

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804 for:

[Grey Iron Casting Products (Blind Pavers)]

From

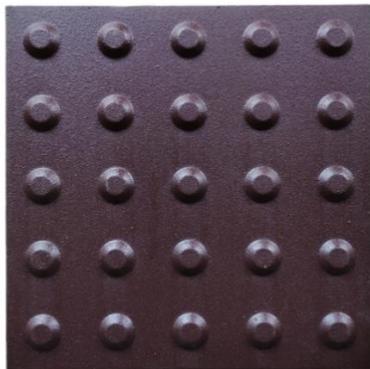
[Yantai Ingrid International Trading
Co Ltd]



CTI 华测认证



Declared product: Grey Iron Casting Products (Blind Pavers)



Programme operator:	EPD China
Registration number:	EPD-CN-00046
Issued date:	2026-01-28
Valid until:	2031-01-27

Programme Information

EPD Owner	Yantai Ingrid International Trading Co Ltd. <u>Contact:</u> Ingrid Wang ingridruiping@163.com 13589870376 <u>Website:</u> https://ingridinternational.com/ <u>Address:</u> Building 5, No. 368 Changning Road, Laishan District, Yantai City, Shandong Province, China.
Product Name	Grey Iron Casting Products (Blind Pavers)
Production Site	Yantai City, Shandong Province, China.
Identification of product	Product HS Code:7325109000 Other non-machinable cast iron products.
Field of Application	Applied to build tactile guidance systems in common public areas to provide safe passage for visually impaired people.
Programme Operator	EPD China Address of Headquarter: Tianping Road, Xuhui District, Shanghai Website: www.epdchina.cn Email: info@epdchina.cn secretary@epdchina.cn
LCA Practitioner	<u>Aijuan Mei, CTI Certification Co., Ltd.,</u> meiaijuan@cti-cert.com
Responsibility	The EPD owner has the sole ownership, liability, and responsibility for the EPD
Comparability	EPDs within same category of product in different programme operator are not suggested to be compared. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible even applying the same PCR.
Liability	The EPD owner has sole ownership, liability, and responsibility for the EPD.
Validity	The EPD is published on 2026-01-28 and valid to 2031-01-27
LCA Software (version)	Simapro 10.2
LCI Dataset (version)	Ecoinvent 3.10
Year(s) of Primary Data	August 1, 2024, to July 31, 2025
PCR	EPDCN-PCR-202204 PCR for construction products and construction services Version number: V2.1
Other Reference Document	EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works- Environmental product declarations - Core rules for the product category of construction products
Verification statement according EN15804	
Independent verification of the declaration and data according to EN ISO 14025:2010 <input type="checkbox"/> internal <input checked="" type="checkbox"/> external Third-party institution verification: <Weifang Yao, WIT> is an approved certification body accountable for third-party verification Approved by: EPD China	



Procedure for follow-up of data during EPD validity involves a third-party certification body:

Yes No



EPD 中国项目 值得信赖

The first EPD Programme Operator registered in China, contributing to the EPD system building in China
www.epdchina.cn

General Information

1.1 Company information

- Owner of the EPD:

Yantai Ingrid International Trading Co Ltd.

- Contact:

ingridruiping@163.com

- Name and location of production site(s):

Building 5, No. 368 Changning Road, Laishan District, Yantai City, Shandong Province, China.

- Brief description of the company:

Yantai Ingrid International Trading Co Ltd was established in year 2010, specializing in providing various customized product services for international clients. The company is not limited to a specific industry, offering a wide range of products tailored to meet diverse customer needs.

1.2 Scope and type of EPD

In this section, it is suggested to include but not limited to the following information:

- Description of system boundaries:

Cradle to Grave (A1-A5, B2, C1-C4, D).

- System diagram:

