Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

[SPC *Flooring Products*]

from

[*FUJIAN SIJIA NEW MATERIAL TECHNOLOGY CO., LTD.*]

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General information

Programme information

Programme:	The International EPD® System
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): Product Category Rules (PCR): *PCR 2019:14 PCR Construction products v1.3.4 issue data 2024-04-30 valid until 2025-06-20* *c-PCR-004 Resilient, textile and laminate floor coverings (EN 16810:2017), version (2019-12-20).*
PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life Cycle Assessment (LCA)
LCA accountability: *<Lilian Li, SGS-CSTC Standards Technical Services Co., Ltd.>*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by accredited certification body Third-party verification: IGSC Inc. is an approved certification body accountable for the third-party verification. The certification body is accredited by: National Accreditation Center (NAC)
Procedure for follow-up of data during EPD validity involves third party verifier: ☒ Yes ☐ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation

factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025

Company information

Owner of the EPD:
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Description of the organisation:

Fujian Sijia New Material Technology Co., Ltd. is a wholly-owned subsidiary of Sijia Group, which is a company engaged in new material technology research and development, high-performance fiber manufacturing, composite material manufacturing and other businesses, established on January 19, 2021. The business scope of the enterprise is: new material technology research and development, high-performance fiber and composite material manufacturing, high-performance fiber and composite material sales, synthetic material manufacturing (excluding hazardous chemicals), synthetic materials sales, floor manufacturing, floor sales, building waterproofing membrane product manufacturing, building waterproofing membrane product sales, new building materials manufacturing (excluding dangerous goods), technical services, technology development, technical consultation, technology exchange, technology transfer, technology promotion, industrial textile products sales, Amusement equipment and entertainment products manufacturing (excluding game and amusement equipment), outdoor products sales, new material technology promotion services, housing leasing, import and export of goods, technology import and export, etc.

Product-related or management system-related certifications:
Management system-related certifications: IS09001, ISO14001

Name and location of production site(s):
Sixth Wei Road, Fuqing City, Fujian Province, China

Product information

Product name:
SPC flooring tiles

Product identification:
Table 1: Product specification

Specification	**SPC**
Total Thickness	(-0.10, +0.10 mm)
Wear Layer Thickness	±0.03 mm
Weight per Unit Area	(-10%, +10%)
Peeling Strength	≥50 N/50mm
Dimensional Stability after Heating	≤0.10%
Curling after Heating	≤1.0 mm
Straightness	≤0.15 mm
Squareness	≤0.15 mm

Product description:

SPC (Stone Plastic Composite)SPC flooring is produced by measuring, heat mixing, cold mixing, feeding, and plasticizing extrusion to create the SPC base material. It is known for its rigidity and toughness, being more stable under temperature variations.

UN CPC code:

363 Semi-manufactures of plastics

Geographical scope:

China for A1-A3, Europe for A4, A5 and C1-C4 and D

LCA information

Declared unit:

In this study, a declared unit is defined as one square meter of SPC flooring. And the defined mass of the product per the declared unit is described in Table 2 below.

Table 2: Declared unit for the flooring products

Name		Value	Unit
Declared unit		1	m^2
Mass conversion factor of declared unit	SPC	7.896	kg/m^2

Reference service life:

Not applicable

Time representativeness:

Data collection period: 2024-01-01 ~ 2024-12-30

Steps were taken to ensure that the LCI data were reliable and representative. The data type used is clearly stated in the Inventory analysis, measured or calculated from primary sources or whether data are from the LCI databases. In this study, the data quality requirements were as follows:

Specific data of the considered system (such as material or energy flows that enter the production system). These data were calculated and submitted by Sijia

Generic data related to the life cycle impacts the material or energy flows that enter the production system. These data were sourced from the Ecoinvent databases.

Database(s) and LCA software used:

Database: Ecoinvent 3.9.1, Ecoinvent 3 – allocation, cut-off by classification – unit

LCA Software: Simapro 9.5

Description of system boundaries:

The system boundary of the study is from cradle to gate (A1-A3) with A4, A5, C1-C4. Module D is also considered in this report.

