ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration ASSA ABLOY AB

Programme holder Institut Bauen und Umwelt e.V. (IBU

Publisher Institut Bauen und Umwelt e.V. (IBU)

Declaration number EPD-ASA-20150156-IBA1-EN

Issue date 10.06.2015 Valid to 09.06.2021

Access Control Systems – Aperio AH40 Hub ASSA ABLOY AB



und Umwelt e.V.

1. General Information

ASSA ABLOY AB

Programme holder

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

Declaration number

EPD-ASA-20150156-IBA1-EN

This Declaration is based on the Product Category Rules:

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

Menmanes

Issue date

10.06.2015

Valid to

09.06.2021

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

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

Aperio AH40 Hub

Owner of the Declaration

ASSA ABLOY AB Förmansvägen 11 SE-117 43 Stockholm Sweden

Declared product / Declared unit

This Declaration represents the Aperio AH40 hub including all market configurations and shipping options.

Scope:

The Life Cycle Assessment is based on data collected from the Escatec facility in Penang, Malaysia.

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

x

externally



2. Product

2.1 Product description

The Aperio AH40 hub, produced by ASSA ABLOY AB, is an accessory to the Aperio Wireless lock product range. The Aperio hub acts as a gateway between the Aperio Wireless lock and the OEM electronic access control system passing credential data in one direction and access decision in the other.

The Aperio hub communicates wirelessly via a IEEE 802.15.4 based radio interface towards the Aperio wireless reader and through a wired interface towards the OEM electronic access control system. The Aperio AH40 hub uses a wired RJ45 Ethernet interface towards the OEM electronic access control system.

Wireless interface

- IEEE 802.15.4 based interface running on the 2.4 GHz band
- ASSA ABLOY proprietary protocol on top of /IEEE 802.15.4/ for the Aperio application

Wired interface

 RJ45 10 BASE-T/100 BASE-TX Ethernet interface supporting PoE according to IEEE 802.3af

Other functions

- Jumper block for configuration of internal/external antenna.
- · LED for operational state indication

2.2 Application

The Aperio hubs are suitable for indoor use. Common applications include: Commercial buildings, Industrial buildings, Government buildings, Education establishments, Healthcare buildings.

2.3 Technical Data

The table presents the technical properties of Aperio AH40 hub:

Technical data

Name	Value	Unit
Power supply or		
PoE IEEE 802.3af	8-24	VDC
compliant class 1		
Power rating	3.5	W
Radio standard/ frequency	IEEE 802.15.4	MHz
range	(2400-2483,5)	IVII IZ
Receiver sensitivity	-100	dBm
Receiver Sensitivity	-100	20%PER
Wireless transmitt power	10	dBm/ MHz
Wireless range	Up to 25	m
Operating Temperature	5-35	°C
Humidity	< 95 (non-condensing)	%



2.4 Placing on the market / Application rules

Compliance with US and Canadian Directives

 UL294 ed 5 The Standard of Safety for Access Control System Units

Compliance with European Union Directives

For the placing on the market of the products in the EU/EFTA (with the exception of Switzerland) the following harmonization legislation of the European Union applies:

 Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC (R&TTE Directive).

The products are subject to CE marking according to this harmonization legislation. Affixing the CE marking to the products means the compliance of the products with the RoHS directive.

The following standards should be taken into account:

- EN 60950-1: 2006 Information technology equipment Safety Part 1: General requirements
- EN 301 489-1/ V1.9.2 Common Technical requirements
- EN 301 489-17/ V2.2.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems
- ETSI EN 300 328/ V1.8.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive

FCC Certification:

- 47 CFR §15.225 Sub part B & C Operation within the band 2400-2483 MHz
- RSS-210 Issue 8: 2010 License-exempt Radio Apparatus (All Frequency Bands): Category I Equipment - Spectrum Management and Telecommunications Radio Standards Specification

RoHS Conformity:

 EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

2.5 Delivery status

The Aperio AH40 hub is shipped in a single package box which includes the Aperio hub, mounting plate, screes and installation manual. The dimension of the Aperio hub is (82mm x 82mm x 37 mm), the dimension of the single package box is (125mm x 125mm x 64mm). The shipment is done to ASSA ABLOY factories where the Aperio hubs are further co-shipped with Aperio wireless readers and accessories.

