Environmental Product Declaration
COMPOSITE FACADE PANELS STACBOND

Version 2.0
PCR 2012:01 Construction Products and Construction Services (Version 2.3)

CPC 314 BOARDS AND PANELS

Declaration holder:	**Sistemas Técnicos del Accesorio y Componentes S.L.**
Website:	**www.stac.es**
Program:	**The International EPD® System, www.environdec.com**
Program operator:	**EPD International AB**
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Registration number:	**00000712**

This environmental product declaration has been prepared according to ISO 14025 and EN 15804 + A1 standards.

The geographical scope of this EPD is international.

THE COMPANY AND THE ENVIRONMENTAL COMMITMENT

STAC, Sistemas Técnicos del Accesorio y Componentes S. L., Technical Systems of Accessory and Components Ltd, is a company that specialises in the manufacturing of products for the aluminium fenestration sector.

In each of its 5 divisions, STAC adopts absolute precision in design, trying to meet the actual market demands in quality and innovation requirements. Consequently, we retain not only the best facilities, which adapt and adhere to the different production lines, but also a specialised technical team whose vast experience has firmly positioned them as one of leaders in this sector. These lines are:

- **STAC HARDWARE** – Ironworks and Accessories
- **STAC POL** – Manufacture of extruded and co-extruded polymer profiles
- **STAC MID** – Production of polyamide profiles
- **STAC BOND** – Composite panel fabrication
- **STAC COIL** – Coil coating and processing

STACBOND® is the leading company in the composite panel market in Spain. Since 2001, STAC develops products focused on aluminium carpentry systems and curtain walling as well as polyamide profiles for thermal breaking and joints. From 2008, with its eagerness for growth and innovation, STAC commenced the design and production of its own constructive systems for the execution of architectonic façades by using STACBOND®, a very high quality panel that allows for a multitude of constructive possibilities thanks to its versatility and excellent physical and mechanical properties.

In the design process, we optimize the materials, to obtain a simple, robust, aesthetic and functional product. We optimize and study our packaging, always optimizing volume and transport. This philosophy allows us to obtain savings and reduce transport costs achieving greater cost efficiency and ecological.

We use, in the design of our products, 100% recyclable materials, such as zamak, extruded aluminium, technical polymers (polyamides, polyethylenes, etc.), aluminium for injection, stainless steel. We think about the life cycle of our products from the design phase.

We are certified according to ISO 14001: 2015, international standard for environmental management systems.

Figure 1. ISO 14001 Certification

In this version V 2.0 of the EPD, the data corresponding to the change of location of the production plant (Parandones, León) have been updated and a new product reference, STACBOND®A2, has been included.

DESCRIPTION OF THE PRODUCTS

The Composite Panel STACBOND® is composed of two aluminium sheets joined by a core of thermoplastic resins. It is lacquered with the highest quality PvdF Kynar® 500 70/30 (fluorinated polyvinyl) paint, offering the highest resistance to aging. The manufacture of the Composite Panel STACBOND® follows a controlled process through rigorous testing and quality controls. It has multiple application possibilities, among which are:

- ✓ Ventilated Façades
- ✓ Coverings and false ceilings
- ✓ Balconies and cantilevers
- ✓ External doors, front doors and canopies
- ✓ Urban street furniture equipment
- ✓ All types of external fittings
- ✓ Industrial applications (automation, railways, furniture, bodywork, etc.).

STACBOND®PE aluminum Composite Panel

The STACBOND®PE panel with inner core of thermoplastic resins (low density polyethylene of 100% recycled origin), has excellent mechanical properties, high degree of acoustic insulation, high impact resistance, high rigidity and low weight.

