ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Royal Boon Edam International b.v.
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-BEN-20200228-IBA1-EN
Issue date	01.04.2021
Valid to	31.03.2026

Crystal Tourniket

Boon Edam

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1. General Information

Boon Edam	Crystal Tourniket
Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the declaration** Royal Boon Edam International B.V. Ambachtstraat 4 1135 GG Edam The Netherlands
Declaration number EPD-BEN-20200228-IBA1-EN	**Declared product / declared unit** The declaration represents one automatic revolving door Boon Edam Crystal Tourniket, type TG. It consists of four (4) doorleaves and has a diameter of 3000 mm, a height under canopy of 2300 mm and 2318 mm total height.
This declaration is based on the product category rules: Automatic doors, automatic gates, and revolving door systems, 07.2014 (PCR checked and approved by the SVR)	**Scope:** The declaration and background LCA report represent an automatic revolving door Boon Edam Tourniket, type TG. Raw materials and components are provided by suppliers from around the globe and shipped to Boon Edam in Edam, where the product is manufactured and assembled before being shipped and installed on a construction site in Europe. The energy use on site and maintenance during the 20 years of use are taken in account. 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*.
Issue date 01.04.2021	
Valid to 31.03.2026	
 Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)	**Verification** The standard *EN 15804* serves as the core PCR Independent verification of the declaration and data according to *ISO 14025:2010* ☐ internally ☒ externally
 Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.))	 Angela Schindler (Independent verifier)

2. Product

2.1 Information about the enterprise

Boon Edam is leading the field when it comes to supplying top quality revolving doors, high security doors and speed gates to customers across the world. We are a third generation, Dutch family business who pride ourselves on our knowledge and dedication to this specialised market.

2.2 Product description/Product definition

Boon Edam's Crystal Tourniket is virtually completely transparent with only a minimal stainless steel frame and patch fittings for maximum strength.. This revolving door is available with three or four door wings and as an element of fun or customisation, tinted glass can be used for the door wings and curved walls. The Crystal Tourniket is available with either manual or automatic operation.
For the configuration studied in this documen, the following options were selected:
- Clear laminated curved walls
- 4 fixed doorwings
- Clear tempered, laminated ceiling with 360 degrees rooftrim
- Clear laminated glass night locking doors
- Stainless steel finishing
- Matwelltrim floor
- Automatic drive mounted in the floor, activated by motion detectors

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

2006/42/EC - Directive 2006/42/EC of the European Parliament and of the Council of 17 May 2006 on machinery, and amending Directive 95/16/EC (recast) (2006)

EMC directive 2014/30/EU - 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 (2014)

*EN 16005:*2012: Power operated pedestrian doorsets - Safety in use - Requirements and test methods (2012)
DIN 18650 - Building hardware - Powered pedestrian doors

- Part 1 (2010): Product requirements and test methods
- Part 2 (Part 2010): Safety at powered pedestrian doors

EN 60335 - Household and similar electrical appliances - Safety

- Part 1 (2014) :General requirements
- Part 2 (2011) : Particular requirements for drives for gates, doors and windows

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

EN 61000

- EN-IEC 61000-3-2: 2009: Electromagnetic compatibility (EMC) - Part 3-2: Limits - Limits for harmonic current emissions (equipment input current <= 16A per phase)
- EN-IEC 61000-3-3: 2008: Electromagnetic compatibility (EMC) - Part 3-3: Limits - Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems, for equipment with rated current <= 16A per phase and not subject to conditional connection
- EN 61000-6-2: 2005: Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments

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.

2.3 Application

Crystal Tourniket are intended to be used in commercial buildings, in particular in:
- Airports
- Retail
- Banks
- Corporate Headquarters
- Governmental buildings
- Healthcare
- Hotels & Restaurants

2.4 Technical Data

Constructional data

Name	Value	Unit
Airborne sound reduction acc. to EN ISO 10140-2	32	dB
Heat transfer coefficient of the entire door system	4.4	W/(m²K)
Windload resistance acc. to EN 12211	448	Pa
Burglar protection class acc. to EN 1627 - EN 1630	Class 3	-
Air permeability acc. to EN 12207 & EN 1026	18.8	m³/h*m²
Power input "Idle"	0	W
Power input "Standby"	75	W
Power input "Operation"	150	W

Performance data of the product according to the harmonised norms, based on the harmonisation provisions.

