ENVIRONMENTAL-PRODUCT DECLARATION

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

Owner of the Declaration	dormakaba International Holding GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-DOR-20210151-CBA3-EN
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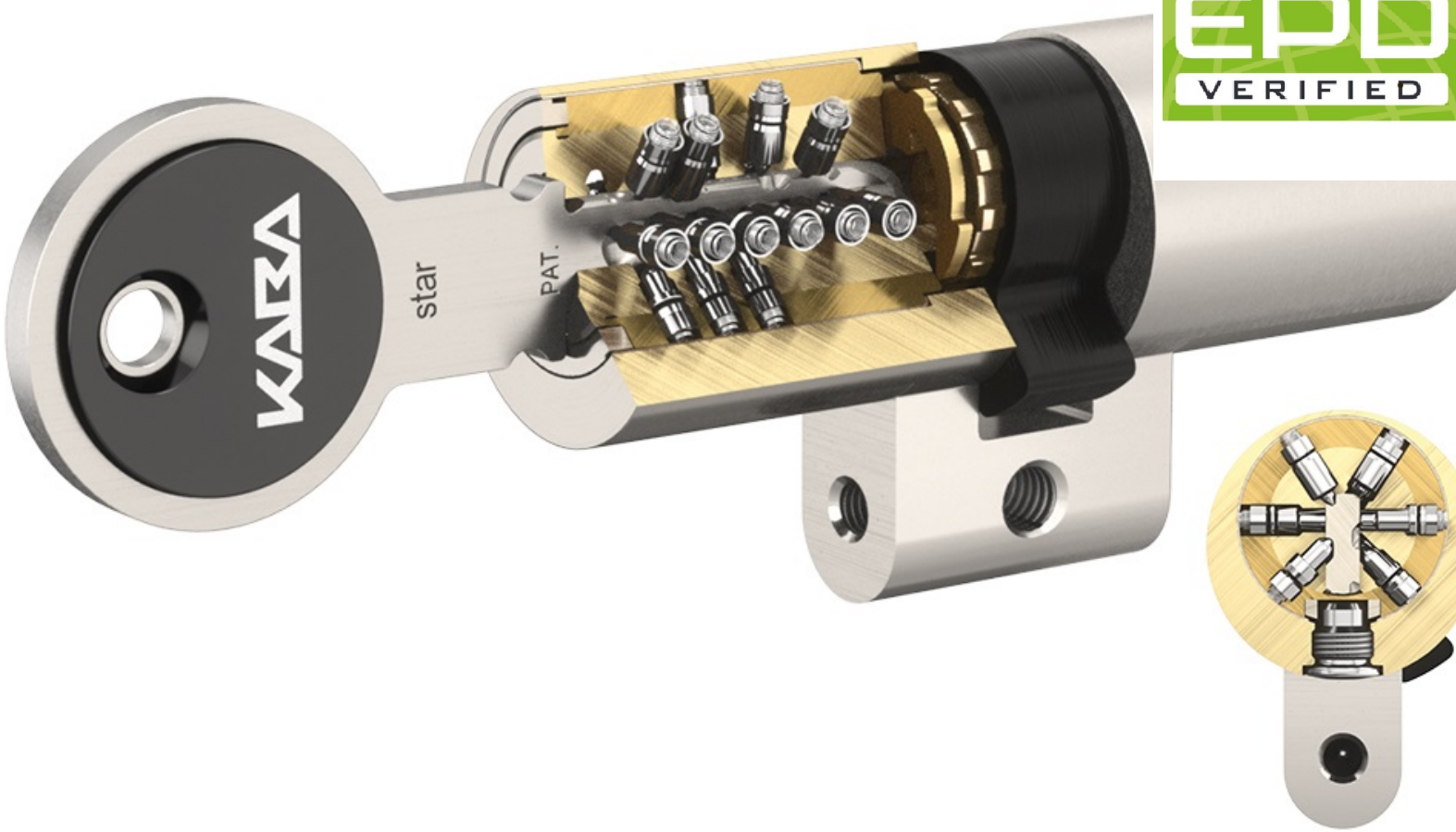
Double cylinder - star cross, star, 20 and 8

dormakaba

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

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General Information

dormakaba

Programme holder

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

Declaration number

EPD-DOR-20210151-CBA3-EN

This declaration is based on the product category rules:

Building Hardware products, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

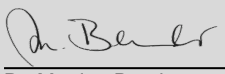
29.06.2021

Valid to

28.06.2028



Dipl.-Ing Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)



Dr. Martina Bender
(Managing Director Institut Bauen und Umwelt e.V.)