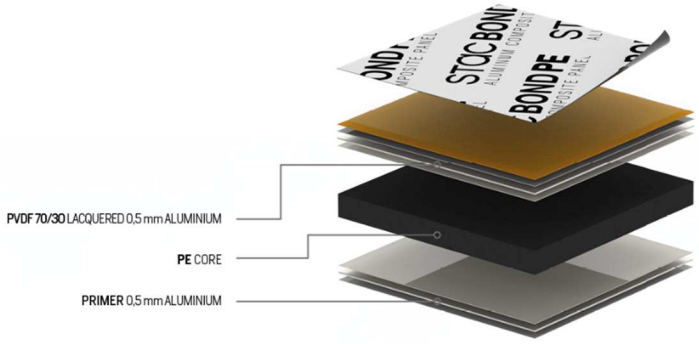

Figure 2. *STACBOND®PE.*

Components: 1 m² of composite panel STACBOND®PE aluminum of 4 mm

Components	Danger	CAS number	Weight%
Polyethylene	Not applicable	9002-88-4	30-50 %
Aluminium	Not applicable	7429-90-5	30-50%
Lacquered PVDF	Not applicable	24937-79-9	1-6%
Adhesive	R: 43	61788-97-4	2-7%
Lacquered Primer	R: 21/44	113669-97-9 108-78-1	1-3%
Other components	H315/318/335	various	1-3%

The exact weight percentage of the components is not included because it is confidential
The components included under the name "other components" are confidential

STACBOND®FR aluminum Composite Panel

The STACBOND®FR panel has been developed to comply with the highest requirements of the current regulations against fire. Its inner core of thermoplastic resins (low density polyethylene of 100% recycled origin and fire retardant) has fire rating B-S1, d0 according to the UNE-EN-13501-1: 2007 + A1: 2010 standard. This panel stands out in the market as one of the most resistant fire resistant composite panels.

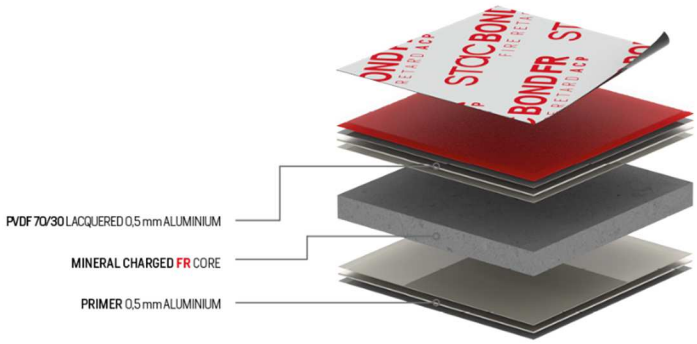

Figure 3. *STACBOND® FR.*

Components: 1 m² of composite panel STACBOND®FR aluminum of 4 mm

Components	Danger	CAS number	Weight%
Polyethylene	Not applicable	9002-88-4	10-30%
Aluminium	Not applicable	7429-90-5	20-50%
Lacquered PVDF	Not applicable	24937-79-9	1-7%
Adhesive	R: 43	61788-97-4	2-8%
Lacquered Primer	R: 21/44	113669-97-9 108-78-1	1-5%
Other components	R: 36/37/38 S: 26-36 H:315/318/335	various	30-60%

The exact weight percentage of the components is not included because it is confidential
The components included under the name "other components" are confidential

STACBOND®A2 aluminum Composite Panel

The composite panel STACBOND® A2, with mineral core, has been developed to meet the highest requirements of current regulations against fire. It has a classification A2-S1, d0 UNE-EN-13501-1: 2007 + A1: 2010 standard. This makes the new STACBOND® A2 panel ideal for high-rise and high-traffic buildings, such as hospitals, shopping centers, airports, hotels or auditoriums.

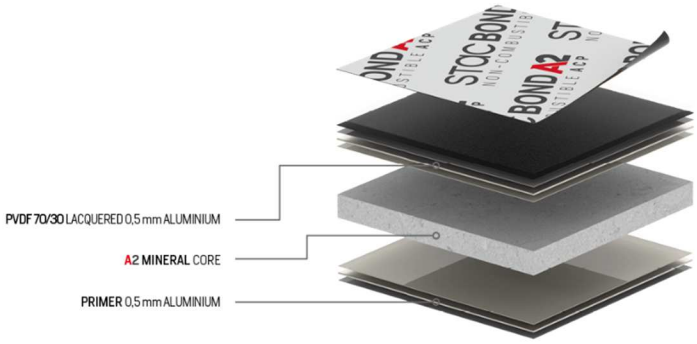

Figure 4. *STACBOND® A2.*

Components: 1 m² of composite panel STACBOND®A2 aluminum of 4 mm

Components	Danger	CAS number	Weight%
Mineral core	Not applicable	various	1-5%
Aluminium	Not applicable	7429-90-5	20-50%
Lacquered PVDF	Not applicable	24937-79-9	1-5%
Adhesive	R: 43	61788-97-4	1-5%
Lacquered Primer	R: 21/44	113669-97-9 108-78-1	1-5%
Other components	R: 36/37/38 S: 26-36 H:315/318/335	various	30-76%