2.6 Base materials / Ancillary materials

The average composition of the Aperio AH40 hub is as following:

Component	Percentage in mass (%)
Plastics	50.71
Steel	1.49
Electronic	44.06
Electro-mechanic	2.99
Other	0.75
Total	100.0

2.7 Manufacture

The Aperio AH40 hub is assembled at the production facility at Escatec Penang in Malaysia. The electronic components, including PCB, are purchased externally and assembled at Escatec. The plastic housing is supplied by another Escatec entity in Penang. The assembled PCBs are supplied by Eline PCB Sdn Bhd which is located in Malaysia. During assembly the individual parts are assembled into the hub casing. The assembled Aperio hub is then packaged with the mounting plate, installation accessories, and installation manual for shipment.

2.8 Environment and health during manufacturing

The Management System of Escatec has assessed and certified as meeting the requirements of ISO 14001:2004.

2.9 Product processing / Installation

Aperio hubs are together with Aperio wireless locks installed by trained product integrators or installers. They can technically be installed by end users as well but that is not the norm case.

2.10 Packaging

The reader is packed in plastic and is fixated in the single package box together with installation accessories and installation instructions. Packaging materials shall be collected separately for recycling.

Material	Value (%)
Cardboard/ Paper	96.1
Plastics	3.9
Total	100.0

Packaging components incurred during installation are directed to energy recovery circuits.

- EWC 15 01 01 Paper and cardboard packaging
- EWC 15 01 02 Plastic packaging.

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 Aperio Hubs is estimated to be 7 years. The 7 years is based on the support & service life of the Aperio Hub and neither factual nor estimated life time..

2.14 Extraordinary effects

Fire

The external housing of the Aperio AH40 hub consists of a cover and mounting plate, are constructed from ABS. The housing material 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 which have a negative impact on ecological water quality on contact by the device with water.

Mechanical destruction

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

2.15 Re-use phase

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 ASSA ABLOY factories provide arrangements for the collection, treatment, recycling and recovery of the Aperio Hubs sold.

Waste codes according to European Waste Catalogue and Hazardous Waste List - Valid from 1 January 2002.

 EWC 16 02 13* discarded equipment containing hazardous components other than those mentioned in 16 02 09 to 16 02 12

- EWC 16 02 14 Discarded equipment other than those mentioned in 16 02 09 to 16 02 13
- EWC 16 02 16 Components removed from discarded equipment other than those mentioned in 16 02 15
- EWC 17 02 03 plastic
- EWC 17 04 05 iron and steel
- EWC 17 04 11 Cables with the exception of those outlined in 17 04 10

Disposal of the product is subject to the WEEE Directive within Europe, Directive 2012/19/EU.

2.16 Disposal

No disposal is foreseen for the product nor for the corresponding packaging.

2.17 Further information

More information on ASSA ABLOY and Aperio is available from:

ASSA ABLOY AB Förmansvägen 11 SE-117 43 Stockholm Sweden

Tel: +46 8 775 1860

Internet: www.assaabloy.com/aperio

3. LCA: Calculation rules

3.1 Declared Unit

The declaration refers to the functional unit of 1 piece of Aperio AH40 hub 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 Aperio AH40 hub
Mass (without packaging)	0.134	kg
Conversion factor to 1 kg	7.47	-

3.2 System boundary

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

A1-A3 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)

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 phase:

For the use phase, it is assumed that the lock is used in European Union, thus an EU electricity grid mix is considered within this stage.

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 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 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. Following specific life cycle inventories for the WIP are considered:

- Waste incineration of plastic
- · Waste incineration of paper
- Waste incineration of electronic scraps (PWB)

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).

Transport to the building site (A4)

Name	Value	Unit								
Truck transport										
Litres of fuel diesel with maximum load (27 t payload)	39.4	l/100 km								
Transport distance truck	839	km								
Capacity utilization (incl. empty runs) of truck	85	%								
Ship transpo	Ship transport									
Volume of heavy fuel oil with maximum load (27500 DWT)	5.3	m³/100 km								
Transport distance ship	5500	km								
Plane transp	ort									
Volume of kerosene with maximum load (113 t payload)	5.8	m³/100 km								
Transport distance plane	4500	km								
Gross density of products transported	-									
Capacity utilisation volume factor	-									

Installation into the building (A5)

installation into the building (AJ)		
Name	Value	Unit
Output substances following waste		
treatment on site Packaging (paper	0.09	kg
and plastic)		
Reference service life		

