

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	ASSA ABLOY Entrance Systems
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASA-20240092-IBA1-EN
Issue date	28.01.2025
Valid to	27.01.2030

ASSA ABLOY RD100-4 Revolving door ASSA ABLOY Entrance Systems

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1. General Information

ASSA ABLOY Entrance Systems

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-ASA-20240092-IBA1-EN

This declaration is based on the product category rules:

Automatic doors, automatic gates, and revolving door systems,
01.08.2021
(PCR checked and approved by the SVR)

Issue date

28.01.2025

Valid to

27.01.2030



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ASSA ABLOY RD100-4 Revolving door

Owner of the declaration

ASSA ABLOY Entrance Systems
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26144 Landskrona
Sweden

Declared product / declared unit

This declaration represents 1 revolving door consisting off 4 door leaves and surrounding frame with internal diameter of 2.4 m and internal height of 2.2 m.

Scope:

This declaration and its LCA study is relevant to the revolving door ASSA ABLOY RD100-4. The final assembly and production stage occurs in Ostrov u Stribra, Czech Republic at ASSA ABLOY ES Production s.r.o at: D5 Logistic Park 34901 Ostrov u Stribra, Czech Republic. Components are sourced from international tier one suppliers. ASSA ABLOY RD100-4 door sizes vary according to project requirements; a standard door with internal diameter of 2.4 m and 4 leaves is used in this declaration.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Dr.-Ing. Wolfram Trinius,
(Independent verifier)

2. Product

2.1 Product description/Product definition

Product name: ASSA ABLOY RD100-4

Product characteristics: Four-wing compact revolving door with digital speed control, power assist and park assist.

Compact pedestrian revolving doors are installations that serve to regulate the flow of people in residential and non-residential buildings while providing high thermal performance.

- Revolving doors are made up of various assemblies mainly consisting of a support structure, glazing, drive unit, controller and safety equipment.
- Revolving doors also feature elements that are designed to simplify their installation, operation and maintenance.
- Revolving doors are typically made of metal, plastic and glass and are available in several designs for a range of requirements in diverse building types.

Equipped with 'Park Assist' as standard the ASSA ABLOY RD100-4 will safely return the door leaves to the optimum park position to minimize air permeability and maximize thermal efficiency. Revolving doors help to maintain a comfortable indoor climate while saving energy.

The door has 4 primary parts:

1. Door leafs
2. Frame
3. Drive system
4. Operating system

The ASSA ABLOY RD100-4 has been designed to meet operational and safety requirements and is certified by a third party to fulfill the European Directives and the standards issued by the *European Standardization Committee (CEN)*.

For the placing on the market in the EU/EFTA (excl. Switzerland), Switzerland and Turkey the following European directives apply to the ASSA ABLOY RD100-4:

- 2014/30/EU Electromagnetic Compatibility Directive (EMCD)
- 2006/42/EC Machinery Directive (MD)
- 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment with the applicable amendments (RoHS).

These directives provide for CE marking of the product and issuing a Declaration of Conformity.

Harmonized European standards, which have been applied:

- *EN 60335-1: 2012+A13:2017* Household and similar electrical appliances -Safety -Part 1: General requirements
- *EN 60335-2-103:2015* Household and similar electrical appliances -Safety -Part 2: Particular requirements for drives for gates, doors and windows
- *EN 61000-6-2:2005* Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- *EN 61000-6-3:2007+A1:2011* Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments

- *EN ISO 13849-1:2015* Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design
- *EN 16005:2012/AC:2015* Power operated pedestrian door sets - Safety in use -Requirements and test methods.

Other standards or technical specifications, which have been applied:

- *IEC 600335-1 ed. 5:2010* Household and similar electrical appliances -Safety -Part 1: General requirements
- *IEC 60335-2-103 ed. 2.1:2011* Household and similar electrical appliances Safety Part 2-103: Particular requirements for drives for gates, doors and windows

Disposal of the product is subject to the Waste from Electrical and Electronic Equipment (WEEE) Directive within Europe, Directive 2012/19/EU together with the RoHS Directive 2011/65/EU and its amending Directive 2015/863.

For the application and use the respective national provisions apply.

2.2 Application

Compact revolving doors are utilized to provide entrance and exit capabilities for many different building types.

