ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	**ASSA ABLOY (HID Global)**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASA-20150220-IBA1-EN
Issue date	17.08.2015
Valid to	16.08.2020

Access control systems – pivCLASS SE RP40-H

ASSA ABLOY / HID Global

Institut Bauen und Umwelt e.V.

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

1. General Information

HID Global

Programme holder

IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number

EPD-ASA-20150220-IBA1-EN

This Declaration is based on the Product Category Rules:

Electronic Access Control Systems, 11-2013
(PCR tested and approved by the independent expert committee (SVR))

Issue date

17.08.2015

Valid to

16.08.2020

Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)

Dr.-Ing. Burkhart Lehmann
(Managing Director IBU)

pivCLASS SE RP40-H

Owner of the Declaration

ASSA ABLOY (HID Global)
611 Center Ridge Drive
Austin, TX 78753
USA

Declared product / Declared unit

This Declaration represents 1 card reader model pivCLASS SE RP40-H, with pigtail, including all custom configurations.

Scope:

The Life Cycle Assessment is based on data collected by the contract manufacturer of the RP40-H at their production facility located in Philippines.

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.

Verification

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

Dr. Wolfram Trinius
(Independent verifier appointed by SVR)

2. Product

2.1 Product description

The pivCLASS SE RP40-H reader, produced by HID Global, an ASSA ABLOY Group brand, is a device that communicates with a personalized credential via RF technology. The reader collects identity information from the credential and passes it along to a secured control unit via electrical cable. The control unit then grants or denies access to the credential holder. The reader is capable of communications using a high or low frequency RF signal and able to communicate with several credential formats. Also factory settings can be updated to various configurations allowing the reader flexibility in its function.

Supported credential formats:
• PKI-Based FIPS-201 including PIV, PIV-I, CIV, CAC, TWIC, and FRAC
• pivCLASS SE
• SE for DESFire EV1
• SE for MIFARE Classic
• HID Prox / AWID
• Indala Prox

Configurable functions:
• LED function
• Audible signal (Beep)
• Communication format
• Optical Tamper

2.2 Application

The pivCLASS SE RP40-H reader is suitable for indoor and outdoor use, where ID authentication is required. Common applications include: Government buildings and Military installations.

2.3 Technical Data

The table presents the technical properties of pivCLASS SE RP40-H reader:

Technical data

Name	Value	Unit
Mounting	Wall Switch Size	-
Power supply	5-16VDC	V
Current Requirements	110mA	A
Operating Temperature	-35 to 65	°C
Operating Humidity	5% to 95%	%
Transmit Frequency	13.56MHz and 125kHz	kHz
Power Input "Standby"	1.02	W
Power Input "Operation"	1.32	W

2.4 Placing on the market / Application rules

Compliance with US, Canada, and CB Scheme Safety:
• UL294-The Standard of Safety for Access Control System Units
• C22.2 No. 205 Signal Equipment
• CB Certificate US-21166-UL

Compliance with US and Canada Unlicensed Radios:
• US FCC Radio Certification 47 CFR Part 15, Subpart C
• Canada Radio Certification RSS-210 Issue 8: 2010

Compliance with the European Union R&TTE Directive:
The products are subject to CE marking according to the relevant harmonization legislation. Affixing the CE marking to the products means the compliance of the product with the a. m. Directive.

The following standards apply:
• EN 60950-1: 2006/ All: 2009 +A1:2010 +A12:2011 - Information technology equipment - Safety - Part1: General requirements

• EN 301 489-1 V1.9.2 - Common Technical Requirements

• EN 301 489-3 V1.6.1 - Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz

• EN 50130-4:2011 - Alarm systems – Electromagnetic Compatibility and Environmental test methods

• ETSI EN 300 330-2 V1.5.1 Electromagnetic Compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

Compliance with the RoHS2 Directive
The products are subject to CE marking according to the relevant harmonization legislation. Affixing the CE marking to the products means the compliance of the product with the a. m. Directive.