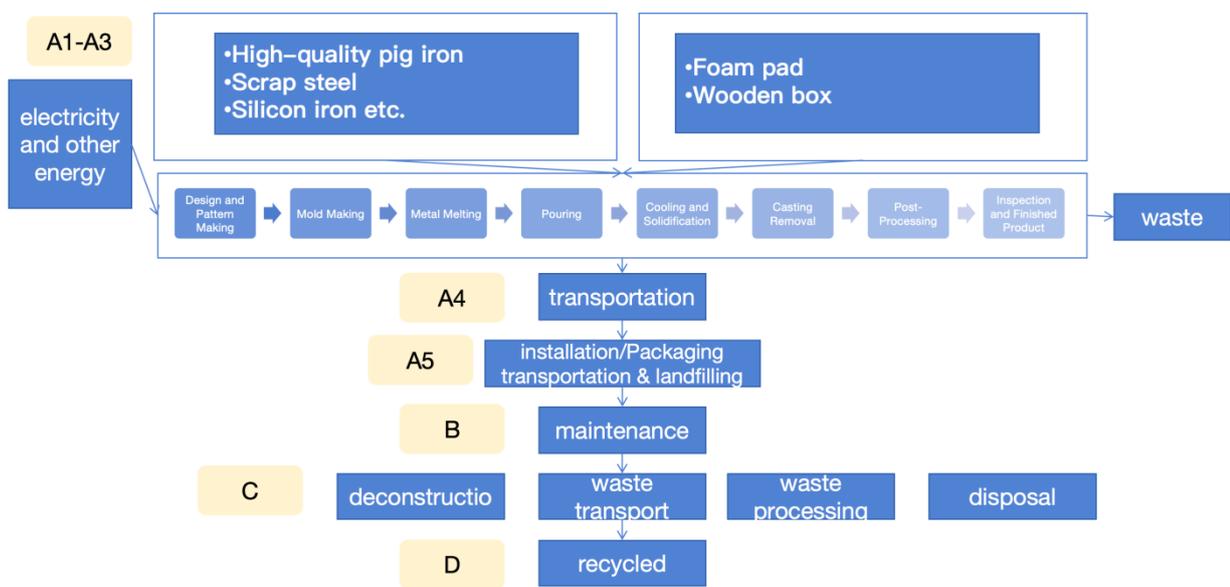


Table Division of Life Cycle Stages

EN15804	Life Cycle Stage
Product stage (A1-A3)	A1 Raw material extraction and processing, processing of secondary material input (e.g. recycling processes)
	A2 Transport to the manufacturer
	A3 Manufacturing
Construction process stage (A4-A5)	A4 Transport to the building site
	A5 Installation into the building
Use stage related to the building fabric (B1-B5)	B1 Use or application of the installed product
	B2 Maintenance
	B3 Repair
	B4 Replacement
	B5 Refurbishment
Use stage related to the operation of the building (B6-B7)	B6 Operational energy use
	B7 Operational water use
End-of-life stage (C1-C4)	C1 De-construction, demolition
	C2 Transport to waste processing
	C3 Waste processing for reuse, recovery and/or recycling
	C4 Disposal
D Benefits and loads beyond the system boundary	D Reuse, recovery and/or recycling potentials, expressed as net impacts and benefits

Table: Process stages and and EPD modules.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Production	Transport from the gate to the	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ 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	X	X	X	X	X	X	X	X	X	X	X	X	X	X



2 Detailed Product Description

- Description of the product

Gray cast iron for blind paving, commissioned by Yantai Ingrid International Trading Co Ltd., is used as raw material and is used to create various components and products through a casting process.

According to the requirements of EPDCN-PCR-202204 PCR for construction products and construction services Version number: V2.1 , this report takes 1 ton of gray iron casting products (blind aisles) as the declared unit, with a service life of 15 years. They are produced in China and sold abroad. The included product series are: B1, R2, R5, etc.

Product advantages: Strong, durable, easy to transport and install, and recyclable, which is environmentally friendly. However, the cost and production cost are relatively higher.

Gray cast iron is a common cast iron material, named for its gray cross-section. It has excellent casting properties, wear resistance, vibration damping, and machinability, and is widely used in machinery manufacturing, the automotive industry, construction equipment, piping systems, and other fields. Gray cast iron products occupy a key position in the industrial sector due to their cost-effectiveness and practicality. They are particularly suitable for applications that require low strength but good wear resistance and vibration damping.

Products can be designed in various sizes and shapes according to customer and construction site requirements. Currently, the product is primarily square, with a common size of 300*300mm and a brown color. Specific specifications are determined based on customer needs. Product patterns primarily feature raised dots or stripes, which are highly perceptible to blind people. The models calculated in this application are B1, R2, and R5. The production process of each product is exactly the same, and the only difference is the pattern and the weight of a single piece. They are divided into dotted, fine stripes, and wide stripes. A single piece of B1 weighs 8kg, while a single piece of R2 and R5 weighs 9kg.

