

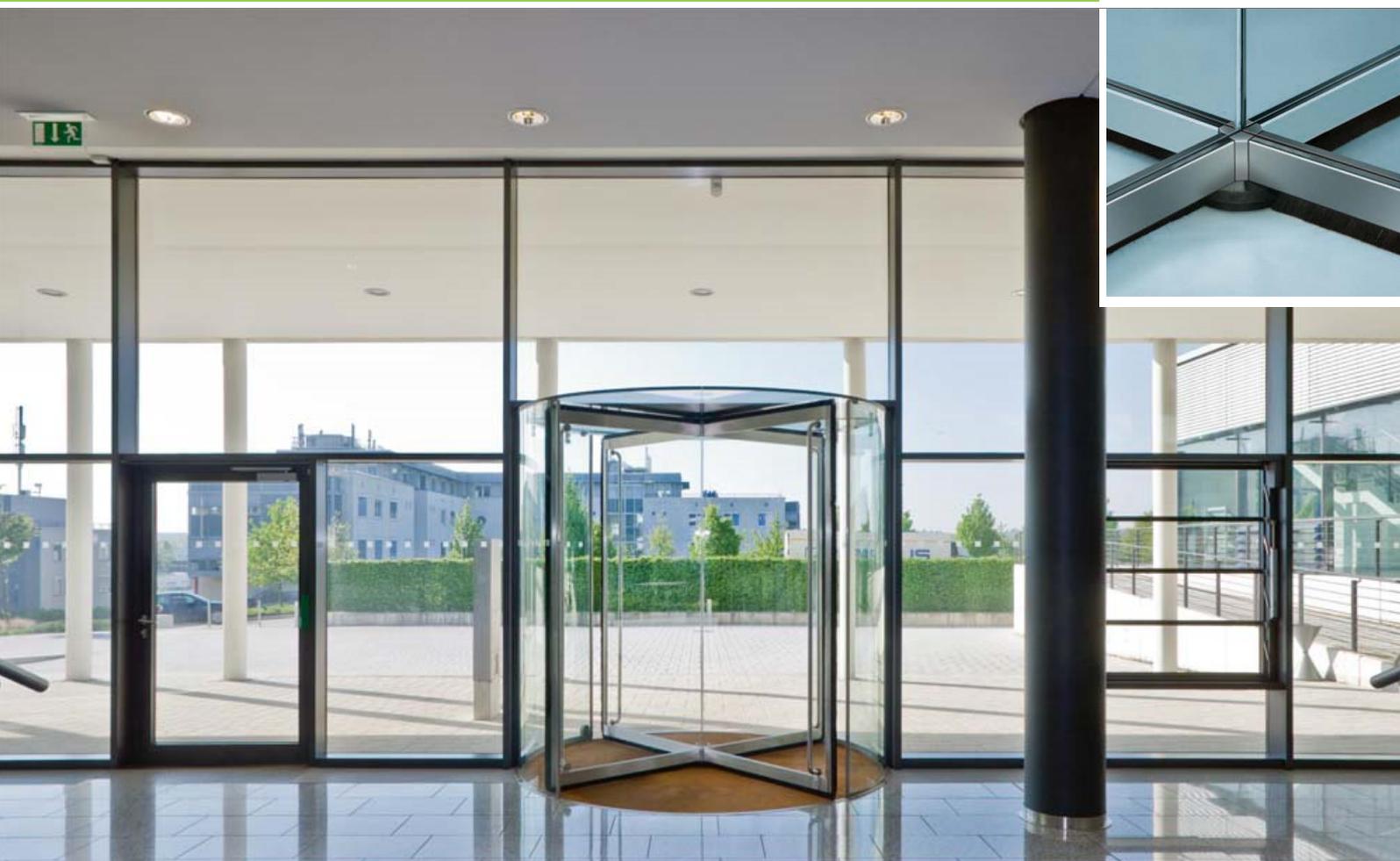
# ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	dormakaba International Holding AG
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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Valid to	23.04.2022

