Environmental Product Declaration

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

Concrete Casting Panel

from

QINGDAO CIMC COMPOSITES CO., LTD

Programme:	The International EPD® System, www.environdec.com
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

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): *PCR 2019:14 Construction products (version 1.3.4)* *UN CPC code: 36390 Other plates, sheets, film, foil and strip, of plastics*
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: *Sally Xie, Intertek* *sally.xie@intertek.com*
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Rui Wang, IVL Swedish Environmental Research Institute* Approved by: The International EPD® System
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:
QINGDAO CIMC COMPOSITES CO., LTD

Contact:
Yujiao Shi
yujiao.shi@cimc.com

Description of the organisation:
Qingdao CIMC Composite Co., Ltd. was established in 2018 with a registered capital of 140 million yuan. It is a subsidiary of China International Marine Containers Group Co., Ltd., mainly engaged in the research and development, production, sales, processing, and testing services of thermoplastic composite materials and their products. QCCC has been awarded honors and qualifications such as "National High-tech Enterprise", "National Specialized, Refined, Unique and New Small Giant Enterprise", "Shandong Gazelle Enterprise", "Shandong Specialized, Refined, Unique and New Enterprise", "Qingdao Specialized, Refined, Unique and New Enterprise", and "Qingdao Industrial Empowerment Demonstration". QCCC have 30 UD production lines, 12 composite production lines, and 4 hot pressing machines, with domestically leading production capacity. As a leading enterprise in the research and development of thermoplastic composite material products and high production capacity, QCCC provides high-quality composite material products for related fields such as vehicles, containers, construction, home furnishings, aviation, etc., creating sustainable value for society.

Product-related or management system-related certifications:
ISO 9001:2015 Quality Management System certificate;
ISO 14001:2015 Environmental Management System certificate;
ISO 45001:2018 Occupational health and safety management systems certificate;
ISO 50001:2018 Energy management system certificate;
IATF 16949 - First Edition International Automotive Task Force certificate.

Name and location of production site(s):
North of West-East Tunnel, East of Planning Wenzhou Rd, Jiaozhou, Qingdao

Product information

Product name:
Concrete casting panel

Product description:
Concrete casting panel is a sandwich panel composed of CFRT (continuous glass fibre reinforced thermoplastic) as reinforced surface layers and PP (polypropylene) hollow plastic board as a core. The reinforced surface layer is made of double-layer continuous glass fibre reinforced thermoplastic unidirectional prepreg tapes (UD-tape) at an angle of 0°and 90°.
It has the characteristics of lightweight and high strength, good impact resistance, environmentally friendly production process, low VOC/formaldehyde emissions, short production cycle, and long service life.

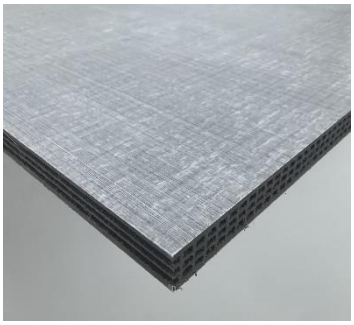


Figure 1 Image of the product

Characteristics	Nominal value
Product thickness, mm	15.0
PP Hollow Plastic Board, mm	14.5
Product weight, kg/m^2	10.09
Product width, mm	500~1200
Product length, mm	500~2500

Products application:
It can be applied in the fields of construction scaffolding, stage pedals, building templates, etc.

UN CPC code:
36390 Other plates, sheets, film, foil and strip, of plastics

Geographical scope:
Modules A1-A3 represent production of products in China. Module C and module D represent the end-of-life treatment of the products in Europe.