2.5 Delivery status

The Crystal Tourniket modelled for this study is delivered ready for installation in a wooden packaging, with a total weight of 1795 kg.

2.6 Base materials/Ancillary materials

Name	Value	Unit
Glass regular	987	kg
Stainless steel	245	kg
Steel	53	kg
Nylon	7	kg
Aluminium	5	kg
Rubber synthetic	5	kg
Motor parts	48	kg
Electrical components including casing	25	kg
Glass tempered	310	kg

Royal Boon Edam International B.V. use substances on their own or in a preparation within its industrial or commercial activities, and is therefore a downstream user as defined in Article 3 No. 13 of *Regulation (EC) No. 1907/2006* (so-called REACh regulation). As a downstream user, Boon Edam has already requested that all suppliers provide confirmation regarding the correct implementation of REACh, and that our products do not contain SVHCs with a concentration greater than 0.1 percent by weight, as for the list published on the 7th of July 2017. Thus the following declarations hold true for the crystal tourniket:

1)Contains substances on the candidate list of SVH(date:25.01.2021) exceeding 0.1 percentage by mass in at least one partial product: **No**

2)Contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass in at least one partial product : **No**

3) “Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): **No**

2.7 Manufacture

All materials are shipped from suppliers to Boon Edam Manufacturing EMEA site in Edam, The Netherlands. Depending on the product, steel and aluminium profiles are cut to shape and size on site, and are assembled with the rest of the materials by Boon Edam.
The manufacturing site in Edam is *ISO 9001* certified.

2.8 Environment and health during manufacturing

Standard cutting and coating machinery are used on site. Safety measures are implemented on site and employees are required to wear personal protective equipment.
Boon Edam's Manufacturing EMEA site in Edam, Netherlands, has set-up several take-back schemes, with customers in the Netherlands and with suppliers. Metal cuttings from production (steel and aluminium alloys) are collected and sent back to suppliers to be reprocessed.
The site is *ISO 14001* certified

2.9 Product processing/Installation

Boon Edam's installation teams in Europe are following a strict safety process to define, together with the clients, safe access and work conditions during the installation. A list of personal protective equipment to be worn for each different task is defined as part of this process.

2.10 Packaging

Packaging materials should be discarded according to the regulations in place in the country of installation, and can be recycled or incinerated (for energy recovery) once the product is installed. The following materials are used for packaging:

107 kg Wood
1.7 kg Cardboard box
1 kg LDPE sheet
220 g Paper printed

2.11 Condition of use

Maintenance instructions are provided by Boon Edam, and will ensure efficient operations of the product. Annual maintenance checks are advised, and should be carried out by Boon Edam or an approved agent. The materials used in the composition of Boon Edam products are very stable, and their composition is not expected to change in the timeframe of use of the product, provided the advised maintenance procedures are respected.

2.12 Environment and health during use

The products manufactured by Boon Edam do not release any fluid, fumes, or chemical substances if used in accordance with the specifications provided, and if proper maintenance checks are performed regularly.
Automatic doors and gates are fitted with safety sensors and actuators that will prevent any physical damage in case of malfunction or improper use.

2.13 Reference service life

To calculate the indicators for potential impact during the use stage of a Tourniket, a service life of 20 years has been selected, as suggested in the 'Nutzungsdauern von Bauteilen' (Service Lives of Components) from the *BBSR*.
Provided that proper maintenance procedures are followed, the characteristics of the installed product will remain stable over the years and will not suffer from ageing of materials or components.
NB: A service life in accordance with the *BBSR* table is not a RSL according to *ISO 15686*.

