
Hydrogen Sulphide (H2S)	g	0.000372	0.000372	0.0186
Hydrocyanic Acid (HCN)	g	1.21 E-06	1.21 E-06	6.07 E-05
Organic chlorine compounds (in Cl)	g	3.07 E-07	3.07 E-07	1.53 E-05
Hydrochloric Acid (HCl)	g	0.00616	0.00616	0.308
Inorganic chlorine compounds (in Cl)	g	1.30 E-06	1.30 E-06	6.50 E-05
Unspecified chlorine compounds (in Cl)	g	3.58 E-07	3.58 E-07	1.79 E-05
Organic fluorine compounds (in F)	g	7.83 E-07	7.83 E-07	3.91 E-05
Inorganic fluorine compounds (in F)	g	0.000260	0.000260	0.0130
Unspecified halogen compounds	g	3.62 E-05	3.62 E-05	0.00181
Unspecified fluorine compounds (in F)	g	0	0	0

Metals (unspecified)	g	0.00372	0.00372	0.186
Antimony and its compounds (in Sb)	g	1.01 E-06	1.01 E-06	5.07 E-05
Arsenic and its compounds (in As)	g	3.61 E-06	3.61 E-06	0.000180
Cadmium and its compounds (in Cd)	g	1.63 E-06	1.63 E-06	8.16 E-05
Chrome and its compounds (in Cr)	g	4.14 E-06	4.14 E-06	0.000207
Cobalt and its compounds (in Co)	g	2.34 E-06	2.34 E-06	0.000117
Copper and its compounds (in Cu)	g	4.36 E-06	4.36 E-06	0.000218
Tin and its compounds (in Sn)	g	1.08 E-07	1.08 E-07	5.40 E-06
Manganese and its compounds (in Mn)	g	5.73 E-06	5.73 E-06	0.000287
Mercury and its compounds (in Hg)	g	1.43 E-06	1.43 E-06	7.14 E-05
Nickel and its compounds (in Ni)	g	3.12 E-05	3.12 E-05	0.00156
Lead and its compounds (in Pb)	g	1.38 E-05	1.38 E-05	0.000688
Selenium and its compounds (in Se)	g	3.12 E-06	3.12 E-06	0.000156
Tellurium and its compounds (in Te)	g	0	0	0
Zinc and its compounds (in Zn)	g	0.000191	0.000191	0.00953
Vanadium and its compounds (in V)	g	0.000110	0.000110	0.00548
Silicon and its compounds (in Si)	g	0.00289	0.00289	0.145
Micro-organisms... acarids...legionnaire's disease		0.0145	0.0145	0.725

NOTE 1: With regards to radioactive emissions, this table will be completed as soon as the transposition of the Euratom European Directive on radioactive emissions is issued.

Comments relating to emissions in the air

Emissions in the air are mainly carbon dioxide (CO_2), representing 98% of the total.

There are no emissions in the air directly associated with the process. Indeed emissions of carbon monoxide (CO), sulphur oxides (SO_2) and dust are only linked to the combustion of energy resources.