The exact weight percentage of the components is not included because it is confidential
The components included under the name "other components" are confidential

DESCRIPTION OF THE MANUFACTURING PROCESS STAGES

The products analyzed are STACBOND®PE, STACBOND®FR and STACBOND®A2. The manufacturing process of the first two products is similar and follows the following scheme:

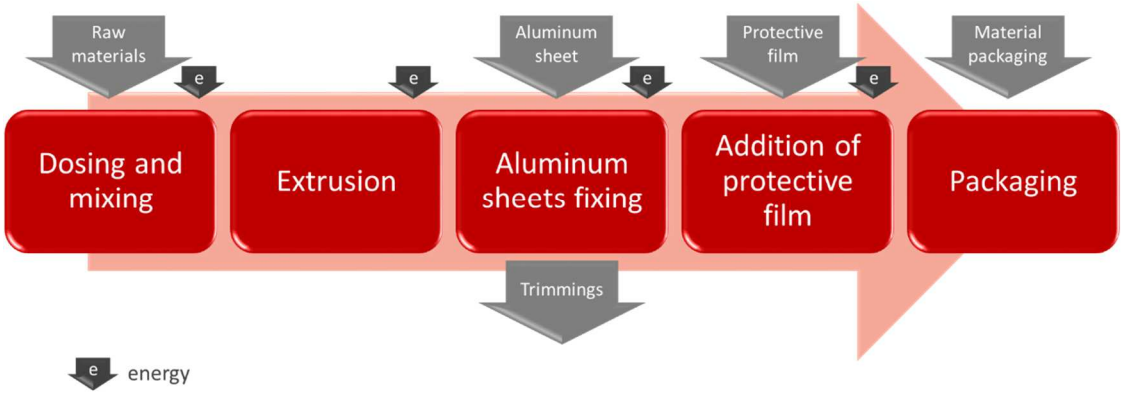

Figure 5. Manufacturing process of STACBOND®PE and STACBOND®FR panels

The manufacturing process of the STACBOND®A2 panels is carried out in another production line in the same plant. The production stages are similar, but in this case, the raw materials (polyethylene core, aluminum sheet and adhesive) arrives at STAC in a prefabricated form, coiled and in sheet form. The process is described below:

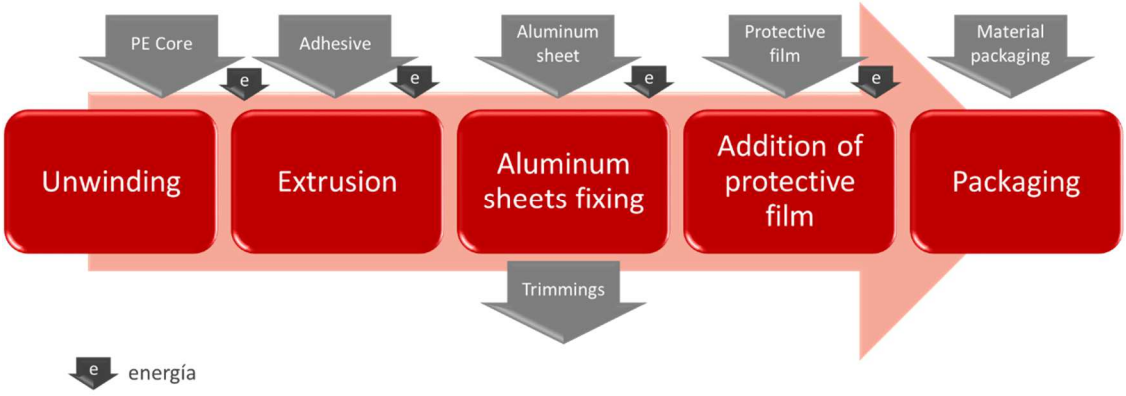

Figure 6. Manufacturing process of the STACBOND®A2 panel

DECLARED UNIT

The declared unit of study are the following. The results have been declared for each of the different panels according to this declared unit:

- ✓ ***"1 m² of STACBOND®PE, 4 mm thickness"***
- ✓ ***"1 m² of STACBOND®FR, 4 mm thickness""***
- ✓ ***"1 m² of STACBOND®A2, 4 mm thickness""***

THE ENVIRONMENTAL PERFORMANCE OF STACBOND COMPOSITE PANELS

The environmental impact of STACBOND® panels has been analyzed based on international standards established for the development of environmental product declarations, such as ISO 14025 for the development of the environmental product declaration, ISO 14040 and ISO 14044 for the elaboration of the life cycle analysis, EN 15804: 2012 + A1: 2014 and the Product Category Rules "PCR 2012: 01 Products and construction service (version 2.3)" of CPC division 314.

The software used for the development of the life cycle analysis has been SimaPro 9.0 with the Ecoinvent 3.5 database. The methodology used to calculate the impact values has been CML IA in the August 2016 version, EDIP for the calculation of waste indicators, CED for energy indicators and Recipe for net fresh water indicator.

SYSTEM BOUNDARIES AND DATA QUALITY

This EPD has been carried out with a "Cradle to Gate" approach, according to EN 15804: 2012 + A1: 2014. Standard and PCR 2012:01 Construction Products and Construction Services (Version 2.3), so the stages out of the scope of study are construction (A4-A5) use (scenarios B1-B7), end of life (scenarios C1-C4) and reuse / recycling (scenario D). Therefore, the scope considered for the STACBOND® panels is the following:

Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw materials	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Energy use	Water use	Deconstruction and demolition	Transport	Waste processing	Final disposal	Reuse, recovery, recycling
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Included in the EPD; MND = Module not declared in the EPD

Product phase:

A1) Raw materials supply:

- ✓ *Extraction and processing of raw materials and recycling processes of materials from the recycling of waste streams from a previous product system but not including those processes that are part of the waste processing in the previous product system, referring to the polluter pays principle.*
- ✓ *Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport.*
- ✓ *Energy recovery of secondary fuels.*

A2) Transport:

- ✓ *External transportation to the core processes and internal transport.*

A3) Manufacturing

- ✓ *Manufacture of the product under analysis: energy consumption and materials.*
- ✓ *Packing materials (if relevant)*
- ✓ *Treatment of waste generated during the manufacturing process.*

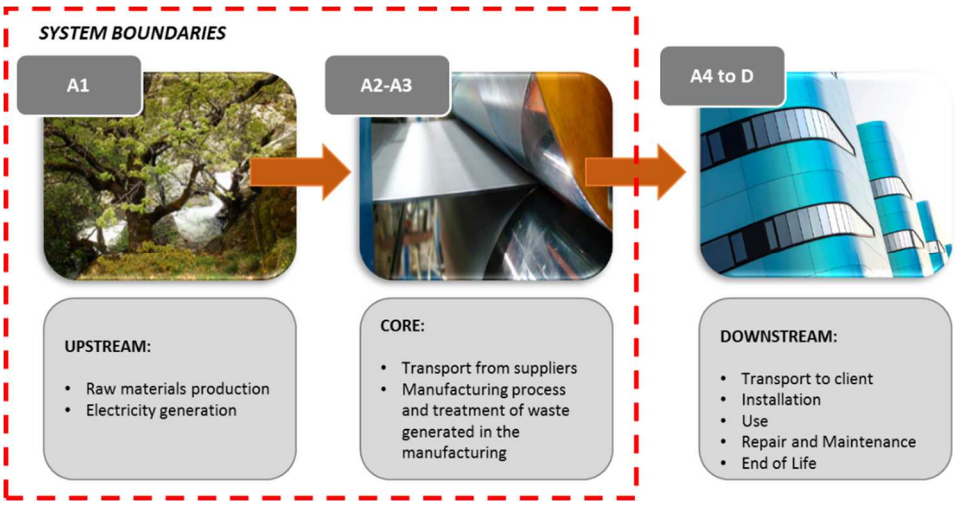

Figure 7. *System Boundaries*

All the data used in the modeling of the process and obtaining the Life Cycle Inventory are specific data and have been obtained by measurements made during the year 2018. They are representative of the different processes developed for the manufacture of STACBOND® panels. The data has been measured directly in the company's own facilities. Likewise, the most complete and highest quality European life cycle inventories database has been used, Ecoinvent 3.5, a database that contains the most updated indicators and whose scope coincides with the geographical area, technological and temporal aspects of the project.