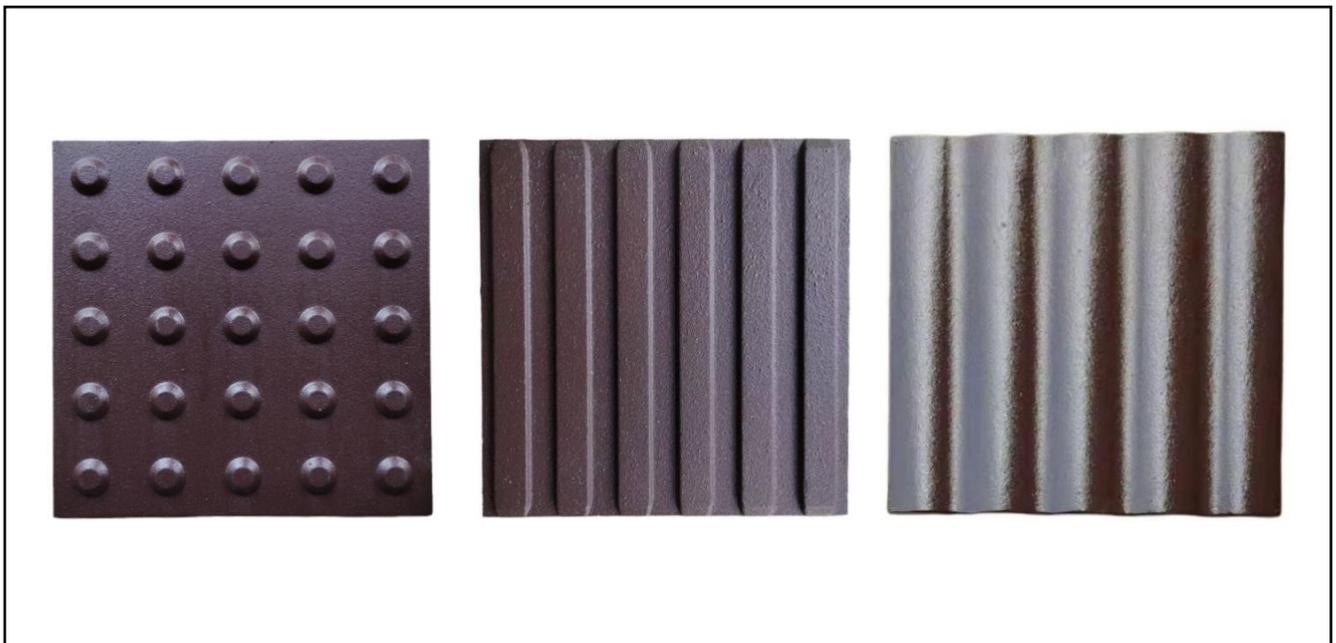


Figure: Picture of the declared product.

- Description of the production processes

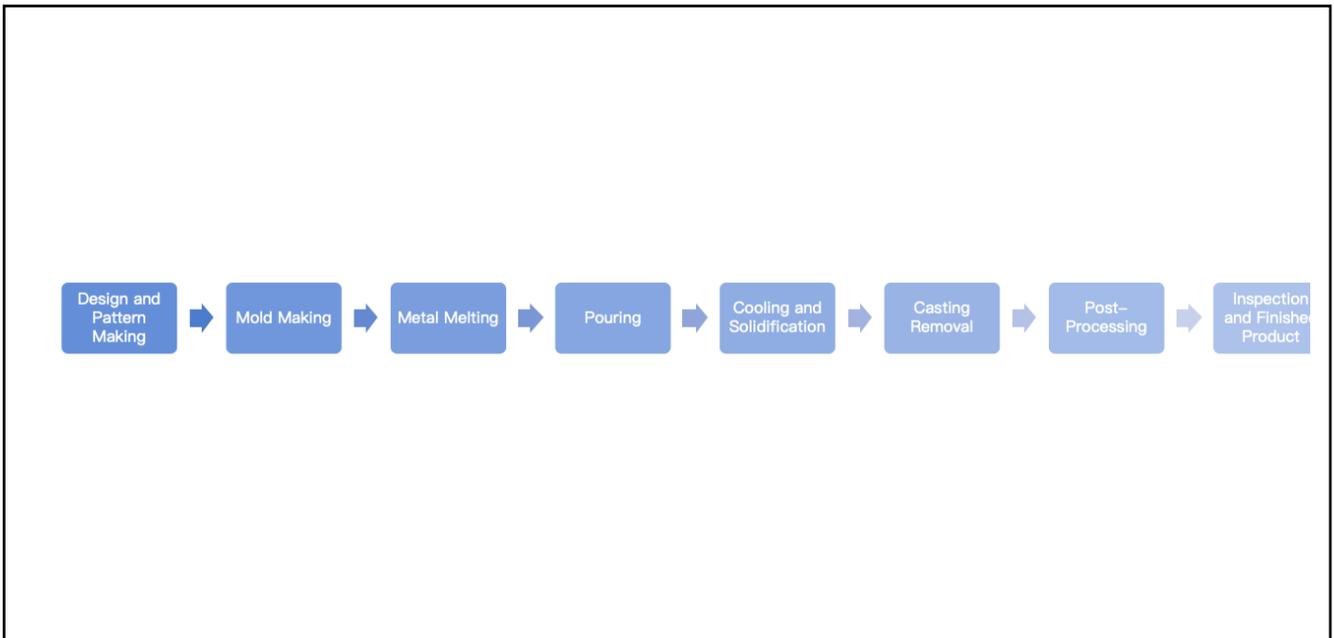


Figure: The production process in selected stages.

- Product components

Table: Main product components and packaging materials per unit.

Product components	Weight, kg	Weight-% (versus the product)
High-quality pig iron	592.24	59.22%
Scrap steel	370.22	37.02%
Silicon iron	20.11	2.01%
Carbon booster	17.43	1.74%
TOTAL	1000.00	100
Packaging materials	Weight, kg	Weight-% (versus the product)
Foam pad	1.00	0.10%
Wooden box	80.00	8.00%
TOTAL	81.00	8.10%

Products do not contain any substances that can be included in the "Candidate List of Substances of Very High Concern for Authorization" and raw materials used are not part of the EU REACH regulation.



