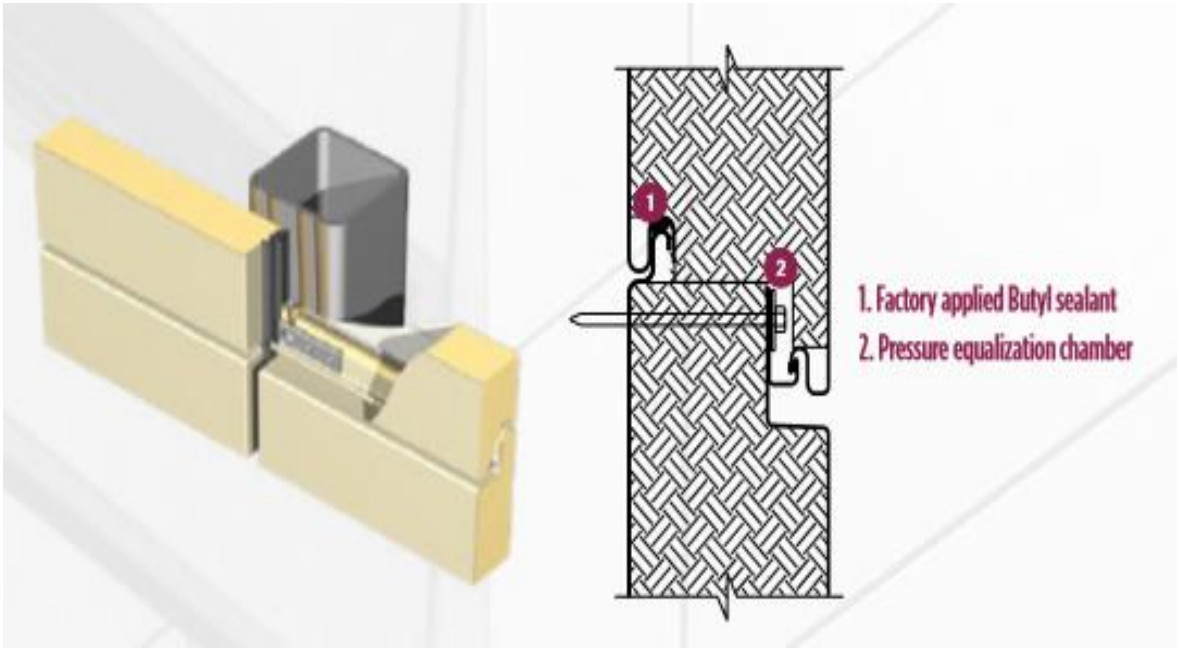
EPD®

Environmental Product Declaration

CENTRIA International

DSR-J Fireproof Insulated Metal Panels

In accordance with ISO 14025 and EN 15804:2012+A2:2019



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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

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
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Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
External independent verifier: Håkan Stripple, e-mail: Hakan.Stripple@IVL.se IVL Swedish Environmental Research Institute Box 530 21 SE-400 14 Gothenburg Sweden www.IVL.se Approved by: The International EPD® System
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EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company information

Owner of the EPD: Centria Building Materials Manufacturing (Shanghai) Co., Ltd. The company's website is centria.com.cn

Contact: Hua Jin e-mail: hjin@centria.com.cn

Description of the organisation:
Centria Building Materials Manufacturing (Shanghai) Co., Ltd. is a wholly owned subsidiary of CENTRIA International Group in China. CENTRIA International is a world-famous R & D and manufacturing enterprise of metal roof and wall system, with rich project experience and high reputation all over the world. Centria invested in Shanghai, China in 2004 and built China's first production base of metal exterior wall panels and roof systems with technology and management in the United States. Centria has provided many professional technical and product solutions for domestic owners, architects, designers, and curtain wall consultants. Centria has also successfully introduced advanced metal roof and wall systems into the domestic construction field.

Product-related or management system-related certifications: ISO 14001

Name and location of production site(s):
Centria Building Materials Manufacturing (Shanghai) Co., Ltd.; Floor 1-2 of Building 4, 459 Wansong Road, Lingang New District of China (Shanghai) Pilot Free Trade Zone, Shanghai, China.

Practitioner:
The study was conducted in the year 2021 by Beijia Huang (ywhbjia@163.com) at University of Shanghai for Science and Technology.