2.1.2 Emissions in water

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
COD (Chemical Oxygen Demand)	g	0.0322	0.0322	1.61
5-day BOD (Biochemical Oxygen Demand)	g	0.00406	0.00406	0.203
Matter in Suspension (MIS)	g	0.0284	0.0284	1.42
Cyanide (CN-)	g	1.08 E-05	1.08 E-05	0.000538
AOX (Adsorbable organic halogen compounds)	g	1.10 E-05	1.10 E-05	0.000549
Hydrocarbons (unspecified)	g	0.0330	0.0330	1.65
Nitrogen compounds (in N)	g	0.00113	0.00113	0.0567
Phosphorous compounds (in P)	g	0.00530	0.00530	0.265
Organic fluorine compounds (in F)	g	0.0147	0.0147	0.735
Inorganic fluorine compounds (in F)	g	0	0	0
Unspecified fluorine compounds (in F)	g	0	0	0
Organic chlorine compounds (in Cl)	g	2.93 E-06	2.93 E-06	0.000146
Inorganic fluorine compounds (in Cl)	g	0.263	0.263	13.2
Unspecified chlorine compounds (in Cl)	g	0.000582	0.000582	0.0291
PAHs (unspecified)	g	4.81 E-06	4.81 E-06	0.000241
Metals (unspecified)	g	0.0412	0.0412	2.06
Aluminium and its compounds (in Al)	g	0.00759	0.00759	0.379
Arsenic and its compounds (in As)	g	1.16 E-06	1.16 E-06	5.82 E-05
Cadmium and its compounds (in Cd)	g	4.32 E-07	4.32 E-07	2.16 E-05
Chrome and its compounds (in Cr)	g	5.81 E-06	5.81 E-06	0.000290
Copper and its compounds (in Cu)	g	7.27 E-06	7.27 E-06	0.000363
Tin and its compounds (in Sn)	g	4.16 E-10	4.16 E-10	2.08 E-08
Iron and its compounds (in Fe)	g	0.0354	0.0354	1.77
Mercury and its compounds (in Hg)	g	9.24 E-07	9.24 E-07	4.62 E-05
Nickel and its compounds (in Ni)	g	3.25 E-06	3.25 E-06	0.000163

Lead and its compounds (in Pb)	g	1.30 E-05	1.30 E-05	0.000650
Zinc and its compounds (in Zn)	g	0.000359	0.000359	0.0179

Comments relating to discharges in water

This product itself does not generate emissions into water during its life cycle. The values reported are indirect emissions generated from parallel processes, i.e. production of electricity and fuel refining for transport.

2.2.3 Emissions in the soil

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Arsenic and its compounds (in As)	g	1.03 E-07	1.03 E-07	5.16 E-06
Biocides [a]	g	0	0	0
Cadmium and its compounds (in Cd)	g	4.66 E-11	4.66 E-11	2.33 E-09
Chrome and its compounds (in Cr)	g	1.29 E-06	1.29 E-06	6.46 E-05
Copper and its compounds (in Cu)	g	2.38 E-10	2.38 E-10	1.19 E-08
Tin and its compounds (in Sn)	g	0	0	0
Iron and its compounds (in Fe)	g	0.000516	0.000516	0.0258
Lead and its compounds (in Pb)	g	1.08 E-09	1.08 E-09	5.42 E-08
Mercury and its compounds (in Hg)	g	8.60 E-12	8.60 E-12	4.30 E-10
Nickel and its compounds (in Ni)	g	3.56 E-10	3.56 E-10	1.78 E-08
Zinc and its compounds (in Zn)	g	3.88 E-06	3.88 E-06	0.000194
Heavy metals (unspecified)	g	0	0	0

Comments relating to emissions in the soil

This product itself does not generate emissions into soil during its life cycle. The values reported are indirect emissions generated from parallel processes, i.e. production of raw materials, electricity and fuel refining. Emission in the soil of atrazine is mainly due to the production of starch generated by corn growing.

2.3 Waste production (SG PCR § 9.4)

2.3.1 Recovered matter

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Recovered Energy (stock)	MJ	2.84 E-05	2.84 E-05	0.00142
Recovered Material (stock) : Total	kg	0.00222	0.00222	0.111
Recovered Material (stock) : Steel	kg	3.30 E-05	3.30 E-05	0.00165
Recovered Material (stock) : Aluminium	kg	0	0	0
Recovered Material (stock) : Metal (unspecified)	kg	0	0	0
Recovered Material (stock) : Paper-Cardboard	kg	0.000721	0.000721	0.0361
Recovered Material (stock) : Plastic	kg	1.06 E-05	1.06 E-05	0.000531
Recovered Material (stock): Cullet	kg	0	0	0
Recovered Material (stock): Biomass	kg	4.66 E-05	4.66 E-05	0.00233
Recovered Material (stock): Mineral	kg	0	0	0
Recovered Material (stock): Unspecified	kg	0.00141	0.00141	0.0704

Comments relating to recovered matter

At the production stage, sites internally recycle gypsum production scrap. This recycling reduces the quantity of waste sent to landfill.