Veletelice service lile			
Name	Value	Unit	
Reference service life	7	а	

Value	Unit
215	kWh
365	d
24	h
3.5	W
	215 365 24

End of life (C1-C4)

Name	Value	Unit
Collected separately Steel, electronic, electro mechanics, plastic parts	0.134	kg
Collected as mixed construction waste construction waste for landfilling	0	kg
Reuse plastic	0.07	kg
Recycling Steel, Electronics, Electro mechanics	0.064	kg
Landfilling construction waste for landfill	0	kg

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

relevant Scenario iniorniation		
Name	Value	Unit
Collected separately waste type (including packaging)	0.223	kg
Recycling Steel	0.90	%
Recycling/Reuse Electronic	26.41	%
Reuse Plastic parts	30.39	%
Recycling others	0.45	%
Reuse packaging (plastic + paper) (from Module A5)	40.06	%

Operational energy use (B6)



5. LCA: Results

Results shown below were calculated using CML 2000 – Apr. 2013 Methodology.

DESC	:RIP1	TION O	F THE	SYS	TEM E	BOUN	IDAF	K) YS	(= IN	ICLU	IDEI	D IN L	CA; I	IND	= MO	DU	LE NO	D TC	ECL#	ARED)	
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ODP		Depletion per			[kg CFC	11-Eq.]	2.91E	-09	1.39E-	-12	5.87E	E-13	6.98E-	-08	1.41E-1	2 4	4.41E-1	2 5.5	0E-13	-8.79E-11	
AP		idification			[kg SC) ₂ -Eq.]	7.64E	-02	1.24E-	-05	3.03E	E-05	4.81E-	01	3.44E-0	5 3	3.04E-0	5 5.0	3E-05	-1.72E-02	
EP	ı	Eutrophica		ential	[kg (PO) ³ - Eq.]	5.99E	-03	1.01E-	-06	5.04E	E-06	2.71E-	02	6.16E-0	6 1	1.71E-0	5.0	3E-06	-1.01E-03	
POCE			on potentia heric ozo mical oxid	ne	[kg Ethe	en Eq.]	5.08E	E-03	7.45E-	-07	2.09E	E-06	2.86E-	02	-7.20E-0	6 1	1.81E-0	3 2.6	5E-06	-9.03E-04	
ADPE	۸hi	iotic deple	etion pote	ntial for	[kg St	Eq.]	9.30E	-04	3.20E-	-10	2.86E	E-09	1.41E-	05	5.01E-1	0 8	8.92E-1) 1.6	0E-08	-1.17E-03	
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Parame PERE PERE PENR PENR PENR SM RSF NRSF FW RESU One p	E No No	enewable en Renewab sources a otal use o ener on renew as en renewas man Total use of sed Jse of rer	Parametre e primary ergy car ergy car ergy car as materia for renewar gy resou able prim terial util of non renergy re econdary econdary for non renergy re fuels fon ondary for for the fres IELCA erio Al	y energy rier rry energy all utiliza- able prin urces nary energy arrier nary energy enewable esource y materi second ewable uels h water	gy ation nary ergy ergy ble ss al ary	Unit [MJ] [MJ] [MJ] [MJ] [MJ] [kg] [MJ] [MJ] [MJ]	1.5 0.0 1.5 2.0 0.0 2.0 2.0 0.0 0.0 7.4	A1-3 i1E+0: i1E+0: i7E+0: i7E+	1	A4	3.4 4.4 0.00 0.00 0.00 3.7	A5	3.31E+ 1.81E+ 0.00E+ 0.00E+ 8.18E- RIES	-02 : -03 -00 (c-00 (c-0) (c-00 (c-0) (c-00 (c-0) (c-00 (c-0) (c-0) (c-0) (c-0) (c-0) (c-0) (c-00 (c-0) (c-0	- 9.76E-03 - - 1.17E-01 0.00E+00 0.00E+00 1.85E-05	1. 0.0	- .10E-02 - .15E-01 .00E+00 .00E+00	9.44 0.00 0.00 0.00 4.9			
Parame PERM PERM PENR PENR PENR NRSF FW	E No No	enewable en Renewable en Renewa	e primary ergy car ole primary ergy car ole primary as materi of renewa gy resou able prin energy ca able prin energy ca able prin energy ca able prin energy ca able prin energy re econdary newable fuels fron ren condary f f ret fres	y energy rier ry energy escond ewable ewable uels energy e	gy ation nary ergy ergy ble es al ary	Unit [MJ] [MJ] [MJ] [MJ] [Kg] [MJ] [MJ] [FLC	1.5 0.0 1.5 2.0 0.0 2.0 2.9 0.0 0.0 0.0	A1-3 i1E+0: i1E+0: i7E+0: i7E+	1	A4 1E-03 8E-02 0E+00 0E+00 0E+00	3.4 4.4 0.00 0.00 0.00 3.7	A5	3.31E+ 1.81E+ 0.00E+ 0.00E+ 8.18E- RIES	-02 9 -03 -00 (0 -00 (0 -00 (0	- 9.76E-03 - - 1.17E-01 0.00E+00 0.00E+00	1. 0.0	- .10E-02 - - .15E-01 .00E+00	9.44 0.00 0.00 0.00 4.9	- 9E-03 - - 0E-02 0E+00 0E+00	-7.47E-01 -7.47E-01 -7.47E-01 -7.47E+01 0.00E+00 0.00E+00 0.00E+00	
