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)
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Valid to	30.09.2027

Reversible Single Cylinder - ace JP, ace APAC

dormakaba

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General Information

dormakaba

Programme holder

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Declaration number

EPD-DOR-20210232-CBC2-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

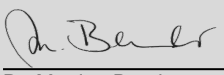
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Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)



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

Reversible Single Cylinder - ace JP, ace APAC

Owner of the declaration

dormakaba International Holding GmbH
DORMA Platz 1
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Declared product / declared unit

1 piece of the product: ace JP mechanical key system, consisting of the following items:
- one (1) ace JP single cylinder
- three (3) ace reversible key
- one (1) user manual
- packaging

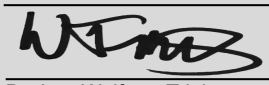
Scope:

This declaration is a specific product declaration for the ace JP single cylinder including three keys. This Environmental Product Declaration is also representative for the system ace APAC. The underlying life cycle assessment is based on the entire life cycle of this specific mechanical key system. Data represents the year 2021. The products are manufactured at the dormakaba production facilities Wah Yuet in Hong Kong (China).
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*.

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

ace JP is patented, reversible master key system representing the premium segment. The patent offers legal protection against commercial imitation. Duplicate keys are only made by dormakaba itself or by authorized partners and requires identification by means of a security card.

While ace JP is an in-house system that is exclusively manufactured in our factories, ace APAC is a partner system that can also be assembled by authorized dealers.
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:

All systems are classified according to the European locking cylinder standards *EN1303* and *DIN18252*.

dormakaba mechanical cylinders fulfill the material requirements given within the Directive *RoHS 2011/65/EU.* In addition, cylinders are fire protection tested according to *EN 1634-1* and *EN 1634-2.*

Application

The dormakaba reversible cylinder ace JP and ace APAC can be used in both residential as well as in the commercial segment in small and simple as well as in large and complex applications, thanks to its versatility. Nearly limitless application options are possible.

Technical Data

ace JP is a high-performance locking system, which fulfils even the most challenging requirements. The system offers exceptional security thanks to:

- Three rows of pins with up to 16 simultaneously usable pin positions.
- Pins that make contact with the key are manufactured from wear-resistant hardened steel.

Delivery status:

The declared ace JP, mechanical master key system including cylinder, key, packaging and service instruction will be supplied with a weight of 0,279 kg.

Base materials/Ancillary materials

For the main product components, the ace JP single cylinder and three reversible keys the composition of the product is the following. Same product composition applies for ace APAC:

Name	Value	Unit
Zinc	62	%
Brass	17	%
Nickel Silver	12	%
Steel	7	%
Plastic	2	%

The cylinders and keys 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 10-15 years, depending on the application and frequency of use. The cylinders are tested to 100,000 locking cycles minimum *(EN1303)*. This corresponds to approximately 18 locking cycles per day for 15 years.

LCA: Calculation rules

Declared Unit

The declared unit is 1 piece of the product: ace JP

Declared unit

Name	Value	Unit
Declared unit	1	piece/product
Conversion factor to 1 kg	3.58	-
conversion factor	-	-
Mass of declared product including packaging	0.279	kg

System boundary

The type of EPD is according to EN 15804:
"cradle to gate with options, modules C1–C4, and module D".
The following modules are declared: A1-A3, C1-C4, 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: China

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, SP40*.

LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in accompanying packaging	0.01	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

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 (truck)	900	km
Transport distance (ship)	3822	km
Capacity utilisation (including empty runs) average	51	%

Numbers reflect the average transport distances per cylinder.

Installation into the building (A5)

Name	Value	Unit
Waste packaging (paper)	0,02057	kg
Waste packaging (plastic)	0,00494	kg

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	0.254	kg
Recycling	0.249	kg
Energy recovery	0.00441	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; MND = 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	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 piece, Reversible Single Cylinder - ace JP, ace APAC