3 LCA results according to EN 15804

3.1 Environmental Impacts

The Life Cycle Assessment (LCA) study is carried out using SimaPro software (version 10.2), the LCA database used is Ecoinvent 3.10. The results of the underlying LCA is provided in this section as environmental impacts, resource use, output flows and additional information on biogenic carbon. All pre-set parameters of EN 15804 are required. Used simultaneously with Environmental Footprint 3.1

Table: Environmental impacts according to EN 15804.

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT per functional or declared unit																		
Core indicator	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	[kg CO ₂ eq.]	1.07E+03	1.50E+01	1.42E+03	2.61E+03	8.82E+00	0.00E+00	1.55E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.72E-02	1.96E+01	0.00E+00	9.39E-01	-2.12E+03
Global Warming Potential fossil fuels (GWP-fossil)	[kg CO ₂ eq.]	1.23E+03	1.50E+01	1.43E+03	2.61E+03	2.62E+00	0.00E+00	1.54E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.64E-02	1.96E+01	0.00E+00	9.38E-01	-2.11E+03
Global Warming Potential biogenic (GWP-biogenic)	[kg CO ₂ eq.]	-1.55E+02	1.87E-04	-8.32E+00	-7.36E-01	1.64E+02	0.00E+00	4.65E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.39E-04	2.45E-04	0.00E+00	1.21E-04	-9.59E+00
Global Warming Potential land use and land use change (GWP-luluc)	[kg CO ₂ eq.]	6.62E-01	5.95E-03	2.13E-01	1.24E+00	1.16E-03	0.00E+00	1.88E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-04	7.77E-03	0.00E+00	4.87E-04	-3.44E-01
Depletion potential of the stratospheric ozone layer (ODP)	[kg CFC 11 eq.]	4.76E-06	2.09E-07	0.00E+00	3.76E-05	4.56E-08	0.00E+00	2.21E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.10E-10	0.00E+00	0.00E+00	0.00E+00	-2.44E-13
Acidification potential, Accumulated Exceedance (AP)	[mol H ⁺ eq.]	4.95E+00	4.99E-02	8.08E+00	7.68E+01	1.18E-02	0.00E+00	8.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.65E-04	6.52E-02	0.00E+00	6.65E-03	-5.36E+00
Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	[kg P eq.]	3.55E-01	1.17E-03	2.82E-01	7.69E-02	8.25E-04	0.00E+00	6.28E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.78E-05	1.53E-03	0.00E+00	0.00E+00	-8.93E-04





Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	[kg N eq.]	1.19E+00	1.62E-02	1.61E+00	1.94E+01	3.14E-02	0.00E+00	1.62E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.18E-05	2.11E-02	0.00E+00	2.53E-03	-9.31E-01
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	[mol N eq.]	1.28E+01	1.76E-01	1.72E+01	2.15E+02	4.51E-02	0.00E+00	1.65E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.87E-04	2.30E-01	0.00E+00	2.77E-02	-9.52E+00
Formation potential of tropospheric ozone (POCP)	[kg NMVOC eq.]	4.16E+00	6.94E-02	4.58E+00	5.81E+01	1.81E-02	0.00E+00	5.05E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E-04	9.07E-02	0.00E+00	9.91E-03	-3.53E+00
Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	[kg Sb eq.]	1.51E-03	4.79E-05	4.85E-03	2.35E-03	7.80E-06	0.00E+00	7.05E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.17E-06	0.00E+00	0.00E+00	0.00E+00	-1.20E-03
Abiotic depletion potential for fossil resources (ADP-fossil)	MJ, net calorific value	1.30E+04	2.10E+02	1.29E+04	3.21E+04	4.24E+01	0.00E+00	1.96E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-01	2.74E+02	0.00E+00	2.30E+01	-2.24E+04
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m ³ world eq. Deprived]	2.13E+02	1.15E+00	1.80E+02	9.07E+01	-1.25E+01	0.00E+00	7.53E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E+00	1.50E+00	0.00E+00	1.02E+00	-6.39E+03

3.2 Resource use and waste categories

Table: Primary and secondary resource consumption according to EN 15804.

RESULTS OF THE LCA - USE OF RESOURCES per declared unit																		
Core indicator	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials (PERE)	MJ	4.01E+03	2.75E+00	8.40E+02	2.17E+02	1.42E+00	0.00E+00	2.23E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E+00	3.60E+00	0.00E+00	2.13E-01	-4.71E+02
Use of renewable primary energy resources used as raw materials (PERM)	MJ	0.00E+00																