The following standard applies:
• EN 50581:2012 – RoHS2 Conformity

2.5 Delivery status
Each reader unit is delivered individually packaged with mounting plate, and mounting hardware. Packaged reader dimensions: 3.3" x 4.8" x 1.0" (8.4cm x 12.2cm x 2.4cm).

2.6 Base materials / Ancillary materials
The average composition of pivCLASS SE RP40-H reader is as following:

Component	Percentage in mass (%)
Plastics	61.5
Stainless Steel	3.1
Glass	9.2
Electronics (signal-power)	24.0
Electronics (signal)	2.2
Total	**100.0**

2.7 Manufacture
The pivCLASS SE RP40-H is assembled at a contract manufacturer's production facility in the Philippines. The injection molded parts are purchased from an external supplier. The electronic components, including PCB, are purchased externally and assembled at the contract manufacturer's production facility. During assembly the individual parts are assembled into the reader bezel and then potted into place. The assembled reader is then packaged with the mounting plate and hardware for shipment.

2.8 Environment and health during manufacturing
The Management System of the contract manufacturer has been assessed and certified as meeting the requirements of ISO 14001:2004 standard. In addition, industrial safety is certified as compliant to OHSAS 18001 standard.

2.9 Product processing/Installation
pivCLASS SE RP40-H readers are installed by trained product integrators or by the product end user. Installation instructions are included with each reader unit.

2.10 Packaging
The reader is packed in a cardboard box. Also included in the packaging are paper installation instructions, and a plastic bag containing the connectors and mounting hardware. Packaging materials shall be collected separately for recycling.

Material	Value (%)
Cardboard/ Paper	98.06
Plastics	1.94
Total	**100.0**

2.11 Condition of use
No auxiliary or consumable materials are incurred for maintenance and usage of the reader. Repairs or replacement are not usually necessary. No cleaning efforts need to be taken into consideration.

2.12 Environment and health during use
There are no interactions between products, the environment and health.

2.13 Reference service life
The service life of the pivCLASS SE RP40-H reader is estimated to be 30 years. This number is based on the most conservative Mean Time Between Failure (MTBF) data available for the reader components at elevated operation temperatures. MTBF of 270110 hours at 65°C.

2.14 Extraordinary effects

Fire
The external housing of the RP40-H, consisting of the bezel and mounting plate, are constructed from polycarbonate resin thermoplastic. The housing material, and thus the reader as a whole unit, has been classified as having a UL94 HB Flame Rating. A UL94 Flame Rating of HB indicates: slow burning on a horizontal specimen; burning rate < 76 mm/min for thickness < 3 mm and burning stops before 100 mm.

Water

No substances are used on the device, which have a negative impact on ecological water quality on contact with water.

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

2.15 Re-use stage
The following possibilities arise with reference to the material composition of the reader.

Re-use
During the reference service life, the reader can be disconnected and dismounted then remounted and attached elsewhere.

Material Recycling
The card reader can be recycled according to local electronics recycling options offered by municipalities, electronics recyclers or garbage haulers.

2.16 Disposal
Packaging components incurred during installation are directed to local paper and cardboard recyclers.

The product can be mechanically dissembled to separate different materials. For this, collection rate of 5% was assumed. The rest is disposed as a construction waste for landfill.

2.17 Further information
More information on ASSA ABLOY (HID Global) and pivCLASS SE readers is available by:

ASSA ABLOY (HID Global)
611 Center Ridge Drive
Austin, TX 78753
USA
Tel: 512-776-9000
Internet: www.hidglobal.com

3. LCA: Calculation rules

3.1 Declared Unit
The declaration refers to the functional unit of 1 piece of pivCLASS SE RP40-H reader as specified in Part B requirements on the EPD for Electronic Access Control Systems /IBU PCR Part B/.