CUT-OFF AND ALLOCATION RULES

ISO 14025 and more specifically, PCR 2012: 01, version 2.3 for construction products and construction services, indicate the possibility of applying a cut-off criterion to the inventoried data. This possible cut-off rule allows the consideration of a minimum of 99% of the total inputs (matter and energy) in the Upstream and Core modules. However, in the Life Cycle Inventory of the considered products, no cut-off rule of this type has been applied. It must be remarked that, being a “cradle to gate” analysis, the placing of the material in the building (auxiliary structure, machinery or auxiliary equipment needed) has not been considered, nor the stages of use and end of life.

Regarding allocation of the environmental stressors, it has not been necessary to make any allocation between products and co-products. However, allocation have been made per m^2 produced, to refer inventories of raw materials, energy and waste to the declared unit of each product.

KEY ASSUMPTIONS

The assumptions made in the analysis are the following:

- Manufacturing processes for capital goods or spare parts and / or maintenance with a life of more than three years are not included.
- The environmental impact of the infrastructure for the general management, office, laboratory and operations of the headquarters is not included.
- The impact caused by people (common activities, work displacements ...) will not be considered.
- The processes associated with the production of fuels are intrinsically included in the indicators of the ECOINVENT database used in the realization of the LCA.
- The time horizon of validity granted to the data collected is 1 year.
- The environmental impact of external transport has been calculated using trucks from the ECOINVENT 3.5 database. Those trucks have been chosen to reflect the most realistic scenario possible.
- The electric mix used corresponds to the company Gas Natural Comercializadora SA.

ORIGIN	Gas Natural Comercializadora, S.A.
Renewables (Pure + Hybrid)	42,4%
High Efficiency Cogeneration	0,6%
Cogeneration	6,8%
Combined natural gas cycles	11,6%
Carbon	14,4%
Fuel/Gas	2,6%
Nuclear	20,5%
Other	1,1%

Figure 6. Gas Natural Comercializadora SA MIX 2018

ENVIRONMENTAL PROFILE

The environmental profile and other environmental indicators of the different types of panels are shown:

Environmental impacts: 1 m² of STACBOND®PE, 4 mm thickness

PARAMETERS	UNITS	A1	A2	A3	TOTAL
Global warming (GWP100a) - TOTAL	kg CO_2 eq.	1,95E+01	2,70E+00	8,91E-02	2,23E+01
Ozone layer depletion	kg CFC-11 eq	9,39E-07	4,83E-07	1,50E-08	1,44E-06
Acidification	kg SO_2 eq.	1,03E-01	8,57E-03	2,70E-04	1,12E-01
Eutrophication	kg PO_4^{3-} eq.	3,64E-02	2,07E-03	5,50E-04	3,90E-02
Photochemical oxidation	kg C_2H_4 eq.	6,20E-03	4,47E-04	2,30E-05	6,67E-03
Abiotic depletion (elements)	kg Sb eq	8,05E-04	1,07E-05	1,92E-07	8,16E-04
Abiotic depletion (fossil fuels)	MJ	1,92E+02	4,01E+01	1,25E+00	2,34E+02

Environmental impacts: 1 m² of STACBOND®FR, 4 mm thickness

PARAMETERS	UNITS	A1	A2	A3	TOTAL
Global warming (GWP100a) - TOTAL	kg CO_2 eq.	2,32E+01	3,69E+00	8,81E-02	2,69E+01
Ozone layer depletion	kg CFC-11 eq	9,05E-07	6,60E-07	1,50E-08	1,58E-06
Acidification	kg SO_2 eq.	1,12E-01	1,17E-02	2,70E-04	1,23E-01
Eutrophication	kg PO_4^{3-} eq.	3,56E-02	2,83E-03	5,46E-04	3,90E-02
Photochemical oxidation	kg C_2H_4 eq.	7,10E-03	6,10E-04	2,28E-05	7,73E-03
Abiotic depletion (elements)	kg Sb eq	8,03E-04	1,47E-05	1,92E-07	8,17E-04
Abiotic depletion (fossil fuels)	MJ	2,69E+02	5,48E+01	1,26E+00	3,25E+02