The quantity of recovered Material: unspecified come from module of data we use and can be recovered materials as dust, ash or unspecified in the various modules of data.

We don’t take into account benefits or credit when we create waste for reuse.

2.3.2 Eliminated waste

Flow	Units	Production	Total life cycle per FU (1m²)	
			Per year	Reference service life
Hazardous waste	kg	0.00116	0.00116	0.0578
Non-hazardous waste	kg	0.00107	0.00107	0.0534
Inert waste	kg	0.00833	0.00833	0.416

Comments relating to Eliminated waste

Hazardous waste; the waste comes from the module of raw material and energy we use in our calculation.

Non-hazardous waste: the waste comes for 50 % from the factory and includes waste from the production line as plaster for example or cardboard which cannot be recycled… The other part comes from the module of raw material and energy we use in our calculation.

Inert waste: the waste comes for 50% from the quarry of natural gypsum. Inert wastes are equivalent to mineral inert waste. The other part comes from the module of raw material and energy we use in our calculation.

3 Contribution of the product to environmental impacts in accordance with SG PCR § 9.6

All these impacts are entered or calculated in compliance with indications of § 9.6 of the SG PCR.

No.	Environmental impact		Value – Unit Total life cycle per FU (1m²)
1	Consumption of energy resources Total primary energy Renewable energy resources Process energy resources		 57.2 MJ 6.15 MJ 51.2 MJ
2	Depletion of natural resources (ADP)		0.0234 kg eq. antimony (Sb)
3	Water Consumption		14.7 litre
4	Solid waste	Recovered	0.111 kg
		Disposed of Hazardous waste Non-hazardous waste Inert waste	 0.0578 kg 0.0534 kg 0.416 kg
5	Climatic change		3.20 kg eq. CO_2
6	Atmospheric acidification		0.0151 kg eq. SO_2
7	Eutrophication		0.863 g eq. PO_4^{3-}
8	Stratospheric ozone layer depletion		0 kg CFC eq. R11
9	Formation of photochemical oxidants		0.00183 kg eq. ethylene

4 Annex I: Characterisation of data for calculating the life cycle inventory

4.1 Definition of LCA system

4.1.1 Stages included

Production stage :

- The production site (including raw material consumption, energy consumption, air emission, water emissions, waste…).
- Production of raw material and all relevant transport (gypsum…).
- Production of electricity and other energy source as natural gas...
- All production waste.

4.1.2 Flow excluded

The following flows are excluded from the calculations:

- Lighting, heating and cleaning of workshops
- The administrative department
- Transportation of employees
- Manufacture of production tools and transport systems (e.g. machinery, vehicles etc)

4.1.3 System boundaries

The threshold cut-off is fixed at 95% for the total mass according to the Saint-Gobain PCR § 8.7.
In the context of this statement, the percentage of flows modelled is 99.74%

The LCA is created for a cradle to gate scenario.

Data sources

4.1.4 Characterisation of primary data

Production

- Year : 2009
- Geographical coverage: The data is representative of the annual quantity manufactured in Denmark
- Technology coverage : Standard technology for production
- Source : The data is provided by the production site

COWI

Certificate of third-party verification

Gyproc A/S, Kalundborg, Denmark

Information module including cradle-to-gate for

Gyptone Big Boards 12.5 mm with Activ'Air

Performed by

Linda Høibye

Date of issue: 20th of September 2013

Issue number: 1

Environmental impacts and resource and energy use

No.	Environmental impact		Value – Unit
1	Consumption of energy resources Total primary energy Renewable energy resources Process energy resources		 57.2 MJ 6.15 MJ 51.2 MJ
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		Disposed of Hazardous waste Non-hazardous waste Inert waste	 0.0578 kg 0.0534 kg 0.416 kg
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