Declared unit

Name	Value	Unit
Declared unit	1	piece of pivCLASS SE RP40-H
Mass (without packaging)	0.27	kg
Conversion factor to 1 kg	3.68	-

3.2 System boundary
Type of the EPD: cradle to gate - with options
The following life cycle stages 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

Use stage related to the operation of the building includes:

- B6 – Operational energy use (Energy consumption for lock operation)

End-of-life stage:

- C2 – Transport to waste processing,
- C3 – Waste processing for recycling and
- C4 – Disposal (landfill).

These information modules include provision and transport of all materials, products, as well as energy and water provisions, waste processing up to the end-of-waste state or disposal of final residues.

Module D:

- Declaration of all benefits or recycling potential from EoL and A5

3.3 Estimates and assumptions
Use stage:
For the use stage, it is assumed that the pivCLASS SE RP40-H is used in the United States of America, thus an US electricity grid mix is considered within this stage.

EoL:
In the End-of-Life stage of the product, a recycling scenario with a 5% collection rate was assumed. For packaging material, a 100% collection rate was assumed.

3.4 Cut-off criteria
In the assessment, all available data from the 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 thinkstep 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/.
thinkstep AG performed a variety of tests and validations during the commission of the present study in order to ensure its quality of the present document and results. 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. Following specific life cycle inventories for the WIP are considered:

- Waste incineration of plastic
- Waste incineration of paper
- Waste incineration of electronic scrap.

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

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site (Paper packaging)	0.0656	kg
Output substances following waste treatment on site (Plastic packaging)	0.0013	kg

Reference service life

Name	Value	Unit
Reference service life	30	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption	256.89	kWh
Years of use	30	Years
Days per year in use	365	Days
Hours per day in on mode	1	h
Hours per day in stand-by mode	23	h
Power consumption on mode	1.52	W
Power consumption stand-by mode	0.96	W

End of life (C2-C4)

Name	Value	Unit
Collected separately plastics, stainless steel, electronics	0.0123	kg
Collected as mixed construction waste construction waste for landfilling	0.2595	kg
Reuse plastic parts	0.0084	kg
Recycling stainless steel, electronics	0.0040	kg
Landfilling - Construction waste for landfill	0.2595	kg

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

Name	Value	Unit
Collected separately waste Card reader (including packaging)	0.3387	kg
Recycling stainless steel	0.13	%
Recycling electronics	1.05	%
Thermal treatment (plastics)	2.47	%
Loss Construction waste for landfilling (no recycling potential)	76.60	%
Reuse packaging (paper)	19.37	%
Reuse packaging (plastics)	0.38	%

5. LCA: Results

Results shown below were calculated using CML 2000 – 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	X	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of pivCLASS SE RP40-H reader

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	1.08E+01	9.63E-02	9.29E-02	1.82E+02	8.06E-04	6.14E-03	4.39E-01	-2.23E+00
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.56E-09	3.85E-13	4.25E-13	6.31E-08	3.86E-15	4.20E-12	1.32E-12	-1.43E-10
AP	Acidification potential of land and water	[kg SO_2-Eq.]	6.77E-02	1.98E-03	2.12E-05	6.16E-01	3.69E-06	2.89E-05	1.18E-04	-2.36E-02
EP	Eutrophication potential	[kg $(PO_4)^{3-}$- Eq.]	5.47E-03	2.21E-04	3.70E-06	3.29E-02	8.43E-07	1.63E-06	1.05E-05	-1.39E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	4.58E-03	5.39E-05	1.50E-06	3.77E-02	-1.19E-06	1.72E-06	6.03E-06	-1.24E-03
ADPE	Abiotic depletion potential for non fossil resources	[kg Sb Eq.]	1.11E-03	2.90E-09	1.68E-09	2.41E-05	3.04E-11	8.49E-10	3.37E-08	-1.57E-03
ADPF	Abiotic depletion potential for fossil resources	[MJ]	1.38E+02	1.24E+00	2.60E-02	2.10E+03	1.11E-02	6.97E-02	1.96E-01	-2.40E+01