2.14 Extraordinary effects

Fire

Fire protection

The fire protection standards are obtained from *EN 13501*

Name	Value
Building material class	Class D
Burning droplets	Class d0
Smoke gas development	Class s1

Water

Automatic doors contain electric and electronic equipment that may malfunction if in contact with water. Please refer to instructions regarding maintenance and cleaning.
No impact on the environment will occur in case of such malfunction.

Mechanical destruction

Mechanical destruction will never result from a malfunction of the door or gate itself.
In case mechanical destruction is caused by an external event, no environmental damage will be caused.
A damaged door or gate will need to be de-constructed with care and replaced.

2.15 Re-use phase

At the end-of-life, Boon Edam Netherlands and several Boon Edam entities in other European countries, offer a take-back scheme.
Products that reached their end-of-life can be dismantled by Boon Edam, and transported to local recycling companies or to the headquarters in Edam for further processing.
Parts obtained from dismantled doors are not reused, for quality and safety reasons, but materials are separated and prepared for recycling.

2.16 Disposal

Waste materials are produced at the end-of-life of the product. They are listed below according to the European List of Waste *2014/955/EU*.
•/16 02 Wastes from electrical and electronic equipment/
•/17 02 01 Wood/
•/17 02 02 Glass/
•/17 02 03 Plastic/
•/17 04 02 Aluminium/
•/17 04 05 Iron and steel/
•/17 04 11 Cables (with no hazardous substances)/

Products that reached their end-of-life can be collected on building site by Boon Edam, and transported to Edam to be dismantled. Metals and glass collected when dismantling are sent back to suppliers to be reprocessed.

2.17 Further information

See contact details

3. LCA: Calculation rules

3.1 Declared Unit

The declaration represents one automatic revolving door Boon Edam Crystal Tourniket, type TG. It consists of four (4) door leaves and has a diameter of 3000 mm, a height under canopy of 2300 mm and 2318 mm total height. It is fitted with a 220V AC motor of 180W

Declared unit

Name	Value	Unit
Declared unit	1	pce.
Declared unit (doorway size 3m x 2.318m)	7	m^2
Mass (total system)	1795	kg
Conversion factor to 1 kg	1795	-

Crystal Tourniket are produced at a single production plant in Edam, The Netherlands. No significant changes were made to the product or production process in the time between the data collection and the publishing of the EPD. As such, this EPD is expected to be representative for all Crystal Tourniket with similar specifications.

3.2 System boundary

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

Product stage
•Raw material supply (A1)
•Transport (A2)
•Manufacturing (A3)

Construction stage
•Transport to the building site (A4)
•Installation, including packaging disposal (A5)

Use stage
•Maintenance (B2)
•Operation energy use (B6)

End-of-life stage
•De-construction (C1)
•Transport to disposal (C2)
•Waste processing (C3)
•Disposal (C4)

Benefits and loads beyond the system boundary
•Reuse, recovery, and recycling potential (D)

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.
No materials are required during use (B1) and no water is needed for operation (B7). Repair (B3), Replacement (B4) and Refurbishment (B5) are not needed if proper maintenance is followed. These submodules are not declared as they would be zero, or are estimated to fall below the cut-off criteria.

3.3 Estimates and assumptions

Main assumptions and proxies :

• Cutting losses : Boon Edam manufactures doors made from both Aluminium and Glass. However, the Aluminium cutting losses for glass door are not available individually and the total Aluminium cutting losses are available as proxy. Since Aluminium cutting losses in Aluminium doors are higher, this leads to an overestimation of Aluminium cutting losses for glass doors. However, the Aluminium cutting losses contribute less than 1% to overall emissions. Furthermore, the cutting losses are sent back to the suppliers who process the lost Aluminium and Steel and thus they do not contribute to waste disposal (C) and avoided burden (D) stages.