Product information

Product name: DSR-J Fireproof Insulated Metal Panels

Geographical scope: At present, it is mainly used in China, and it will also open up the international market in the future

Product specification: The size of the product can be customized, the thickness of the panel plate can be from 50 mm to 200 mm, the width of panel module can be customized from 300 mm to 1200 mm, and the panel length can be from 600 mm to 12 000 mm. The specific parameters of the panel can be found in Table 1.

Table 1 Product size.

Panel Thickness	50 mm–200 mm
Panel Module Width	Stepless module from 300 mm–1200 mm
Panel Length	600 mm–12 000 mm
Core Material	140 kg/m^3, Class A fireproof mineral wool insulation
Standard Reveal	13 mm
Thickness of Outer Metal Skin	Skin thickness (for pure surface application): ≥0.8 mm Skin thickness (for embossed or microwaved surface): ≥ 0.6 mm (Steel), Aluminum 0.8 mm and above

Product Application: DSR-J Fireproof Insulated Metal Panels can be applied to the metal wall maintenance system of public buildings and industrial plants.

Product description: DSR-J panels are primarily used in exterior wall applications--when performance and design aesthetics are a priority−−for commercial and public buildings as well as industrial manufacturing plants. This composite panel consists of two layers of metal permanently hot-pressed onto a fireproof mineral wool core. These panels can be installed both horizontally and vertically and can be customized to meet different widths, lengths, thickness, and joint requirements. Additionally, DSR-J is certified to meet international testing requirements for fireproofing, insulation, waterproofing and decorative integrated assembly. The product description is illustrated in Figure 1 below.

UN CPC code: 421

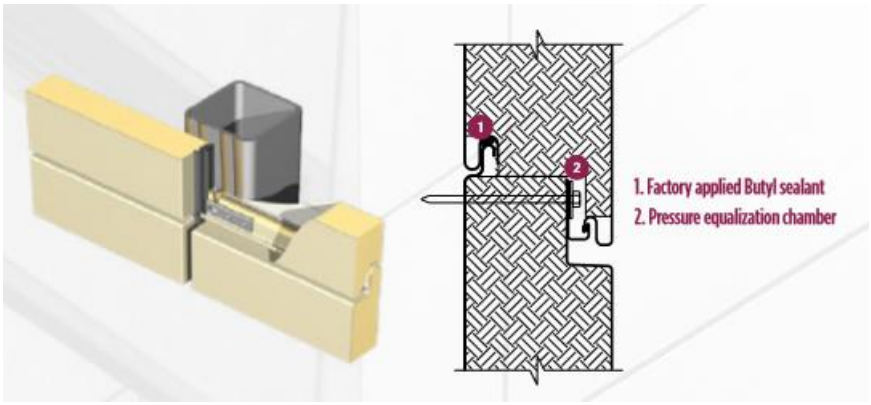

Figure 1 Product description.

Product identification

Table 2 Technical product specifications.

Performance indicator	Parameter
Thermal conductivity of rock wool	0.048 W/(m·K)
Combustion performance	Class A fire prevention
Fire resistance limit	≥ 90 min (100 mm)
Bonding strength	≥0.19 Mpa
Peel Performance	100%
Bending-resisting bearing capacity	≥0.8 kN/m^2
Air-tight performance	Level 4
Water-tight performance	Level 5
Air pressure resistance performance	Level 4
In-plane deformation performance	Level 5
Sound insulation index	35 dB (100 mm)

Manufacturing Process

The manufacturing process of DSR-J Fireproof Insulated Metal Panels includes: First, the steel is rolled. Secondly, the treated steel is assembled with rock wool by glue. After hot pressing curing and inspection, it is finally packaged and put into storage. Figure 2 below are flowcharts depicting the production process stages of the declared product. For simplification purpose, only main stages of manufacturing are presented. Raw materials and auxiliary processes that were considered in the LCA but not shown in the flowcharts include: rock wool in the stage of raw materials production, fastener, clip, sealant and gasket in the stage of installation.