Typical applications of compact revolving doors include:

- Commercial buildings
- Private sector and office facilities
- Hospitality facilities
- Residential buildings

Well known features of automatic revolving doors include:

- Pedestrian flow control capability
- High thermal performance and climate control

The ASSA ABLOY RD100-4 is a digitally controlled manually operated revolving door, developed to provide an attractive and draught free access to buildings that adapts naturally to the volume and flow of traffic. The system is self-adjusting to the effects caused by normal variations in the weather conditions and to minor friction changes caused by e.g. dust and dirt. It will try to achieve set speed in all weather conditions within system limits for a user safe door.

2.3 Technical Data

The following list presents the technical properties of the ASSA ABLOY RD100-4 revolving door:

Technical and constructional data

The table presents the technical properties of the ASSA ABLOY RD100-4 revolving door:

Name	Value	Unit
Door leaves clear laminated	4	pcs
Door leaves safety glass*	6.0	mm
Width	2400	mm
External height	2400	mm
Internal height	2200	mm
Outer wall - clear laminated safety glass**	8.0	mm
Night closing doors - clear laminated safety glass**	8.0	mm
Door section profiles	aluminum	
Finish***	powder coating	
Ceiling panel	white laminated****	
Dust protection roof	white laminated	
Heat transfer coefficient glass acc. to EN 674 / EN 675	Not specified	W/(m ² K)
Heat transfer coefficient frame acc. to EN 12567-1	Not specified	W/(m ² K)
Heat transfer coefficient † of the entire door or gate system (open position/closed position††)	4.2/5.0	W/(m ² K)
Total energy transmittance	Not specified	%
joint permeability coefficient acc. to EN 1026	Not specified	m ³ /mh
Water tightness acc. to EN 1027	Not specified	Pa
Airborne sound reduction acc. to EN ISO 140-3	Not specified	dB
Deflection as a result of wind loads acc. to EN 12211	Not specified	mm
Burglar protection class ††† acc. to EN 1628 - EN 1630	yes	-
Power input "Standby"	10	W
Power input "Idle"	10	W
Power input "Operation" (during park assist)	80	W
Wind load	Not specified	

* EN 12600/2B2, 3.0+0.38+3.0 mm

** EN 12600/1B1, 4.0+0.76+4.0 mm

*** Optional: Anodized finish, stainless steel cladding

**** Optional: aluminium

† Heat transfer Coefficient of the entire door (U-value), in accordance with *EN-ISO 10077-1:2017* and *EN-ISO 10077-2:2017* Thermal performance of windows, doors and shutters - Calculation of thermal transmittance

†† Closed position includes night closing doors

††† To meet the standards of burglar protection, additional equipments have to be added

Performance data of the product according to the harmonised standards, based on provisions for harmonization.

- *EN 60335-1:2012+A13:2017* Household and similar electrical appliances -Safety -Part 1: General requirements
- *EN 60335-2-103:2015* Household and similar electrical appliances -Safety -Part 2: Particular requirements for drives for gates, doors and windows
- *EN 61000-6-2:2005* Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

- *EN 61000-6-3:2007+A1:2011* Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments
- *EN ISO 13849-1:2015* Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design
- *EN 16005:2012/AC:2015* Power operated pedestrian door sets - Safety in use -Requirements and test methods

2.4 Delivery status

Revolving door unit with internal diameter of 2.4 m, internal height of 2.2 m and external height 2.4 m, is delivered ready for installation.

2.5 Base materials/Ancillary materials

The average composition for ASSA ABLOY RD100-4 is as following (values are provided by percentage in mass):

Name	Value	Unit
Plastics	5.87	%
Aluminium	22.72	%
Stainless Steel	0.13	%
Steel	13.29	%
Glass	46.44	%
Electronics	0.47	%
Electro mechanics	0.31	%
Paper	0.01	%
Wood	10.46	%
Others	0.30	%
Total	100	%

2.6 Manufacture

The revolving door is manufactured in two locations, Ostrov Czech Republic and Suzhou, China respectively. The Ostrov location is represented in this declaration. Profiles are provided by tier one suppliers and delivered to the factory. The profiles are bent and machined. The products are surface treated; either anodized (externally) or powder coated (internally). Other parts such as, electronics, glass, etc. arrive from tier one suppliers All the parts are encased in pine crates and forwarded on a standard wooden pallet for on-site installation. The certified Quality Management system, *EN ISO 9001:2015*, ensures high standards.

