# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

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|---|---|
| Owner of the Declaration | **ASSA ABLOY Entrance Systems AB** |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
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| Valid to | 12.11.2022 |

## ASSA ABLOY RD150-4, Revolving door

## ASSA ABLOY Entrance Systems AB

Institut Bauen und Umwelt e.V.

**www.ibu-epd.com / https://epd-online.com**

# 1. General Information

| ASSA ABLOY Entrance Systems AB | ASSA ABLOY RD150-4, Revolving door |
|---|---|
| **Programme holder**<br>IBU - Institut Bauen und Umwelt e.V.<br>Panoramastr. 1<br>10178 Berlin<br>Germany | **Owner of the Declaration**<br>ASSA ABLOY Entrance Systems AB<br>Lodjursgatan 10<br>SE-261 44 Landskrona<br>Sweden |
| **Declaration number**<br>EPD-ASAB-20171176-IBA1-EN | **Declared product / Declared unit**<br>This declaration represents 1 revolving door consisting of 4 door leaves and surrounding frame with internal diameter of 2.4 m and internal height of 2.2 m |
| **This Declaration is based on the Product Category Rules:**<br>IBU: PCR Automatic doors, automatic gates, and revolving door systems (door systems), 07.2014<br>(PCR tested and approved by the independent expert committee) | **Scope:**<br>This declaration and its LCA study is relevant to the revolving door ASSA ABLOY RD150-4. 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 RD150-4 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.<br>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. |
| **Issue date**<br>13.11.2017 | |
| **Valid to**<br>12.11.2022 | |
| Prof. Dr.-Ing. Horst J. Bossenmayer<br>(President of Institut Bauen und Umwelt e.V.) | **Verification**<br>The CEN Standard EN 15804 serves as the core PCR<br>Independent verification of the declaration and data according to ISO 14025<br>☐ internally ☒ externally |
| Dr.-Ing. Burkhart Lehmann<br>(Managing Director IBU) | Dr. Wolfram Trinius<br>(Independent verifier appointed by SVR) |

# 2. Product

### 2.1 Product description

**Product name:** ASSA ABLOY RD150-4

**Product characteristic:**

Four-wing Automatic Revolving Door System provides hands free operation and simultaneous adapts safely to faster pedestrian traffic. 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.

The door has 4 primary parts:
1) Door leafs
2) Frame
3) Drive system
4) Operating system

**The harmonizing provisions that apply for ASSA ABLOY RD150-4 revolving doors are:**

/2014/35/EC Low Voltage Directive (LVD)/
/2014/30/EC Electro Magnetic Compatibility Directive (EMCD)/
/2006/42/EC Machinery Directive (MD)/

The product needs the CE-marking.
The CE-marking takes into account the proof of conformity with the following harmonised standards based on the a.m. harmonisation provisions.

**Harmonized European standards, which apply:**

/EN 60335-1/ Household and similar electrical appliances -Safety -Part 1: General requirements
/IEC 60335-1/ Household and similar electrical appliances -Safety -Part 1: General requirements
/EN 60335-2-103/ Household and similar electrical appliances -Safety -Part 2: Particular requirements for drives, for gates, doors and window

/EN 61000-6-2/ Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
/EN 61000-6-3/Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments
/EN ISO 13849-1/ Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design
/EN 16005/ Power operated pedestrian door sets - Safety in use -Requirements and test methods.

**Other standards or technical specifications, which apply:**
DIN 18650-1/-2 Building hardware - Powered pedestrian doors - Part 1: Product requirements and test methods/ Building hardware - Powered pedestrian doors - Part 2: Safety at powered pedestrian doors

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

### 2.2 Application
The ASSA ABLOY RD150-4 is an automatic 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.

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

### 2.3 Technical Data
The table presents the technical properties of the ASSA ABLOY RD150-4 revolving door:

**Technical data**

| Name | Value | Unit |
|---|---|---|
| Power input "Standby" | 10 | W |
| Power input "Idle" | 10 | W |
| Power input "Operation" | 80 | W |

**Features**
Size: (W x H) 2400 x 2400 mm (external height) X 2200 (internal height)
Glass wall: 4 + 4 mm clear laminated
Glass door leaves: 3+3 mm clear laminated
Door sections: aluminium profiles Optional: Powder-coated finish (RAL colours), Stainless steel cladding
Burglar protection: Class 3