RESULTS OF THE LCA - RESOURCE USE: One piece of pivCLASS SE RP40-H reader

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.01E+01	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.01E+01	2.11E-02	2.43E-03	2.06E+02	4.38E-04	2.00E-02	1.53E-02	-1.11E+00
PENRE	Non renewable primary energy as energy carrier	[MJ]	1.55E+02	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	1.55E+02	1.24E+00	3.05E-02	2.66E+03	1.12E-02	1.09E-01	2.19E-01	-2.56E+01
SM	Use of secondary material	[kg]	2.91E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of non renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	[m^3]	6.48E-02	1.84E-05	2.70E-04	9.36E-01	3.09E-07	4.93E-05	1.11E-03	-1.60E-02

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of pivCLASS SE RP40-H reader

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	7.32E-03	1.98E-06	2.10E-06	2.07E-03	2.54E-08	1.51E-05	1.71E-05	-4.14E-04
NHWD	Non hazardous waste disposed	[kg]	2.27E-01	6.60E-05	2.33E-03	8.49E-01	1.40E-06	3.53E-05	6.20E-02	-2.25E-02
RWD	Radioactive waste disposed	[kg]	6.86E-03	1.56E-06	1.78E-06	2.19E-01	1.46E-08	1.57E-05	9.11E-06	-6.07E-04
CRU	Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	6.50E-02	0.00E+00	0.00E+00	3.41E-02	0.00E+00	0.00E+00
MER	Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	1.18E-01	0.00E+00	0.00E+00	0.00E+00	8.04E-01	0.00E+00
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	3.32E-01	0.00E+00	0.00E+00	0.00E+00	2.21E+00	0.00E+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).

The production stage (modules A1-A3) contributes between 4% and 14% to the overall results for all the environmental impact assessment categories hereby considered, except for the abiotic depletion potential (ADPE), for which the contribution from the production stage accounts for app. 98% - this impact category describes the reduction of the global amount of non-renewable raw materials, therefore, as expected, it is mainly related with the extraction of raw materials (A1).

Within the production stage, the main contribution for all the impact categories is the production of electronics mainly due to the energy consumption on these processes. Plastics accounts with about 61% to the overall mass of the product, therefore, the impacts are not in line with the mass composition of the product. The environmental impacts for the transport (A2) have a negligible impact within this stage.

To reflect the use stage (module B6), the energy consumption was included and it has a major contribution for all the impact assessment categories considered - between 85% and 93%, with the exception of ADPE (2%). This is a result of 23 hours of operation in stand-by mode and 1 hour in on mode per day and per 365 days in a year.

In the end-of-life stage, there are loads and benefits (module D, negative values) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process (energy substitution).

7. Requisite evidence

Not applicable in this EPD.

8. References

Institut Bauen und Umwelt
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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 Electronic Access Control Systems. www.bau-umwelt.com

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

ISO 14001
ISO 14001:2009-11: Environmental management systems - Requirements with guidance for use

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

ISO 9001
ISO 9001:2008: Quality management systems - Requirements

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

RoHS Conformity:
RoHS Conformity: EN50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

UL294/cUL
The Standard of Safety for Access Control System Units

UL94
Flame Rating of HB

EN60950
EN60950-1: 2006/ All: 2009 +A1:2010 +A12:2011 Information technology equipment - Safety - Part1: General requirements

EN 301 489
EN 301 489-1 V1.9.2 : Common Technical requirements

EN 301 489-3 V1.6.1: Specific conditions for Short-Range Devices (SRD) operating on frequencies between 9 kHz and 40 GHz

EN 50130
EN 50130-4:2011: Alarm systems - Electromagnetic compatibility and Environmental test methods