Parame PERB PERN PENR PENR PENR SM RSF NRSF FW RESU One p	R A res T C E No No T T T T T T T T T T T T T T T T T T T	enewable en Renewable en Renewable en Renewable en Renewable en renew as et al use of en renew as man Total use primary Use of sec Use of OF THE OF Apo	Parametre e primary ergy car ole primary ergy car ole primary ass materia frenewas eable prin energy ca able prin energy ca able prin energy ca able prin energy re econdary newable fuels fron ren condary fr fres erio Al Pa	y energy rier ry energy escond ewable ewable uels h water energy	gy gy gy ation nary ergy ergy ble es al ary JTPU ub r	Unit [MJ] [MJ] [MJ] [MJ] [KJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	1.5 0.0 1.5 2.0 0.0 2.0 2.0 0.0 0.0 7.4 Unit	A1-3 i1E+0 i1E-0 i	1	A4	3.4 4.4 0.00 0.00 0.00 3.7 CA	A5	3.31E+ 1.81E+ 0.00E+ 0.00E+ 8.18E- RIES B 3 2.51	-02 : -03 : -00 (- 9.76E-03 - 1.17E-01 0.00E+00 0.00E+00 1.85E-05 - C2	1. 0.0 0.0 0.0 5. 5.	- .10E-02 - .15E-01 .00E+00 .00E+00 .17E-05	9.44 0.00 0.00 0.00 4.9:		-7.47E-01 -7.47E-01 -7.47E-01 -7.47E-01 -7.79E+01 0.00E+00 0.00E+00 0.00E+00 -9.76E-03	
Parame PERE PERE PENR PENR PENR SM RSF NRSF FW RESU One parame	E No No TT U	enewable en Renewable en Renewa	Parametre e primary ergy car ole primary ergy car ole primary ergy resour able prim energy car able prim energy car energy resour energy re econdary econdary enewable fuels fuels fuels fuels fuels fuels fuels fuels hazardous hazardous	reference of the control of the cont	gy attion nary ergy ergy ble es al ary UTPU ub r dispose e dispose	Multi [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	1.5 0.0 1.5 2.0 0.0 2.0 0.0 0.0 7.4 Unit [kg]	A1-3 i1E+0: i1E+0: i1E+0: i7E+0: i7E+	1	A4	3.4 4.4 0.0 0.0 0.0 3.7 CA	A5	3.31E+ 1.81E+ 0.00E+ 0.00E+ 8.18E- RIES 6 2.51 3 5.86	-03 -00 (c-00 (c-0) (c-00 (c-00 (c-00 (c-0) (c-00 (c-0) (c-00 (c-0) (c-0) (c-0) (c-00 (c-0) (c-0	- 9.76E-03 - 1.17E-01 0.00E+00 0.00E+00 1.85E-05 C2 5.17E-0 2.18E-0	1. 0.0 0.0 0.1 0.1 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5. 5.		9.44 0.00 0.00 0.00 4.93		-7.47E-01 -7.47E-01 -7.47E-01 -7.79E+01 0.00E+00 0.00E+00 -9.76E-03 D -2.37E-04 -2.56E-02	
Parame PERE PENR PENR PENR SM RSF NRSF FW RESU One p Param HW RW	E No	enewable en Renewable en Renewa	Parametre e primary ergy car ole primary ergy car ole primary ass materia frenewas eable prin energy ca able prin energy ca able prin energy ca able prin energy re econdary newable fuels fron ren condary fr fres erio Al Pa	y energy rier rury energy all utilization rary energy ener	gy ation nary ergy ergy ble is all ary UTPU dispose dispose	Multi [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	1.5 0.0 1.5 2.0 0.0 2.6 0.0 0.0 7.4 VWS	A1-3 i1E+0 i1E+0 i1E+0 i1E+0 i1E+0 i7E+0 i	1	A4	3.4 4.4 0.0 0.0 0.0 0.0 3.7 CA	A5	3.31E+ - 1.81E+ 0.00E+ 0.00E+ 8.18E- RIES 6 2.51 3 5.86 6 2.61	.002 !! .003 .000 (.000		1. 0 0 0 0 5 5 5 66 1		9.44 0.00 0.00 0.00 4.92 5 8.11		-7.47E-01 -7.47E-01 -7.47E-01 -7.47E-01 -7.79E+01 0.00E+00 0.00E+00 0.00E+00 -9.76E-03	