Double cylinder - star cross, star, 20 and 8

Owner of the declaration

dormakaba International Holding GmbH
DORMA Platz 1
58256 Ennepetal
Germany

Declared product / declared unit

1 piece of the product: star mechanical key system, consisting of the following items:
- one star double cylinder
- one star reversible key

Scope:

This EPD refers to a mechanical key system, including the star double cylinder and one star reversible key. This EPD is also representative for the products: star cross, star, 20 and 8. The underlying life cycle assessment is based on the entire life cycle of this specific master key system manufacured by dormakaba. Data represents the year 2021.

The various technical features are outlined in the Product chapter of this EPD. The products are manufactured at the dormakaba production facility in Wetzikon (Switzerland).
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 bezeichnet*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally



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

Product

Product description/Product definition
Information about the enterprise
Dormakaba stands for a broad offering of products, solutions and services for smart and secure access to buildings and rooms from a single source.

Product description/ Product definition
star is the most advanced patented master key system. It offers legal protection against commercial imitation. The registration of individual locking system, and master key system with dormakaba ensures that keys cannot be ordered without authorization. Extensions or single parts can be ordered as required.

This feature also applies for star cross and 20.
The system is ideal and can be used in both the private sector as for large and complex buildings with high security requirements. star cross, star and 20 can be equipped with RFID transponder for integration in electronic access systems from dormakaba.
star uses the dormakaba keylink planning method and has a virtually unlimited number of locking combinations. For placing the
mechanical key systems on the market in the European Union/European Free Trade
Association (EU/EFTA, with the exception of Switzerland) the following legal provisions
apply:

- *DIN EN 1303: 2015-08*
  Building
  Hardware - Cylinders for locks - Requirements and test methods
- *DIN 18252: 2018-05Profile cylinders for door locks – Terminology, dimensions,*
  requirements, test methods and marking

- *Restriction of*
  Hazardous Substances (RoHS)
  Directive on
  the restriction of the use of certainhazardous substances in electrical and electronic equipment (RoHS), Directive (EU) No 2011/65. In addition, the mechanical cylinders meet the material requirements of the RoHS
  2011/65/EU directive

Application
Reversible
mechanical double cylinder can be used in both residential as well as in the
commercial segment and in small and simple as well as inlarge and
complex applications, thanks to its versatility. Nearly limitless application
options are possible.

Technical Data
star cross and star are locking systems, which fulfill even the most challenging requirements. Both systems offer exceptional security thanks to:

- Five to eight rows of pins with up to 26 simultaneously-usable pin positions.
- Pins that make contact with the key are manufactured from wear-resistant hardened steel.
- Key protected by patented characteristic.
- Key of star cross with active protection against copies.

20 is a locking system, which is a patented system, registered and factory produced.
8 is a locking system, which is non patented and non registered and with a possibility to assemble components at the dealer to be more flexible and faster to deliver to the end customer.
All systems are available with 22 mm Swiss round profile cylinders and 17 mm diameter Euro profile cylinders.
All systems are classified according to the European locking cylinder standards EN1303 and DIN18252. While the basic cylinder configuration already fulfills the attack resistance class B, the highest protection grade D is an option that can be achieved with integrated carbide steel inserts.

Gebrauchs-klasse category of use	Dauerhaftig-keit durability	Türmasse door mass	Feuerwider-stand fire resistance	Betriebs-sicherheit safety	Korrosionsbest. + Temperatur corrosion resistance and temperature	Verschluss-sicherheit key related security	Angriffs-widerstand attack resistance
1	6	0	B	0	C	6	0/B/C/D

Please list the Technical Data according to the
List in the chapter “Product group specific calculation rules”

Example:

Technical
Data for Locking Cylinders acc. to the classification in EN 1303: Delivery
status:

The declared mechanical key system includes one Swiss round profile double cylinder and one key, packaging and service instruction with a weight of 0,259 kg.

Base materials/Ancillary materials
For the main
product components, the star
double cylinder and star
reversible key the composition of the product is the following.
Same product
composition applies for star cross, star, 20 and 8:

Name	Value	Unit
Brass	78	%
Steel	13	%
Nickel silver	8	%
Plastic	1	%

The reversible
mechanical double cylinder and reversible key contain partial articles which contain substances listed
in the Candidate List of *REACH Regulation 1907/2006/EC*

(date: 19.01.2021)
exceeding 0.1 percentage by mass: yes

- Lead (Pb): 7439-92-1 (CAS-No.)
  is included in some of the alloys used. The concentration of lead in each individual alloy does not exceed 4.0% (by mass).

