

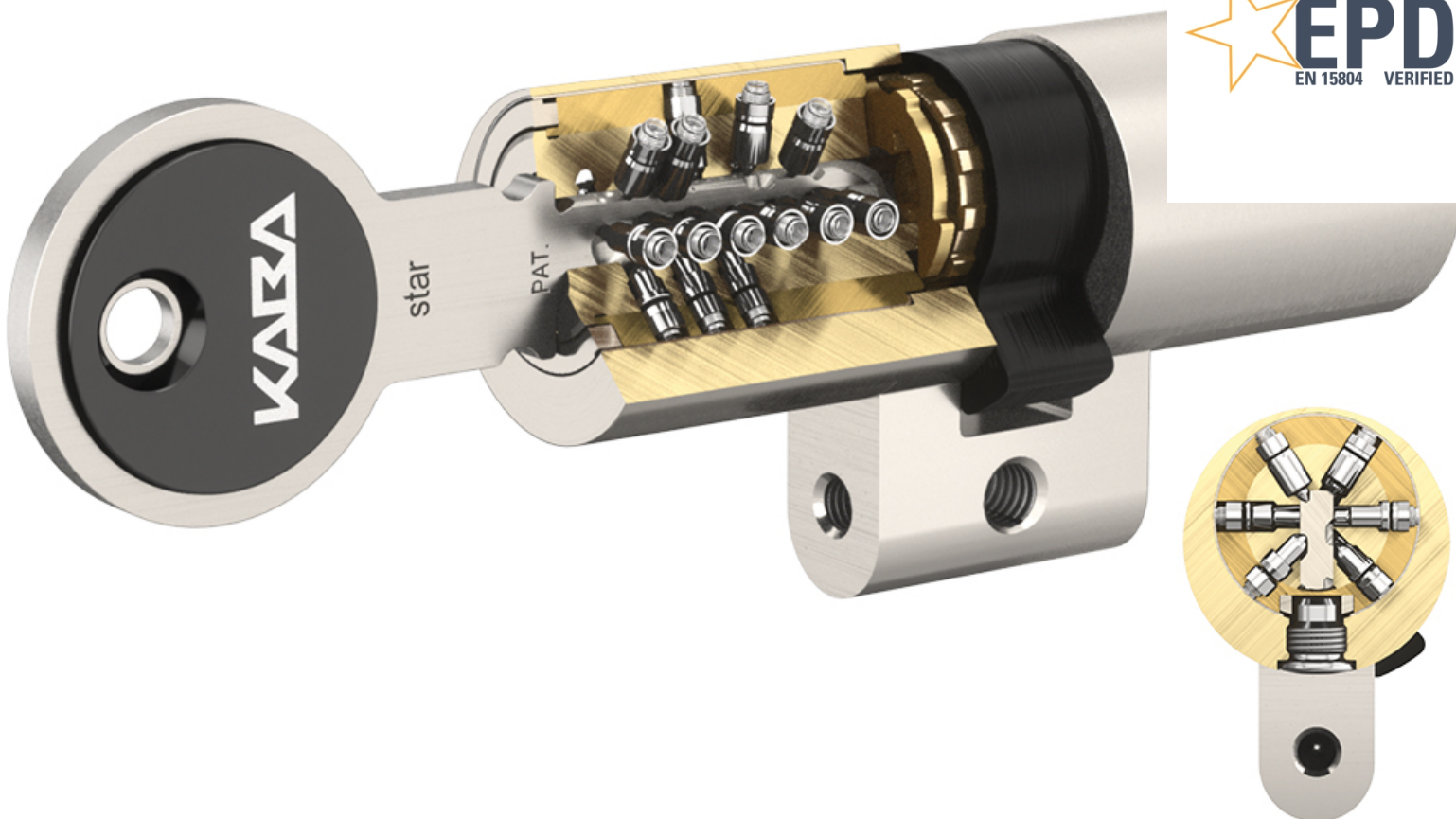
ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

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)
Declaration number	EPD-DOR-20210151-CBA1-EN
Issue date	29.06.2021
Valid to	28.06.2026

Double cylinder – star cross, star, 20 and 8 dormakaba

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General Information

<p>dormakaba</p> <hr/> <p>Programme holder IBU – Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany</p> <hr/> <p>Declaration number EPD-DOR-20210151-CBA1-EN</p> <hr/> <p>This declaration is based on the product category rules: Building Hardware products, 11.2017 (PCR checked and approved by the SVR)</p> <hr/> <p>Issue date 29.06.2021</p> <hr/> <p>Valid to 28.06.2026</p> <hr/> <p> Dipl. Ing. Hans Peters (chairman of Institut Bauen und Umwelt e.V.)</p> <hr/> <p> Dr. Alexander Röder (Managing Director Institut Bauen und Umwelt e.V.)</p>	<p>Double cylinder - star cross, star, 20 and 8</p> <hr/> <p>Owner of the declaration dormakaba International Holding AG Hofwisenstr. 24 CH--8153 Rümlang Switzerland</p> <hr/> <p>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</p> <hr/> <p>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 manufactured 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).</p> <p>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 <i>EN 15804+A2</i>. In the following, the standard will be simplified as <i>EN 15804</i>.</p> <hr/> <p>Verification</p> <table border="1"> <tr> <td colspan="2">The standard <i>EN 15804</i> serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and data according to <i>ISO 14025:2010</i></td> </tr> <tr> <td><input type="checkbox"/> internally</td> <td><input checked="" type="checkbox"/> externally</td> </tr> </table> <hr/> <p> Dr.-Ing. Wolfram Trinius (Independent verifier)</p>	The standard <i>EN 15804</i> serves as the core PCR		Independent verification of the declaration and data according to <i>ISO 14025:2010</i>		<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally
The standard <i>EN 15804</i> serves as the core PCR							
Independent verification of the declaration and data according to <i>ISO 14025:2010</i>							
<input type="checkbox"/> internally	<input checked="" type="checkbox"/> externally						

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

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 in large 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.