## Manual Revolving Door KTV M dormakaba

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## 1. General Information

<p><b>dormakaba</b></p> <hr/> <p><b>Programme holder</b>          IBU - Institut Bauen und Umwelt e.V.          Panoramastr. 1          10178 Berlin          Germany</p> <hr/> <p><b>Declaration number</b>          EPD-DOR-20160275-ICB1-EN</p> <hr/> <p><b>This Declaration is based on the Product Category Rules:</b>          Automatic doors, automatic gates, and revolving door systems, 07.2014          (PCR tested and approved by the SVR)</p> <hr/> <p><b>Issue date</b>          24.04.2017</p> <hr/> <p><b>Valid to</b>          23.04.2022</p> <hr/> <p></p> <hr/> <p>Prof. Dr.-Ing. Horst J. Bossenmayer          (President of Institut Bauen und Umwelt e.V.)</p> <hr/> <p></p> <hr/> <p>Dr. Burkhard Lehmann          (Managing Director IBU)</p>	<p><b>Manual Revolving Door KTV M</b></p> <hr/> <p><b>Owner of the Declaration</b>          dormakaba International Holding AG          Hofwisenstr. 24          CH-8153 Rümlang          Switzerland</p> <hr/> <p><b>Declared product / Declared unit</b>          The declaration represents one manual revolving door, consisting of four (4) door leaves and with a diameter of 2200 mm and a height of 2200 mm.</p> <hr/> <p><b>Scope:</b>          The declaration and background LCA report represent dormakaba's KTV M manual revolving doors. Raw materials and components are provided by suppliers and shipped to dormakaba's facilities in Sofia, Bulgaria and Dubai, United Arab Emirates. Doors are manufactured and assembled at the facilities before being shipped to job sites.          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.</p> <hr/> <p><b>Verification</b></p> <table border="1"> <tr> <td colspan="2">The CEN Norm /EN 15804/ serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration according to /ISO 14025/</td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/> <p></p> <hr/> <p>Dr.-Ing. Wolfram Trinius          (Independent verifier appointed by SVR)</p>	The CEN Norm /EN 15804/ serves as the core PCR		Independent verification of the declaration according to /ISO 14025/		<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally
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## 2. Product

### 2.1 Product description / Product definition

dormakaba revolving doors hold back noise, dust and dirt, reliably protect employees near the entrances from drafts, and help to keep heating costs down. The revolving doors of the VARIOLINE (KTV) series are exceptionally versatile. They combine elegance with functionality and are available with different options.

Manual revolving doors (KTV M) are activated and rotated by the user pushing a handle. They offer the following benefits:

- Flexible system to suit all requirements
- Easy installation and rapid commissioning
- Guaranteed state-of-the-art design and compliance with all regulations
- Extensive design flexibility in terms of planning and technical requirements
- Visually, technically and economically the ideal application
- Assured quality
- Optimization of the building energy balance
- Efficient noise protection
- Possible operation by any user

- Solid processing
- Easy and simple use.

For placing of the product on the market in the EU/EFTA (with the exception of Switzerland), the following legal provisions apply:

- /EMC Directive/ (2014/30/EU)
- /Machinery Directive/ (2006/42/EC)

as well as the harmonized norms based on these provisions:

- /DIN EN ISO 13849-1/: Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design.
- /DIN EN 16005/: Power operated pedestrian doorsets - Safety in use - Requirements and test methods.
- /EN 60335-1/: Household and similar electrical appliances. Safety. General Requirements.
- /EN 60335-2-103/: Household and similar

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

The CE-marking takes into account the proof of conformity with the respective harmonized norms based on the legal provisions above. For the application and use, the respective national provisions apply.

In addition to the harmonized standards, the following national standards have also been applied and complied with:

- /DIN 18650-1/: Powered pedestrian doors. Part 1: Product requirements and test methods.
- /DIN 18650-2/: Building Hardware. Powered pedestrian doors. Part 2: Safety at powered pedestrian doors.
- /AutSchR/.
- /ASR A1.7/: Technical rules for the workplace. Doors and gates.

## 2.2 Application

Manual revolving doors may be used to provide a comfortable entry and exit in many applications in the facade of or within a building.

Typical applications include:

- Office / commercial buildings
- Airports
- Public buildings
- Hospitals
- Hotels

Manual revolving doors are used to control the pedestrian flow in combination with an optimal thermal separation of the inside and outside climates during normal use.

KTV M revolving doors can optionally be equipped with:

- 3- or 4-wing design
- Glazed drum walls or with metal paneling
- Additional curved sliding doors in front of the entrance to act as night shields

Observance of the applicable regulations and standards guarantee the highest level of pedestrian safety.

## 2.3 Technical Data

Performance data of the product according to the harmonized norms, based on the harmonization provisions. The following technical data also apply:

Name	Value	Unit
Drum wall glass body impact resistance according to DIN 52290, class A 1	Yes	
Air curtain	Optional	
Night shield	Optional	
Bookfold wings	Optional	
Stainless steel cladding	Optional	

## 2.4 Delivery status

A manual revolving door with the following dimensions:

- Internal diameter: 2200 mm
- External Diameter: 2296 mm
- Clear passage height: 2200 mm

The unit is delivered ready for installation.

