ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	**ASSA ABLOY**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASA-20150100-IBA1-EN
Issue date	30.04.2015
Valid to	29.04.2020

TrioVing – Triton Scandinavian Oval

ASSA ABLOY

Institut Bauen und Umwelt e.V.

www.bau-umwelt.com / https://epd-online.com

1. General Information

ASSA ABLOY	TrioVing - Triton Scandinavian oval
Programme holder IBU - Institut Bauen und Umwelt e.V. Panoramastr. 1 10178 Berlin Germany	**Owner of the Declaration** TrioVing a.s Anolitveien 1-3 N-1400 Ski, Norway
Declaration number EPD-ASA-20150100-IBA1-EN	**Declared product / Declared unit** The declaration represents 1 mechanical cylinder – TrioVing - Triton Scandinavian oval.
This Declaration is based on the Product Category Rules: Locks and fittings, 07.2014 (PCR tested and approved by the independent expert committee (SVA))	**Scope:** This declaration and its LCA study are relevant to Triton Scandinavian oval mechanical cylinders. The primary manufacturing processes are made by external suppliers and the final manufacturing processes and assembly occur at the manufacturing factory in Ski, Norway. 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.
Issue date 30.04.2015	
Valid to 29.04.2020	**Verification** The CEN Standard EN 15804 serves as the core PCR Independent verification of the declaration according to ISO 14025 ☐ internally ☒ externally
Prof. Dr.-Ing. Horst J. Bossenmayer (President of Institut Bauen und Umwelt e.V.)	
Dr.-Ing. Burkhart Lehmann (Managing Director IBU)	Dr. Wolfram Trinius (Independent verifier appointed by SVA)

2. Product

2.1 Product description

Product name: TrioVing - Triton Scandinavian oval
Product characteristic:
With patented features combined with precision engineering and electromechanical compatibility with CLIQ technology, the Triton is unrivalled in its class.

- High security.
- Resistant to picking.
- Resistant to bumping.
- Case-hardened drill-resistant inserts.
- Patented keys and cylinder mechanism.
- Double layer of security with topcode and sidecode mechanism.
- Paracentric profile for increased anti-picking protection.
- 2.8 mm thick keys made from hard-wearing nickel silver.
- 15 billion usable differs available per key profile.

2.2 Application

Triton Scandinavian oval mechanical cylinders are ideal for a wide range of applications – all from private to commercial and public sectors, for all types of doors:

- Fits in all modern Scandinavian lockcases including Evolution-Modul 50 and 51-series.
- For internal and external use.

2.3 Technical Data

For the declared product, the following technical data in the delivery status must be provided with reference to the test standard:

Technical data

Parameter	Value	Unit
W*H*D or W*H*L	35.0x34.8x20.0	mm
Weight	0.117	Kg

2.4 Placing on the market / Application rules

Cylinders are rated according to European standard EN 1303. The rating for Triton Scandinavian oval cylinder are:
a - b - c - d - e - f - g - h
1 - 6 - 0 - 1 - 0 - C - 6 - 2

where:

a - Category of use: small chance to misuse
b - Durability: number of test cycles 100,000 (highest requirements)
c - Door mass: no requirement

d - Fire resistance: 1, Triton Scandinavian Oval offers fire resistance
e - Safety: no requirement
f - Corrosion resistance and temp.: EN 1670 grade 3 / -20…+80 °C
g - Key related security: grade 6 (highest requirements)
h - Attack resistance: grade 2 (highest requirement)

2.5 Delivery status
Mechanical cylinders are delivered as separate in a box size - 110 mm x 82 mm x 55 mm.

2.6 Base materials / Ancillary materials
The primary product components and/or materials must be indicated as a percentage mass to enable the user of the EPD to understand the composition of the product in delivery status.
The average composition for Triton Scandinavian oval is as following:

Component	Percentage in mass (%)
Brass	95.85
Stainless Steel	3.08
Steel	1.07
Total	100.0

2.7 Manufacture
The primary manufacturing processes are made by Tier 1 suppliers in Rychnov, Czech Republic. The final manufacturing processes and assembly occur in the factory in Ski, Norway.
The components come from processes like machined brass and hardened steel.

The factory in Ski has a certification of Quality Management system in accordance with ISO 9001:2008.

2.8 Environment and health during manufacturing
ASSA ABLOY is committed to producing and distributing door opening solutions with minimal environmental impact, where health & safety is the primary focus for all employees and associates.
• Environmental operations, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met and Environment Management program effectiveness is evaluated.
• Code of Conduct covers human rights, labor practices and decent work. Management of ASSA ABLOY is aware of their environmental roles and responsibilities, providing appropriate training, supporting accountability and recognizing outstanding performance.
• The factory of Czech Republic has certification of Environmental Management to ISO 14001:2004.
• The assembly site in Ski has certification of Environmental Management to ISO 14001:2004.
• Any waste metals during machining are separated and recycled. All manufacturing waste in minimized and appropriately treated to ensure minimal environmental impact.