• Survey and modelling methodology : This EPD is generated through an automated EPD tool. As a first step, users are invited to answer a survey which contains questions about the amount of products and energy used for packaging, manufacturing, installation of the product as well as the maintenance. The answers to this questions serve as an input to a LCA model. The model results are then populated in a pre-defined EPD template which generates the EPD in PDF format.

• Waste processing data assumptions : Boon Edam provides option to its users to collect back the waste and send it back to suppliers for processing. However, in the absence of any other data, the waste scenarios for different materials were treated according to the average waste scenarios for that particular product in the Netherlands. For example, for packaging wastes, 97% of waste was assumed to be incinerated and 3% of waste was assumed to be landfilled. For some metals and alloys such as Aluminium and Steel, there are no specific datasets for incineration and landfilling. So, the environmental impacts of incineration and landfilling of these materials have been accounted for through the incineration and landfilling processes of common municipal solid waste albeit not providing any electricity or heat recovery for this processes.

3.4 Cut-off criteria

•Production stage

All materials and energy inputs and outputs were considered, based on the nomenclature of the product considered, and on the energy inputs and waste flows from the factory.
To the best of our knowledge, no input or output having a significant impact on the indicators have been left aside.

•Use stage

During the use stage, the only maintenance activities not included are the cleaning and technical checks. These would consist of: energy necessary to power the cleaning devices, water, soap and transport of personnel for the technical checks.
Given the predominance of the operational energy use (B6), these impacts will be negligible in comparison.

•End-of-Life

During the end of life stage, all the end-of-life activities have been accounted for. The end of life phase is divided into recycling, incineration and landfilling. Environmental impacts of this activities for all materials have been accounted for to the best of our knowledge and no material having significant impact has been left aside. The avoided burden from materials recycled, electricity and heat recovered has

also been considered for all packaging as well as constituent materials of crystal tourniket.

3.5 Background data

The EPD is generated by an EPD tool, which enables to model the environmental impacts of a revolving glass door. For the application of the EPD tool users are required to enter the weight of different materials used in manufacture and packaging of the door through a survey which then triggers a model run and generates the EPD. The EPD is generated from the EPD tool version 1.0 (validity: Dec 2020 to Dec 2025), owned by PRé consultants bv, Amersfoort, NL.

3.6 Data quality

The *Ecoinvent 3.6* database is used for every background datasets, ensuring consistence of the scope.

Global market data were used for all supplies that are procured on the market without specific requirement for location, and more specific geographies were used otherwise (e.g. electricity used on site is representative of the Dutch electricity market) All background data have been reviewed by the editor in 2020.

Primary data have been collected specifically for the product considered, at the time when the assessment has been made and are representative of the current situation at Boon Edam.

Based on the data quality framework of EN15804 provided by UN environment, the model data is assessed on three criteria of geography, time and technical accuracy. According to the framework, the data quality for Boon Edam's crystal tourniket is assessed as follows. :

• Geographical representativeness- Good: Most of the data on production, transport and energy use is representative of the Entire Europe. So, the data is from a larger area (Europe) in which the area under study (Netherlands) is included. This satisfies the good quality data criteria of UN environment global guidance on LCA development

• Time representativeness –Good: Most of the processes in Ecoinvent 3.6 accurately reflect the data for 2016. For some of the processes which are older than 10 years, they are extrapolated to 2010.

• Technical representativeness-Good: For Boon Edam's crystal tourniket, the materials used are very commonly available in the market and thus the processes corresponding to their production are readily available in the ecoinvent database and they represent the actual material accurately.

3.7 Period under review

Data have been collected in 2019 and represents an average of the consumptions in 2018.

3.8 Allocation

Given the variation in size of products manufactured by Boon Edam, allocating manufacturing (A3) inputs and outputs per product was not deemed fair. As production lines within the facility were similar, allocation was done on the basis of the number of production lines.

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.

Background data processes were obtained from *Ecoinvent 3.6*, with the Cut-off system model, as compiled for *SimaPro* in June 2020.