## 2.5 Base materials / Ancillary materials

The basic material composition of the door from Bulgaria / U.A.E. is given below. The door can be manufactured in both stainless steel and aluminum versions. Typically main components of doors produced in Bulgaria are manufactured from aluminum, whereas the same components of doors produced in U.A.E. are manufactured from stainless steel.

Name	Value	Unit
Glass	44	%
Aluminum	32	%
Steel	8	%
Stainless steel	10	%
Chipboard	4	%
Other incl. plastic	2	%

## 2.6 Manufacture

Materials such as aluminum sheet, steel bar, and tempered glass are shipped to dormakaba, where they are further processed into door leafs and other components. Depending on the component, some aluminum parts are powder coated. The door is then packaged in wooden crates and shipped to the job site for installation.

The plant in Sofia, Bulgaria is certified to the quality management system /ISO 9001/, which ensures consistent quality of dormakaba's products.

## 2.7 Environment and health during manufacturing

The manufacturing plant has an internal environmental, health and safety system according to national regulations and good European practices. The system ensures healthful and safe workplaces and good working conditions for each employee.

## 2.8 Product processing/Installation

Cutters, sanders, drills, and other standard equipment is used to manufacture the door. Ancillary materials include supplies for this equipment, as well as welding gases and electrodes.

Installation is done manually with simple tools.

## 2.9 Packaging

Packaging is intended to protect the product during distribution. Wood crates are used to package larger components, while corrugate is used for the accessories. Both cardboard and wood can be recycled or incinerated for energy recovery once the product is delivered and removed from the packaging.

## 2.10 Condition of use

Regular maintenance is advised to ensure the life expectancy of 20 years. Sensors and weather stripping are assumed to be replaced halfway through the service life.

## 2.11 Environment and health during use

No impacts on human health or the environment are expected during product use.

## 2.12 Reference service life

The reference service life of dormakaba's manual revolving doors will ultimately depend on the traffic pattern and degree of usage of the doors. A reference service life of 30 years is assumed for the calculation of the Use Stage impacts of the KTV M door. This is consistent with approximately 10 million cycles over the door's service life.

## 2.13 Extraordinary effects

### Fire

Not applicable.

### Water

Unforeseen contact with water may cause a malfunction of the door. Should contact with water occur, the unit is designed to remain in fail-safe state and is not anticipated to cause impact to the environment.

### Mechanical destruction

No impacts on human health or the environment are known or expected. No hazardous substance emissions are anticipated in case of mechanical destruction.

## 2.14 Re-use phase

Reuse of individual product components is not anticipated. The door, however, can be disassembled and the individual materials such as aluminum, steel, and glass recycled. Plastic components can be combusted for energy recovery.

## 2.15 Disposal

### Manufacturing

Scrap from production is collected separately by material type and disposed of.

- /EWC 12 01 01/ Ferrous metal filings and turnings
- /EWC 12 01 03/ Non-ferrous metal filings and turnings

### Packaging

Packaging waste from installation is assumed to be sent to a facility for energy recovery.

- /EWC 15 01 01/ Paper and cardboard packaging
- /EWC 15 01 02/ Plastic packaging
- /EWC 15 01 03/ Wooden packaging

### End-of-life

Door components at end-of-life can be either sent for material or energy recovery, or disposed to landfill. Recovery rates will depend on typical practices at the location in which the door is installed.

- /EWC 17 02 02/ Glass
- /EWC 17 03 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

## 2.16 Further information

Please refer to the last page of this declaration for contact details to obtain further information.

## 3. LCA: Calculation rules

### 3.1 Declared Unit

The declared unit for this analysis is one (1) revolving door system.

#### Declared unit

Name	Value	Unit
Declared unit for revolving door system*	4.8	m <sup>2</sup>
Mass of the entire system	661	kg
Conversion factor to 1 kg	0.0015	-
Grammage of the components	136	kg/m <sup>2</sup>
Dimensions for revolving door, diameter	2200	mm
Dimensions for revolving door, height	2200	mm

\* Area represent the cross-sectional area of the door, which is designed to fit in an opening of 2200-mm wide by 2200-mm high.