Total use of renewable primary energy resources (PERT) (primary energy and primary energy resources used as raw materials)	MJ	4.01E+03	2.75E+00	8.40E+02	2.17E+02	1.42E+00	0.00E+00	2.23E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.56E+00	3.60E+00	0.00E+00	2.13E-01	-4.71E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials (PENRE)	MJ	1.34E+04	2.10E+02	1.29E+04	3.21E+04	4.24E+01	0.00E+00	1.96E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-01	2.74E+02	0.00E+00	2.30E+01	-2.24E+04
Use of non-renewable primary energy resources used as raw materials (PENRM)	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (PENRT) (primary energy and primary energy resources used as raw materials)	MJ	1.34E+04	2.10E+02	1.29E+04	3.21E+04	4.24E+01	0.00E+00	1.96E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.19E-01	2.74E+02	0.00E+00	2.30E+01	-2.24E+04
Use of secondary material (SM)	kg	3.23E+02	9.42E-02	1.81E+00	1.40E+01	1.74E-02	0.00E+00	5.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.66E-04	1.23E-01	0.00E+00	5.78E-03	0.00E+00
Use of renewable secondary fuels (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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels (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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (FW)	m ³	5.20E+00	2.80E-02	4.27E+00	2.22E+00	-2.91E-01	0.00E+00	1.75E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.23E-02	3.66E-02	0.00E+00	2.39E-02	-3.24E+02

Table: Waste production according to EN 15804.

RESULTS OF THE LCA - Waste of production and outflows per declared unit																		
Core indicator	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste disposed (HWD)	kg	1.03E+02	3.68E-01	1.77E+02	3.93E+01	7.47E-02	0.00E+00	1.69E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.32E-03	4.81E-01	0.00E+00	2.56E-02	0.00E+00
Non-hazardous waste disposed (NHWD)	kg	2.29E+03	6.91E+00	1.35E+03	5.33E+02	4.03E+02	0.00E+00	3.08E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.41E-01	9.03E+00	0.00E+00	5.84E-01	0.00E+00
Radioactive waste disposed (RWD)	kg	6.46E-03	4.23E-05	3.87E-03	3.23E-03	9.76E-06	0.00E+00	4.55E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.20E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery (MER)	kg	7.05E-04	1.35E-05	5.25E-04	5.71E-04	2.83E-06	0.00E+00	1.48E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.22E-08	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Material for recycling (MFR)	kg	2.53E-01	1.55E-03	8.95E-01	3.40E+00	6.25E-04	0.00E+00	1.43E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.68E-04	2.02E-03	0.00E+00	1.00E-04	0.00E+00
Components for re-use (CRU)	kg	0.00E+00																





Exported thermal energy (ETE)	MJ	1.63E+00	3.08E-02	8.47E-01	9.83E-01	5.59E-03	0.00E+00	2.73E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.54E-04	4.03E-02	0.00E+00	8.98E-04	0.00E+00
Exported electricity energy (EEE)	MJ	2.05E+00	1.53E-02	2.62E-01	1.32E+00	5.92E-03	0.00E+00	2.09E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.32E-02	2.00E-02	0.00E+00	1.40E-03	0.00E+00

3.3 Information on biogenic carbon content

Information on biogenic carbon content which shall be included in the EPD as follows:

Biogenic carbon content	Unit (expressed per functional unit or per declared unit)
Biogenic carbon content in product	0 kg C
Biogenic carbon content in accompanying packaging	44.800 kg C
NOTE: 1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂ .	

3.4 Additional impact indicators

A set of optional additional indicators must be addressed in a mandatory table (see table below) in the EPD if complying with EN 15804. If the EPD owner decides to not declare one or any additional indicator from the list in EN 15804, the boxes for those modules are assigned ND = not declared. Any additional indicator not declared must be identified in the table e.g. as an entry of "ND" to the table or as text.

Table: Optional additional impact indicators according to EN 15804.

RESULTS OF THE LCA - ADDITIONAL ENVIRONMENTAL IMPACT per functional or declared unit																		
Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	disease inc.	2.39E-04	1.19E-06	1.07E-04	7.72E-05	2.72E-07	0.00E+00	9.84E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-09	1.55E-06	0.00E+00	1.51E-07	-9.01E-05
Ionising radiation	kBq U-235 eq	2.65E+01	1.72E-01	1.67E+01	1.33E+01	4.01E-02	0.00E+00	1.83E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E-02	2.25E-01	0.00E+00	1.47E-02	-9.36E+03
Land use	Pt	1.95E+04	1.25E+02	3.13E+03	2.61E+03	6.02E+01	0.00E+00	4.23E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E-01	1.64E+02	0.00E+00	4.53E+01	-7.81E+02



4 Supplementary information

4.1 Calculation rules

- Declared unit:

1 ton Grey Iron Casting Products (Blind Pavers)

- Assumptions:

(1) Construction process stage (A4-A5): The energy consumption data for the construction stage is assumed based on experience; In the Product installation (A5) module, the energy consumption data for the construction stage is assumed based on experience, assuming that the on-site assembly process only consumes electricity, with an electricity consumption of 0.2 kWh. The A5 module also includes the calculation of the environmental impact of the packaging materials at the end of their life cycle. It is assumed that 100% of the packaging materials enter the scrap disposal stage and are transported 100 km to the waste disposal plant by truck. For this project, the main packaging materials are foam padding and wood;

(2) Use stage (B1-B7): The energy and resource consumption data for the use stage is assumed based on experience;

(3) End of life stage (C1-C4): After the product is used, it is demolished and transported to the waste disposal site. The corresponding transportation data is assumed based on experience. The treatment methods for metal products, and packaging materials are all reasonable assumptions made according to the product characteristics and recycling methods.

