



Environmental Product Declaration

LAUDIO FORM/CAR & LAUDIO PLY PLYWOOD PANELS

CPC 314 BOARDS AND PANELS

PCR 2012:01.V2.1. Construction products and construction services

This EPD has been prepared according to ISO 14025 and
EN 15804: 2012 + A1: 2013.

S-P-00531



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THE COMPANY AND ITS ENVIRONMENTAL COMMITMENT

Maderas de Llodio, S.A. is a Company devoted to Design and Manufacturing of technical plywood panels, focused on both domestic and international industrial trade.

The mill is located in Llodio, and has more than 30 years of experience within this sector, it is the main Spanish manufacturer of technical plywood panels for industrial applications. It is also the only European manufacturer of plywood panels made by radiata pine, classified within the “softwood segment”.

With its background of success and expertise, the Company carries out the design and production of plywood panels in diverse formats and sizes. Finish qualities go from uncovered to film-coating faces and special specifications can be developed depending on customer needs.

Our main raw material is radiata pine, available in a radius of 50 to 100 Km. from our facilities. This wood, used for Maderas de Llodio products, comes from sustainably managed forests with PEFC certification. The plywood panel production complies with UNE EN 13986 regulation and the gluing has an outdoor resistance class of 3 according to UNE EN 314-2 standards.

The Company counts with different and relevant certifications, such as:

- **CE Marking**
In compliance with the Construction Products Regulation (EU) N°305/2011; mandatory rules to sell within the EU Construction Sector.
- **PEFC Certification to ensure forest sustainability**
- **AITIM Quality Mark**



DESCRIPTION OF THE ANALYSED PRODUCTS

The products submitted for examination in this Environmental Declaration are based on 1 m³ LAUDIO-FORM/CAR plywood panel (for both, Building and Civil Engineering works) and 1 m³ LAUDIO PLY with a wide range of industrial applications.

LAUDIO FORM, LAUDIO CAR and LAUDIO PLY are produced from European radiata pine wood veneers, in different thicknesses, longitudinal and transversally combined, glued and bonded by heat and pressure.



This coating confers a high wear & abrasion resistance, reducing moisture absorption on both board sides. Coating may vary on weight and be combined with different veneers, varying in resistance and durability meeting customer needs.

LAUDIO FORM is a highly profitable product, due to its excellent finish quality can be used several times in both vertical and horizontal formwork systems.

A small part of this production goes to **LAUDIO CAR** panels and the difference between them lies in its special non-slip coating on one of the faces.

This feature turns our panel into an outstanding candidate for specific industrial applications, such as scaffoldings, stages or transport floor vehicles.



LAUDIO PLY is a panel with uncoated faces. Different finishes qualify this range of products for applications such as floors, mezzanine floors, walls, roof covers, industrial vehicles structures, laminated panels, linings, special packaging, etc.

The variety of Maderas de Llodio's plywood panels are wide and versatile, with technical characteristics and finishes which allow themselves to be used in applications with specific industrial requirements.

COMPOSITION OF THE BOARDS
1 m3 of LAUDIO FORM-CAR and PLY plywood panel

COMPONENTS	FORM Weight (%)	PLY Weight (%)	Hazard	CAS Number
Wood	79,12	84,33	-	-
Resin	10,71	10,76	H314/H315/H319	1310-73-2/108-95-2/ 50-00-0/67-56-1
Phenolic film	5,13	-	-	-
Composing resin	0,01	0,01	H302/H314/H318/H341	108-46-3/64-175-/108-95-2
Mastic	0,16	0,16	H314/H315/H317/H318/H319	500-033-55/1173092-74-4
Sealant	0,08	-	-	-
Additive	0,16	0,16	H315/H318	68891-38-3
Hardener & Water	4,59	4,61	-	-
Glued tapes & Composing's glue	0,04	0,04	-	-
TOTAL	100	100	-	-

No product's substance greater than 0.10% of the weight is listed on the "List of Hazardous Substances (SVHC) for its authorization.

STAGES IN THE PRODUCTION PROCESS OF MADERAS DE LLODIO

The following procedure describes the productive process carried out for our plywood panels LAUDIO FORM and LAUDIO CAR.

Both families henceforth will be defined as LAUDIO FORM.

Process 1. Raw Materials

The main raw materials needed to produce our panels are: wood, coating films, glue, patching mastic and sealants.