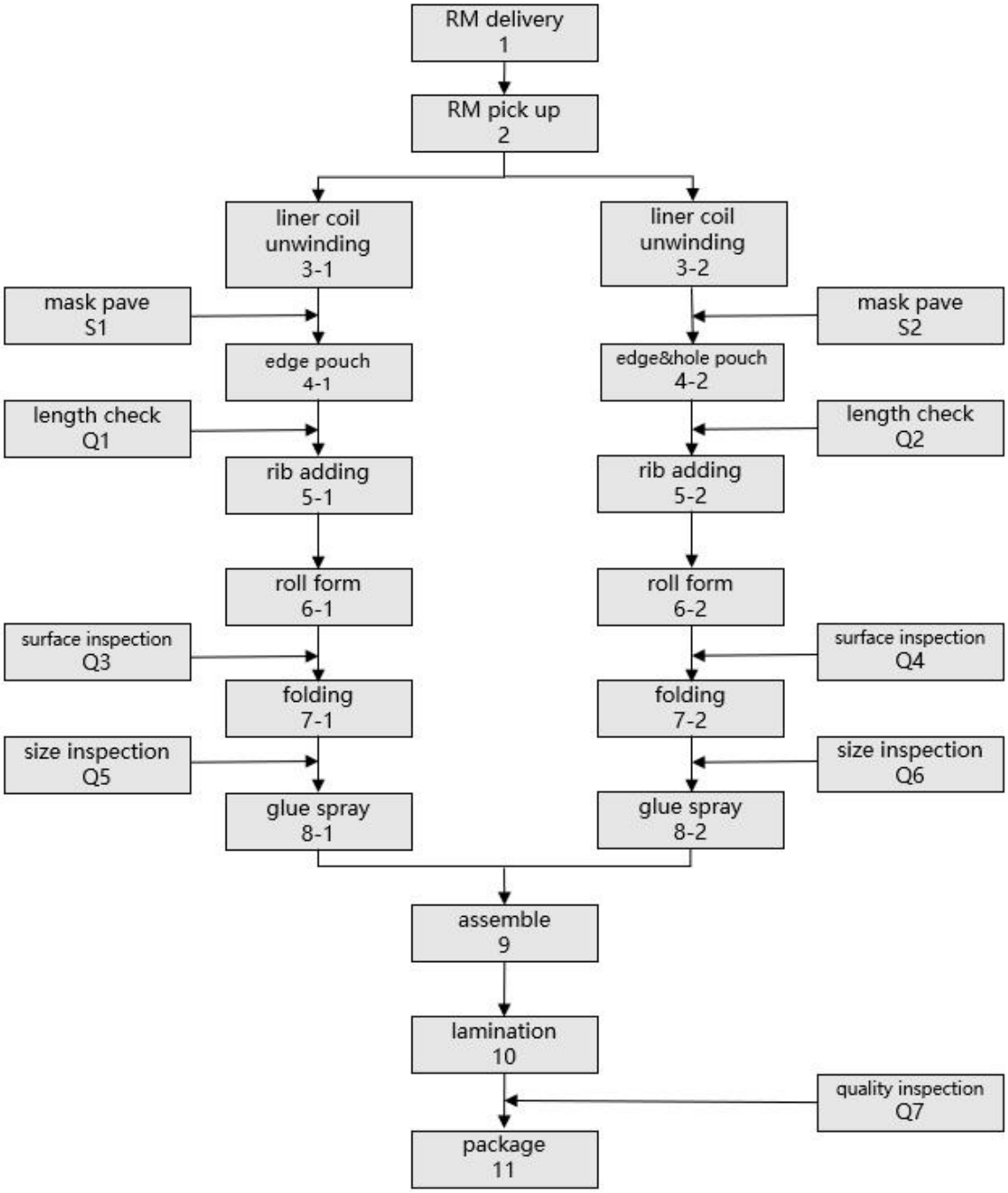

Figure 2 Manufacturing process.

Functional unit

1 m^2 DSR-J Fireproof Insulated Metal Panels with the average thickness 125 mm, and it weighs 17.5 kg.

Reference Service Life

The service life of this product is 30 years, and the service life of the building on which the product is installed is also estimated at 30 years. Therefore, there is no maintenance and replacement stage for this product. In addition, no annual energy is required.

System boundary

The system boundary considered in this LCA study is from cradle to grave, except the use by end consumer.

According to the PCR, the following life cycle phases were considered:

Table 3 System boundaries includes provision of all materials, products, energy, packaging, processing, and its transports as well as wastes.