Parame PERE PERE PENR PENR PENR SM RSF NRSF FW RESU One parame	E No	enewable en Renewable sources a stal use o eneron renewal as ma Total use primary use of sec Use of OF THE OF Apo	Parametre e primary ergy car oble prima ass materi of renewa rgy resou able prim able prim able prim terial util of non re energy re econdary newable fuels	y energy rier all utilization arrier	gy ation nary ergy ergy ole is al ary ub r dispose e dispose re-use	Multi [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ] [MJ]	1.5 0.0 1.5 2.0 0.0 2.0 2.0 0.0 7.4 WS Unit [kg] [kg]	A1-3 i1E+0 i1E+0 i1E+0 i1E+0 i1E+0 i7E+0 i	1	A4	3.4 4.4 0.00 0.00 0.00 3.7 CA 06 3 05 3 06 2 00 0	A5	3.31E+ - 1.81E+ 0.00E+ 0.00E+ 8.18E- RIES B	-03 : -00 (- 9.76E-03 - 1.17E-01 0.00E+00 0.00E+00 1.85E-05 C2 5.17E-0 2.18E-0	1. 1. 0. 0. 0. 0. 0. 5. 5. 5. 3. 6. 1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.		9.44 0.00 0.00 0.00 4.93 5 8.11 0 0.00		-7.47E-01 -7.47E-01 -7.47E-01 -7.79E+01 0.00E+00 0.00E+00 -9.76E-03 D -2.37E-04 -2.56E-02	
Parame PERM PERM PENR PENR PENR SM RSF NRSF FW RESU One p Param HW NHM RW CR	R R R R R R R R R R R R R R R R R R R	enewable en Renewable en Renewa	Parametre e primary ergy car ergy car ergy car ergy car ergy resour able prima ergy resour able prim energy re energy re energy re energy re energy re enough fuels roon re fuels roon re energy re enough fuels roon re enough fuels r	y energy rier and utilized ble pringress nary energy energ	gy ation nary ergy ergy ergy ergy less al ary lub r dispose e dispose ergy ergy ergy lub r ergy lub r ergy lub ergy lub ergy ergy ergy ergy ergy ergy ergy ergy	Unit [MJ]	1.5 0.0 1.5 2.0 0.0 2.0 2.0 0.0 7.4 Unit [kg] [kg] [kg] [kg] [kg]	A1-3 i1E+0 i1E-0 i	1	A4	3.4 4.4 0.00 0.00 3.7 CA CA 006 2 006 2 007 00 8	A5	3.31E+ - 1.81E+ 0.00E+ 0.00E+ 0.00E+ 8.18E- RIES 6 2.51 3 5.86 6 2.61 0 0.000 2 0.000	-02 !		1. 1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.		9.44 0.00 0.00 4.9: 5 5 8.1 5 1.9 0 0.00 0.00 3 0.00		-7.47E-01 -7.47E-01 -7.47E-01 -7.79E+01 0.00E+00 0.00E+00 -9.76E-03 D -2.37E-04 -2.56E-02	
Parame PERM PERM PENR PENR PENR SM RSF NRSF FW RESU One p Param HW NHW RW CR MF	R No	enewable en Renewable en Renewa	Parametre e primary ergy car ergy car ergy car ergy car ergy car as materi of renewa rgy resou able prim energy ca able prim energy re econdary freecondary freeco	rerespondents of the second se	gy ation nary ergy ergy ole es al ary Ub r dispose e dispose re-use exycling r recover	Unit [MJ] [MJ]	1.5 0.0 0.0 1.5 2.0 0.0 2.0 0.0 0.0 7.4 WS Unit [kg] [kg] [kg] [kg] [kg] [kg]	A1-3 i1E+0: i1E-0: i1E-	1	A4	3.4 4.4 0.00 0.00 3.7 CA 06 3 06 2 -00 0	A5	3.31E+ 1.81E+ 0.00E+ 0.00E+ 0.00E+ 8.18E- RIES B 3 5.86 6 2.61 0 0.00 2 0.00 0 0.00	-02 : : : : : : : : : : : : : : : : : : :		1. 1. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0. 0.		9.44 0.00 0.00 0.00 4.93 5 5 8.1 1.9 5 4.1 0 0.0 0.00 0.00		-7.47E-01 -7.47E-01 -7.47E-01 -7.79E+01 0.00E+00 0.00E+00 -9.76E-03 D -2.37E-04 -2.56E-02	