Process 2. Debarking

Logs, green raw material, are introduced into the log debarking to remove bark and impurities.

Part of this bark is sold as co-product for a variety of uses such as gardening. The surplus is used directly as fuel.

Process 3. Log Preconditioning

Round wood is stuck in the boilers for the purpose of getting its softening and plasticity by water saturation. The result is an energy saving when cutting, a better peeling quality and its subsequent improvement on the drying process.

Process 4. Cross-Cutting

The log is cut and areas of deviations detected from logging are removed. Surpluses are sent to a chipping area. The resulting wood-chip amount is sent as co-product for chipboard manufacture or to the pulp paper industry, among other uses.

Process 5. Veneer peeling

The trunk rotates around the peeling axis while the blade cuts it in parallel to the module axis. The veneer come out unrolled and are cut to size with a shear. Veneers with a large number of defects or those whose measures do not meet standards are sent for woodchip manufacture, together with residual wood resulting from the log rounding. Sheets suitable for plywood panels manufacture are classified and stacked. The central part from the cylinder-rolling are the cylindrical logs.

Our co-products are obtained throughout this process: chips and cylindrical logs. If wood-chip passes the screening, is stored straight away. The refused one is used as fuel. Cylindrical logs come from the log central part and are suitable for posts, billboards, fences, etc.

Process 6. Veneer Drying

The sheets previously stored are now introduced into a roller track dryer. And they are re-classified depending on the grades of humidity and defects. This phase identifies the most suitable sheets for each part of the panel.



Process 7. Composing

During this process, veneers get assembled and glued in other dimensions in such a way that we obtain panels with the qualities and sizes required. These combinations can be made in crosswise as well as in longitudinal direction to the wood grain.

Process 8. Gluing Line

This process takes place in two different gluing machines. One for sizes and special requirements according customer needs and the other one for standard production.



Process 9. Pre-Pressing

Once a board packet has been completed in any of the gluing machines, they move on to the pre-press where, without applying heat, they are pre-pressed in order to strengthen the sheets assembly through direct contact with the adhesive. After this step, panels can be handled already.

Process 10. Hot Pressing

The panel already pre-pressed is now sent to the presses combining at the same time heat and pressure, glue polymerizes providing the final gluing touch to panels.

The boiler heats the oil thermic fluid which feeds the presses.



Process 11. Mechanical Trimming

At this stage, panels are cleaned all over their edges. LAUDIO PLY boards are cut in specific sizes. The oversize goes to be used as fuel.

Process 12. Patching

Panels, that require reparations to increase or recover their quality, are moved to the reparation line where defects will be removed applying a filler product.

Process 13: Sanding

In this process, panels get the thickness desired. In addition to that, it is applied a roughness finish on one face and the surplus is sent to the mill to be used in the boiler.

Process 14. Phenolic Film Coating (FORM)

The panel goes on through a press that, with pressure and temperature, the paper melts down on both faces. The plates of this press, as the ones in the composer, are also heated with oil fluid.

Process 15. Trimming (FORM)

The plywood panels, now filmed, come back to the saw to be cut at their final sizes. The surplus has the same destination as in process 11.

Process 16. Edge Sealing (FORM)

LAUDIO FORM finishing includes edges coating with a damp-proofing sealant.

Process 17. Packing

Once completed, the product is packed with metal-strip or polyethylene film to be sent to the customer.

LAUDIO PLY process does not include stage 14 - Phenolic paper coating, stage 15 - Saw and stage 16 - Edges painting.

For LAUDIO PLY III panel is not necessary reparation and for LAUDIO PLY IV panel, neither reparation nor sanded.



ASSUMPTIONS

Down below are detailed the main estimations considered in the life cycle assessment:

- Manufacturing processes about goods, equipment, replacement or maintenance parts with a life longer than three years are excluded.
- Impact caused by people (common activities, job distance, etc.) has not been taken into account.
- It has been considered a density of 0,88 g/ml for the oil consumed.
- Densities considered: cylindrical logs 0,5 ton / m³, wood-chips 0,9 ton / m³, bark 0,8 ton / m³, incoming wood 0,92 ton / m³.
- Radiata Pine is the type of wood used for the report.

UNIT DECLARED

Throughout the report, we talk about “declared unit” instead “functional unit” (as defined in the PCR), since the stages of use and end of life in building construction are not yet established, are unknown or were not considered for the EPD.