LCA information

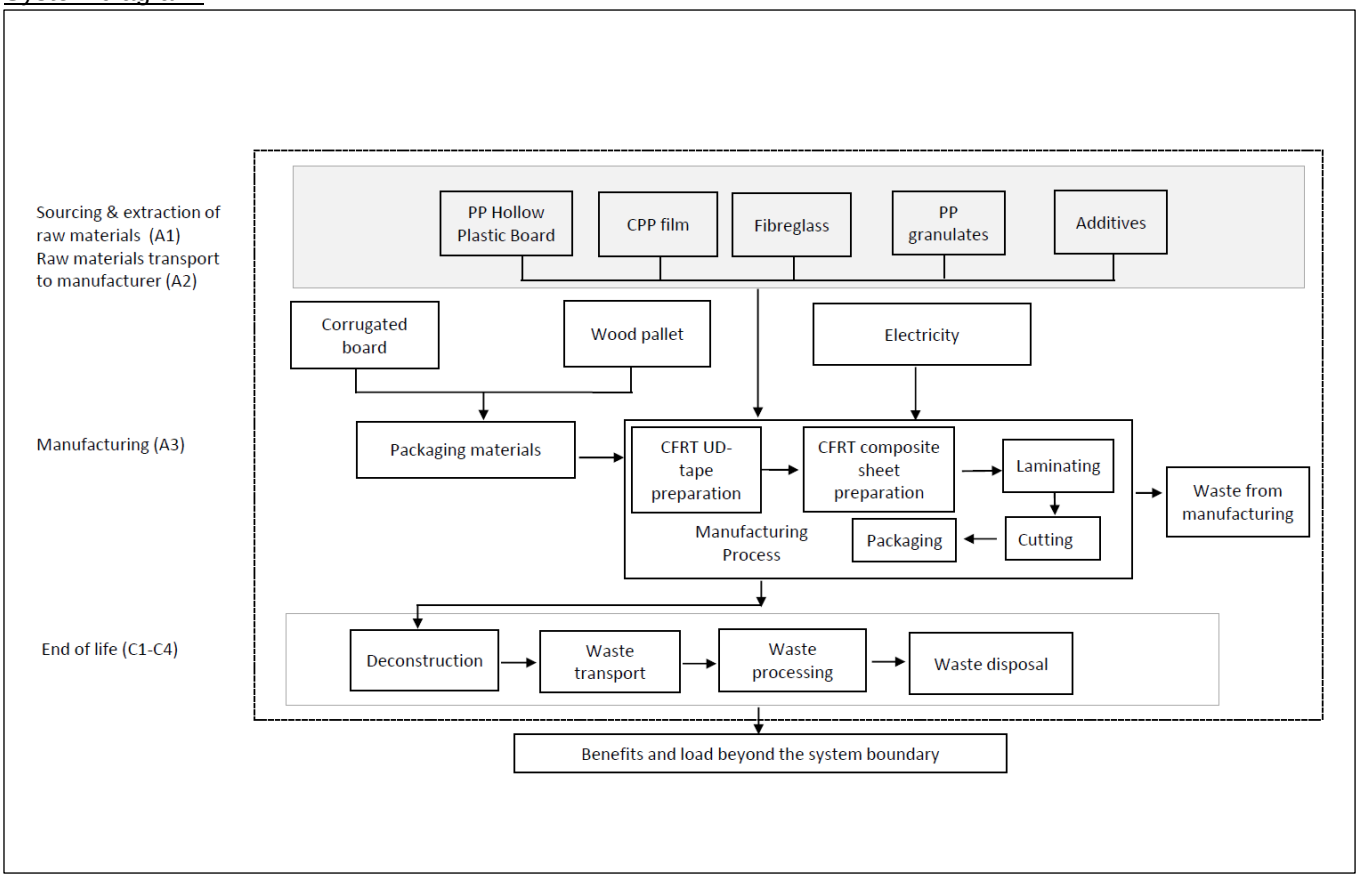
Declared unit:
1 m^2 of Concrete casting panel
Conversion factor to 1 kg: 0.099

Time representativeness:
1st January 2023 to 31st December 2023 (12 months)

Database(s) and LCA software used:
Ecoinvent 3.10 (Allocation, cut-off by classification) and Simapro 9.6.0.1 software

Description of system boundaries:
The system boundary is the cradle to gate (A1-A3) with module C1-C4 and module D. The mandatory cycle stages are analysed in the study, including: A1-A3 product stage, C1-C4 end-of-life stage, and D benefits and loads beyond the system boundary. The life cycle stages A4-A5, B1-B7 were excluded from the LCA study.

System diagram:



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	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	CN	CN	CN	-	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	81%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

More information:
Electricity data source used in the manufacturing process in A3: Market group for electricity, medium voltage, CN-ECGC, in Ecoinvent 3.10 (cut-off)
Climate impact: 0.857 kg CO_2 eq./kWh

Product stage (A1-A3)

A1, Raw material supply takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process. Specifically, raw material supply covers sourcing of PP hollow plastic board, CPP film, PP granulates, fiberglass and additives.