A1-A3: Product stage (raw material acquisition, transport to manufacturing site and manufacturing)

A4: Production distribution stage

A5: Installation

C1-C4: End-of-life stage (deconstruction, transport, waste processing and disposal)

D: Reuse, recovery and/or recycling potentials

A1 Raw materials extraction

The product ismanufactured in Xiamen, Fujian Province, China. The Life Cycle Inventory (LCI) of raw materials for Sijia's products includes detailed data on the material composition of SPC. These materials include significant quantities of PVC (polyvinyl chloride), calcium carbonate, DOTP (a plasticizer), stabilizers, and various additives. The LCI captures data from raw material extraction to the production

of these compounds, forming the basis for environmental impact assessment in subsequent stages of the life cycle. The major components are sourced directly from suppliers, ensuring that the LCI is as accurate as possible, and background data for upstream processes are modeled using established databases like Ecoinvent.

A2 Raw materials transport

The transportation mainly takes place on the upstream of raw material and packaging material supply. Since there lacks of the detailed transportation type, the transport dataset "Transport, freight, lorry 16-32 metric ton, EURO5 {RoW}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U" is applied.

A3 Product manufacturing

Manufacturing of different flooring types varies. SPC starts with extruding limestone powder, PVC, and stabilizers for the rigid core, then coating, curing, splitting, grooving, adding an underlay, and packaging, making it durable for various uses. In this LCA, the grid mix data on electricity of for the site in Xiamen is based on grid mixes of the State Grid Corporation of China for Eastern China Region (Electricity, medium voltage {CN-ECGC}| market for electricity, medium voltage | Cut-off, U). The calculation is made based on total electricity losses between net electricity available at the busbar and the use of electricity calculated based on China Energy Portal 2020. The climate impact of the energy source behind electricity in the manufacturing process in A3 is 0.89 kg/ CO2 eq./kWh (using GWP-GHG indicator).

Table 3: Electricity profile for flooring product assembly

Province involved	Process	Production mix	Technology year	GHG-GWP (kgCO2/kWh)
Fujian	Flooring production	Electricity, medium voltage {CN-ECGC}| market for electricity, medium voltage	Cut-off, U	2022	0.89

C1-C4 modules

For the end-of-life (EoL) scenario of the SPC floor tiles, the stages are described as follows:

C1 - De-installation: The products are manually removed from buildings, requiring no additional energy or resources. Therefore, no input or output is accounted for in this phase.

C2 - Transportation: Following de-installation, the waste is assumed to be transported 100 km by road to a waste treatment facility. This reflects standard transportation distances in Europe for construction waste.

C3 - Waste Processing: In this stage, the waste materials are processed by shredding into flakes to prepare for further treatment or recycling. This step enables easier handling, separation, and processing of recyclable materials. The energy consumption and emissions from the shredding process are modeled using data from the Ecoinvent database, representing typical shredding operations for similar materials.

C4 - Disposal: Since SPC mainly contains calcium in the mass composition followed by polyvinyl chloride, the disposal scenario, as recommend by the SiJia, the manufacturer, is landfill (C3 and C4).

Module D

The environmental benefits or loads resulting from recyclable materials and energy recovery of the waste products and waste packaging leaving a product system are declared in module D. According to EN15804, the benefits and loads for module D can be calculated according to the following formula:

$$e_{module,D} = e_{module,D1} + e_{module,D2} + e_{module,D3} + e_{module,D4}$$

Where $e_{module,D1}$ indicates the being the loads and benefits related to the export of secondary materials, $e_{module,D2}$ being the loads and benefits related to the export of secondary fuels; $e_{module,D3}$ being the loads and benefits related to the export of energy as a result of waste incineration (for R1 < 60 % and R1 > 60 %) $e_{module,D4}$ being the loads and benefits related to the export of energy as a result

of landfilling. For these flooring products, $e_{module,D2}$ and $e_{module,D4}$ are zeros. For $e_{module,D1}$, the parameters for its calculation are given in the following Table

Table 4: Module D modeling for recycling of the packaging materials

Product category	Materials	Mass(kg)	$Q_{R,out}/Q_{sub}$*	$M_{MR,in}$	$M_{MR,out}$
SPC	Paper packaging	0.141	0.85	0	0.120
	Plastic packaging	0.007	0.9	0	0.006

For The parameter of $E_{MR\ after\ EOW,out}$, we follow a convervative approach of substituting a more primitive materials. Thus, no $E_{MR\ after\ EOW,out}$ is needed under this approach.