### 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 RD150-4 is as following:

| Component | Percentage in mass (%) |
|---|---|
| Glass | 49.45 |
| Steel | 11.21 |
| Stainless steel | 0.31 |
| Aluminium | 12.99 |
| Wood | 21.87 |
| Plastics | 2.33 |
| Electronics | 0.63 |
| Electro-mechanics | 0.49 |
| Others | 0.72 |
| **Total** | **100** |

### 2.6 Manufacture
Profiles are provided by tier one supplier SAPA and are delivered to the factory in Ostrov, Czech Republic. The profiles are bended and machined. The products are surface treated; either anodized (externally) or powder coated (internally). Other parts as electronics, glass, etc. arrives from tier one suppliers or the factory in China and a basic assembly is done in Ostrov. The parts are encased in pine crates and forwarded on a standard wooden pallet to on-site installation. The certified Quality Management system, DIN EN ISO 9001:2008, ensures high standards.
Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002.

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

### 2.7 Environment and health during manufacturing
ASSA ABLOY Entrance Systems AB are 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, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits and reviews are conducted periodically to ensure that applicable standards are met and to evaluate the effectiveness of the environmental management program.
• Code of Conduct covers human rights, labor practices and decent work. ASSA ABLOY Entrance Systems ABs' management is aware of their environmental roles and responsibilities, providing appropriate training and supporting accountability.
• Preparation conditions 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 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 certified installation technicians.

### 2.9 Packaging

ASSA ABLOY RD150-4 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 the cardboard is recyclable.
80% of cardboard is made from recycled material
100% of paper documents are made from recycled material.

| Material | Value (%) |
|---|---|
| Cardboard/ Paper | 3.49 |
| Plastics | 10.66 |
| Wood | 85.85 |
| **Total** | **100.0** |

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 January 2002:
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 RD150-4 and to maintain the quality of the enamel layer is to clean the surfaces three times/year with gentle (pH 5-9), non-polishing detergent and water. Use a soft non-abrasive sponge. The cleaning should be documented.
To avoid damages to the profiles, the brushes must be vacuum-cleaned weekly. Regular inspections by a trained and qualified person is recommended a minimum of two visits per year.

- 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 like Scotch-brite, as this 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.
For user safe operation there are monitored pressure sensitive safety sensors on both entrance post and door leafs and monitored touchless sensor on vertical entrance post and top of door leaf. If an obstacle prohibits the rotation of the door (the resistance is higher than the pre-set value) the rotation will cease. Compressible vertical safety switches placed on the drum edges. To prevent injury, the drum edges are equipped with soft safety edges.

### 2.12 Reference service life

The product has reference service life of 10 000.000 cycles based on internal reference installations, which complies for 15 years of standard daily use (with the recommended service check). For this EPD the lifetime of 15 years was considered.
A calculation according ISO 15686 /ISO 15686/ is not applied.

### 2.13 Extraordinary effects

**Fire**

The product is not fireproof. No test has been done according to EN13501-1. 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 have any impact on water in case of flood. Electric operation of the device will be influenced negative.

**Mechanical destruction**

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

### 2.14 Re-use stage

The product is possible to re-use during the reference service life and be moved from one entrance to another. The majority, by weight, of components is aluminium alloy, steel and glass which can be recycled. The plastic components are used for energy recovery within a waste incineration process.

### 2.15 Disposal

The requirements on waste disposal and recycling listed in the European Waste Catalogue (EWC) should be followed. As the product contains no substances harmful to the environment or human health, the entire system can be safely placed in a landfill site in cases where no waste recycling technologies are available.
Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002:
EWC 16 02 13* discarded equipment containing hazardous components (2) 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
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# 3. LCA: Calculation rules

## 3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of revolving door ASSA ABLOY RD150-4 as specified in Part B requirements on the EPD for PCR Automatic doors, automatic gates, and revolving door systems (door systems).