In this sense, the declared unit of this product is 1 m³ of PLY-FORM manufactured in Maderas de Llodio’s mill. (Alava – Spain).

RESULTS SUMMARY

Declared Unit = 1 m³ LAUDIO FORM plywood panel

Impact Category	Quantity	Units
CML-IA Global Warming (100 years)	4,57E+02	kg CO ₂ eq.
CML-IA Acidification	2,54E+00	kg SO ₂ eq.
CML-IA Eutrophication	8,89E-01	kg PO ₄ eq.
CML-IA Photochemical oxidation	3,71E-01	kg C ₂ H ₄ eq.
CML-IA Ozone layer depletion	2,49E-05	kg CFC-11 eq.
CML-IA Depletion of abiotic resources (elements)	1,64E-03	kg Sb eq.
CML-IA Depletion of abiotic resources (fossils)	1,11E+04	MJ

Declared Unit = 1 m³ LAUDIO PLY plywood panel

Impact Category	Quantity	Units
CML-IA Global Warming (100 years)	3,17E+02	kg CO ₂ eq.
CML-IA Acidification	1,75E+00	kg SO ₂ eq.
CML-IA Eutrophication	6,60E-01	kg PO ₄ eq.
CML-IA Photochemical oxidation	2,59E-01	kg C ₂ H ₄ eq.
CML-IA Ozone layer depletion	1,77E-05	kg CFC-11 eq.
CML-IA Depletion of abiotic resources (elements)	1,08E-03	kg Sb eq.
CML-IA Depletion of abiotic resources (fossils)	7,77E+03	MJ

CUT-OFF RULES

The ISO-14025 standard and specifically PCR for Construction Products and Construction Services, point towards the possibility to apply a cut-off criteria to the data indexed.

Although PCR 2012:01 V-2.1. indicates that it might be included from the Life Cycle Inventory for a minimum of 95% of its total inputs (weight and energy to the upstream and core module. In this way, the present study has not taken into account any cut-off rule, except that the study has not considered the product's handing out (infrastructure, machinery, auxiliary equipment) nor the use and end of life, ie from the stage A4 to stage D.

ENVIRONMENTAL IMPACTS, REGARDING CO₂ FIXINGS

Trees play an extremely important role in the process of carbon capture. Thanks to the photosynthesis process carried out by them, a huge amount of CO₂ is fixed inside trees. This is the reason why wood products act as a CO₂ biogenic store which will be released if product gets incinerated. It has been estimated that for each m³ of pine wood, it can be stored about 897 Kg CO₂ eq. (Source: Ecoinvent v3.0) Therefore, if we consider this energy-storage inside the product, the CO₂ amount captured inside the product over its lifetime will be as follows:

Capture of CO₂ for 1m³ of LAUDIO FORM plywood panel

Impact Category	Quantity	Units
CML-IA Capture of CO ₂	440	kg CO ₂ eq.

Capture of CO₂ for 1m³ of LAUDIO PLY plywood panel

Impact Category	Quantity	Units
CML-IA Capture of CO ₂	580	kg CO ₂ eq.