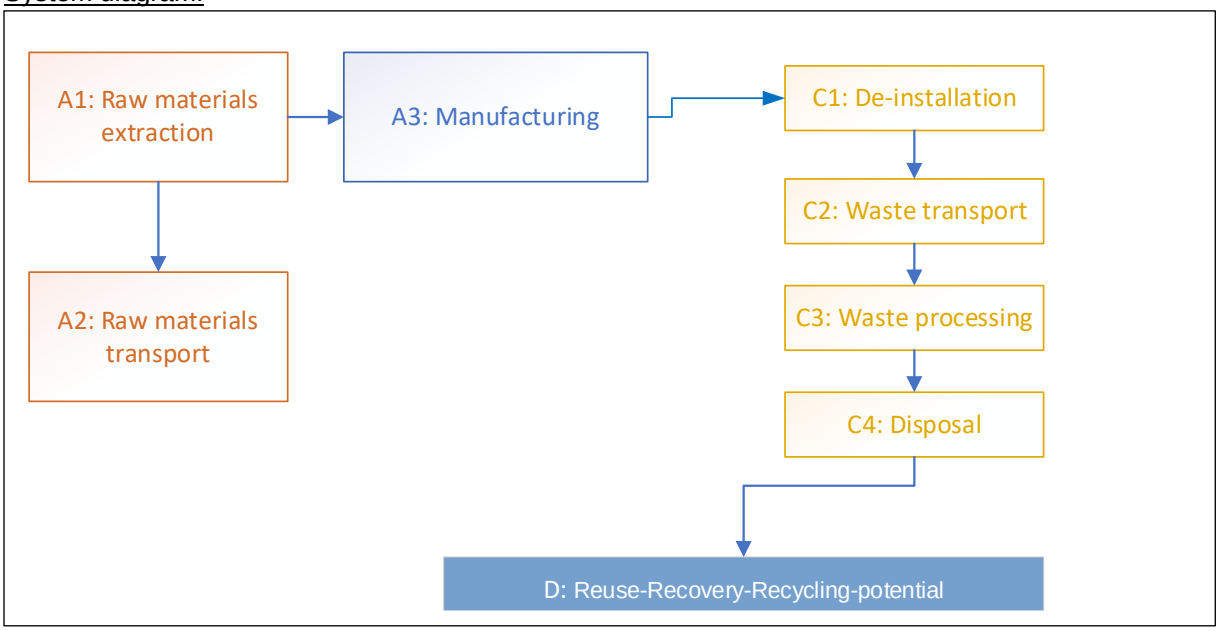
Table 5: Selection of substituted materials

Materials	Substituted materials
Plastic	Polyethylene terephthalate, granulate, bottle grade {RER}| | Cut-off, U
Paper	Pulpwood, hardwood, measured as solid wood under bark {Europe without Switzerland}| market for pulpwood, hardwood, measured as solid wood under bark | Cut-off, U

Table 6: Recovered energy for module D

Product category	Materials	$M_{inc,out}$	LHV (MJ/kg waste)	Exported electricity(MJ/ kg waste)	Exported thermal energy(MJ/kg waste)
SPC	Paper packaging	0.011	15.92	0.017	0.036
	Plastic packaging	0.003	42.47	0.015	0.031

System diagram:



More information:

Cut-off criteria

The following steps/stages were not included in the system boundary due to the reason that the elements below are considered irrelevant or not within the boundary to the LCA study of the product system:

1) Storage phases of flooring products
2) Secondary and intermediate packaging.
3) Personnel-related processes, such as transportation of employees to and from work are excluded.
4) The production and end-of-life processes of infrastructure or capital goods used in the product system are excluded since it has no evidence that it is of relevance in terms of environmental impact.