**Declared unit**

| Name | Value | Unit |
|---|---|---|
| Mass (without packaging) | 371.85 | kg |
| Mass packaging (wood, paper and plastics) | 111.82 | kg |
| Conversion factor to 1 kg | 0.0027 | - |
| Declared unit for revolving door systems (dimensions acc. to this PCR) | 1 | piece |

*The areas for the Revolving doors are represented by the lateral area i.e. the outer wall cylinder area surrounding the revolving door leafs

## 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

C1-C4 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.
Module D:

- Declaration of all benefits and loads

## 3.3 Estimates and assumptions

Transportation: Data on mode of transport and distances, as reported by suppliers were used for those materials and parts contributing more than 2% of total product mass. In case of unknown transport distances for parts and materials, contributing less than 2% to the total product mass, transport by road over an average distance of 500 km was assumed.

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 1000 hours in on mode, 2500 hours in stand-by mode and 2500 hours in idle mode per year as the product is only operational for 250 days per year; the power consumption throughout the whole life-cycle is 1950 kWh.

EoL:
In the End-of-Life stage, for all the materials which can be recycled, a recycling scenario with 100% collection rate was assumed

## 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 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 modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by thinkstep AG, is used /GaBi 6 2013/. The GaBi-database contains consistent and documented datasets which are documented in the online GaBi-documentation /GaBi 6 2013D/.
To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.

## 3.6 Data quality

The requirements for data quality and background data correspond to the specifications of the /IBU PCR Part A/.
thinkstep performed a variety of tests and checks during the entire project to ensure 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 GaBi 6 software database.

## 3.7 Period under review

The period under review is 2013/14 (12 month average).

## 3.8 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 plastic

- Waste incineration of paper
- 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 GaBi dataset documentation.

### 3.9 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. GaBi 6 serves as background database for the calculation.

## 4. LCA: Scenarios and additional technical information

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).

**Installation into the building (A5)**

| Name | Value | Unit |
|---|---|---|
| Output substances following waste treatment on site (Paper packaging) | 3.9 | kg |
| Output substances following waste treatment on site (Plastics packaging) | 11.92 | kg |
| Output substances following waste treatment on site (Wood packaging) | 96 | kg |

**Reference service life**

| Name | Value | Unit |
|---|---|---|
| Reference service life | 15 | a |

**Operational energy use (B6)**

| Name | Value | Unit |
|---|---|---|
| Electricity consumption per RSL (15 years, 250 days per year) | 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 | W |
| Power consumption – stand-by mode | 10 | W |
| Power consumption – idle mode | 10 | W |

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

*(W_active_mode*h_active_mode+W_idle_mode*h_idle_mode+W_stand_by_mode*h_stand_by_mode)*Life_span*days_year*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, stainless steel, steel, electronic, electro mechanics, wood and plastic parts | 371.85 | kg |
| Collected as mixed construction waste – glass, other construction waste for landfilling | 186.55 | kg |
| Incineration of plastic parts and wood | 197.9 | kg |
| Recycling Aluminium, stainless steel, steel, electronic, electro-mechanics, plastic parts | 103.97 | kg |
| Landfilling – glass, other construction waste for landfilling | 186.55 | kg |

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

| Name | Value | Unit |
|---|---|---|
| Collected separately waste type ASSA ABLOY RD150-4 (including packaging) | 297.11 | kg |
| Recycling Aluminium | 9.9 | % |
| Recycling Stainless steel | 0.2 | % |
| Recycling Steel | 8.6 | % |
| Recycling Electronic | 0.4 | % |
| Recyling Electro mechanics | 0.3 | % |
| Reuse Plastic parts | 2.1 | % |
| Incineration of packaging (paper) (from A5) | 0.8 | % |
| Incineration of packaging (plastics) (from A5) | 4.2 | % |
| Incineration of packaging (wood) (from A5) | 35.5 | % |
| Loss Glass, constructions waste for landfilling (no recycling potential) | 38 | % |

## 5. LCA: Results

Results shown below were calculated using CML 2000 – Apr. 2013 Methodology.

**DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)**

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement[1)] | Refurbishment[1)] | 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 | MND | MND | MND | X | MND | MND | X | X | X | X |

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One **piece of ASSA ABLOY RD150-4, Revolving door**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B6 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| GWP | Global warming potential | [kg $CO_2$-Eq.] | 2.35E+03 | 2.80E+01 | 1.91E+02 | 5.70E+02 | 1.41E+01 | 1.32E+02 | 7.47E+01 | -1.47E+03 |
| ODP | Depletion potential of the stratospheric ozone layer | [kg CFC11-Eq.] | 2.41E-07 | 1.34E-10 | 7.33E-10 | 3.90E-07 | 6.76E-11 | 5.83E-10 | 2.41E-10 | 5.37E-07 |
| AP | Acidification potential of land and water | [kg $SO_2$-Eq.] | 1.52E+01 | 1.28E-01 | 3.06E-02 | 2.69E+00 | 6.46E-02 | 1.88E-02 | 2.86E-02 | -7.57E+00 |
| EP | Eutrophication potential | [kg $(PO_4)^{3-}$-Eq.] | 1.03E+00 | 2.93E-02 | 4.15E-03 | 1.51E-01 | 1.48E-02 | 2.86E-03 | 2.80E-03 | -3.72E-01 |
| POCP | Formation potential of tropospheric ozone photochemical oxidants | [kg Ethen Eq.] | 9.32E-01 | -4.13E-02 | 2.23E-03 | 1.60E-01 | -2.08E-02 | 1.53E-03 | 1.84E-03 | -4.60E-01 |
| ADPE | Abiotic depletion potential for non-fossil resources | [kg Sb Eq.] | 6.20E-02 | 1.06E-06 | 4.14E-06 | 7.89E-05 | 5.32E-07 | 1.77E-06 | 5.51E-06 | -3.90E-03 |
| ADPF | Abiotic depletion potential for fossil resources | [MJ] | 2.95E+04 | 3.87E+02 | 4.85E+01 | 6.47E+03 | 1.95E+02 | 3.01E+01 | 5.15E+01 | -1.48E+04 |

**RESULTS OF THE LCA - RESOURCE USE:** One **piece of ASSA ABLOY RD150-4, Revolving door**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B6 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| PERE | Renewable primary energy as energy carrier | [MJ] | 1.02E+04 | - | - | - | - | - | - | - |
| PERM | Renewable primary energy resources as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PERT | Total use of renewable primary energy resources | [MJ] | 1.02E+04 | 1.52E+01 | 4.46E+00 | 1.85E+03 | 7.68E+00 | 3.16E+00 | 4.06E+00 | -5.42E+03 |
| PENRE | Non-renewable primary energy as energy carrier | [MJ] | 3.46E+04 | - | - | - | - | - | - | - |
| PENRM | Non-renewable primary energy as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PENRT | Total use of non-renewable primary energy resources | [MJ] | 3.46E+04 | 3.88E+02 | 5.65E+01 | 1.01E+04 | 1.95E+02 | 3.60E+01 | 5.60E+01 | -1.84E+04 |
| SM | Use of secondary material | [kg] | 4.97E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | Use of renewable secondary fuels | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | Use of non-renewable secondary fuels | [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 |
| FW | Use of net fresh water | [$m^3$] | 1.80E+01 | 1.07E-02 | 4.92E-01 | 4.58E+00 | 5.42E-03 | 3.42E-01 | 9.83E-02 | -1.44E+01 |

**RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:** One **piece of ASSA ABLOY RD150-4, Revolving door**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B6 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| HWD | Hazardous waste disposed | [kg] | 2.05E+00 | 8.83E-04 | 3.96E-03 | 1.41E+00 | 4.45E-04 | 2.63E-03 | 3.41E-03 | -2.60E-01 |
| NHWD | Non-hazardous waste disposed | [kg] | 2.44E+02 | 4.88E-02 | 5.13E+00 | 3.27E+00 | 2.46E-02 | 1.88E+00 | 1.22E+02 | -7.88E+01 |
| RWD | Radioactive waste disposed | [kg] | 2.01E+00 | 5.08E-04 | 3.19E-03 | 1.46E+00 | 2.56E-04 | 2.37E-03 | 1.76E-03 | -1.43E+00 |
| CRU | Components for re-use | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| MFR | Materials for recycling | [kg] | 0.00E+00 | 0.00E+00 | 9.99E+01 | 0.00E+00 | 0.00E+00 | 4.20E+02 | 0.00E+00 | 1.24E+02 |
| MER | Materials for energy recovery | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| EEE | Exported electrical energy | [MJ] | 0.00E+00 | 0.00E+00 | 2.46E+02 | 0.00E+00 | 0.00E+00 | 1.54E+02 | 1.39E+02 | 0.00E+00 |
| EET | Exported thermal energy | [MJ] | 0.00E+00 | 0.00E+00 | 6.87E+02 | 0.00E+00 | 0.00E+00 | 4.32E+02 | 3.82E+02 | 0.00E+00 |

