ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	dormakaba International Holding GmbH
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-DOR-20210232-CBC1-EN
Issue date	01.10.2021
Valid to	30.09.2026

Reversible Single Cylinder
ace JP, ace APAC
dormakaba

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General Information

dormakaba	**Reversible Single Cylinder - ace JP, ace APAC**

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Owner of the declaration
dormakaba International Holding GmbH
DORMA Platz 1
58256 Ennepetal
Germany

Declaration number
EPD-DOR-20210232-CBC1-EN

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

This declaration is based on the product category rules:
Building Hardware products, 11.2017
(PCR checked and approved by the SVR)

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).

Issue date
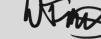01.10.2021

Valid to
30.09.2026

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 14025:2010*

☐ internally	☒ externally

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

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

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 cylinder comply with the EU regulatory *RoHS 2011/65/EU*. In addition, cylinders are

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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/Declared Unit]	-	-
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.

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.

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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	0.01	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 (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	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; 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	X	X

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

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO$_2$-Eq.]	1.16E+0	6.00E-2	4.20E-2	0.00E+0	1.00E-3	1.10E-2	0.00E+0	-6.71E-1
GWP-fossil	[kg CO$_2$-Eq.]	1.19E+0	5.70E-2	1.30E-2	0.00E+0	1.00E-3	1.10E-2	0.00E+0	-6.69E-1
GWP-biogenic	[kg CO$_2$-Eq.]	-3.05E-2	2.00E-3	2.80E-2	0.00E+0	4.90E-5	2.61E-7	0.00E+0	-8.19E-4
GWP-luluc	[kg CO$_2$-Eq.]	1.10E-3	1.35E-6	1.19E-6	0.00E+0	2.52E-8	6.34E-7	0.00E+0	-6.43E-4
ODP	[kg CFC11-Eq.]	2.37E-13	6.01E-18	1.16E-17	0.00E+0	1.12E-19	5.65E-18	0.00E+0	-3.17E-15
AP	[mol H$^+$-Eq.]	6.25E-3	1.79E-4	1.04E-5	0.00E+0	1.06E-6	2.00E-6	0.00E+0	-5.00E-3
EP-freshwater	[kg PO$_4$-Eq.]	3.27E-6	1.23E-8	2.04E-9	0.00E+0	2.27E-10	9.02E-10	0.00E+0	-1.65E-6
EP-marine	[kg N-Eq.]	1.20E-3	4.94E-5	3.45E-6	0.00E+0	3.38E-7	4.50E-7	0.00E+0	-4.59E-4
EP-terrestrial	[mol N-Eq.]	1.36E-2	5.45E-4	4.70E-5	0.00E+0	3.75E-6	9.09E-6	0.00E+0	-5.00E-3
POCP	[kg NMVOC-Eq.]	4.18E-3	1.40E-4	9.21E-6	0.00E+0	9.55E-7	1.25E-6	0.00E+0	-2.00E-3
ADPE	[kg Sb-Eq.]	7.13E-4	1.70E-9	1.70E-10	0.00E+0	3.18E-11	7.75E-11	0.00E+0	-3.09E-4
ADPF	[MJ]	1.70E+1	8.05E-1	1.50E-2	0.00E+0	1.50E-2	5.00E-3	0.00E+0	-8.19E+0
WDP	[m³ world-Eq deprived]	3.94E-1	1.12E-4	5.00E-3	0.00E+0	2.08E-6	1.00E-3	0.00E+0	-1.96E-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: 1 piece, Reversible Single Cylinder - ace JP, ace APAC

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	4.78E+0	3.00E-3	2.50E-1	0.00E+0	4.74E-5	1.00E-3	0.00E+0	-1.68E+0
PERM	[MJ]	2.47E-1	0.00E+0	-2.47E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	[MJ]	5.03E+0	3.00E-3	3.00E-3	0.00E+0	4.74E-5	1.00E-3	0.00E+0	-1.68E+0
PENRE	[MJ]	1.66E+1	8.06E-1	2.27E-1	0.00E+0	1.50E-2	1.95E-1	0.00E+0	-8.20E+0
PENRM	[MJ]	4.02E-1	0.00E+0	-2.12E-1	0.00E+0	0.00E+0	-1.90E-1	0.00E+0	0.00E+0
PENRT	[MJ]	1.70E+1	8.06E-1	1.50E-2	0.00E+0	1.50E-2	5.00E-3	0.00E+0	-8.20E+0
SM	[kg]	5.40E-2	0.00E+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
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
FW	[m³]	8.59E-3	4.57E-6	1.16E-4	0.00E+0	8.50E-8	2.74E-5	0.00E+0	-5.00E-3

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, Reversible Single Cylinder - ace JP, ace APAC

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	2.73E-8	7.82E-11	3.58E-11	0.00E+0	1.46E-12	1.98E-11	0.00E+0	-2.26E-7
NHWD	[kg]	1.29E-1	8.24E-5	2.00E-3	0.00E+0	1.54E-6	1.00E-3	0.00E+0	-2.90E-2
RWD	[kg]	1.00E-3	8.67E-7	7.00E-7	0.00E+0	1.62E-8	1.93E-7	0.00E+0	-3.60E-4
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
MFR	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	2.49E-1	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
EEE	[MJ]	3.02E-4	0.00E+0	6.70E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	[MJ]	5.48E-4	0.00E+0	1.33E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

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

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

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1 piece, Reversible Single Cylinder - ace JP, ace APAC

Indicator	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	5.52E-8	2.47E-9	7.38E-11	0.00E+0	5.58E-12	2.55E-11	0.00E+0	-5.10E-8
IR	[kBq U235-Eq.]	1.06E-1	1.24E-4	9.44E-5	0.00E+0	2.31E-6	1.74E-5	0.00E+0	-4.10E-2
ETP-fw	[CTUe]	1.04E+1	5.71E-1	7.00E-3	0.00E+0	1.10E-2	2.00E-3	0.00E+0	-4.32E+0
HTP-c	[CTUh]	8.94E-9	1.07E-11	4.20E-13	0.00E+0	2.00E-13	1.69E-13	0.00E+0	1.95E-9
HTP-nc	[CTUh]	8.70E-8	4.61E-10	2.92E-11	0.00E+0	8.57E-12	1.71E-11	0.00E+0	2.34E-7
SQP	[-]	8.71E+0	2.00E-3	4.00E-3	0.00E+0	3.86E-5	2.00E-3	0.00E+0	-1.67E+0
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 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.

Environmental Product Declaration dormakaba – Reversible Single Cylinder - ace JP, ace APAC