Allocation

For recycling and disposal process at the end-of-life stage, the Polluters Pay Principle(PPP) has been adopted. PPP indicates that the environmental impacts to dispose the products are allocated to the polluter, i.e., the product manufacturer. The benefits of recycling and recovery is out of boundary of the product system and will not be allocated to flooring product. For data sets in this study, allocation is done via total dimension in m2 of the flooring on a yearly average. The principle for choosing the size is based on the linear relationship of the product output to the environmental impacts.In this study, there is no other by products produced from the production line, hence there is quite little occasion that required allocation for multi-output processes.

Key assumptions

The main assumptions and limitations of this LCA study are as follows：

- In the Life Cycle Assessment (LCA) for SPC, the additives and stabilizers used in the manufacturing process are represented using proxy data due to confidentiality restrictions. These substances play a crucial role in enhancing product performance, but specific details regarding their composition and sourcing are not disclosed. Despite this, their impact is included in the analysis, albeit with generalized data, as they constitute a relatively small fraction of the total materials.

Table 7 Proxy dataset selection

Substances	Proxy data	Dosage in SPC(kg/m2)
Stabilizer	Chemical, organic {GLO}| chemical production, organic | Cut-off, U	0.137
Additive	Chemical, inorganic {GLO}| chemical production, inorganic | Cut-off, U	0.187

- Waste transport from the A3 stage is assumed to be to be 100km. A sensitivity analysis will be implemented to examine this scenario.
- Installation of De-installation of the floor are assumed to be done through manual labour
- The product is assumed to be firstly shredded into flakes (C3) and finally disposed through a combination of recycling and inert materials landfill.
- Product losses due to abnormal damage such as natural disaster or fire accident. These losses would mostly be accidental.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	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
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x
Geography	CN	CN	CN	EUR	EUR								EUR	EUR	EUR	EUR	EUR
Specific data used	50.2%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%					-	-	-	-	-	-	-	-	-	-	-	-

Content information

According to the PCR, for EPD with multiple products, three options can be chosen. Per the requirement of the PCR 2019:14 version 1.3.4, the content declaration is based on the declare unit.

Product components	Weight, kg	Post-consumer material, weight	Biogenic material, weight- and kg C/product
UV resin	1.54E-02	0	0
PVC	2.37E+00	0	0
DOTP	1.58E-01	0	0
Calcium carbonate	5.14E+00	0	0
Stabilizer	1.37E-01	0	0
Additives	1.87E-01		
Packaging materials	Weight, kg	Weight- (versus the product)	Weight biogenic carbon, kg C/product
Wood Pallet (kg)	2.57E-01	3.21%	1.27E-01
Corrugate Board Box (kg)	1.41E-01	1.76%	6.34E-02
Packaging Film (kg)	7.20E-03	0.09%	

No dangerous substances from the candidate list of SVHC for Authorisation for these products.

Results of the environmental performance indicators

The results section presents the environmental impact for the worst-case scenario among the peer products, i.e., the A-C modules results are based on a higher impacts values. The variations for environmental impact categories are supplied. The variation is defined as the ratio between the distance of max and min results over the maximum results.