Offcuts and scraps during the manufacturing process are directed to a recycling unit. Waste is sent for disposal.

Waste codes according to *European Waste Catalogue and Hazardous Waste List* -Valid from 1 July 2015.

- EWC 12 01 01 ferrous metal filings and turnings
- EWC 12 01 03 non-ferrous metal filings and turnings
- EWC 08 02 01 waste coating powders
- EWC 17 02 03 plastic
- EWC 17 04 01 copper, bronze, brass
- EWC 17 04 02 aluminum
- EWC 17 04 05 iron and steel
- EWC 17 04 11 cables with the exception of those outlined in 17 04 10

2.7 Environment and health during manufacturing

ASSA ABLOY Entrance Systems AB is committed to producing and distributing door opening solutions with minimal environmental impact, where health & safety is the primary focus for all employees and associates.

- Environmental operations, Greenhouse gases, energy, water, waste, VOC, surface treatment and Health & Safety are being routinely monitored. Inspections,

audits, and reviews are conducted periodically to ensure that applicable standards are met and environment management program effectiveness is evaluated

- Code of Conduct covers human rights, labor practices and decent work. ASSA ABLOY Entrance Systems AB's management is aware of their environmental roles and responsibilities, providing appropriate training, supporting accountability and recognizing outstanding performance.
- Preparation conditions (including the process of power coating) in the factory of Ostrov do not require special health and safety measures. Standard health and safety measures (work gloves, hearing protection, safety shoes, dust mask when sanding and milling, dust extraction, etc.) are observed where appropriate.
- Water and soil contamination does not occur and all production related waste is processed internally in the appropriate manner.

2.8 Product processing/Installation

The revolving door components are supplied and ready for installation. The frame as well as the door leaves and central column are assembled and installed on-site. The components are assembled using simple tools including drills and hand tools. The installation is performed by trained and qualified installation technicians.

2.9 Packaging

Packaging exists for the purpose of protection during transportation. ASSA ABLOY RD100-4 revolving door is initially packaged in plastic tarpaulin, polystyrene and corrugated cardboard. Finally, a revolving door is placed on a standard wooden pallet and encased in a pine crate. All of these packaging components are standard industry types and while the cardboard is recyclable, the pallets are available for immediate reuse upon delivery. The wood material is FSC certified.

- Cardboard/paper 3.49%
- Wood 85.85%
- Plastics 10.66%

All materials incurred during installation are directed to a recycling unit.

Waste codes according to *European Waste Catalogue and Hazardous Waste List* -Valid from 1 July 2015:

- EWC 15 01 01 paper and cardboard packaging
- EWC 15 01 02 plastic packaging
- EWC 15 01 03 wooden packaging

2.10 Condition of use

The best way to remove dust and dirt from the ASSA ABLOY RD100-4 and to maintain the quality of the enamel layer, the surfaces should be cleaned three times/year (once/four months period) with gentle (pH 5-9), non-polishing detergent and water. Use a soft non-abrasive sponge.

To avoid damages to the profiles, the brushes must be vacuum-cleaned weekly. Regular inspections performed by a trained and qualified person in a minimum of one visit per year, two is recommended. According to the EN16005.

- Do not expose doors or profiles to alkalis. Both aluminium and glass are sensitive to alkalis.
- Do not clean with high-pressure water. Operator, programme selector and sensor may be damaged and water may enter the profiles.
- Do not use detergents or abrasive additives.
- Do not scrub with materials that will cause mechanical damage

2.11 Environment and health during use

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

2.12 Reference service life

The product has reference service life of 10 000.000 cycles or 15 years of average daily use with the recommended maintenance and service program. For this EPD the lifetime of 15 years was considered.

Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire

No standardized test has been conducted. The product wall surfaces however consists of a large amount of aluminium and glass, which does not add to the spread of fire.

Water

Contains no substances that impact water. In case of a flood electric operation of the device will be influenced negatively.

Mechanical destruction

No danger to the environment can be anticipated during mechanical destruction.

2.14 Re-use phase

The product is possible to be re-used during the reference service life and be moved from one opening to another.

All recyclable materials are directed to a recycling unit where they are recycled (brass, electronics, electro-mechanics, stainless steel, steel, and aluminium).

On the other hand, the plastic components are sent to the waste incineration plant for its energy recovery.

Waste codes according to *European Waste Catalogue and Hazardous Waste List* -Valid from 1 July 2015.