	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	X	X	X	X	X	X	X	X	X	X	X	X
Geography	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN
Specific data used	40%					-	-	-	-	-	-	-	-	-	-	-	-
Variation-products	not relevant					-	-	-	-	-	-	-	-	-	-	-	-
Variation-sites	not relevant					-	-	-	-	-	-	-	-	-	-	-	-

According to the PCR, the life cycle stage must refer to segmentation in the following:

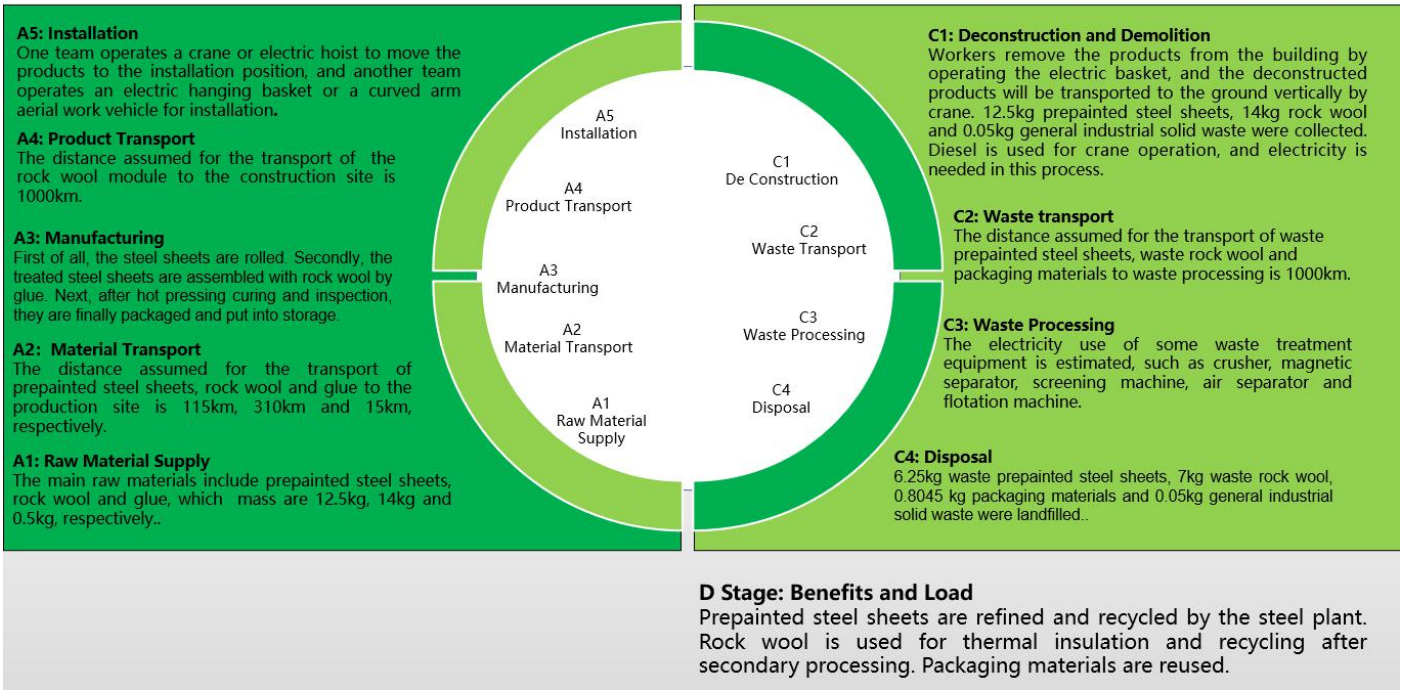

Figure 3 Stage diagram

More information

Excluded Processes

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 DSR-J Fireproof Insulated Metal Panels products.

- Storage phases and sales of products due to no observable impact.
- Product losses due to abnormal damage such as natural disaster or fire accident. These losses would mostly be accidental.
- Recycling process of defective products.
- Handling operations at the distribution center and retail outlet due to small contribution and negligible impact.

Assumptions and Limitations

In order to carry out the LCA study, the following main assumptions were made: For missing data, substitution of missing data using similar background data approach was taken to shorten the gap. The raw materials produced in the production stage are not recycled materials, and the amount of waste materials produced in this stage is very small, so they are not included in the life cycle to consider their environmental impact (cut-off approach). In view of the lack of actual transportation distance data, the distance assumed for the transport of the rock wool module to the construction site is 1000 km in module A2, and the distance assumed for the transport of waste prepainted steel sheets and waste rock wool to waste processing is 1000 km in module C2. In module C4, 50% of prepainted steel sheets and rock wool deconstructed from the building are landfilled. In module D, the recycling rate assumed for prepainted steel sheets, rock wool and packaging materials is 50%.

Production Plants

Centria has the production facilities for metal roof and wall system products in Shanghai. Raw material contents are modeled for DSJ product and factory. Raw materials mainly include prepainted steel sheets, rock wool and glue. The type and quantity are listed in Table 4.

Table 4 Raw materials of DSR-J per functional unit.