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 phase (modules A1-A3) contributes between 4% and 18% 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 phase accounts for app. 99% - 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 phase, the main contribution for all the impact categories is the production of plastics and steel, with app. 49%, mainly due to the energy consumption on this process. Plastics and electronics account with app. 95% to the overall mass of the

product, therefore, the impacts are 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 phase (module B6), the energy consumption was included and it has a major contribution for all the impact assessment categories considered - between 82% and 96%, with the exception of ADPE (1%). This high value is due to the 24 hours per day in on mode as stated in Chapter 4.

In the end-of-life phase, 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

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

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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

EN 15804

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

GaBi 6 2013

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

ISO 14025

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

EN 50581:2012

RoHS Conformity: EN 50581:2012 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

EN 60950-1

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

EN 301 489-1

EN 301 489-1 V1.9.2 Common Technical requirements

EN 301 489-17

EN 301 489-17 V2.2.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); ElectroMagnetic Compatibility (EMC) standard for radio equipment; Part 17: Specific conditions for Broadband Data Transmission Systems

EN 300 328

EN 300 328 V1.8.1 Electromagnetic compatibility and Radio spectrum Matters (ERM); Wideband transmission systems; Data transmission equipment operating in the 2,4 GHz ISM band and using wide band modulation techniques; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive



EWC

European Waste Catalog

47 CFR §15.225

47 CFR $\S15.225$: 2012 Sub part B & C Operation within the band 2400-2483 MHz

RSS-210 Issue 8: 2010

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

IEE 802.15.4

IEEE Standard for Local and metropolitan area networks – Part 15.4: Low-Rate Wireless Personal Area Networks

IEEE 802.3af

Amendment to the IEEE 802.2 ethernet standard for Power via Media Dependent Interface (MDI), i.e. Power Over Ethernet

ISO 14001:2004

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

III 94 HR

UL94 HB: slow burning on a horizontal specimen; burning rate < 76 mm/min for thickness < 3 mm and burning stops before 100 mm

UL294 ed 5

The Standard of Safety for Access Control System Units

R&TTE Directive

Radio and telecommunications terminal equipment (R&TTE); 2014/53/EU



9. Annex

Results shown below were calculated using TRACI Methodology.