The candidate
list can be found on the /*ECHA*/ website address: https://echa.europa.eu/de/home.

Environment and health during use

Reference service life
The
life cycle (security and function) of a lock cylinder is about 15 years,
depending on the application frequency of use. The cylinders are tested to 100,000 *(EN1303)* locking cycles minimum. This corresponds to approximately 18 locking cycles per day for 15 years. In case of extensions parts are available for a long lifetime. Availability
for over 30 years is secured.

LCA: Calculation rules

Declared Unit
The declared unit is 1 piece of the product: kaba star.

Declared unit

Name	Value	Unit
Declared unit	1	piece/product
Conversion factor to 1 kg (mass of declared unit)	0.259	-

For IBU core EPDs (where clause 3.6 is part of the EPD): for average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning variability of the production process, geographical representativeness and the influence of background data and preliminary products compared to the environmental impacts caused by actual production.

System boundary
The type of EPD is: cradle to gate with options, modules C1–C4, and module D
(A1–A3 + C + D and additional modules: A4 + A5)
Production - Module A1-A3
The product stage includes:
— A1, raw material extraction, processing and mechanical treatments, processing of secondary material input (e.g. recycling processes),
— A2, transport to the manufacturer,
— A3, manufacturing and assembly
including provision of all materials, products and energy, as well as waste processing up to the end-of waste state.

Construction stage - Modules A4-A5
The construction process stage includes:
— A4, transport to the building site;
— A5, installation into the building;
including provision of all materials, products and energy, as well as waste processing up to the end-ofwaste state or disposal of final residues during the construction process stage.

End-of-life stage– Modules C1-C4 and D
The end-of-life stage includes:
— C1, de-construction, demolition:
— C2, transport to waste processing;
— C3, waste processing for reuse, recovery and/or recycling;
— C4, disposal;
including provision and all transport, provision of all materials, products and related energy and water use.
Module D (Benefits and loads beyond the system boundary) includes:
— D, recycling potentials, expressed as net impacts and benefits.

Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Switzerland

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 database: *GaBi ts software*, SP40.

LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in a construction product leaving the factory gate, and it shall be separately declared for the product and for any accompanying packaging.
If the total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content may be omitted. The mass of packaging containing biogenic carbon shall always be declared.

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

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.02	kg C

The following technical scenario information is required for the declared modules.

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel (per piece)	0.0015	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs) average	55	%

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site (packaging waste)	0.045	kg

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies for the reference conditions only.

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list on service life by BNB is declared.

End of life (C1-C4)

C1: The product dismantling from the building is done manually without environmental burden.

Name	Value	Unit
Collected separately waste type	0.214	kg

The product is disassembled in a recycling process. Material recycling is then assumed for the metals. The plastic components are assumed to be incinerated with energy recovery.

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

Collection rate is 100%.

LCA: Results

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	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 piece, Double cylinder - star cross, star, 20 and 8

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	D
GWP-total	kg CO_2 eq	3.82E-01	2.26E-03	7.05E-02	0	9.36E-04	3.56E-03	-1.03E-01
GWP-fossil	kg CO_2 eq	3.92E-01	2.16E-03	1.66E-02	0	8.94E-04	3.56E-03	-1.03E-01
GWP-biogenic	kg CO_2 eq	-1.02E-02	1E-04	5.39E-02	0	4.13E-05	8.29E-08	2.24E-04
GWP-luluc	kg CO_2 eq	6.64E-04	5.15E-08	1.77E-06	0	2.13E-08	2.01E-07	-1.56E-04
ODP	kg CFC11 eq	1.58E-12	2.29E-19	1.77E-17	0	9.44E-20	1.79E-18	-4.48E-16
AP	mol H^+ eq	3.47E-03	2.17E-06	1.82E-05	0	8.95E-07	6.33E-07	-9.21E-04
EP-freshwater	kg P eq	1.61E-06	4.63E-10	3.18E-09	0	1.91E-10	2.86E-10	-5.9E-08
EP-marine	kg N eq	3.09E-04	6.89E-07	6.2E-06	0	2.85E-07	1.43E-07	-6.35E-05
EP-terrestrial	mol N eq	3.3E-03	7.66E-06	8.21E-05	0	3.17E-06	2.89E-06	-6.72E-04
POCP	kg NMVOC eq	1.01E-03	1.95E-06	1.65E-05	0	8.05E-07	3.95E-07	-2.29E-04
ADPE	kg Sb eq	1.29E-04	6.49E-11	2.63E-10	0	2.68E-11	2.46E-11	-2.07E-05
ADPF	MJ	5.07E+00	3.07E-02	2.45E-02	0	1.27E-02	1.65E-03	-1.19E+00
WDP	m^3 world eq deprived	2.23E-01	4.24E-06	8.42E-03	0	1.75E-06	3.64E-04	-4.07E-02