A2, Transport to the manufacturer. The transportation of the raw materials to the manufacturing site is studied in this module.

A3, Manufacturing. The manufacturing process of concrete casting panel mainly includes:

CFRT UD-tape preparation: Melt the PP granulates with additives and extrude into the impregnation mold through an extruder. At the same time, the evenly dispersed fiberglass bundle is sent into the impregnation mold for fully impregnated with the molten resin. Then cool and shape into a sheet by a pressure roller to prepare a CFRT UD-tape.

CFRT composite sheet preparation: Thermally laminate two layers of CFRT UD-tape at an angle of 0° and 90°.

Concrete casting panel manufacturing: Thermally laminate CFRT composite sheet, CPP film, PP hollow plastic board together. It is a symmetrical structure, and PP hollow plastic board is the core. After heating, cooling and pressure shaping, the concrete casting panel is obtained.

Cutting, the semi-finished product is cut into a suitable size.

The finished panels are stacked on the wood pallet with corrugated board on top and corner for protection and wrapped around with packaging film.

Electricity is consumed during the manufacturing process.

Packaging-related flows in the production process are included in the manufacturing module, i.e. packaging film, wood pallet and corrugated board. Apart from production of packaging material, the supply and transport of packaging material are also considered in the LCA model.

End-of-Life Stage (C1-C4):

C1, De-construction. According to the owner, the product can be manually removed. Hence no impact is considered during demolition.

C2, Transport to waste processing. It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight with the declared product. All of the end-of-life product is assumed to be transported as separate construction waste to the closest facilities. Transportation distance to the closest disposal area is estimated as 100 km and the transportation method is lorry which is the most common.

C3, Waste processing for reuse, recovery and/or recycling. It is assumed 100% of the deconstructed products (C1) to be sent to landfill. Hence, no waste processing is required.

C4, Disposal. The 100% of the deconstructed products are assumed to be sent to landfill.

Resource Recovery Stage (D)

D, Reuse/recovery/recycling potential.

100% of the products are assumed to be sent to landfill.

No benefit or load resulting from reuse/recovery/recycling beyond the product system boundary.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit

process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.
No cut-off criteria has been taken into account in this study.

ALLOCATION

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation.
In this study, as per EN 15804, allocation is conducted in the following order;
1. Allocation should be avoided.
2. Allocation should be based on physical properties (e.g., mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

Allocation used in Ecoinvent 3.10 environmental data sources follows the methodology “allocation, cut-off by classification”. This methodology is in line with the requirements of the EN 15804 standard.

Physical allocation rules are applied in this study to allocate the energy consumption, auxiliary materials usage, and manufacturing emissions and wastes.

During the production process of the product, there are no other by-products produced from the production line, hence there is no occasion that requires allocation for multi-output processes.

For this project, there is only one production site. So, there is no allocation among plants.

key assumptions

1. 100 km transportation distance is assumed for the disposal of the deconstructed products.
2. The 100% of the deconstructed products are assumed to be sent to landfill.

Inclusion or exclusion of Infrastructure and/or Capital goods

Depending on the PCR, in general, the production and end-of-life processes of infrastructure or capital goods used in the product system should be excluded, unless there is evidence that they are relevant in terms of their environmental impact, or when a generic LCI dataset includes infrastructure/capital goods, and it is not possible, within reasonable effort, to subtract the data on infrastructure/capital goods from this dataset (directly citation from section 4.3.2 of PCR 1.3.4). In this study, the infrastructure and capital goods are not included in the LCA analysis since they are used plenty of times for several years for the product manufacturing. According to the PCR, it should be excluded.