2.9 Product processing / Installation
Triton Scandinavian oval mechanical cylinders are distributed through and installed by trained installation technicians, such as locksmiths, carpenters etc. adhering to local/national standards and requirements. It can also be installed by the end user.

2.10 Packaging
Triton Scandinavian oval mechanical cylinders are packed in a cardboard box with corrugated carton inlays. The packaging is fully recyclable. Separate package with dimensions: 110 mm x 82 mm x 55 mm, weighing up to 0.026 kilos.

Material	Value (%)
Cardboard/paper	100
Plastic	0
Total	100.0

2.11 Condition of use
To maintain low friction, a bi-annual maintenance, <1g of oil according to the manufacturers standard, should be added inside the cylinder through the profile. Mechanical cylinders can be replaced or upgraded.

2.12 Environment and health during use
There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

2.13 Reference service life
Approved for 100.000 cycles under normal working conditions, 10 years depending on cycle frequency.

2.14 Extraordinary effects

Fire
Suitable for use in fire and smoke doors (EN 1303).

Water
Contain no substances that have any impact on water in case of flood.

Mechanical destruction
No danger to the environment can be anticipated during mechanical destruction.

2.15 Re-use phase
The product is possible to re-use during the reference service life and be moved from one door to another. The majority, of components are brass and steel, which can be recycled. The locks can be mechanically disassembled to separate the different materials. 100% of the materials used are recyclable.

2.16 Disposal
All parts of product can be recycled.

2.17 Further information
TrioVing A/S
Anolitveien 1-3
1400 Ski, Norway
Phone: +47 69 24 52 00
www.trioving.no

3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of mechanical cylinder Triton Scandinavian round as specified in Part B requirements on the EPD for PCR Locks and fittings: (mechanical & electromechanical locks & fittings).

Declared unit

Name	Value	Unit
Declared unit	1	piece
Mass	0.156	kg
Conversion factor to 1 kg	6.41	-

3.2 System boundary

Type of the EPD: cradle to gate - with options
The following life cycle phases were considered:

Production stage:

- A1 – Raw material extraction and processing
- A2 – Transport to the manufacturer and
- A3 – Manufacturing

Construction stage:

- A4 – Transport from the gate to the site
- A5 – Packaging waste processing

End-of-life stage:

- C2 – Transport to waste processing

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.

- D - Declaration of all benefits or recycling potential from EOL and A5.

3.3 Estimates and assumptions

Transport:
For parts and materials, contributing less than 2% to the total product mass, distances of 500 km and road transport was assumed.

EoL:
In the End-of-Life phase, for all the materials which can be recycled, a recycling scenario with 100% collection rate was assumed.

3.4 Cut-off criteria

In the assessment, all available data from production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), thermal energy consumption and electric power consumption - including material and energy flows contributing less than 1% of mass or energy (if available).

In case a specific flow contributing less than 1% in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts.

Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

3.5 Background data

For life cycle modeling of the considered products, the GaBi 6 Software System for Life Cycle Engineering, developed by PE INTERNATIONAL AG, is used /GaBi 6 2013/. The GaBi-database contains consistent and documented datasets which are documented in the online GaBi-documentation /GaBi 6 2013D/.
To ensure comparability of results in the LCA, the basic data of GaBi database were used for energy, transportation and auxiliary materials.

3.6 Data quality

The requirements for data quality and background data correspond to the specifications of the /IBU PCR PART A/.
PE INTERNATIONAL performed a variety of tests and checks during the entire project to ensure high quality of the completed project. This obviously includes an extensive review of project-specific LCA models as well as the background data used.
The technological background of the collected data reflects the physical reality of the declared products. The datasets are complete and conform to the system boundaries and the criteria for the exclusion of inputs and outputs.
All relevant background datasets are taken from the GaBi 6 software database. The last revision of the used background data has taken place not longer than 10 years ago.

3.7 Period under review

The period under review is 2013/14 (12 month average).

3.8 Allocation

Regarding incineration, the software model for the waste incineration plant (WIP) is adapted according to the material composition and heating value of the combusted material. In this EPD, the following specific life cycle inventories for the WIP are considered for:

- Waste incineration of paper from packaging

Regarding the recycling material of metals, the metal parts in the EoL are declared as end-of-waste status. Thus, these materials are considered in module D. Specific information on allocation within the background data is given in the GaBi dataset documentation.