ETSI EN 300
ETSI EN 300 330-2 V1.5.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Radio equipment in the frequency range 9 kHz to 25 MHz and inductive loop systems in the frequency range 9 kHz to 30 MHz; Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

ETSI EN 302
ETSI EN 302 291-2 V1.1.1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Short Range Devices (SRD); Close Range Inductive Data Communication equipment operating at 13,56 MHz; Part 2: Harmonized EN under article 3.2 of the R&TTE Directive

EN 50581
EN 50581: 2012 Guiding Standard for Compliance with RoHS2 Technical Documentation Requirements
FCC Certification: 47 CFR §15.225: 2011 Operation within the band 13.110-14.010 MHz

RSS-210
RSS-210 Issue 8: 2010 License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment - Spectrum Management and Telecommunications Radio Standards Specification

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	X	MND	MND	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: One piece of pivCLASS SE RP40-H reader

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	1.08E+01	9.63E-02	9.29E-02	1.82E+02	8.06E-04	6.14E-03	4.39E-01	-2.23E+00
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.75E-09	4.10E-13	4.52E-13	6.71E-08	4.10E-15	4.47E-12	1.40E-12	-2.04E-10
AP	Acidification potential of land and water	[kg SO_2-Eq.]	6.79E-02	2.13E-03	2.57E-05	5.75E-01	4.82E-06	2.74E-05	1.39E-04	-2.27E-02
EP	Eutrophication potential	[kg N-eq.]	6.78E-03	7.82E-05	1.48E-06	2.83E-02	3.41E-07	1.17E-06	4.93E-06	-5.99E-04
Smog	Ground-level smog formation potential	[kg O_3-eq.]	8.92E-01	3.95E-02	5.99E-04	4.90E+00	9.92E-05	2.48E-04	1.39E-03	-2.57E-01
Resources	Resources – fossil resources	[MJ]	1.18E+01	1.78E-01	3.05E-03	1.24E+02	1.60E-03	4.96E-03	2.02E-02	-1.24E+00

RESULTS OF THE LCA - RESOURCE USE: One piece of pivCLASS SE RP40-H reader

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.01E+01	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.01E+01	2.11E-02	2.43E-03	2.06E+02	4.38E-04	2.00E-02	1.53E-02	-1.11E+00
PENRE	Non renewable primary energy as energy carrier	[MJ]	1.55E+02	-	-	-	-	-	-	-
PENRM	Non renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non renewable primary energy resources	[MJ]	1.55E+02	1.24E+00	3.05E-02	2.66E+03	1.12E-02	1.09E-01	2.19E-01	-2.56E+01
SM	Use of secondary material	[kg]	2.91E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	Use of renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	Use of non renewable secondary fuels	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	Use of net fresh water	[m^3]	6.48E-02	1.84E-05	2.70E-04	9.36E-01	3.09E-07	4.93E-05	1.11E-03	-1.60E-02

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of pivCLASS SE RP40-H reader

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	7.32E-03	1.98E-06	2.10E-06	2.07E-03	2.54E-08	1.51E-05	1.71E-05	-4.14E-04
NHWD	Non hazardous waste disposed	[kg]	2.27E-01	6.60E-05	2.33E-03	8.49E-01	1.40E-06	3.53E-05	6.20E-02	-2.25E-02
RWD	Radioactive waste disposed	[kg]	6.86E-03	1.56E-06	1.78E-06	2.19E-01	1.46E-08	1.57E-05	9.11E-06	-6.07E-04
CRU	Components for re-use	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
MFR	Materials for recycling	[kg]	0.00E+00	0.00E+00	6.50E-02	0.00E+00	0.00E+00	3.41E-02	0.00E+00	-
MER	Materials for energy recovery	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-
EEE	Exported electrical energy	[MJ]	0.00E+00	0.00E+00	1.18E-01	0.00E+00	0.00E+00	0.00E+00	8.04E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	3.32E-01	0.00E+00	0.00E+00	0.00E+00	2.21E+00	-

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