## 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 73% and 99% to the overall results for all the environmental impact assessment categories hereby considered, except for the depletion potential of the stratospheric ozone layer (ODP), for which the contribution from the production stage accounts for approx. 38%. Glass, aluminium and steel account in total with approx. 74% 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 major contribution for all the impact assessment categories considered - between 0.1% and 17%, with the exception of ODP (62%). In calculating the ozone depletion potential, the anthropogenically released halogenated hydrocarbons, which can destroy many ozone molecules, are recorded first, therefore, as expected, the impact is higher during the use stage of the product (B6). This is a result of operation in 4 hours on and 10 hours on idle and stand-by modes for 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


**Institut Bauen und Umwelt**
Institut Bauen und Umwelt e.V., Berlin (pub.): Generation of Environmental Product Declarations (EPDs);

**General principles**
for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013-04
www.bau-umwelt.de

**PCR Part A**
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 1.6, 2017
www.ibu-epd.de

**IBU PCR Part B**
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. www.ibu-epd.com

**EN 15804**
EN 15804:2012-04: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

**GaBi 6 2013**
GaBi 6 2013: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, thinkstep AG, Echterdingen, 1992-2013.

**GaBi 6 2013D**
GaBi 6 2013D: Documentation of GaBi 6: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, thinkstep AG, Echterdingen, 1992-2013. http://documentation.gabi-software.com/

**ISO 14025**
DIN EN ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

**2014/30/EC**
Electro Magnetic Compatibility Directive

**2014/35/EC**
Low Voltage Directive

**2006/42/EC**
Machinery Directive (MD)

**ISO 15686:**
ISO 15686:2011-05, Buildings and constructed assets - Service life planning

**EN 60335-1**
EN 60335-1:2012: Household and similar electrical appliances -Safety - Part 1: General requirements

**EN 60335--2-103**
EN 61000-6-2-103:2003: Household and similar electrical appliances - Safety - Part 2-103: Particular requirements for drives for gates, doors and windows

**EN 61000-6-2**
EN 61000-6-2:2005: Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

**EN 61000-6-3**
EN 61000-6-3:2001: Quality management systems - Requirements (ISO 9001:2008)

**EN ISO 13849-1**
EN ISO 13849-1:2008: Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design

**EN 16005**
EN 16005:2012: Power operated pedestrian door sets - Safety in use - Requirements and test methods

**DIN 18650-1**
DIN 18650-1:2005: Building hardware - Powered pedestrian doors - Part 1: Product requirements and test methods

**DIN 18650-2**
DIN 18650-2:2005: Building hardware - Powered pedestrian doors - Part 2: Safety at powered pedestrian doors

IEC 60335-1 Household and similar electrical appliances-Safety- Part 1: General requirements

IEC 60335-2-103 Household and similar electrical appliances-Safety- Part 2: Particular requirements for drives, for gates, doors and windows

**2012/19/EU**
Waste Electrical and Electronic Equipment Directive (WEEE Directive)

**EWC**
Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002

# 9. Annex

Results shown below were calculated using TRACI Methodology.

**DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)**

| PRODUCT STAGE | | | CONSTRUCTION PROCESS STAGE | | USE STAGE | | | | | | | END OF LIFE STAGE | | | | BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Raw material supply | Transport | Manufacturing | Transport from the gate to the site | Assembly | Use | Maintenance | Repair | Replacement[1)] | Refurbishment[1)] | 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 | MND | MND | MND | X | MND | MND | X | X | X | X |