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic Carbon

Information on describing the biogenic Carbon Content at factury gate

Name	Value	Unit
Biogenic carbon content in product	negligible (<5%)	kg C
Biogenic carbon content in accompanying packaging	26.1	kg C

Transport to the manufacturer (A2)

A survey from Boon Edam in 2016 shown that all their suppliers are local companies, the furthest being situated 260km from Edam. This maximum value has been selected for all transport distances.

Note: 'market' datasets from ecoinvent were selected in to model materials, meaning that upstream transports - occurring before the last transport step to Edam - are computed in the A1 module.

Transport to the building site (A4)

The distance is calculated as an average of Boon Edam's actual delivery, and is modelled as a freight truck transport.

Name	Value	Unit
Litres of fuel	4.5	l/100km
Transport distance	3500	km
Capacity utilisation (including empty runs)	0.49	%

Installation into the building (A5)

Name	Value	Unit
Waste wood	107	kg
Waste paper and cardboard	2	kg
Waste LDPE plastic	1	kg

Maintenance (B2)

A yearly maintenance check is recommended. Motors and moving parts are prone to wear, and are replaced every few years. Over the 20 years of the product, the following parts are replaced 2 times.

Name	Value	Unit
Maintenance cycle	2	Number/RSL
Materials replaced per cycle:	-	
Stainless steel	10	kg
Aluminium	5	kg
Electric components including casing	5.81	kg
Drive parts	48	kg

Reference service life

Name	Value	Unit
Life Span (according to BBSR)	20	a

Operational energy use (B6)

The electricity consumption of the motor drive is divided in 3 ranges of use:

•The door or gate is idle or turned off (building is closed)

•The door or gate is in stand-by mode

•The door or gate is active

The electricity consumption process was modelled using low voltage electricity mix for Europe. The estimated operating conditions are given below:

Name	Value	Unit
Life span according to BBSR	20	years
Days used per year	260	days/year
Hours idle (on day used)	8	hours/day
Hours in standby (on day used)	8	hours/day
Hours active (on day used)	8	hours/day
Power while idle	0	W
Power in standby	75	W
Power while active	150	W
Electricity consumption over lifetime	9360	kWh

End of life (C1-C4)

Boon Edam Netherlands offers their customers a recycling scheme, in which the materials recovered from deconstruction are delivered to recycling stations, which are also the suppliers of Boon Edam. Their exact recycling rate is not known, therefore average Dutch percentage of recycled steel and aluminium was used in the model. They are based on the data from Dutch waste scenario in *Ecoinvent 3.6*. For glass, which is used in the product but not included as recyclable in ecoinvent dataset, the collection rate of 25% was used. The remaining, not recycled materials are treated according to the same ecoinvent waste scenario, based on *Eurostat 2017* data.

At the end of life, it is assumed that from the BOM, Aluminium, Steel, Stainless steel and glass are collected separately whereas the remaining BOM consisting of Fasteners, drive parts, electrical components, Rubber and Nylon are collected as mixed municipal waste. The percentages of each material going to recycling, incineration and landfill respectively are aggregated over the BOM to compute the amount of waste recycled, incinerated and landfilled.

Name	Value	Unit
Collected separately	1595	kg
Collected as mixed construction waste	90	kg
Recycling	558.44	kg
Incineration	856.25	kg
Landfilling	270.37	kg

Avoided Burden (D)

The total amount of material recycled, electricity and heat recovered are shown in the table below. The main materials recycled are Steel, stainless steel, glass (regular and tempered) and Aluminium. The amount of recycled materials are obtained by multiplying the total masses of respective products with the corresponding percentages that go to recycling. For eg, of the 1297 kg of glass used, 25% goes to recycling and there is 15% of recycling loss thus, the glass recycled correspondingly is 276.9 kg.

Name	Value	Unit
Aluminium recycled	1.75	kg
Steel recycled	33.70	kg
Stainless steel recycled	171.99	kg
Glass recycled	276.90	kg
Electricity generated	306.81	MJ
Heat generated	641.05	MJ

5. LCA: Results

LCA results for 1 Boon Edam Crystal Tourniket.