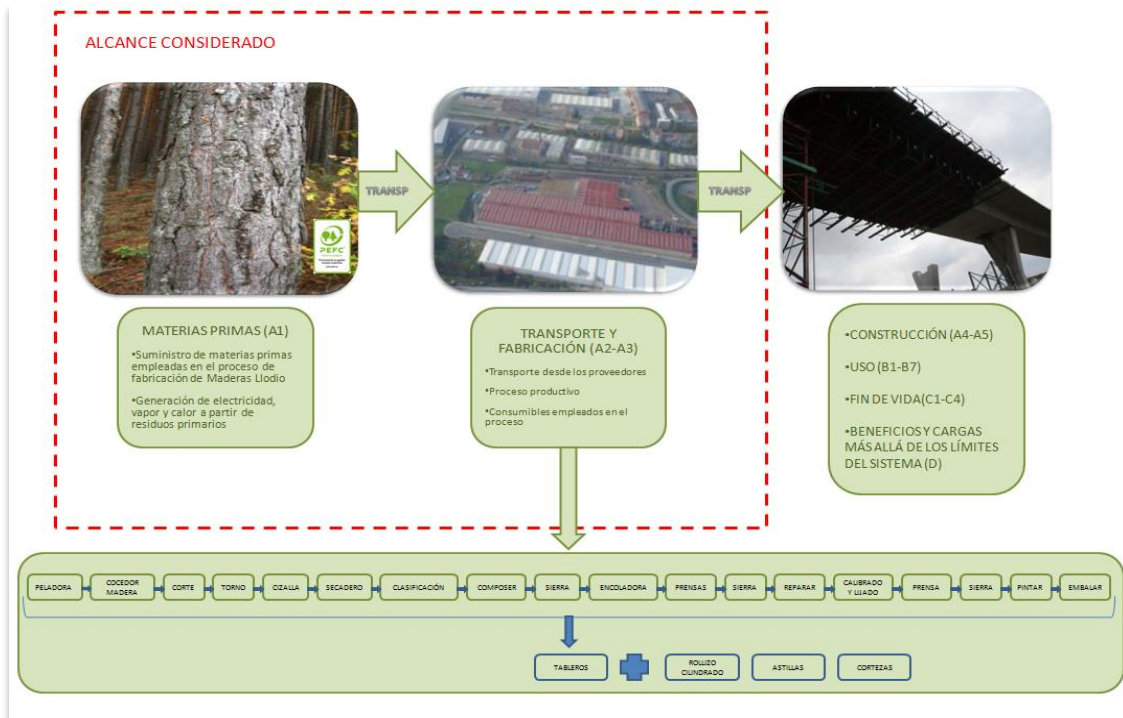
In addition to these environmental benefits, we must add that a significant part of the energy consumed within the process comes from the waste of our own wood products. This contributes to reduce the demand of solid fuels.

Another benefit to point out is the large capacity of the audited products to be re-used and re-cycled at their end of life stage.



GENERAL SYSTEM BOUNDARIES AND DATA QUALITY

In this EPD the final scope is “Cradle to Gate”, so it will be outside of the extent of the study the stage of construction (stage A4-A5), use (stage B1-B7), End of life (stage C1-c4) and recovery (stage D). The limits of the system (upstream A1 and A2, and core A3) are defined in the following graph:



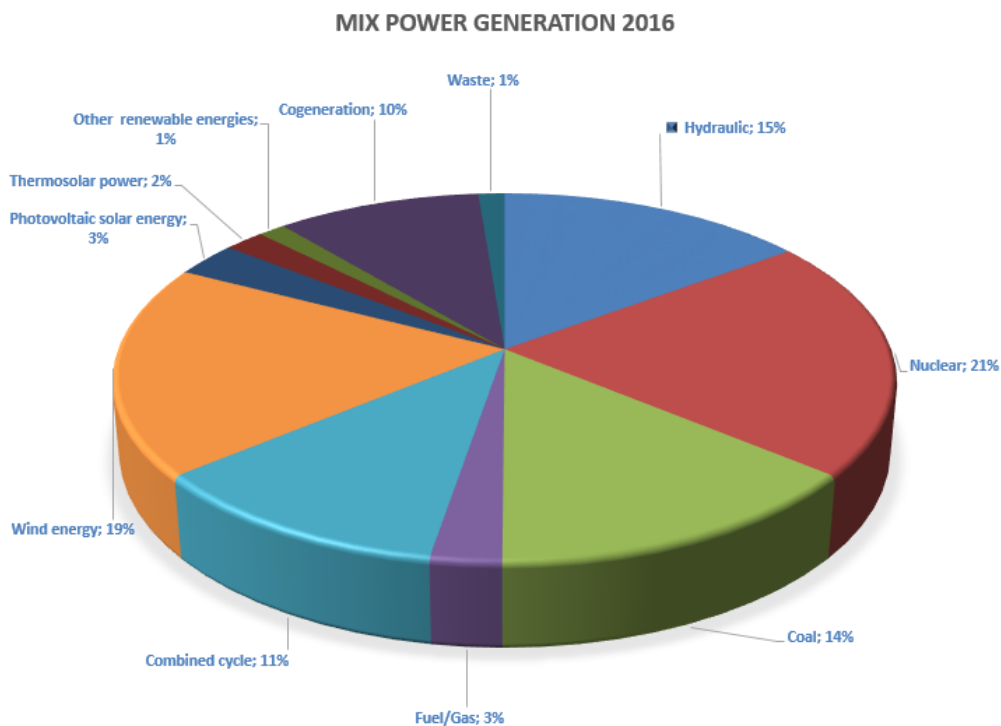
Product stage			Construction process stage		Use Stage							End of life stage				Resource recovery stage
Raw material	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
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 LCA
MND= Module Not Declared

All data, used to shape the process and obtain the life cycle inventory, have been obtained during the year 2016 and they are representative of the different processes developed to manufacture our products.