B1: The installed product does not consume energy during B1 stage.

B2: To maintain cleanliness, tap water is used for cleaning during the product use stage. According to experience, it is estimated that 45 kg of tap water is consumed per cleaning session. Mechanical sweepers are used for cleaning once every two weeks, totaling approximately 26 cleaning sessions a year. Based on a service life of 15 years, the total tap water consumption throughout the product's entire life cycle amounts to 17,550 kg.

In addition, according to experience, the product will be maintained once every 3 years during the use stage, with each maintenance consuming 0.025 kWh of electricity, resulting in a total of 5 maintenances during the life cycle, with a total electricity consumption of 0.125 kWh.

C1: After product use, the disassembly of the target product using tools consumes 1.1 kWh of electricity.

C2: It is demolished and transported to the waste disposal site. The corresponding transportation scenario is assumed based on experience. It is assumed that 100% of the product enter the scrap disposal stage and are transported 100 km to the waste disposal plant by truck.

C3: After inspection, the waste disposal process does not require energy consumption. The steel in the product will be recycled for further production.

C4: The recycling process will recover 85% of the scrap iron, while the remaining 15% of the scrap iron will be disposed of through landfill. The environmental benefits generated by recycling scrap iron will be presented in module D.

The specific assumptions for each module can be found in corresponding product LCA report.





● Cut off rules:

The threshold for substance set in this report is 1%. The exclusion threshold for individual material flows is 0.1%, and the total exclusion should not exceed 1% of the total mass. However, any toxic and harmful materials and substances should be included in the inventory, and this report should not be overlooked. Due to some processes that may have environmental impacts, the corresponding processes will be excluded when the following situations occur.

- (1) There is no appropriate accounting and quantification method;
- (2) Although the quantification process is feasible, it does not conform to economic benefits, and the mass accounts for less than 0.1% of the total mass.

The processes excluded in this report include:

The construction process (A3) does not involve the use of circulating cooling water, so the water consumption of the product production process is not considered.

● Data quality:

The data quality assessment of this report follows the EN 15804 + A2 LCIA, with the Annex E Schemes in Table E.2 - Data quality level and criteria from the Product Environmental Footprint Category Rules in the section for the application of data quality assessment for generic and specific data. The overall assessment of the results regarding the generic data quality assessment is as follows: geographical representativeness and technical representativeness are good, and time representativeness is very good; for the data quality assessment of manufacturer's specific data: geographical representativeness, technical representativeness, and time representativeness are very good.

Specific data on material and energy usage have been collected for the product life cycle. These data are provided by Yantai Ingrid International Trading Co Ltd. and use real production data from August 1, 2024, to July 31, 2025.

In addition, the environmental impact data for the general data of resource consumption and energy consumption per 1 ton Grey Iron Casting Products (Blind Pavers) product have been collected. These data come from the Ecoinvent database, version 3.10.

No alternative data were used in this study.

● Allocations:

During the reporting period, the manufacturing facility manufactures a diverse range of product lines alongside the target product. Given that time-segmented metering of energy and resource consumption for distinct production runs has not yet been implemented, and that monthly production output and manufacturing processes remain consistently stable, the manufacturer adopts a proportional allocation approach to assign the relevant energy and resource consumption to the target product, with reference to the facility's total output, production capacity, and empirical operational data.

Specifically, the allocation of electricity consumption follows the equation below:

$$\frac{\text{Total Output of Target Product}}{\text{Total Factory Output}} = \frac{\text{Electricity Consumption Attributed to Target Product}}{\text{Total Factory Electricity Consumption}}$$

For water consumption, the allocation is determined by the input-output ratio of raw material input volume and production output—a methodology aligned with the electricity allocation principle in its proportionality. All water consumption allocated to the target product in this manner is attributed to A3 of its life cycle.

All production activities associated with the target product are substantiated by corresponding production records and accounting ledgers, including detailed electricity consumption logs. In response to this specific operational constraint, the manufacturing facility has issued a formal statement to validate the rationale and applicability of this allocation method.

4.2 Scenarios and additional technical information





In this section, it is suggested to include but not limited to following information:

EN15804	Life Cycle Stage
Product stage (A1-A3)	A1: Raw material extraction and processing(High-quality pig iron, Scrap steel, Silicon iron etc.)
	A2: Transport to the Yantai Ingrid International Trading Co Ltd.
	A3: Manufacturing (Electricity, Tap water)
Construction process stage (A4-A5)	A4: Transport to the building site (Truck and sea transport)
	A5: Installation into the building (Electricity)
Use stage related to the building fabric (B1-B5)	B1: Use or application of the installed product (Not consuming energy and resources)
	B2: Maintenance (Consuming tap water)
	B3: Repair (Electricity)
	B4: Replacement (Not consuming energy and resources)
	B5: Refurbishment (Not consuming energy and resources)
Use stage related to the operation of the building (B6-B7)	B6: Operational energy use (Not consuming energy and resources)
	B7: Operational water use (Not consuming energy and resources)
End-of-life stage (C1-C4)	C1: De-construction, demolition (Only consuming electricity)
	C2: Transport to waste processing (Truck transport)
	C3: Waste processing for reuse, recovery and/or recycling (Not consuming energy and resources)
	C4: Disposal (landfill)
D Benefits and loads beyond the system boundary	D: Reuse, recovery and/or recycling potentials, expressed as net impacts and benefits (iron scrap recycling)