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.

4. LCA: Scenarios and additional technical information

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site (Paper packaging)	0,026	kg

Reference service life

Name	Value	Unit
Reference service life	10	a

End of life (C1-C4)

Name	Value	Unit
Collected separately Brass, StainlessSteel, Steel	0.156	kg
Collected as mixed construction waste	0	kg
Reuse Plastic	0	kg
Recycling Brass, Stainless steel, Steel	0.152	kg
Landfilling others	0.0042	kg

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

Name	Value	Unit
Collected separately waste type (without packaging)	0.156	kg
Recycling Brass	95.85	%
Recycling StainlessSteel	3.08	%
Recycling Steel	1.07	%

5. LCA: Results

Results shown below were calculated using CML2001 – Apr. 2013 Methodology.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement[1)]	Refurbishment[1)]	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	MND	MND	MND	MND	MND	MND	X	MND	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of mechanical cylinder TRIOVING Triton Scandinavian oval

Parameter	Parameter	Unit	A1-A3	A4	A5	C2	D
GWP	Global warming potential	[kg CO_2-Eq.]	3.7E-01	2.7E-03	3.7E-02	4.3E-03	-7.8E-02
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.4E-11	1.4E-12	1.7E-13	2.1E-14	-1.1E-11
AP	Acidification potential of land and water	[kg SO_2-Eq.]	2.8E-03	1.2E-05	8.4E-06	2.0E-05	-4.8E-04
EP	Eutrophication potential	[kg $(PO_4)^{3-}$- Eq.]	1.7E-04	1.0E-06	1.5E-06	4.5E-06	-3.2E-05
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	1.5E-04	7.5E-07	6.0E-07	-6.4E-06	-3.2E-05
ADPE	Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	1.6E-04	3.2E-10	6.7E-10	1.6E-10	-6.4E-05
ADPF	Abiotic depletion potential for fossil resources	[MJ]	4.8E+00	3.9E-02	1.0E-02	6.0E-02	-9.7E-01

RESULTS OF THE LCA - RESOURCE USE: 1 piece of mechanical cylinder TRIOVING Triton Scandinavian oval

Parameter	Parameter	Unit	A1-A3	A4	A5	C2	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.2E+00	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.0E+00	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.2E+00	6.9E-03	9.6E-04	2.4E-03	-6.9E-02
PENRE	Non renewable primary energy as energy carrier	[MJ]	6.0E+00	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.0E+00	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	6.0E+00	5.2E-02	1.2E-02	6.0E-02	-1.0E+00
SM	Use of secondary material	[kg]	2.4E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RSF	Use of renewable secondary fuels	[MJ]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NRSF	Use of non renewable secondary fuels	[MJ]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FW	Use of net fresh water	[m^3]	2.6E-03	1.7E-05	1.1E-04	1.7E-06	-5.3E-04

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of mechanical cylinder TRIOVING Triton Scandinavian oval

Parameter	Parameter	Unit	A1-A3	A4	A5	C2	D
HWD	Hazardous waste disposed	[kg]	2.2E-04	5.0E-06	8.3E-07	1.4E-07	-8.5E-06
NHWD	Non hazardous waste disposed	[kg]	4.6E-02	1.3E-05	9.3E-04	7.5E-06	2.0E-03
RWD	Radioactive waste disposed	[kg]	4.7E-04	5.2E-06	7.1E-07	7.8E-08	-2.9E-05
CRU	Components for re-use	[kg]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-
MFR	Materials for recycling	[kg]	0.0E+00	0.0E+00	2.6E-02	0.0E+00	-
MER	Materials for energy recovery	[kg]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-
EEE	Exported electrical energy	[MJ]	0.0E+00	0.0E+00	4.7E-02	0.0E+00	-
EET	Exported thermal energy	[MJ]	0.0E+00	0.0E+00	1.3E-01	0.0E+00	-

6. LCA: Interpretation

This chapter contains an interpretation of the Life Cycle Impact Assessment categories. Stated percentages in the whole interpretation are related to the overall life cycle, excluding credits (module D).

Production phase (module A1-A3) contributes between 90% and 98% to total impact assessment. This stage is dominated by upstream emissions associated with steel- and brass manufacturing processes. The environmental impacts for the transport (A2) have a negligible impact within this stage.

In module D the benefits (negative values) and loads beyond the system boundary are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution) within A5.

7. Requisite evidence

Not applicable in this EPD.