DESC	RIP	ΓΙΟΝ Ο	F THE	SYST	ГЕМ	BOUN	DAF	RY (X	= 11	NCLUE	DEI	D IN L	.CA	: MND	= MOD	ULE N	DT D	ECL/	ARED)
		STAGE	CONSTRUCTI							\GE					END OF L		BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS		
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	USB	Maintenance		Repair	Replacement ¹⁾	Refurbishment ¹⁾		Operational energy use	Operational water	Use De-construction	Transport	Waste processing	Disposal	Reuse-	Recovery- Recycling- potential
A1	A2	А3	A4	A5	B	l B2	E	33	B4	B5		В6	В7	C1	C2	C3	C4		D
X	Χ	Х	Χ	Χ	MN	D MNE	M	ND N	MND	MND)	Х	MNI	D MN	D X	Х	Χ		Χ
RESU	ILTS	OF TH	E LC	4 - EN'	VIR	ONMEN	TAI	_ IMP	AC	T: One	p p	iece c	of A	perio .	AH40 H	ub			
Paran	neter		Parame	eter		Unit	:	A1	-3	A4		A5		В6	C2	С3		C4	D
GW	/P		l warmin			[kg CO ₂ -	Eq.]	1.46E	+01	2.66E-0	03	1.32E-0)1 1	.02E+02	7.38E-03	6.44E-0	3 1.8	4E-01	-1.60E+00
OD	P		tion pote spheric o			[kg CFC1	1-Eq.] 3.12E	E-09	1.47E-1	12	6.25E-1	13 7	7.42E-08	1.50E-12	4.69E-1	2 5.8	4E-13	-1.32E-10
AF	-	Acidifica	ation pote and wa		and	[kg SO ₂ -	Eq.]	7.59E	E-02	1.23E-0	05	3.66E-0	05 4	I.55E-01	4.14E-05	2.88E-0	5.9	8E-05	-1.65E-02
EF	>		phication	potentia		[kg N-e	q.]	5.16E	E-03	5.86E-0)7	2.03E-0	06 1	.94E-02	2.69E-06	1.22E-0	06 2.3	2E-06	-4.31E-04
Sm	og	Ground	level smo potenti		ion	[kg O ₃ -	eq.]	9.62	≣-01	1.59E-0	04	8.09E-0)4 4	.12E+00	7.40E-04	2.60E-0	7.0	0E-04	-1.86E-01
Resou	ırces	Resource	es – res			[MJ]		1.31E		3.90E-0				.24E+01	1.33E-02	5.21E-0	3 8.5	2E-03	-8.29E-01
RESU	ILTS	OF TH	IE LC	4 - RE	SOL	IRCE U	SE:	One	pie	ce of A	Δрє	erio A	H40	0 Hub					
Parame	eter	Parameter			Unit	4	41-3		A4		A5	I	B6	C2	C3	(C4	D	
PERE	E R	enewable en	e primary ergy car		as	[MJ]	1.5	1E+01		-				-	-	-			-
PERM		Renewab sources a				[MJ]	0.0	0E+00		-	-		-		-	-	-		-
PERT	To	tal use o	f renewa	ble prim	ary	[MJ]	1.5	1E+01	6.9	1E-03	3.4	9E-03	3.31	1E+02	9.76E-03	2.10E-02	6.89	E-03	-7.47E-01
PENR	E No	on renewa	able prin	nary ene	rgy	[MJ]	2.0	7E+02		_		-		_	-	_	-		-
PENR	M No	on renewa		nary ene	ergy	[MJ]	0.0	0E+00		_				_	_			_	_
		as ma Total use	terial util of non r		le				1	25.00			4.04				0.4		
PENR		primary of Se				[MJ]	-	7E+02				7E-02					-	E-02	-1.79E+01
SM RSF	+	lse of ren				[kg] [MJ]		0E+00				0E+00			0.00E+00 0.00E+00	0.00E+00		E+00 E+00	0.00E+00 0.00E+00
		Use of	fuels non ren	ewable					1			0E+00					_		
NRSF	-	sec	ondary f	uels		[MJ]	_												0.00E+00
FW	II TO				TDI	[m³]		1E-02				9E-04			1.85E-05	5.17E-05	4.92	2E-04	-9.76E-03
		of Ape				JT FLO	ws	AND	VVA	SIEC	A	IEGO	KIE	:5:					
Param				rameter			Unit	A1-	3	A4		A5		В6	C2	СЗ		C4	D
HW	D D	Ha	zardous	waste d	ispos	ed	[kg]	5.65E	-03	5.01E-0	6 3	3.08E-0	6 2	.51E-01	5.17E-06	1.59E-0	5 8.1	3E-06	-2.37E-04
NHV	-	Non I	nazardo	us waste	disp	osed		2.05E		1.27E-0	_	3.99E-0	-	.86E-01	2.18E-05	1	_	0E-02	-2.56E-02
RW	'D		dioactive						_	5.20E-0	_	2.53E-0	_	.61E-01	5.28E-06	1.65E-0	5 4.1	3E-06	-3.79E-04
CR			Compone							0.00E+0	_		_	.00E+00		<u> </u>		DE+00	-
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