Raw material supply (A1)

The environmental impacts generated during the raw material acquisition and processing stages mainly originate from the production process of raw and auxiliary materials. Based on the list of raw and auxiliary materials and the survey statistics on the consumption of raw and auxiliary materials, the main raw and auxiliary material consumption information for producing 1 ton of gray iron casting products produced from August 1, 2024 to July 31, 2025 is shown in the table below.

Table: Raw and Auxiliary Materials List (1 ton Grey Iron Casting Products (Blind Pavers))

No.	Material Name	Weight	Unit
1	High-quality pig iron	592.24	kg
2	Scrap steel	370.22	kg
4	Silicon iron	20.11	kg
5	Carbon booster	17.43	kg
6	Foam pad	1.000	kg
7	Wooden box	80.000	kg

Note 1: 80.000 kg of wooden box corresponds to 0.133 m³;



Raw material transportation (A2)

The following table shows the transportation information for the main raw and auxiliary materials of Grey Iron Casting Products (Blind Pavers).

Table: Raw and auxiliary material transportation information form(1 ton Grey Iron Casting Products (Blind Pavers))

Material Name	Raw material origin	Transportation method	Transportation distance (km)
High-quality pig iron	Laiyang, China	Land	155
Scrap steel	Laiyang, China	Land	13
Foundry returns	Laiyang, China	Land	5
Silicon iron	Laiyang, China	Land	13
Carbon booster	Laiyang, China	Land	13
Foam pad	Laiyang, China	Land	8
Wooden box	Laiyang, China	Land	8

Production (A3)

The production process of gray iron casting products (Blind pavers) mainly uses electricity and water. It does not involve the use of shielded welding gas. Based on the provided energy invoices and related documents, and considering the allocation process, the main energy consumption information for gray iron casting products (Blind pavers) during production is as follows.

Table: Energy consumption during product manufacturing (1 ton Grey Iron Casting Products (Blind Pavers))

Resource/Energy Type	Amount	Unit
Electricity	1197.697	kWh
Water	440.119	kg

The production process of Grey Iron Casting Products (Blind Pavers) involves only physical changes and does not generate hazardous or solid waste

Transport from the gate (A4)

According to the product shipment statistics table, the shipment information for Grey Iron Casting Products (Blind Pavers) is shown in the table below.

Table: Product Outbound Transportation Information Sheet(1 ton Grey Iron Casting Products (Blind Pavers))

Destination	Transportation method	Transportation distance(km)	Transportation method	Transportation distance(km)
Norway	Land	151.68	Sea	21669.00

Assembly(A5)

In the Product installation (A5) module, the energy consumption data for the construction stage is assumed based on experience, assuming that the on-site assembly process only consumes electricity, with an electricity consumption of 0.2 kWh.

During product installation, the packaging waste generated will be transported 100km to a landfill for disposal. Specific details are shown in the table below.





Table: Product Installation Information Sheet (1 ton Grey Iron Casting Products (Blind Pavers))

Recycled Material	Unit Product Disposal Quantity	Unit	Processing Method	Stage	Transportation distance (km)	Transportation method	Transportation distance (tkm)
Packaging Materials	81.00	kg	Transport to treatment site	A5	100	Land	8.10
Plastic	1.00	kg	Landfill	A5	/	/	/
Wood	80.00	kg	Landfill	A5	/	/	/

Use stage (B1-B2)

The energy and resource consumption data for the use stage is assumed based on experience:

B1: The installed product does not consume energy during use stage.

B2: To maintain cleanliness, tap water is used for cleaning during the product use stage. According to experience, it is estimated that 45 kg of tap water is consumed per cleaning session. Mechanical sweepers are used for cleaning once every two weeks, totaling approximately 26 cleaning sessions a year. Based on a service life of 15 years, the total tap water consumption throughout the product's entire life cycle amounts to 17,550 kg. In addition, according to experience, the product will be maintained once every 3 years during the use stage, with each maintenance consuming 0.025 kWh of electricity, resulting in a total of 5 maintenances during the life cycle, with a total electricity consumption of 0.125 kWh.

End of life stage (C1-C4)

After the product is used, it is demolished and transported to the waste disposal site. The corresponding transportation data is assumed based on experience. The treatment methods for metal products, and packaging materials are all reasonable assumptions made according to the product characteristics and recycling methods.

C1: After product use, the disassembly of the target product using tools consumes 1.1 kWh of electricity.

C2: It is demolished and transported to the waste disposal site. The corresponding transportation scenario is assumed based on experience. It is assumed that 100% of the product and packaging materials enter the scrap disposal stage and are transported 100 km to the waste disposal plant by truck.