**RESULTS OF THE LCA - ENVIRONMENTAL IMPACT:** One **piece of ASSA ABLOY RD150-4, Revolving door**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B6 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| GWP | Global warming potential | [kg $CO_2$-Eq.] | 2.35E+03 | 2.80E+01 | 1.91E+02 | 5.70E+02 | 1.41E+01 | 1.32E+02 | 7.47E+01 | -1.47E+03 |
| ODP | Depletion potential of the stratospheric ozone layer | [kg CFC11-Eq.] | 2.57E-07 | 1.43E-10 | 7.80E-10 | 4.15E-07 | 7.19E-11 | 6.20E-10 | 2.56E-10 | 5.72E-07 |
| AP | Acidification potential of land and water | [kg $SO_2$-Eq.] | 1.51E+01 | 1.68E-01 | 3.54E-02 | 2.54E+00 | 8.44E-02 | 2.16E-02 | 3.28E-02 | -7.11E+00 |
| EP | Eutrophication potential | [kg N-eq.] | 7.16E-01 | 1.18E-02 | 1.73E-03 | 1.08E-01 | 5.96E-03 | 1.18E-03 | 1.63E-03 | -1.91E-01 |
| Smog | Ground-level smog formation potential | [kg $O_3$-eq.] | 1.73E+02 | 3.45E+00 | 5.81E-01 | 2.30E+01 | 1.74E+00 | 4.06E-01 | 3.94E-01 | -6.57E+01 |
| Resources | Resources – resources fossil | [MJ] | 2.50E+03 | 5.56E+01 | 5.45E+00 | 4.61E+02 | 2.80E+01 | 3.44E+00 | 5.79E+00 | -1.29E+03 |

**RESULTS OF THE LCA - RESOURCE USE:** One **piece of ASSA ABLOY RD150-4, Revolving door**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B6 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| PERE | Renewable primary energy as energy carrier | [MJ] | 1.02E+04 | - | - | - | - | - | - | - |
| PERM | Renewable primary energy resources as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PERT | Total use of renewable primary energy resources | [MJ] | 1.02E+04 | 1.52E+01 | 4.46E+00 | 1.85E+03 | 7.68E+00 | 3.16E+00 | 4.06E+00 | -5.42E+03 |
| PENRE | Non-renewable primary energy as energy carrier | [MJ] | 3.46E+04 | - | - | - | - | - | - | - |
| PENRM | Non-renewable primary energy as material utilization | [MJ] | 0.00E+00 | - | - | - | - | - | - | - |
| PENRT | Total use of non-renewable primary energy resources | [MJ] | 3.46E+04 | 3.88E+02 | 5.65E+01 | 1.01E+04 | 1.95E+02 | 3.60E+01 | 6E+01 | -1.84E+04 |
| SM | Use of secondary material | [kg] | 4.97E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| RSF | Use of renewable secondary fuels | [MJ] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| NRSF | Use of non-renewable secondary fuels | [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 |
| FW | Use of net fresh water | [m³] | 1.80E+01 | 1.07E-02 | 4.92E-01 | 4.58E+00 | 5.42E-03 | 3.42E-01 | 9.83E-02 | -1.44E+01 |

**RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES:** One **piece of ASSA ABLOY RD150-4, Revolving door**

| Parameter | Parameter | Unit | A1 - A3 | A4 | A5 | B6 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| HWD | Hazardous waste disposed | [kg] | 2.05E+00 | 8.83E-04 | 3.96E-03 | 1.41E+00 | 4.45E-04 | 2.63E-03 | 3.41E-03 | -2.60E-01 |
| NHWD | Non-hazardous waste disposed | [kg] | 2.44E+02 | 4.88E-02 | 5.13E+00 | 3.27E+00 | 2.46E-02 | 1.88E+00 | 1.22E+02 | -7.88E+01 |
| RWD | Radioactive waste disposed | [kg] | 2.01E+00 | 5.08E-04 | 3.19E-03 | 1.46E+00 | 2.56E-04 | 2.37E-03 | 1.76E-03 | -1.43E+00 |
| CRU | Components for re-use | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | - |
| MFR | Materials for recycling | [kg] | 0.00E+00 | 0.00E+00 | 9.99E+01 | 0.00E+00 | 0.00E+00 | 4.20E+02 | 0.00E+00 | - |
| MER | Materials for energy recovery | [kg] | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | - |
| EEE | Exported electrical energy | [MJ] | 0.00E+00 | 0.00E+00 | 2.46E+02 | 0.00E+00 | 0.00E+00 | 1.54E+02 | 1.39E+02 | - |
| EET | Exported thermal energy | [MJ] | 0.00E+00 | 0.00E+00 | 6.87E+02 | 0.00E+00 | 0.00E+00 | 4.32E+02 | 3.82E+02 | - |

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