Content information

Product components		Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
CFRT UD-tape		1.52E+00	0.00E+00	0.00E+00
CPP(Casting Polypropylene) film		1.20E-01	0.00E+00	0.00E+00
PP Hollow Plastic Board	PP	5.41E+00	0.00E+00	0.00E+00
	Talc powder	2.96E+00	0.00E+00	0.00E+00
	Carbon black	8.45E-02	0.00E+00	0.00E+00
TOTAL		1.01E+01	0.00E+00	0.00E+00
Packaging materials		**Weight, kg**	**Weight-% (versus the product)**	**Weight biogenic carbon, kg C/kg**
Wood pallet		3.62E-01	3.58E-02	3.92E-01
Corrugated board		2.40E-02	2.38E-03	4.26E-01
Packaging film		2.00E-04	2.00E-05	0.00E+00
TOTAL		3.86E-01	3.82E-02	3.94E-01

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per declared unit
None	None	None	0.00E+00

Results of the environmental performance indicators

This LCA analysis applied the EN 15804+A2, EF3.1 was used

Mandatory impact category indicators according to EN 15804

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	4.47E+01	0.00E+00	1.08E-01	0.00E+00	1.04E+00	0.00E+00
GWP-biogenic	kg CO_2 eq.	2.10E-02	0.00E+00	1.96E-05	0.00E+00	6.87E-04	0.00E+00
GWP-luluc	kg CO_2 eq.	2.22E-02	0.00E+00	3.70E-05	0.00E+00	6.37E-05	0.00E+00
GWP-total	kg CO_2 eq.	4.48E+01	0.00E+00	1.08E-01	0.00E+00	1.04E+00	0.00E+00
ODP	kg CFC 11 eq.	7.34E-07	0.00E+00	2.18E-09	0.00E+00	2.91E-09	0.00E+00
AP	mol H^+ eq.	1.82E-01	0.00E+00	3.49E-04	0.00E+00	7.99E-04	0.00E+00
EP-freshwater	kg P eq.	9.15E-03	0.00E+00	7.36E-06	0.00E+00	1.19E-05	0.00E+00
EP-marine	kg N eq.	3.75E-02	0.00E+00	1.19E-04	0.00E+00	2.30E-03	0.00E+00
EP-terrestrial	mol N eq.	3.90E-01	0.00E+00	1.29E-03	0.00E+00	3.27E-03	0.00E+00
POCP	kg NMVOC eq.	1.68E-01	0.00E+00	5.69E-04	0.00E+00	1.38E-03	0.00E+00
ADP-minerals&metals*	kg Sb eq.	5.43E-04	0.00E+00	2.92E-07	0.00E+00	2.47E-07	0.00E+00
ADP-fossil*	MJ	8.23E+02	0.00E+00	1.57E+00	0.00E+00	2.50E+00	0.00E+00
WDP*	m^3	8.52E+00	0.00E+00	7.47E-03	0.00E+00	-1.61E+00	0.00E+00
Acronyms	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.*

Statement: 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 impact category indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	4.48E+01	0.00E+00	1.08E-01	0.00E+00	1.04E+00	0.00E+00

Resource use indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3.13E+01	0.00E+00	2.42E-02	0.00E+00	3.58E-02	0.00E+00
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	3.13E+01	0.00E+00	2.42E-02	0.00E+00	3.58E-02	0.00E+00
PENRE	MJ	5.84E+02	0.00E+00	1.57E+00	0.00E+00	2.42E+02	0.00E+00
PENRM	MJ	2.40E+02	0.00E+00	0.00E+00	0.00E+00	-2.40E+02	0.00E+00
PENRT	MJ	8.23E+02	0.00E+00	1.57E+00	0.00E+00	2.50E+00	0.00E+00
SM	kg	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
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	2.23E-01	0.00E+00	2.35E-04	0.00E+00	-3.73E-02	0.00E+00
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

[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.

Waste indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2.12E-02	0.00E+00	4.39E-05	0.00E+00	6.57E-05	0.00E+00
Non-hazardous waste disposed	kg	4.57E+00	0.00E+00	1.34E-01	0.00E+00	1.01E+01	0.00E+00
Radioactive waste disposed	kg	5.29E-04	0.00E+00	4.71E-07	0.00E+00	6.07E-07	0.00E+00

Output flow indicators

Results per declared unit							
Indicator	**Unit**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy, thermal	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Disclaimer: it is discouraging the use of the results of modules A1-A3 (A1-A5 for services) without considering the results of module C.

References

General Programme Instructions of the International EPD® System. Version 4.0.

PCR 2019:14 Construction products, version 1.3.4

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

EN 15804:2012+A2:2019/AC:2021 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

Ecoinvent 3.10 database.

QINGDAO CIMC COMPOSITES CO., LTD LCA background report.

EPD®

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