Material Name	Value(kg/m^2)	Quantity (% by weight)
Prepainted steel sheets	12.50	46.30 %
Rock wool	14.00	51.85 %
Glue	0.50	1.85 %

Packaging

The packaging materials of the final product are included in the LCA, the packaging material list is as follows, Table 5:

Table 5 Packing materials used for DSR-J.

Name	Value (kg/m^2)	Quantity (% by weight)
Wood square	0.35	21.75 %
Board	0.77	47.86 %
Polystyrene foam strip	0.041	2.55%
Steel angle guard	0.3925	24.39 %
Iron packing belt and nail	0.056	5.28 %
Total	1.609	100 %

Cut-Off Criteria

All inputs and outputs to a (unit) process will be included in the calculation for which data is available. Data gaps may be filled by conservative assumptions with average or generic data. Any assumptions for such choices will be documented. According to PCR, data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts shall be included. Therefore, the cut off criteria was set to 1% in this study. The neglected flows are demonstrated in Table 6 below.

Table 6 Cut-off flows.

Flow name	Process stage	Mass(kg/m^2)	Mass %	Reason to cut off
Masking tape	A3	0.003	0.01%	<1%
Pearl cotton	A3	0.012	0.04%	<1%
Plastic film	A3	0.019	0.07%	<1%

LCA Modelling, Calculation, and Data Quality

The results of the LCA with the indicators as per EPD requirement are given in the LCA result tables. There are no co-product allocations within the LCA study underlying this EPD.

The LCA software Gabi version 10.5 database were used to calculate the environmental impacts. Raw materials, energy and water consumption, and waste/material/product transport data were collected from Centria.

The study used primary data collected from June 2021 to July 2021. The data represent the whole year from June 2020 to June 2021, normal manufacturing condition.

Geographical Scope

The geographical scope of this EPD is global. The assumptions of the end-of-life (C modules) and benefits (D module) stages can be referred to as global.

Use, Maintenance and Reference Service Life

The service life of this product is 30 years according to the manufacturer's specifications, and the lifespan of the building is also assumed to have 30 years lifespan. Certria International in Shanghai claims that there is no necessary to replace or refurbish the product among its 30 year life span. Thus, there is no energy and water assumption during modules from B1 to B7. The panel's interaction with the building is not included. Therefore, no distinct environmental impacts exist among modules B1-B7.

Environmental Information

To analyze the contribution of different life cycle stages to the environmental impacts, a LCIA was conducted using EN 15804 method from the PCR. The result was allocated by stages, as shown in the tables below. The estimated impact results are only relative statements, which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

Overview of environmental impacts

Table 7 Environmental impact of 1 m^2 DSR-J Fireproof Insulated Metal Panels.

Indicators	Units	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	5.00E+01	7.16E-01	4.44E+00	3.49E+00	1.13E+00	7.69E-01	3.48E-01	6.19E-01	6.99E-01	-2.59E+01
GWP-biogenic	kg CO_2 eq.	5.48E-02	3.06E-02	-1.90E+00	1.76E-03	3.21E-02	2.81E-02	1.49E-02	-1.62E-04	1.22E+01	-9.23E-01
GWP-luluc	kg CO_2 eq.	1.19E-02	2.97E-05	3.48E-03	2.27E-02	5.08E-04	1.26E-04	1.44E-05	5.37E-04	-5.34E-04	-6.55E-03
GWP-total	kg CO_2 eq.	5.00E+01	7.46E-01	2.55E+00	3.52E+00	1.16E+00	7.97E-01	3.63E-01	6.20E-01	1.29E+01	-2.50E+01
ODP	kgCFC-11eq.	3.56E-07	1.22E-16	2.56E-14	9.06E-16	3.49E-14	8.19E-16	5.94E-17	3.86E-15	-3.72E-15	-1.78E-07
AP	mol H^+ eq.	2.38E-01	3.98E-03	1.38E-02	2.80E-02	2.96E-03	5.75E-03	1.94E-03	2.15E-03	1.49E-03	-1.21E-01
EP-Freshwater	kg PO_4^{3-}eq.	3.15E-05	9.06E-08	2.97E-06	7.28E-06	6.44E-07	1.23E-07	4.40E-08	2.17E-07	2.76E-04	-1.68E-05
EP-Marine	kg N eq.	3.45E-02	1.91E-03	3.08E-03	1.40E-02	5.37E-04	2.74E-03	9.30E-04	4.58E-04	2.46E-03	-1.78E-02
EP-Terrestrial	mol N eq.	7.10E-01	2.10E-02	3.34E-02	1.55E-01	5.92E-03	3.00E-02	1.02E-02	4.98E-03	8.27E-03	-3.61E-01
POCP	kg NMVOC	1.12E-01	3.75E-03	9.79E-03	2.60E-02	1.62E-03	5.24E-03	1.82E-03	1.36E-03	5.89E-03	-5.79E-02
ADPE	kg Sb eq.	2.21E-03	2.81E-08	7.02E-05	3.08E-07	9.65E-06	3.51E-08	1.36E-08	5.08E-08	6.31E-09	1.14E-03
ADPF	MJ	5.43E+02	1.00E+01	4.96E+01	4.69E+01	1.65E+01	1.04E+01	4.86E+00	6.36E+00	1.67E+00	-2.82E+02