Environmental impacts: 1 m² of STACBOND®A2, 4 mm thickness

PARAMETERS	UNITS	A1	A2	A3	TOTAL
Global warming (GWP100a) - TOTAL	kg CO_2 eq.	2,45E+01	3,60E+00	1,76E+00	2,98E+01
Ozone layer depletion	kg CFC-11 eq	1,34E-06	6,21E-07	2,25E-07	2,18E-06
Acidification	kg SO_2 eq.	1,14E-01	3,24E-02	1,39E-03	1,48E-01
Eutrophication	kg PO_4^{3-} eq.	4,12E-02	4,46E-03	7,61E-04	4,64E-02
Photochemical oxidation	kg C_2H_4 eq.	7,16E-03	1,20E-03	1,19E-04	8,48E-03
Abiotic depletion (elements)	kg Sb eq	8,24E-04	9,90E-06	2,80E-07	8,34E-04
Abiotic depletion (fossil fuels)	MJ	2,32E+02	5,22E+01	2,82E+01	3,13E+02

Use of Resources: 1 m² of STACBOND®PE, 4 mm thickness

PARAMETRO		UNIDADES	A1	A2	A3	TOTAL
Use of renewable primary energy	Used as an energy carrier	MJ	5,39E+01	4,78E-01	1,40E-02	5,44E+01
	Used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Total	MJ	**5,39E+01**	**4,78E-01**	**1,40E-02**	**5,44E+01**
Use of non- renewable primary energy	Used as an energy carrier	MJ	9,75E+01	4,08E+01	1,28E+00	1,40E+02
	Used as raw materials	MJ	1,29E+02	0,00E+00	0,00E+00	1,29E+02
	Total	MJ	**2,26E+02**	**4,08E+01**	**1,28E+00**	**2,69E+02**
Use of secondary material		kg	2,79E+00	0,00E+00	0,00E+00	2,79E+00
Use of renewable secondary fuels		MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels		MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water		m3	1,33E-01	6,82E-03	1,69E-04	1,40E-01

Waste categories indicators: 1 m² of STACBOND®PE, 4 mm thickness

PARAMETERS	UNITS	A1	A2	A3	TOTAL
Hazardous waste disposed [kg]	kg	1,99E-02	2,92E-05	7,34E-07	1,99E-02
Non-hazardous waste disposed [kg]	kg	3,26E+00	1,59E+00	7,47E-02	4,92E+00
Radioactive waste disposed [kg]	kg	6,66E-04	2,72E-04	8,43E-06	9,47E-04

Use of Resources: 1 m² of STACBOND®FR, 4 mm thickness

PARAMETRO		UNIDADES	A1	A2	A3	TOTAL
Use of renewable primary energy	Used as an energy carrier	MJ	5,56E+01	6,53E-01	1,40E-02	5,63E+01
	Used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Total	MJ	**5,56E+01**	**6,53E-01**	**1,40E-02**	**5,63E+01**
Use of non- renewable primary energy	Used as an energy carrier	MJ	2,49E+02	5,57E+01	1,28E+00	3,06E+02
	Used as raw materials	MJ	6,09E+01	0,00E+00	0,00E+00	6,09E+01
	Total	MJ	**3,09E+02**	**5,57E+01**	**1,28E+00**	**3,66E+02**
Use of secondary material		kg	1,00E-01	0,00E+00	0,00E+00	1,00E-01
Use of renewable secondary fuels		MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels		MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water		m3	1,41E-01	9,32E-03	1,69E-04	1,50E-01

Waste categories indicators: 1 m² of STACBOND®FR, 4 mm thickness

PARAMETERS	UNITS	A1	A2	A3	TOTAL
Hazardous waste disposed [kg]	kg	1,99E-02	3,99E-05	7,34E-07	1,99E-02
Non-hazardous waste disposed [kg]	kg	3,08E+00	2,17E+00	7,28E-02	5,32E+00
Radioactive waste disposed [kg]	kg	6,25E-04	3,72E-04	8,45E-06	1,01E-03