The data have been directly measured in the Company facilities. Moreover, it has been used the most completed European Life-Cycle Inventory database called Ecoinvent 3. This base contains the most comprehensive and up-to-date information regarding our geographical, technological and temporal area.

However, a specific procedure has been defined for this project. The environmental impact implication of our product is fairly significant to set up real data indicators. 2016 Electrical Mix has been the indicator we have created. (Source: REE).



ALLOCATION RULES

Throughout the whole productive process of Maderas de Llodio, three other co-products are also manufactured in addition to plywood panels: woodchip, cylindrical logs and bark. Partly of them become sold and the rest is used as fuel for the boiler. The part sold is considered as co-product; the INPUT assignment has been designed dividing the environmental impact caused by plywood panels on one side, wood waste burned in the boiler on the other and co-products for selling on another one. The same applies to woodchip and cylindrical logs. The input allocation has been done according to volume, in order to assess the process data more coherently and complying with the requirements of PCR and ISO 14040 standard.

This will involve the evaluation of all data from the Maderas de Llodio's productive process Inventory. For each of the outputs it has been calculated a co-product output percentage in m³, to identify its allocation.

CALCULATION OF THE ENVIRONMENTAL PERFORMANCE

To obtain the Environmental Impact of 1m³ of LAUDIO FORM and 1 m³ of LAUDIO PLY plywood panel, has been used the environmental software SimaPro 8.1. This enables you to obtain values for different categories of environmental impacts by using different methodologies. In our case, impact values have been calculated according to process CML-IA, v 4.2 April 2013 and the database used has been Ecoinvent 3.0



ENVIRONMENTAL PROFILE

The environmental impact and consumption of renewable and non-renewable resources for 1 m³ of LAUDIO FORM & LAUDIO PLY plywood panel is described below, according to the PCR as well as a classification table of the production waste.

LAUDIO FORM and LAUDIO PLY plywood panels are not classified as hazardous material according to Regulation 1272/2008 with regard to Labelling and Packaging of hazardous substances (REACH).

*Declared Unit = 1 m³ of LAUDIO FORM plywood panel
Environmental profile for each module and stage*

IMPACT CATEGORY	UPSTREAM	CORE			TOTAL [A1-A2-A3]
	Raw material supply [A1]	Transport [A2]	Production [A3]	Total Core [A2-A3]	
Global warming [kg CO ₂ eq.]	2,64E+02	9,59E-04	1,93E02	1,93E+02	4,57E+02
Acidification [kg SO ₂ eq.]	1,48E+00	3,09E-06	1,07E+00	1,07E+00	2,54E+00
Eutrophication [kg PO ₄ eq.]	4,43E-01	2,68E-02	4,46E-01	4,44E-01	8,89E-01
Photochemical oxidation [kg C ₂ H ₄ eq.]	2,14E-01	1,31E-07	1,57E-01	1,57E-01	3,71E-01
Ozone layer depletion [kg CFC-11 eq.]	1,40E-05	6,70E-11	1,09E-05	1,1E-05	2,49E-05
Depletion of abiotic resources (elements) [kg Sb eq.]	9,54E-05	2,51E-09	6,70E-04	6,7E-04	1,64E-03
Depletion of abiotic resources (fossils) [MJ]	6,27E+03	1,43E+03	4,88E+03	4,88E+03	1,11E+04

*Declared Unit = 1 m³ of LAUDIO PLY plywood panel
Environmental profile for each module and stage*

IMPACT CATEGORY	UPSTREAM	CORE			TOTAL [A1-A2- A3]
	Raw material Supply [A1]	Transport [A2]	Production [A3]	Total Core [A2-A3]	
Global warming [kg CO ₂ eq.]	1,24E+02	5,18E-04	1,89E+02	1,89E+02	3,17E+02
Acidification [kg SO ₂ eq.]	6,86E-01	1,71E-06	1,06E+00	1,06E+00	1,75E+00
Eutrophication [kg PO ₄ eq.]	2,08E-01	3,97E-07	4,51E-01	4,51E-01	6,60E-01
Photochemical oxidation [kg C ₂ H ₄ eq.]	1,01E-01	7,27E-08	1,58E-01	1,58E-01	2,59E-01
Ozone layer depletion [kg CFC-11 eq.]	6,70E-06	3,67E-11	1,1E-05	1,1E-05	1,77E-05
Depletion of abiotic resources (elements) [kg Sb eq.]	4,10E-04	2,34E-05	6,60E-04	6,60E-04	1,08E-03
Depletion of abiotic resources (fossils) [MJ]	2,95E+03	7,80E-03	4,82E+03	4,82E+03	7,77E+03