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	1.16E+00	6E-02	4.2E-02	0	1E-03	1.1E-02	0	-6.71E-01
GWP-fossil	kg CO_2 eq	1.19E+00	5.7E-02	1.3E-02	0	1E-03	1.1E-02	0	-6.69E-01
GWP-biogenic	kg CO_2 eq	-3.05E-02	2E-03	2.8E-02	0	4.9E-05	2.61E-07	0	-8.19E-04
GWP-luluc	kg CO_2 eq	1.1E-03	1.35E-06	1.19E-06	0	2.52E-08	6.34E-07	0	-6.43E-04
ODP	kg CFC11 eq	2.37E-13	6.01E-18	1.16E-17	0	1.12E-19	5.65E-18	0	-3.17E-15
AP	mol H^+ eq	6.25E-03	1.79E-04	1.04E-05	0	1.06E-06	2E-06	0	-5E-03
EP-freshwater	kg P eq	3.27E-06	1.23E-08	2.04E-09	0	2.27E-10	9.02E-10	0	-1.65E-06
EP-marine	kg N eq	1.2E-03	4.94E-05	3.45E-06	0	3.38E-07	4.5E-07	0	-4.59E-04
EP-terrestrial	mol N eq	1.36E-02	5.45E-04	4.7E-05	0	3.75E-06	9.09E-06	0	-5E-03
POCP	kg NMVOC eq	4.18E-03	1.4E-04	9.21E-06	0	9.55E-07	1.25E-06	0	-2E-03
ADPE	kg Sb eq	7.13E-04	1.7E-09	1.7E-10	0	3.18E-11	7.75E-11	0	-3.09E-04
ADPF	MJ	1.7E+01	8.05E-01	1.5E-02	0	1.5E-02	5E-03	0	-8.19E+00
WDP	m^3 world eq deprived	3.94E-01	1.12E-04	5E-03	0	2.08E-06	1E-03	0	-1.96E-01

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, Reversible Single Cylinder - ace JP, ace APAC

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	4.78E+00	3E-03	2.5E-01	0	4.74E-05	1E-03	0	-1.68E+00
PERM	MJ	2.47E-01	0	-2.47E-01	0	0	0	0	0
PERT	MJ	5.03E+00	3E-03	3E-03	0	4.74E-05	1E-03	0	-1.68E+00
PENRE	MJ	1.66E+01	8.06E-01	2.27E-01	0	1.5E-02	1.95E-01	0	-8.2E+00
PENRM	MJ	4.02E-01	0	-2.12E-01	0	0	-1.9E-01	0	0
PENRT	MJ	1.7E+01	8.06E-01	1.5E-02	0	1.5E-02	5E-03	0	-8.2E+00
SM	kg	5.4E-02	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	8.59E-03	4.57E-06	1.16E-04	0	8.5E-08	2.74E-05	0	-5E-03

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, Reversible Single Cylinder - ace JP, ace APAC

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2.73E-08	7.82E-11	3.58E-11	0	1.46E-12	1.98E-11	0	-2.26E-07
NHWD	kg	1.29E-01	8.24E-05	2E-03	0	1.54E-06	1E-03	0	-2.9E-02
RWD	kg	1E-03	8.67E-07	7E-07	0	1.62E-08	1.93E-07	0	-3.6E-04
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	2.49E-01	0	0
MER	kg	0	0	0	0	0	0	0	0

EEE	MJ	3.02E-04	0	6.7E-02	0	0	0	0	0
EET	MJ	5.48E-04	0	1.33E-01	0	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, Reversible Single Cylinder - ace JP, ace APAC

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	5.52E-08	2.47E-09	7.38E-11	0	5.58E-12	2.55E-11	0	-5.1E-08
IR	kBq U235 eq	1.06E-01	1.24E-04	9.44E-05	0	2.31E-06	1.74E-05	0	-4.1E-02
ETP-fw	CTUe	1.04E+01	5.71E-01	7E-03	0	1.1E-02	2E-03	0	-4.32E+00
HTP-c	CTUh	8.94E-09	1.07E-11	4.2E-13	0	2E-13	1.69E-13	0	1.95E-09
HTP-nc	CTUh	8.7E-08	4.61E-10	2.92E-11	0	8.57E-12	1.71E-11	0	2.34E-07
SQP	SQP	8.71E+00	2E-03	4E-03	0	3.86E-05	2E-03	0	-1.67E+00

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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, 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 as there is limited experience with the indicator.

References

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

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

DIN EN 1634-1
DIN EN 1634-1:2018, Fire resistance and smoke control tests for door and shutter assemblies, openable windows and elements of building hardware

DIN EN 1634-2
DIN EN 1634-2:2009, Fire resistance and smoke control tests for door, shutter and openable window assemblies and elements of building hardware

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

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

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

RoHS 2011/65/EU
RoHS 2011/65/EU, Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

European Chemicals Agency (ECHA)
https://echa.europa.eu/de/

Further References

IBU
Institut Bauen und Umwelt e.V.:
General Instructions for the EPD Programme of Institut Bauen und Umwelt e.V. Version 2.0., Berlin: Institut Bauen und Umwelt e.V., 2021.
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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