Mandatory impact category indicators according to EN 15804 with EF3.1

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1.82E+01	2.33E+00	7.33E-01	0.00E+00	1.52E-01	8.84E-02	4.64E-02	-1.66E-02
GWP-fossil	kg CO2 eq.	1.85E+01	2.32E+00	1.72E-02	0.00E+00	1.51E-01	7.67E-02	4.53E-02	-1.57E-02
GWP-biogenic	kg CO2 eq.	-2.95E-01	8.15E-03	7.16E-01	0.00E+00	1.10E-03	1.15E-02	1.10E-03	-7.17E-04
GWP-luluc	kg CO2 eq.	1.51E-02	1.55E-03	3.98E-06	0.00E+00	7.32E-05	2.05E-04	8.93E-06	-1.28E-04
ODP	kg CFC11 eq.	6.34E-06	3.50E-08	2.40E-10	0.00E+00	3.28E-09	1.41E-09	1.57E-09	-3.48E-10
AP	mol H^+ eq.	4.19E-03	1.21E-04	6.19E-07	0.00E+00	1.06E-05	7.42E-05	2.12E-06	-5.75E-06
EP-freshwater	kg P eq.	1.89E-02	1.15E-02	1.24E-05	0.00E+00	1.69E-04	6.55E-05	1.28E-04	-1.57E-05
EP-marine	kg N eq.	1.99E-01	1.27E-01	1.21E-04	0.00E+00	1.79E-03	5.64E-04	1.37E-03	-1.57E-04
EP-terrestial	mol N eq.	6.38E-02	3.55E-02	4.57E-05	0.00E+00	7.35E-04	1.83E-04	5.43E-04	-9.03E-05
POCP	kg NMVOC eq.	9.25E-02	4.50E-02	3.12E-05	0.00E+00	4.92E-04	3.66E-04	2.93E-04	-5.57E-05
ADP-fossil	kg Sb eq.	1.21E-04	4.30E-06	2.60E-08	0.00E+00	4.84E-07	1.58E-07	4.78E-08	-3.98E-08
ADP-minerals &metals	MJ	2.80E+02	3.01E+01	1.14E-01	0.00E+00	2.14E+00	1.76E+00	1.15E+00	-3.52E-01
WDP	m^3	-1.09E+00	9.60E-02	5.93E-04	0.00E+00	8.72E-03	1.85E-02	4.16E-03	-6.58E-03
Acrynom		GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption							

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

**Disclaimer: The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.*

Additional mandatory and voluntary impact category indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO2 eq.	1.85E+01	2.32E+00	1.72E-02	0.00E+00	1.51E-01	7.69E-02	4.53E-02	-1.59E-02

Resource use indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PENRM	MJ	5.14E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

PENRE	MJ	2.28E+02	3.01E+01	1.14E-01	0.00E+00	2.14E+00	1.76E+00	1.15E+00	-3.52E-01
PENRT	MJ	2.80E+02	3.01E+01	1.14E-01	0.00E+00	2.14E+00	1.76E+00	1.15E+00	-3.52E-01
PERM	MJ	5.96E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERE	MJ	1.62E+01	2.87E-01	1.99E-03	0.00E+00	3.32E-02	3.67E-01	2.29E-02	-2.49E+00
PERT	MJ	2.22E+01	2.87E-01	1.99E-03	0.00E+00	3.32E-02	3.67E-01	2.29E-02	-2.49E+00
FW	M3	-1.39E-02	3.19E-03	2.80E-05	0.00E+00	3.05E-04	1.47E-03	1.35E-03	-1.43E-04
SM	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
RSF	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
NRSF	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

Waste indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Hazardous waste disposed	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
Non-hazardous waste disposed	kg	0.00E+00	0.00E+00	1.59E-02	0.00E+00	0.00E+00	0.00E+00	8.01E+00	0.00E+00
Radioactive waste disposed	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

Output flow indicators

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
Materials for energy recovery	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
Material for recycling	kg	0.00E+00	0.00E+00	1.18E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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
Exported energy, electricity	MJ	0.00E+00	0.00E+00	3.25E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	6.66E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental information

None

Additional social and economic information

None

Information related to Sector EPD

This EPD is not sectorial

Differences versus previous versions

This EPD is a new submission

References

[1] Ecoinvent, 2023. Swiss Centre for Life Cycle Assessment, v3.9 (www.ecoinvent.ch).
[2] EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products.
[3] ISO 14025:2006, Environmental labels and declarations-Type III environmental declarations-Principles and procedures.
[4] ISO 14040: 2006/Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework Amendment 1 (ISO 2020).
[5] ISO 14044: 2006/Amd 2:2020 Environmental management - Life cycle assessment - Requirements and guidelines Amendment 2 (ISO 2020).
[6] ISO 21930:2017, Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services.
[7] EPD International. (2021). GENERAL PROGRAMME INSTRUCTIONS FOR THE INTERNATIONAL EPD® SYSTEM Version 4.0.
[8] EPD International. (2022). PCR 2019:14, Version 1.3.3 Construction Products.
[9] Plastics - the Facts 2021 Plasctics - the Facts 2021 (plasticseurope.org)

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