- EWC 16 02 13* discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12
- EWC 17 02 01 wood
- EWC 17 02 03 plastic
- EWC 17 04 01 copper, bronze, brass
- EWC 17 04 02 aluminium
- EWC 17 04 05 iron and steel
- EWC 17 04 11 Cables with the exception of those outlined in 17 04 10

Note: Disposal of the motor is subject to the WEEE Directive within Europe, *Directive /2012/19/EU/*

2.15 Disposal

The product can be mechanically disassembled to separate the different materials. The majority, of components are steel, glass and aluminium which will be recycled. The plastic components are used for energy recovery in an incineration plant. No disposal is foreseen for the product nor for the corresponding packaging

2.16 Further information

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3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of ASSA ABLOY RD100-4 as specified in Part B requirements on the *EPD IBU: PCR Automatic doors, automatic gates, and revolving door systems (door systems)*. The functional unit for module B6: Use of 1 piece of ASSA ABLOY RD100-4 for 15 years.

Declared unit and mass reference

Name	Value	Unit
Mass (without packaging)	662.49	kg
Mass packaging (paper, wood, and plastics)	111.82	kg
Dimensions for revolving door systems (W x H)	2400 x 2400	mm
Declared unit for revolving door systems (dimensions acc. to this PCR)	1	pce.
Mass reference	662.49	kg/pce

3.2 System boundary

Type of the EPD: cradle to gate - with options
The following life cycle stages were considered:

Production stage:

- A1 – Raw material extraction and processing
- A2 – Transport to the manufacturer and
- A3 – Manufacturing

Construction stage:

- A4 – Transport from the gate to the site
- A5 – Packaging waste processing

Use stage related to the operation of the building includes:

- B6 – Operational energy use

End-of-life stage:

- C2 – Transport to waste processing,
- C3 – Waste processing for recycling and
- C4 – Disposal (landfill, waste for incineration).

This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of-waste state or disposal of final residues.

- Benefits and loads beyond the system boundaries: D – Declaration of all benefits and loads.

3.3 Estimates and assumptions

Transportation: Data on the mode of transport and distances, as reported by suppliers were used for those materials and parts contributing more than 2 % of the total product mass.

Use stage: For the use stage, it is assumed that the revolving door is used in the European Union, thus a European electricity grid mix is considered within this stage. According to the most representative scenario, the operating hours of the product are accounted for 4 hours in on mode, 10 hours in stand-by, and finally 10 hours in idle mode per day (250 days per year in use, 15 years lifetime); the power consumption throughout the whole life cycle is 1950.00 kWh.

EoL: In the End-of-Life stage, for all the materials from the product which can be recycled (steel, aluminium, electronic parts, electro-mechanics, copper, stainless steel and brass), a

recycling scenario with 100 % collection rate was assumed. The plastic components are sent for energy recovery within a waste incineration process.

EoL is assumed to happen within EU-28. Furthermore, a transport distance by truck of 100 km has been assumed in the model.

3.4 Cut-off criteria

In the assessment, all available data from the production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), and electric power consumption - including material and energy flows contributing less than 1 % of mass or energy (if available). In case a specific flow contributing less than 1 % in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts.

Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

3.5 Background data

For life cycle modelling of the considered product, Sphera's Life Cycle for Expert (LCA FE) software is used. Sphera Managed Lifecycle Content (MLC) modelling database is used as the background database of the study.

3.6 Data quality

The requirements for data quality and background data correspond to the specifications of the *IBU PCR Part A*. Sphera performed a variety of tests and checks during the entire project to ensure a high quality of the completed project. This obviously includes an extensive review of project-specific LCA models as well as the background data used. The technological background of the collected data reflects the physical reality of the declared products. The datasets are complete and conform to the system boundaries and the criteria for the exclusion of inputs and outputs. All relevant background datasets are taken from the *Sphera MLC database*.

3.7 Period under review

The period under review is 2023 (12-month average).

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Europe

3.9 Allocation

Regarding incineration, the software model for the waste incineration plant (WIP) is adapted according to the material composition and heating value of the combusted material. In this EPD, the following specific life cycle inventories for the WIP are considered for:

- Waste incineration of paper
- Waste incineration of Plastic
- Waste incineration of Wood

Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. Thus, these materials are considered in module D. Specific information on allocation within the background data is given in the Sphera MLC dataset documentation.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively

the product-specific characteristics of performance, are taken into account. MLC database CUP version 2020.1 (former GaBi) serves as background database for the calculation.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Product material containing biogenic carbon includes wood (65.11 kg) and paper (0.06 kg). Packaging material containing biogenic carbon includes wood (96.00 kg) and paper (3.90 kg).