Disclaimer:
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; ND = 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	ND	X	MNR	MNR	MNR	X	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: one piece Crystal tourniket

Core Indicator	Unit	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D
GWP-total	[kg CO_2-Eq.]	5.01E+3	1.34E+2	1.04E+2	1.62E+3	4.10E+3	2.63E+0	2.79E+1	1.89E+2	3.48E+1	-1.82E+2
GWP-fossil	[kg CO_2-Eq.]	5.26E+3	1.33E+2	8.52E+0	1.53E+3	3.97E+3	2.54E+0	2.78E+1	8.68E+1	4.25E+0	-1.82E+2
GWP-biogenic	[kg CO_2-Eq.]	-2.54E+2	7.18E-2	9.58E+1	9.35E+1	1.20E+2	7.72E-2	1.50E-2	1.02E+2	3.06E+1	4.64E-1
GWP-luluc	[kg CO_2-Eq.]	5.34E+0	4.71E-2	7.27E-3	3.01E+0	9.23E+0	5.92E-3	9.82E-3	3.49E-3	8.07E-4	-1.10E-1
ODP	[kg CFC11-Eq.]	4.37E-4	3.06E-5	1.07E-6	1.10E-4	3.36E-4	2.15E-7	6.38E-6	2.81E-6	8.72E-7	-1.51E-5
AP	[mol H^+-Eq.]	4.31E+1	6.80E-1	4.62E-2	1.84E+1	2.32E+1	1.49E-2	1.42E-1	2.86E-1	2.44E-2	-1.05E+0
EP-freshwater	[kg PO_4-Eq.]	3.20E+0	9.83E-3	3.36E-3	2.12E+0	3.98E+0	2.55E-3	2.05E-3	7.01E-3	6.97E-4	-1.05E-1
EP-marine	[kg N-Eq.]	7.05E+0	2.33E-1	3.33E-2	2.10E+0	3.81E+0	2.44E-3	4.86E-2	1.31E-1	7.36E-2	-1.74E-1
EP-terrestrial	[mol N-Eq.]	7.84E+1	2.55E+0	1.59E-1	2.34E+1	3.63E+1	2.32E-2	5.32E-1	1.45E+0	9.02E-2	-2.06E+0
POCP	[kg NMVOC-Eq.]	2.19E+1	7.27E-1	4.73E-2	6.79E+0	9.20E+0	5.90E-3	1.52E-1	3.88E-1	3.31E-2	-8.26E-1
ADPE	[kg Sb-Eq.]	6.80E-1	3.63E-3	1.10E-4	4.17E-1	2.89E-2	1.85E-5	7.58E-4	1.03E-4	2.71E-5	-3.66E-3
ADPF	[MJ]	6.22E+4	2.03E+3	1.13E+2	1.79E+4	8.21E+4	5.26E+1	4.23E+2	2.25E+2	6.39E+1	-2.27E+3
WDP	[m^3 world-Eq deprived]	1.61E+3	9.18E+0	2.05E+0	5.92E+2	2.99E+3	1.91E+0	1.92E+0	2.78E+1	3.09E+0	-3.59E+1

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; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: one piece Crystal tourniket

Indicator	Unit	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D
PERE	[MJ]	1.13E+4	2.86E+1	2.08E+3	2.17E+3	1.59E+4	1.02E+1	5.98E+0	6.30E+0	1.80E+0	-2.05E+2
PERM	[MJ]	2.07E+3	0.00E+0	-2.07E+3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	1.34E+4	2.86E+1	1.11E+1	2.17E+3	1.59E+4	1.02E+1	5.98E+0	6.30E+0	1.80E+0	-2.05E+2
PENRE	[MJ]	6.19E+4	2.03E+3	1.56E+2	1.79E+4	8.20E+4	5.26E+1	4.23E+2	4.90E+2	6.39E+1	-2.27E+3
PENRM	[MJ]	3.08E+2	0.00E+0	-4.29E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-2.65E+2	0.00E+0	0.00E+0
PENRT	[MJ]	6.22E+4	2.03E+3	1.13E+2	1.79E+4	8.20E+4	5.26E+1	4.23E+2	2.25E+2	6.39E+1	-2.27E+3
SM	[kg]	2.53E+2	0.00E+0	0.00E+0	6.07E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m^3]	3.80E+1	2.45E-1	4.85E-2	1.38E+1	6.96E+1	4.46E-2	5.11E-2	6.50E-1	7.24E-2	-8.78E-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 – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: one piece Crystal tourniket