C3: After inspection, the waste disposal process does not require energy consumption. The steel in the product will be recycled for further production.

C4: The recycling process will recover 85% of the scrap iron, while the remaining 15% of the scrap iron will be disposed of through landfill. The environmental benefits generated by recycling scrap iron and aluminum will be presented in module D.

Benefits and loads beyond the system boundaries (D)

Based on the current state of recycling in China's steel industry, the metal materials in the product are assumed to have a recycling rate of 85%. Consequently, 0.85 tons of iron will be recycled from the product, and the corresponding environmental impact and revenue will be attributed to module D.

● Power Structure Description:

The electricity used by Yantai Ingrid International Trading Co Ltd. in Phase A3 is supplied by the State Grid in Yantai City, Shandong Province, and does not involve the use of photovoltaic power or green electricity. The electricity used in the modeling and results of this study is location-based. The background electricity data used in this study comes



from the Ecoinvent 3.10 database, and the corresponding specific data entry is: Electricity, low voltage {CN-NCGC}| market for electricity, low voltage | EN15804, U. This data represents the average electricity emissions in North China, consistent with the production location of Yantai Ingrid International Trading Co Ltd. The corresponding time is 2023; the corresponding GWP-GHG is 1.1897 kg CO₂ eq/kWh.

Phase A5, B3, and C1 occur in Norway, so the background electricity data used is from the Ecoinvent 3.10 database, and the corresponding specific data entry is: Electricity, low voltage {NO}| market for electricity, low voltage | EN15804, U. This data represents the average electricity emissions in Norway, consistent with the locations where this target product will be subsequently installed, maintained, and received. The corresponding timeframe is 2020; the corresponding GWP-GHG is 0.0244 kg CO₂ eq/kWh.

● Uncertainty Analysis:

This analysis aims to determine the level of uncertainty in the final outcome data used in the study. The analysis was conducted using the Monte Carlo method, and the results are shown in the table below.

Table: Product Uncertainty Analysis

Category	Unit	Mean	Median	SD	CV	2.5%	97.5%	SEM
Climate change - Total	kg CO ₂ eq	2.94E+03	2.94E+03	3.79E+02	1.29E-01	2.14E+03	3.68E+03	7.58E+01
Climate change - Fossil	kg CO ₂ eq	3.12E+03	3.13E+03	3.80E+02	1.22E-01	2.29E+03	3.76E+03	7.59E+01
Climate change - Biogenic	kg CO ₂ eq	-1.78E+02	-1.60E+02	9.98E+01	-5.61E-01	-4.86E+02	-4.08E+01	2.00E+01
Climate change - Land use and LU change	kg CO ₂ eq	1.89E+00	1.68E+00	7.83E-01	4.14E-01	8.36E-01	3.74E+00	1.57E-01
Ozone depletion	kg CFC11 eq	4.71E-05	4.54E-05	7.50E-06	1.59E-01	3.73E-05	5.98E-05	1.50E-06
Acidification	mol H ⁺ eq	8.61E+01	8.21E+01	1.14E+01	1.33E-01	6.52E+01	1.17E+02	2.29E+00
Eutrophication, freshwater	kg P eq	5.62E-01	5.55E-01	1.65E-01	2.95E-01	3.01E-01	9.08E-01	3.31E-02
Eutrophication, marine	kg N eq	2.29E+01	2.37E+01	3.71E+00	1.62E-01	1.56E+01	3.05E+01	7.43E-01
Eutrophication, terrestrial	mol N eq	2.53E+02	2.61E+02	4.07E+01	1.61E-01	1.73E+02	3.33E+02	8.13E+00
Photochemical ozone formation	kg NMVOC eq	6.74E+01	6.73E+01	9.77E+00	1.45E-01	5.14E+01	8.96E+01	1.95E+00
Resource use, minerals and metals	kg Sb eq	7.80E-03	7.88E-03	1.97E-03	2.53E-01	4.49E-03	1.20E-02	3.94E-04
Resource use, fossils	MJ	3.50E+04	3.48E+04	1.20E+04	3.43E-01	1.68E+04	7.15E+04	2.41E+03
Water use	m ³ depriv.	-3.07E+03	-1.88E+03	2.55E+04	-8.30E+00	-9.22E+04	3.64E+04	5.10E+03



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4.3 Dangerous substances

There are no dangerous substances in indoor air, oil and water during the use stage.

4.4 Other optional additional environmental information

Not public



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www.epdchina.cn



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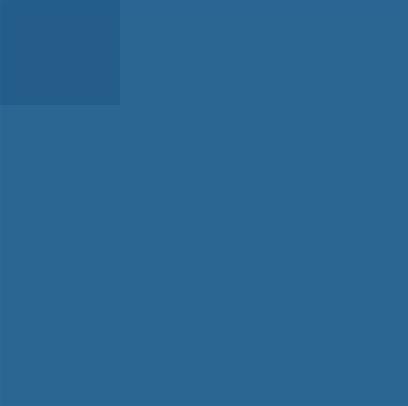
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