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

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>.

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/prod uct
Conversion factor to 1 kg (mass of declared unit)	0.259	-

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.

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**

**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

End of life (C1-C4)

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

Name	Value	Unit
Collected separately	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	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	ND	X

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

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	D
GWP-total	[kg CO ₂ -Eq.]	3.82E-1	2.26E-3	7.05E-2	0.00E+0	9.36E-4	3.56E-3	-1.03E-1
GWP-fossil	[kg CO ₂ -Eq.]	3.92E-1	2.16E-3	1.66E-2	0.00E+0	8.94E-4	3.56E-3	-1.03E-1
GWP-biogenic	[kg CO ₂ -Eq.]	-1.02E-2	1.00E-4	5.39E-2	0.00E+0	4.13E-5	8.29E-8	2.24E-4
GWP-luluc	[kg CO ₂ -Eq.]	6.64E-4	5.15E-8	1.77E-6	0.00E+0	2.13E-8	2.01E-7	-1.56E-4
ODP	[kg CFC11-Eq.]	1.58E-12	2.29E-19	1.77E-17	0.00E+0	9.44E-20	1.79E-18	-4.48E-16
AP	[mol H ⁺ -Eq.]	3.47E-3	2.17E-6	1.82E-5	0.00E+0	8.95E-7	6.33E-7	-9.21E-4
EP-freshwater	[kg PO ₄ -Eq.]	1.61E-6	4.63E-10	3.18E-9	0.00E+0	1.91E-10	2.86E-10	-5.90E-8
EP-marine	[kg N-Eq.]	3.09E-4	6.89E-7	6.20E-6	0.00E+0	2.85E-7	1.43E-7	-6.35E-5
EP-terrestrial	[mol N-Eq.]	3.30E-3	7.66E-6	8.21E-5	0.00E+0	3.17E-6	2.89E-6	-6.72E-4
POCP	[kg NMVOC-Eq.]	1.01E-3	1.95E-6	1.65E-5	0.00E+0	8.05E-7	3.95E-7	-2.29E-4
ADPE	[kg Sb-Eq.]	1.29E-4	6.49E-11	2.63E-10	0.00E+0	2.68E-11	2.46E-11	-2.07E-5
ADPF	[MJ]	5.07E+0	3.07E-2	2.45E-2	0.00E+0	1.27E-2	1.65E-3	-1.19E+0
WDP	[m ³ world-Eq deprived]	2.23E-1	4.24E-6	8.42E-3	0.00E+0	1.75E-6	3.64E-4	-4.07E-2

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

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	D
PERE	[MJ]	1.30E+1	9.68E-5	4.73E-1	0.00E+0	4.00E-5	4.29E-4	-1.63E-1
PERM	[MJ]	4.68E-1	0.00E+0	-4.68E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	1.35E+1	9.68E-5	5.01E-3	0.00E+0	4.00E-5	4.29E-4	-1.63E-1
PENRE	[MJ]	4.77E+0	3.07E-2	2.83E-1	0.00E+0	1.27E-2	4.82E-2	-1.19E+0
PENRM	[MJ]	3.05E-1	0.00E+0	-2.58E-1	0.00E+0	0.00E+0	-4.66E-2	0.00E+0
PENRT	[MJ]	5.08E+0	3.07E-2	2.45E-2	0.00E+0	1.27E-2	1.65E-3	-1.19E+0
SM	[kg]	1.93E-1	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
NRSF	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	[m ³]	5.24E-3	1.74E-7	1.99E-4	0.00E+0	7.17E-8	8.71E-6	-9.36E-4

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

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	D
HWD	[kg]	3.89E-8	2.98E-12	5.27E-11	0.00E+0	1.23E-12	6.29E-12	-2.56E-8
NHWD	[kg]	8.28E-2	3.14E-6	3.32E-3	0.00E+0	1.30E-6	3.70E-4	-2.02E-2
RWD	[kg]	2.51E-4	3.30E-8	1.18E-6	0.00E+0	1.36E-8	6.12E-8	-2.62E-5
CRU	[kg]	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	0.00E+0	0.00E+0	2.13E-1	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
EEE	[MJ]	7.94E-2	0.00E+0	1.12E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	1.44E-1	0.00E+0	2.17E-1	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

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

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	D
PM	[Disease Incidence]	2.96E-8	1.14E-11	1.20E-10	0.00E+0	4.70E-12	8.08E-12	-8.67E-9
IR	[kBq U235-Eq.]	3.73E-2	4.71E-6	1.66E-4	0.00E+0	1.95E-6	5.52E-6	-5.38E-3
ETP-fw	[CTUe]	3.71E+0	2.18E-2	1.09E-2	0.00E+0	8.99E-3	6.19E-4	-5.23E-1
HTP-c	[CTUh]	5.01E-9	4.09E-13	6.68E-13	0.00E+0	1.69E-13	5.36E-14	-5.93E-11
HTP-nc	[CTUh]	1.38E-8	1.75E-11	4.22E-11	0.00E+0	7.23E-12	5.43E-12	-2.94E-9
SQP	[-]	9.50E+0	7.89E-5	6.75E-3	0.00E+0	3.26E-5	4.94E-4	-5.64E-1
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.

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.

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