Use of resources

Table 8 Resource use of 1 m^2 DSR-J Fireproof Insulated Metal Panels.

Indicators	Units	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
PERE	kg	2.87E+01	6.76E-02	2.78E+01	2.72E+00	1.24E+00	3.29E-01	3.29E-02	1.46E+00	-1.33E+00	-2.51E+01
PERT	kg	2.87E+01	6.76E-02	2.78E+01	2.72E+00	1.24E+00	3.29E-01	3.29E-02	1.46E+00	-1.33E+00	-2.51E+01
PENRE	kg	5.45E+02	1.00E+01	4.97E+01	4.69E+01	1.65E+01	1.04E+01	4.86E+00	6.36E+00	1.67E+00	-2.83E+02
PENRT	kg	5.45E+02	1.00E+01	4.97E+01	4.69E+01	1.65E+01	1.04E+01	4.86E+00	6.36E+00	1.67E+00	-2.83E+02
FW	MJ	5.42E-02	1.59E-04	2.45E-02	2.42E-03	3.37E-03	9.92E-04	7.74E-05	4.61E-03	-4.95E-03	-2.96E-02
Acronyms	PERE: Use of renewable primary energy excluding resources used as raw materials, PERT: Total use of renewable primary energy, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRT: Total use of non-renewable primary energy, FW: Net use of fresh water.										

Waste and output flows

Table 9 Waste and output flows of 1 m^2 DSR-J Fireproof Insulated Metal Panels.

Indicators	Units	A1	A2	A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2.01E-08	4.66E-11	7.46E-09	1.96E-09	3.95E-05	1.76E-10	2.26E-11	7.29E-10	-1.84E-10	-1.22E-08
NHWD	kg	1.59E+00	4.02E-04	3.92E-02	7.57E-03	3.33E-02	8.70E-04	1.95E-04	2.73E-03	1.17E+01	-8.07E-01
RWD	kg	1.01E-02	5.14E-06	8.71E-04	4.50E-05	1.68E-04	2.73E-05	2.50E-06	1.23E-04	-1.20E-04	-5.23E-03
Acronyms	HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed.										

Additional information

Waste gas, noise, and solid waste

The main environmental impacts of component manufacturing are noise, waste gas and solid waste. The waste gas is purified by the corresponding treatment device and discharged up to the standard. The noise is within a controllable range and below the legally set limits. Solid waste is divided into general industrial solid waste and hazardous waste. General industrial solid wastes are recycled by material companies, while hazardous wastes are treated by qualified companies.

Environmental risks

The main pollution from production is waste gas and solid waste. The organic waste gas will be produced in the production process of the module, which will be collected by the waste gas adsorption device. Then the exhaust pipe is used to meet the discharge standard. The main hazardous wastes are waste mineral oil, waste activated carbon, waste adhesive and paper tape with glue. These will be entrusted to qualified companies for regular disposal.

References

General Programme Instructions of the International EPD® System. Version 3.01.
PCR 2019: 14 Construction Products (EN 15804: 2012+A2:2019)
PCR 2019: 14-c-PCR-005 c-PCR-005 Thermal Insulation products (EN 16783) (2019-12-20)
Sub-PCR-I Thermal insulation products (EN 16783) (2020-09-18)
EN 15804: 2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
ISO 21930: 2017 Environmental declaration of building products
ISO 14025: 2006 Environmental labels and declarations - Type III environmental declarations -Principles and procedures
ISO 14040: 2006 Environmental management - Life cycle assessment - Principles and framework
ISO 14044: 2006 Environmental management - Life cycle assessment - Requirements and guidelines
Xu Yuewei. Construction waste resource pretreatment technology and its application [J]. Construction technology, 52 (7): 4 (in Chinese)

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