### 3.2 System boundary

Type of EPD: cradle-to-grave. The following modules were considered in this analysis:

#### Product stage

- Raw materials supply (A1)
- Transport (A2)
- Manufacturing (A3)

#### Construction stage

- Transport to the building site (A4)
- Installation, including packaging disposal (A5)

#### Use stage

- Maintenance (B2)

#### End-of-life stage

- Transport to disposal (C2)
- Waste processing (C3)
- Disposal (C4)

### Benefits and loads beyond the system boundary

- Reuse, recovery, and recycling potential (D)

Submodules that were not declared either do not apply and would therefore be zero, or are estimated to fall below the cut-off criteria.

### 3.3 Estimates and assumptions

The analysis represents a weighted average of doors produced at dormakaba's Bulgaria and U.A.E. facilities.

Revolving doors installation, maintenance, and deconstruction were assumed to be performed by hand with minimal additional electricity required to operate power tools.

### 3.4 Cut-off criteria

All available data from the production process are considered in the analysis. This includes raw materials used, thermal energy, electric power consumption, and ancillary materials.

### 3.5 Background data

The LCA model was created using the GaBi ts Software system for life cycle engineering, developed by thinkstep AG /thinkstep 2016/. The GaBi 2016 LCI database /thinkstep 2016b/ provides the life cycle inventory data for most of the raw and process materials obtained from the background system.

### 3.6 Data quality

Primary materials and production data were obtained directly from dormakaba's facilities that produce KTV M doors. Background data were sourced from the GaBi 2016 database /thinkstep 2016b/ and are representative of the years 2007 - 2015. European or global data were used as appropriate. As such, geographical and technological representativeness is warranted. Primary data were also evaluated for precision, completeness, and consistency, including cross-checks with other sources. Overall, data are considered to be of high quality.

### 3.7 Period under review

The period under review is the 2014 calendar year.

### 3.8 Allocation

Manufacturing inputs (e.g. ancillary materials, packaging, and energy) were allocated on a per-door basis.

Material credits attributed to Module D were calculated based on the net amount of scrap leaving the system boundary (i.e., the amount of scrap generated upon disposal, minus the amount of scrap consumed by raw material production).

### 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. The used background database has to be mentioned.

## 4. LCA: Scenarios and additional technical information

Additional information is provided for the declared modules, including A4, A5, B2, C2, C4, and D. In order to represent dormakaba's global distribution network, sales-weighted averages are used to model transport to the building sites and electricity consumption during product use.

### Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	23	l/100km
Transport distance	3520	km
Capacity utilisation (including empty runs)	77	%

### Installation into the building (A5)

Name	Value	Unit
Packaging waste for recovery (wood)	286	kg
Packaging waste for recovery (other)	1.7	kg
Packaging waste for disposal	34	kg

### Maintenance (B2)

Name	Value	Unit
Maintenance cycle	1	Number/ RSL
Replacement components	7	kg

### Reference service life

Name	Value	Unit
Reference service life	30	a

### End of life (C1-C4)

Name	Value	Unit
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Collected separately	284	kg
Collected as mixed construction waste	376	kg
Recycling	284	kg
Landfilling	376	kg

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

Name	Value	Unit
Collection rate, aluminum	90	%
Collection rate, steel	81	%

## 5. LCA: Results

The table below summarizes which modules are declared and which are not declared. Environmental performance results are shown for one (1) piece of revolving door and represent the average of KTV M doors produced at dormakaba's facilities.

### 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 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	X	MND	MND	MND	MND	MND	MND	X	X	X	X

### RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: one revolving door system

Parameter	Unit	A1-A3	A4	A5	B2	C2	C3	C4	D
GWP	[kg CO <sub>2</sub> -Eq.]	3.29E+3	3.12E+2	5.42E+2	3.38E+1	9.05E+0	0.00E+0	1.26E+1	-2.01E+3
ODP	[kg CFC11-Eq.]	7.51E-7	2.15E-9	8.34E-7	2.79E-9	6.53E-11	0.00E+0	8.95E-11	-1.67E-6
AP	[kg SO <sub>2</sub> -Eq.]	1.77E+1	1.77E+0	2.10E-1	1.02E-1	3.65E-2	0.00E+0	3.69E-2	-1.09E+1
EP	[kg (PO <sub>x</sub> ) <sup>3</sup> -Eq.]	1.45E+0	3.48E-1	9.14E-2	1.06E-2	8.92E-3	0.00E+0	1.72E-2	-5.85E-1
POCP	[kg ethene-Eq.]	1.15E+0	-3.54E-1	2.05E-2	8.09E-3	-1.20E-2	0.00E+0	5.05E-3	-6.18E-1
ADPE	[kg Sb-Eq.]	4.70E-2	2.28E-5	-1.34E-5	8.26E-4	6.75E-7	0.00E+0	2.12E-6	-1.34E-2
ADPF	[MJ]	4.09E+4	4.26E+3	2.48E+2	6.55E+2	1.24E+2	0.00E+0	8.46E+1	-2.17E+4