USE OF RESOURCES

Declared Unit = 1 m³ of LAUDIO FORM-PLY plywood panel

PARAMETER	Unit	TOTAL FORM	TOTAL PLY
Use of primary renewable energy, excluding the primary renewable energy resources of the MMPP	MJ	1,38E+04	1,27E+04
Use of primary renewable energy resources used for MMPP	MJ	4,0E-01	4,0E-01
Renewable energy total resources	MJ	1,38E+04	1,27E+04
Use of primary non-renewable energy: excluding non-renewable energy used for MMPP	MJ	1,53E+03	4,18E+02
Use of non-renewable primary energy: energy resources used for MMPP	MJ	1,06E+04	8,07E+E03
Total primary non-renewable energy (primary energy and resources of primary non-renewable energy for MMPP)	MJ	1,21E+04	8,49E+03
Use of secondary materials	Kg	0	0
Use of secondary renewable fuels	MJ	5,73E+08	4,51E+08
Use of secondary non-renewable fuels	MJ	0	0
Use of net fresh water	m ³	3,14E+03	2,46E+03

WASTE CATEGORIES

Declared Unit = 1 m³ of LAUDIO FORM-PLY plywood panel

PARAMETER	Unit	FORM	PLY
Non hazardous wastes	Kg	3,05E+01	2,09E+01
Hazarduos wastes	Kg	2,24E-02	1,37E-02
Radioactive wastes	Kg	2,00E-02	1,44E-02

Wastes generated throughout the process, are managed by authorized waste management companies.

Inert wastes are sent to landfill and the hazardous ones get stored previously to their assessment or being sent to a safe landfill. Recycle wastes are sent to a recycling plant.

CHANGES FROM PREVIOUS VERSION

There are no significant modifications in relation to the previous version.

The results obtained from the year 2012 compared to 2016 with respect to the environmental impact in its different indicators, show the best efficiencies in the process due to the productive load and the reduction of energy consumption by the investments made.



RELEVANT INFORMATION ABOUT USE AND APPLICATIONS OF THE PRODUCTS



LAUDIO FORM

LAUDIO CAR

LAUDIO PLY

Our customers are welcome to ask for Safety Data Sheets at:
info@maderasdelloodio.com

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 2012:01 (version 2.1)** “Construction Products and construction services”
- **EN 15804:2012.** Sustainability of construction works - Environmental product declarations.

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Independent verification of the EPD and data

EPD programme	The International EPD® System Vasagatan 15 - 17 se - 111 20 Stockholm Sweden www.environdec.com
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Date of publication (current version)	04/05/2017
EPD validity	04/05/2022
EPD valid within the following geographical area	International
EPD type	<input checked="" type="checkbox"/> Cradle-to-gate <input type="checkbox"/> Cradle-to-gate+options <input type="checkbox"/> Cradle-to-grave
Independent verification of the declaration and data, according to EN ISO 14025: 2006	<input type="checkbox"/> EPD internal verification <input checked="" type="checkbox"/> EPD external verification <input type="checkbox"/> EPD Process certification
Third party verifier	TECNALIA R&I CERTIFICACION Auditor: Elisabet Amat Guasch Eli.amat@tecnaliacertificacion.com
Third party accredited or approved by	ENAC nº 125 / C-PR283
Reference Product category rules (PCR)	PCR 2012:01 (versions 2.1). Construction products and construction services. Multiple UN CPC codes
Product category rules (PCR) review conducted by	The Technical Committee of the International EPD® System Chair: Massimo Marino Contact info@environdec.com
<p>The declaration data will be valid as far as significant changes would not take place through the productive process. The results are not comparable with other product's references or declarations drafted based on other certification system, or if the requirements established in EN 15804:2012-Sustainability in Construction are not fulfilled. The verifier and the program operator are not responsible for the complaints or the legality of the product.</p>	