Use of Resources: 1 m² of STACBOND®A2, 4 mm thickness

PARAMETERS		UNITS	A1	A2	A3	TOTAL
Use of renewable primary energy	Used as an energy carrier	MJ	5,81E+01	8,18E-01	9,48E-02	5,90E+01
	Used as raw materials	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	Total	MJ	**5,81E+01**	**8,18E-01**	**9,48E-02**	**5,90E+01**
Use of non- renewable primary energy	Used as an energy carrier	MJ	2,61E+02	5,36E+01	2,84E+01	3,43E+02
	Used as raw materials	MJ	1,04E+01	0,00E+00	0,00E+00	1,04E+01
	Total	MJ	**2,71E+02**	**5,36E+01**	**2,84E+01**	**3,53E+02**
Use of secondary material		kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable secondary fuels		MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels		MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water		m3	1,58E-01	8,19E-03	4,57E-04	1,66E-01

Waste categories indicators: 1 m² of STACBOND®A2, 4 mm thickness

PARAMETERS	UNITS	A1	A2	A3	TOTAL
Hazardous waste disposed [kg]	kg	1,99E-02	3,62E-05	3,52E-05	2,00E-02
Non-hazardous waste disposed [kg]	kg	4,17E+00	1,45E+00	8,21E-02	5,71E+00
Radioactive waste disposed [kg]	kg	8,19E-04	3,55E-04	2,57E-05	1,20E-03

The results shown in this EPD will be valid as long as there are no significant changes in the analyzed process.

REFERENCES

- **ISO14040:2006**. Environmental management. Life cycle assessment. Principles and framework.

- **ISO14044:2006**. Environmental management. Life cycle assessment. Requirements and guidelines.

- **ISO 14025:2006**: Environmental labels and declarations. Type III environmental declarations. Principles and procedures.

- **PCR** - "Construction Products and construction services" (PCR 2012:01.) (Versión 2.3)

- **EN 15804:2012+A1:2014**. Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.

- **General Programme Instructions** of the International EPD® System. Version 3.0.

INTEREST INFORMATION OF THE COMPANY´S INFORMATION AND ITS SERVICES

For more information about these or other services, visit the website: www. www.stacbond.es or contact us through the following email: acp@stac.es

Program information

CEN Standard EN 15804 serves as the core PCR

EPD owner:	CENTRAL OFFICE Pol. industrial Picusa s/n 15900 Padrón (A Coruña), Spain (+34) 981 817 036 (+34) 981 817 037 stacbond@stac.es PRODUCTION PLANT C/ Isaac Prado Bodelón, Parcela 2 Polígono Industrial de La Rozada, Viladecanes 24516, Parandones, León, Spain (+34) 987 553 117 acp@stac.es
LCA Author:	Ingurumenaren Kideak Ingeniería Avenida Cervantes 51, Edificio 10, 5ª planta Departamento 7 48970 Basauri (Bizkaia) Tel. +34 94 418 17 46 www.ik-ingenieria.com ik@ik-ingenieria.com
EPD Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
Product category rules (PCR):	PCR - "2012:01 CONSTRUCTION PRODUCTS AND CONSTRUCTION SERVICES" (Version 2.3)
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent third-party verification of the declaration and data, according to ISO 14025:2006:	☐ EPD process certification ☒ EPD verification
Third party verifier:	Tecnalia R&I Certificacion, SL Auditor: Maria Feced eva.sanchez@tecnaliacertificacion.com Accredited by: *ENAC nº125/C-PR283 accreditation.*
Procedure for follow-up of data during EPD validity involves third party verifier:	☐ Yes ☒ No
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EPD validity	2025-01-21
EPD valid within the following geographical area	International

The EPD owner has the sole ownership, liability, and responsibility for the EPD. The verifier and the program operator do not have any claim nor have any responsibility of the legality of the product.

EPD of construction products may not be comparable if they do not comply with EN 15804.Environmental product declarations within the same product category from different programs may not be comparable.

More information on the Environdec website: www.environdec.com