Information on describing the biogenic carbon content at factory gate

Name	Value	Unit
Biogenic carbon content in product	32.58	kg C
Biogenic carbon content in accompanying packaging	49.68	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

Transport to the building site (A4)

Name	Value	Unit
Kg of fuel diesel with maximum load (27t payload)	27.51	kg
Transport distance truck (primary target market is EU 28)	835	km
Capacity utilisation (including empty runs)	61	%
Transport by ship	0.00	km

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site (paper/cardboard packaging)	3.90	kg
Output substances following waste treatment on site (plastic packaging)	11.92	kg
Output substances following waste treatment on site (wood packaging)	96.00	kg
Output substances following waste treatment on site (steel packaging)	0.00	kg

Reference service life

Name	Value	Unit
Reference service life	15	a

Operational energy use (B6) and Operational water use (B7)

Name	Value	Unit
Electricity consumption	1950	kWh
Hours per day in on mode	4	h
Hours per day in stand-by mode	10	h
Hours per day in idle mode	10	h
Power consumption – on mode	80	kW
Power consumption – stand-by mode	10	kW
Power consumption – idle mode	10	kW

For the remaining days (115 days) the power is being switched off.

*Total energy consumed during the whole product life was calculated using following formula:

$$(W_{active_mode} \cdot h_{active_mode} + W_{idle_mode} \cdot h_{idle_mode} + W_{stand_by_mode} \cdot h_{stand_by_mode}) \cdot Life_span \cdot days_year \cdot 0.001$$

Where:

- W_active_mode - Energy consumption in active mode in W
- h_active_mode - Operation time in active mode in hours
- W_idle_mode - Energy consumption in idle mode in W
- h_idle_mode - Operation time in idle mode in hours
- W_stand_by_mode - Energy consumption in stand-by mode in W
- h_stand_by_mode - Operation time in stand-by mode in hours
- Life_span - Reference service life of product
- days_year - Operation days per year 0.001 - Conversion factor from Wh to kWh.

End of life (C1-C4)

Name	Value	Unit
Collected separately aluminium, steel, brass, plastics, stainless steel, copper, electronic, electromechanics etc.	331.53	kg
Transportation (C2)	100	km
Incineration of plastic parts	36.5	kg
Incineration of paper and wood	0.280	kg
Incineration of wood	96	kg
Recycling aluminium, steel, copper, electronic, electro-mechanics, stainless steel and brass	229.81	kg
Landfill of glass	290.95	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Collected separately waste type (including packaging)	443.35	kg
Recycling aluminium	31.90	%
Recycling brass	0.00	%
Recycling copper	0.00	%
Recycling stainless steel	0.19	%
Recycling steel	18.66	%
Recycling electronic	0.66	%
Recycling electro mechanics	0.43	%
Incineration of plastic parts	10.93	%
Incineration of paper	0.89	%
Incineration of wood	36.34	%
Incineration of packaging (paper, wood and plastic) (from A5)	25.22	%
Recycling of steel packaging	0.00	%

5. LCA: Results

Results shown are calculated according to EN 15804+A2.

Note: EP-freshwater: This indicator has been calculated as 'kg P eq' as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; <http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>).

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	X	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: One Piece RD100-4

Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	2.49E+03	3.71E+01	2.14E+02	7.89E+02	0	3.76E+00	2.1E+02	3.81E+00	-1.39E+03
GWP-fossil	kg CO ₂ eq	2.75E+03	3.67E+01	3.1E+01	7.85E+02	0	3.73E+00	8.72E+01	3.8E+00	-1.39E+03
GWP-biogenic	kg CO ₂ eq	-2.58E+02	0	1.83E+02	2.62E+00	0	0	1.23E+02	0	-2.48E+00
GWP-luluc	kg CO ₂ eq	2.33E+00	2.98E-01	1.44E-03	1.14E+00	0	3.03E-02	3.29E-03	1.09E-02	-5.13E-01
ODP	kg CFC11 eq	1.18E-08	4.42E-15	1.2E-14	1.73E-11	0	4.49E-16	2.74E-14	1.41E-14	2.53E-10
AP	mol H ⁺ eq	1.1E+01	3.77E-02	2.14E-01	1.73E+00	0	3.83E-03	1.56E-01	2.73E-02	-5.98E+00
EP-freshwater	kg P eq	3.38E-03	1.12E-04	2.15E-06	2.1E-03	0	1.14E-05	4.68E-06	6.53E-06	-7.14E-04
EP-marine	kg N eq	2.27E+00	1.1E-02	5.31E-02	3.85E-01	0	1.12E-03	3.93E-02	7.02E-03	-7.81E-01
EP-terrestrial	mol N eq	2.55E+01	1.32E-01	5.93E-01	4.04E+00	0	1.34E-02	4.52E-01	7.71E-02	-8.5E+00
POCP	kg NMVOC eq	6.58E+00	3.05E-02	1.72E-01	1.05E+00	0	3.1E-03	1.26E-01	2.13E-02	-2.46E+00
ADPE	kg Sb eq	3.7E+04	4.9E+02	1.68E+01	1.38E+04	0	4.97E+01	3.69E+01	4.99E+01	-1.76E+04
ADPF	MJ	4.87E-02	2.64E-06	1.84E-07	2.27E-04	0	2.68E-07	4.08E-07	3.41E-07	-5.51E-04
WDP	m ³ world eq deprived	1.6E+02	3.29E-01	9.78E+00	1.71E+02	0	3.34E-02	1.34E+01	3.98E-01	-1.83E+02

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: One Piece RD100-4

Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
PERE	MJ	5.7E+03	2.75E+01	2.11E+03	6.12E+03	0	2.8E+00	1.52E+01	6.53E+00	-6.76E+03
PERM	MJ	2.11E+03	0	-2.11E+03	0	0	0	0	0	0
PERT	MJ	1.02E+04	2.75E+01	3.25E+00	6.12E+03	0	2.8E+00	7.37E+00	6.53E+00	-6.76E+03
PENRE	MJ	3.09E+04	4.9E+02	2.55E+02	1.38E+04	0	4.98E+01	1.61E+03	4.99E+01	-1.76E+04
PENRM	MJ	1.79E+03	0	-2.52E+02	0	0	0	-1.54E+03	0	0
PENRT	MJ	3.7E+04	4.9E+02	1.68E+01	1.38E+04	0	4.98E+01	3.69E+01	4.99E+01	-1.76E+04
SM	kg	5.94E+01	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m ³	1.52E+01	3.19E-02	2.28E-01	7.07E+00	0	3.24E-03	3.14E-01	1.26E-02	-1.66E+01

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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: One Piece RD100-4

Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
HWD	kg	2.1E-04	2.28E-05	5.14E-08	5.71E-06	0	2.32E-06	1.2E-07	7.6E-07	-7.92E-06
NHWD	kg	3.16E+02	7.51E-02	3.96E+00	9.79E+00	0	7.62E-03	8.93E+00	2.51E+02	-2.94E+02
RWD	kg	1.71E+00	6.07E-04	6.53E-04	2.09E+00	0	6.16E-05	1.46E-03	5.67E-04	-1.07E+00
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	5.74E+02	0	0
MER	kg	0	0	9.99E+01	0	0	0	0	0	0

EEE	MJ	0	0	5.5E+02	0	0	0	5.17E+02	0	0
EET	MJ	0	0	8.05E+02	0	0	0	8.08E+02	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

One Piece RD100-4

Parameter	Unit	A1-A3	A4	A5	B6	C1	C2	C3	C4	D
PM	Disease incidence	1.06E-04	2.25E-07	9.61E-07	1.45E-05	0	2.28E-08	7.77E-07	3.38E-07	-6.36E-05
IR	kBq U235 eq	2.98E+02	8.78E-02	8.44E-02	3.44E+02	0	8.91E-03	1.85E-01	5.82E-02	-2.12E+02
ETP-fw	CTUe	2.32E+04	3.46E+02	1.36E+01	5.9E+03	0	3.52E+01	2.74E+01	2.85E+01	-5.74E+03
HTP-c	CTUh	2.96E-06	7.25E-09	1.3E-08	1.63E-07	0	7.36E-10	9.85E-09	4.22E-09	-2.27E-06
HTP-nc	CTUh	3.05E-05	3.74E-07	1.13E-06	6.01E-06	0	3.8E-08	8.79E-07	4.65E-07	-1.48E-05
SQP	SQP	3.36E+04	1.72E+02	3.93E+00	4.4E+03	0	1.75E+01	8.97E+00	1.04E+01	-9.57E+02

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator 'Potential Human exposure efficiency relative to U235'. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

6. LCA: Interpretation

This chapter contains an interpretation of the Life Cycle Impact Assessment categories. Stated percentages in the whole interpretation are related to the overall life cycle, excluding credits (module D).