8. References

Institut Bauen und Umwelt
Institut Bauen und Umwelt e.V., Berlin (pub.): Generation of Environmental Product Declarations (EPDs);

General principles
for the EPD range of Institut Bauen und Umwelt e.V. (IBU), 2013-04
www.bau-umwelt.de

IBU PCR Part A
IBU PCR Part A: Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. April 2013
www.bau-umwelt.de

IBU PCR Part B
IBU PCR Part B: PCR Guidance-Texts for Building-Related Products and Services. From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU). Part B: Requirements on the EPD for Locks and fittings.
www.bau-umwelt.com

EN 1303
EN 1303: Building hardware - Cylinders for locks - Requirements and test methods; German version EN 1303:2005, Corrigendum to DIN EN 1303:2005-04; German version EN 1303:2005/AC:2008

DIN EN ISO 9001
DIN EN ISO 9001:2008: Quality management systems - Requirements; Trilingual version EN ISO 9001:2008

EN 15804
EN 15804:2012+A1:2014: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

EN 1670
EN 1670: Building hardware - Corrosion resistance - Requirements and test methods; German version EN 1670:2007

GaBi 6 2013
GaBi 6 2013: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2013.

GaBi 6 2013D
GaBi 6 2013D: Documentation of GaBi 6: Software-System and Database for Life Cycle Engineering. Copyright, TM. Stuttgart, Leinfelden-Echterdingen, 1992-2013. http://documentation.gabi-software.com/

OHSAS 18001
OHSAS 18001: Arbeits- und Gesundheitsschutz-Managementsysteme - Leitfaden für die Implementierung von OHSAS 18001

DIN EN ISO 14001
DIN EN ISO 14001: Environmental management systems - Requirements with guidance for use (ISO 14001:2004 + Cor. 1:2009)

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

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9. Annex

Results shown below were calculated using TRACI Methodology.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement[1)]	Refurbishment[1)]	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	MND	MND	MND	MND	MND	MND	X	MND	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 piece of mechanical cylinder TRIOVING Triton Scandinavian oval

Parameter	Parameter	Unit	A1-A3	A4	A5	C2	D
GWP	Global warming potential	[kg CO_2-Eq.]	3.7E-01	2.7E-03	3.7E-02	4.3E-03	-7.7E-02
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	3.6E-11	1.5E-12	1.8E-13	2.2E-14	-1.1E-11
AP	Acidification potential of land and water	[kg SO_2-Eq.]	2.6E-03	1.2E-05	1.0E-05	2.6E-05	-4.6E-04
EP	Eutrophication potential	[kg N-eq.]	1.1E-04	5.9E-07	5.9E-07	1.8E-06	-1.4E-05
Smog	Ground-level smog formation potential	[kg O_3-eq.]	2.6E-02	1.6E-04	2.4E-04	5.3E-04	-5.1E-03
Resources	Resources – fossil resources	[MJ]	3.3E-01	3.9E-03	1.2E-03	8.6E-03	-9.0E-02

RESULTS OF THE LCA - RESOURCE USE: 1 piece of mechanical cylinder TRIOVING Triton Scandinavian oval

Parameter	Parameter	Unit	A1-A3	A4	A5	C2	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.2E+00	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.0E+00	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.2E+00	6.9E-03	9.6E-04	2.4E-03	-6.9E-02
PENRE	Non renewable primary energy as energy carrier	[MJ]	6.0E+00	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.0E+00	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	6.0E+00	5.2E-02	1.2E-02	6.0E-02	-1.0E+00
SM	Use of secondary material	[kg]	2.4E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RSF	Use of renewable secondary fuels	[MJ]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NRSF	Use of non renewable secondary fuels	[MJ]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FW	Use of net fresh water	[m^3]	2.6E-03	1.7E-05	1.1E-04	1.7E-06	-5.3E-04

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 piece of mechanical cylinder TRIOVING Triton Scandinavian oval

Parameter	Parameter	Unit	A1-A3	A4	A5	C2	D
HWD	Hazardous waste disposed	[kg]	2.2E-04	5.0E-06	8.3E-07	1.4E-07	-8.5E-06
NHWD	Non hazardous waste disposed	[kg]	4.6E-02	1.3E-05	9.3E-04	7.5E-06	2.0E-03
RWD	Radioactive waste disposed	[kg]	4.7E-04	5.2E-06	7.1E-07	7.8E-08	-2.9E-05
CRU	Components for re-use	[kg]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-
MFR	Materials for recycling	[kg]	0.0E+00	0.0E+00	2.6E-02	0.0E+00	-
MER	Materials for energy recovery	[kg]	0.0E+00	0.0E+00	0.0E+00	0.0E+00	-
EEE	Exported electrical energy	[MJ]	0.0E+00	0.0E+00	4.7E-02	0.0E+00	-
EET	Exported thermal energy	[MJ]	0.0E+00	0.0E+00	1.3E-01	0.0E+00	-