Indicator	Unit	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D
HWD	[kg]	2.10E-1	5.31E-3	1.80E-4	1.95E-1	5.45E-2	3.49E-5	1.10E-3	4.30E-4	1.20E-4	-6.14E-5
NHWD	[kg]	2.25E+3	9.70E+1	3.53E+1	4.14E+2	2.77E+2	1.78E-1	2.02E+1	9.32E+0	2.71E+2	-2.77E+1
RWD	[kg]	1.88E-1	1.38E-2	7.40E-4	4.88E-2	5.86E-1	3.70E-4	2.88E-3	1.04E-3	4.00E-4	-7.12E-3
CRU	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	1.91E+1	0.00E+0	0.00E+0	0.00E+0	5.58E+2	0.00E+0	0.00E+0
MER	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EEE	[MJ]	0.00E+0	0.00E+0	1.21E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.86E+2	0.00E+0	0.00E+0
EET	[MJ]	0.00E+0	0.00E+0	2.64E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.77E+2	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

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

Indicator	Unit	A1-A3	A4	A5	B2	B6	C1	C2	C3	C4	D
PM	[Disease Incidence]	4.30E-4	9.67E-6	5.34E-7	1.07E-4	6.75E-5	4.33E-8	2.02E-6	2.83E-6	4.58E-7	-1.03E-5
IR	[kBq U235-Eq.]	4.09E+2	1.05E+1	1.69E+0	1.30E+2	2.19E+3	1.40E+0	2.18E+0	9.95E-1	3.57E-1	-1.50E+1
ETP-fw	[CTUe]	4.05E+4	7.14E+2	3.93E+1	2.21E+4	4.76E+3	3.05E+0	1.49E+2	3.70E+2	9.96E+1	-1.30E+3
HTP-c	[CTUh]	2.74E-5	3.90E-8	2.35E-8	4.70E-6	1.22E-6	7.81E-10	8.14E-9	2.31E-7	2.10E-9	-2.42E-9
HTP-nc	[CTUh]	9.87E-5	8.16E-7	1.74E-7	9.16E-5	2.56E-5	1.64E-8	1.70E-7	6.47E-7	5.78E-8	-3.17E-6
SQP	[-]	5.07E+4	1.40E+3	7.24E+1	6.93E+3	2.00E+4	1.28E+1	2.92E+2	2.92E+2	1.59E+2	-1.12E+3

Caption	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 IRP
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 due to 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 ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP
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 experienced with the indicator.

6. LCA: Interpretation

The environmental impacts of a Crystal Tourniket are mainly attributed to the Product Stage (A1-A3) and the operational energy use (B6). This is applicable for all Environmental Impact and Resource Use indicators and Waste Flows, and for Radioactive and Non-hazardous Waste Disposed indicators. For Hazardous Waste Disposed, Maintenance and Benefits beyond the System Boundary are also important due to metals waste and recycling. The three Output Flows indicators are naturally dominated by disposal, during the Production, Installation and End-of-Life Stage. During production, main impacts were distributed between the electronics, the motor, the glass and the steel. At the end-of-life 51% of the materials in the product are send to incineration, 33% are recycled and the remainder is sent to landfill.

7. Requisite evidence

Not applicable for this product. It relies on electric energy for functioning and no emissions will be released in normal conditions.

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