The production stage (modules A1-A3) contributes between 45% and 99% to the overall results for all core environmental impact assessment categories, except for global warming potential – biogenic (GWP-biogenic). This result is mainly related to the extraction of renewable raw materials (A1). Within the production stage, the main contribution for all impact categories is the production of glass, steel, and aluminium mainly due to the energy consumption of these processes. These three materials account for approx. 70% to the overall mass of the product, therefore, the impacts are in line with the

mass composition of the product. The environmental impacts for the transport (A2) have a negligible impact within this stage.

To reflect the use stage (module B6), the energy consumption was included, and it has a contribution for all core impact assessment categories - between 5% and 48%, with the exception of ODP (0.2%) and ADPE (0.5%). This is a result of 4 hours of operation in on mode, 10 hours in stand-by mode, and 10 hours in idle mode per day and per 250 days in a year.

In the end-of-life stage, there are loads and benefits (module D, negative values) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution).

7. Requisite evidence

Not applicable in this EPD.

8. References

Standards, norms, directives:

CPR

Regulation (EU) No. 305/2011, Construction Product Regulation (CPR)- laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

DIN EN ISO 10140-2

DIN EN ISO 10140-2:2010, Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation (ISO 10140-2:2010); German version EN ISO 10140-2:2010

DIN EN ISO 13849-1

DIN EN ISO 13849-1:2016:2023, Safety of machinery - Safety-related parts of control systems - Part 1: General principles for

design

DIN EN ISO 14025

DIN EN ISO 14025:2011, Environmental labels and declarations - Type III environmental declarations - Principles and procedures

EN 15804+A2

EN 15804:2014+A2:2020, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

EN 61000-6-2

EN 61000-6-2:2019, Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

EN 61000-6-3

EN 61000-6-3:2021: Electromagnetic compatibility (EMC) - Part 6-3: Generic Standards - Emission standard for residential, commercial and light-industrial environments

EWC

European Waste Catalogue established by Commission Decision 2000/532/EC

ISO 9001

ISO 9001:2015, Quality management systems - Requirements with guidance for use

Regulation (EU) No 305/2011

Regulation of the European parliament and the council laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

2006/42/EC

European directive on machinery, and amending Directive 95/16/EC (recast)

2011/65/EU

European directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment, and its amendment directives including 2015/863/EC (RoHS directive)

2012/19/EU

European directive on waste electrical and electronic equipment (WEEE)

2014/30/EU

European directive on the harmonisation of the laws of the Member States relating to electromagnetic compatibility (recast)

2015/863/EU

European directive amending Annex II to Directive 2011/65/EU of the European Parliament and of the Council as regards the list of restricted substances

Other sources:

Sphera Managed Lifecycle Content (MLC)

Sphera Solutions, Managed LCA content dataset documentation, Sphera Solutions, Chicago, US, 2023. Retrieved from <https://sphera.com/product-sustainability-gabi-data-search/>

Sphera's Life Cycle for Expert (LCA FE) software: Sphera Solutions, 'Life Cycle Assessment for Expert software', Sphera Solutions, Chicago, US, 2023. Retrieved from <https://sphera.com/life-cycle-assessment-lca-software/>.

IBU PCR Part A:2019

Institut Bauen und Umwelt e.V., Königswinter (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. Version 1.8 April 2019 www.ibu-epd.de

IBU PCR Part B: 2017

IBU PCR Part B: PCR Guidance-Texts for Building-Related Products and Services. From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU). Part B: Requirements on the EPD for Automatic doors, automatic gates and revolving door systems Version 1.6 (11. 2017) www.ibu-epd.com

IBU 2021

General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

TRACI Methodology

Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), EPA/600/R-12/554 2012
The literature referred to in the Environmental Product Declaration must be listed in full. Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.



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