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

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 piece, Double cylinder - star cross, star, 20 and 8

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	D
PERE	MJ	1.3E+01	9.68E-05	4.73E-01	0	4E-05	4.29E-04	-1.63E-01
PERM	MJ	4.68E-01	0	-4.68E-01	0	0	0	0
PERT	MJ	1.35E+01	9.68E-05	5.01E-03	0	4E-05	4.29E-04	-1.63E-01
PENRE	MJ	4.77E+00	3.07E-02	2.83E-01	0	1.27E-02	4.82E-02	-1.19E+00
PENRM	MJ	3.05E-01	0	-2.58E-01	0	0	-4.66E-02	0
PENRT	MJ	5.08E+00	3.07E-02	2.45E-02	0	1.27E-02	1.65E-03	-1.19E+00
SM	kg	1.93E-01	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m^3	5.24E-03	1.74E-07	1.99E-04	0	7.17E-08	8.71E-06	-9.36E-04

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: 1 piece, Double cylinder - star cross, star, 20 and 8

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	D
HWD	kg	3.89E-08	2.98E-12	5.27E-11	0	1.23E-12	6.29E-12	-2.56E-08
NHWD	kg	8.28E-02	3.14E-06	3.32E-03	0	1.3E-06	3.7E-04	-2.02E-02
RWD	kg	2.51E-04	3.3E-08	1.18E-06	0	1.36E-08	6.12E-08	-2.62E-05

CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	2.13E-01	0
MER	kg	0	0	0	0	0	0	0
EEE	MJ	7.94E-02	0	1.12E-01	0	0	0	0
EET	MJ	1.44E-01	0	2.17E-01	0	0	0	0

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

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 piece, Double cylinder - star cross, star, 20 and 8

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	D
PM	Disease incidence	2.96E-08	1.14E-11	1.2E-10	0	4.7E-12	8.08E-12	-8.67E-09
IR	kBq U235 eq	3.73E-02	4.71E-06	1.66E-04	0	1.95E-06	5.52E-06	-5.38E-03
ETP-fw	CTUe	3.71E+00	2.18E-02	1.09E-02	0	8.99E-03	6.19E-04	-5.23E-01
HTP-c	CTUh	5.01E-09	4.09E-13	6.68E-13	0	1.69E-13	5.36E-14	-5.93E-11
HTP-nc	CTUh	1.38E-08	1.75E-11	4.22E-11	0	7.23E-12	5.43E-12	-2.94E-09
SQP	SQP	9.5E+00	7.89E-05	6.75E-03	0	3.26E-05	4.94E-04	-5.64E-01

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

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor 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 “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

References

DIN EN 1303: 2015-08
Building Hardware - Cylinders for locks - Requirements and test methods

DIN 18252: 2018-05
Profile cylinders for door locks – Terminology, dimensions, requirements, test methods and marking

EN 15804:2019+A2
EN 15804:2019+A2 (in press), Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

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

Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH)
Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH).

Restriction of Hazardous Substances (RoHS)
Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), Directive (EU) No 2011/65.

Further References

IBU
Institut Bauen und Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V. Version 1., Berlin: Institut Bauen und Umwelt e.V., 2016. www.ibu-epd.com

GaBi ts software
Sphera Solutions GmbH Gabi Software System and Database for Life Cycle Engineering 1992-2020 Version 10.0.0.71 University of Stuttgart Leinfelden-Echterdingen

GaBi ts documentation

GaBi life cycle inventory data documentation (https://www.gabi-software.com/support/gabi/gabidatabase- 2020-lci-documentation/).

LCA-tool dormakaba
LCA tool, version 1.0.
Developed by Sphera Solutions GmbH

PCR Part A
PCR – Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Re-port according to EN 15804+A2:2019, Version 1.0, Institut Bauen und Umwelt e.V., www.ibu-epd.com.

PCR Part B
PCR – Part B: Requirements on the EPD for Electronic and physical Access Control Systems , version 1.2, Institut Bauen und Umwelt e.V., www.ibu-epd.com, 2017.
The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

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