Caption: 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

### RESULTS OF THE LCA - RESOURCE USE: one revolving door system

Parameter	Unit	A1-A3	A4	A5	B2	C2	C3	C4	D
PERE	[MJ]	2.07E+4	2.33E+2	1.08E+1	3.90E+1	7.17E+0	0.00E+0	9.47E+0	-1.05E+4
PERM	[MJ]	5.78E+2	0.00E+0						
PERT	[MJ]	2.13E+4	2.33E+2	1.08E+1	3.90E+1	7.17E+0	0.00E+0	9.47E+0	-1.05E+4
PENRE	[MJ]	4.80E+4	4.29E+3	2.86E+2	6.79E+2	1.25E+2	0.00E+0	8.77E+1	-2.63E+4
PENRM	[MJ]	1.80E+2	0.00E+0						
PENRT	[MJ]	4.82E+4	4.29E+3	2.86E+2	6.79E+2	1.25E+2	0.00E+0	8.77E+1	-2.63E+4
SM	[kg]	1.14E+2	0.00E+0						
RSF	[MJ]	0.00E+0							
NRSF	[MJ]	0.00E+0							
FW	[m <sup>3</sup> ]	3.66E+1	5.74E-1	7.59E-1	1.53E-1	1.78E-2	0.00E+0	1.66E-2	-2.83E+1

Caption: 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 – OUTPUT FLOWS AND WASTE CATEGORIES: one revolving door system

Parameter	Unit	A1-A3	A4	A5	B2	C2	C3	C4	D
HWD	[kg]	1.85E-4	3.03E-4	4.77E-6	9.17E-6	9.35E-6	0.00E+0	1.82E-6	-2.63E-5
NHWD	[kg]	6.86E+2	3.50E-1	2.08E+1	1.01E+0	1.08E-2	0.00E+0	3.66E+2	-5.55E+2
RWD	[kg]	2.87E+0	8.86E-3	1.12E-2	9.40E-3	2.67E-4	0.00E+0	1.24E-3	-1.79E+0
CRU	[kg]	0.00E+0							
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.24E+2	0.00E+0	0.00E+0
MER	[kg]	0.00E+0							
EEE	[MJ]	0.00E+0	0.00E+0	5.80E+2	0.00E+0	0.00E+0	2.43E+0	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	1.71E+3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

Caption: 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; EEE = Exported thermal energy

## 6. LCA: Interpretation

The revolving door environmental footprint is dominated primarily by materials production (Module A1). Packaging incineration after door installation (Module A5) is also a key contributor to potential global

warming and ozone depletion impacts. Materials used during door maintenance (Module B2) play a minor role in abiotic depletion potential of elements.

At the end-of-life, the metal components of the revolving door are modeled as being recycled. A portion of the aluminum and steel are recovered and the remainder landfilled. Glass, however, is assumed

to be sent entirely to landfill as recycling this material from demolished buildings is not considered common practice.

## 7. Requisite evidence

Not applicable.

## 8. References

### **Institut Bauen und Umwelt**

Institut Bauen und Umwelt e.V., Berlin(pub.):  
Generation of Environmental Product Declarations (EPDs);  
[www.ibu-epd.de](http://www.ibu-epd.de)

### **ISO 14025**

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

### **EN 15804**

EN 15804:2012-04+A1 2013: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

### **EMC Directive**

Directive 2014/30/EU of the European Parliament and of the Council of 26 February 2014 on the harmonisation of the laws of the Member States relating to electromagnetic compatibility and repealing Directive 2004/108/EC.

### **Machinery Directive**

Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC.

### **ISO 9001**

Quality management systems - Requirements (ISO 9001:2008).

### **EWC**

European Waste Catalogue.

### **thinkstep 2016**

thinkstep; GaBi ts: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2016.

### **thinkstep 2016b**

GaBi ts: Documentation of GaBi ts: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Echterdingen, 1992-2016.  
<http://www.gabi-software.com/international/databases/gabi-databases/>.

### **ISO 14040**

EN ISO 14040:2006, Environmental management - Life cycle assessment - Principles and framework.

### **ISO 14044**

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

### **PCR Part A**

Institut Bauen und Umwelt e.V., 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. 2013. [www.ibu-epd.com](http://www.ibu-epd.com).

### **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. 2012. [www.ibu-epd.com](http://www.ibu-epd.com).

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