ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

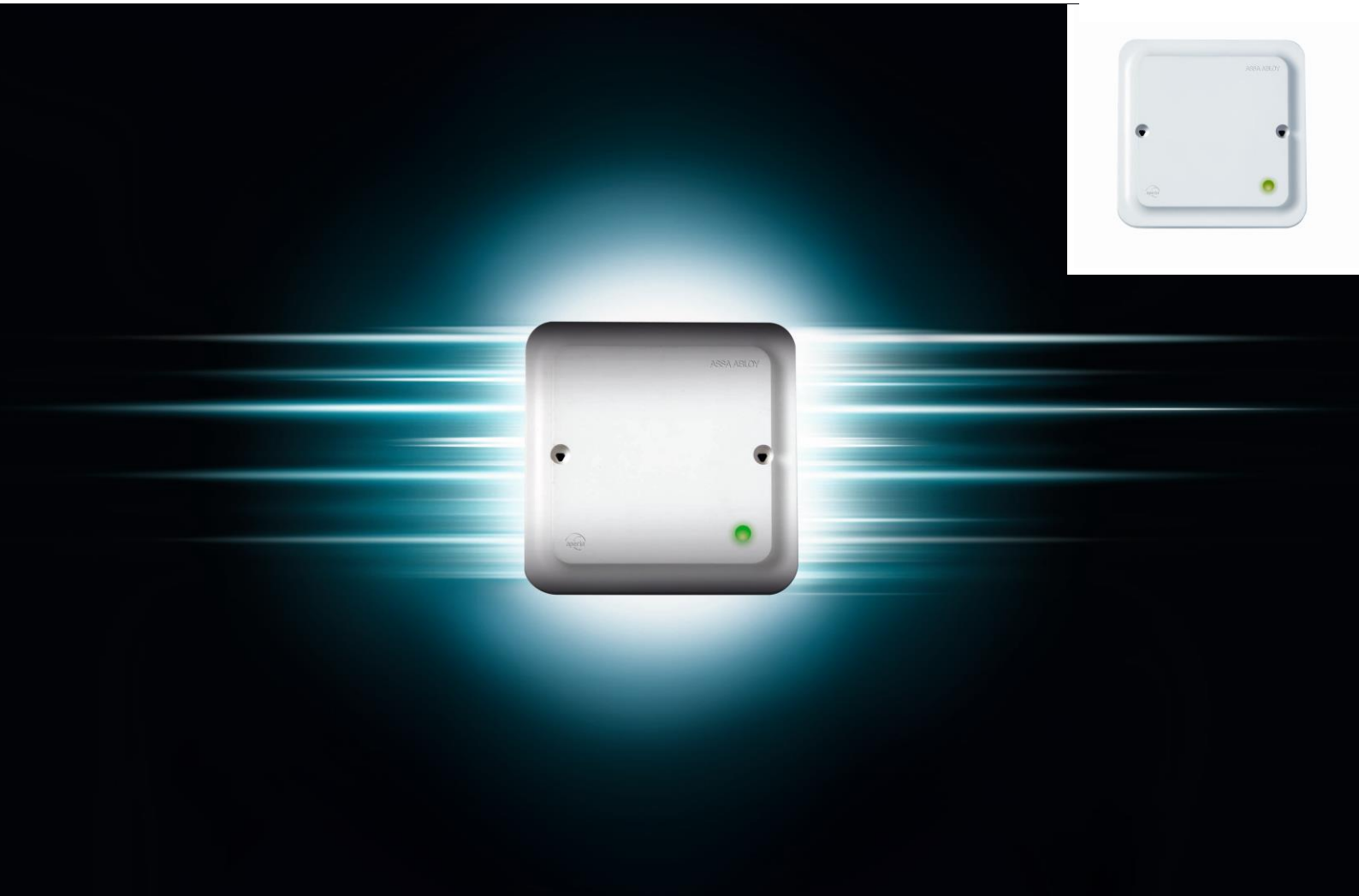
Owner of the Declaration	**ASSA ABLOY AB**
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-ASA-20150169-IBA1-EN
Issue date	10.06.2015
Valid to	09.06.2021

Access Control Systems – Aperio AH20 Hub

ASSA ABLOY AB

Institut Bauen und Umwelt e.V.

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



1. General Information

ASSA ABLOY AB

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

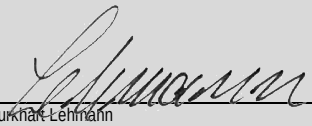
Declaration number
EPD-ASA-20150169-IBA1-EN

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))

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 AH20 Hub

Owner of the Declaration
ASSA ABLOY AB
Förmansvägen 11
SE-117 43 Stockholm
Sweden

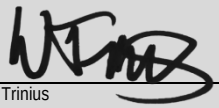
Declared product / Declared unit
This Declaration represents one piece of Aperio AH20 hub including all market configurations and shipping options

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 ☒ externally



Dr. Wolfram Trinius
(Independent verifier appointed by SVA)

2. Product

2.1 Product description

The Aperio AH20 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 an 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 AH20 hub is using a wired Wiegand 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
- 3-wire Wiegand interface

Other functions
- DIP switch for configuration
- LED for operational state indication
- 4 dry contact relays for additional indications to the electronic access control system

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 AH20 hub Wireless lock:

Technical data

Name	Value	Unit
Power supply	8-24	VDC
Power rating	2	W
Radio standard/ frequency range	IEEE 802.15.4 (2400-2483,5)	MHz
Receiver sensitivity	-100	dBm 20%PER
Wireless transmitt power	10	dBm/ MHz
Wireless range	Up to 25 (depending on installation environment)	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 AH20 hub is shipped in a single package box which includes the Aperio hub, mounting plate, screws 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 AH20 hub Wireless lock is as following:

Component	Percentage in mass (%)
Plastics	62.67
Stainless Steel	0.41
Steel	1.64
Electronic	32.81
Electro-mechanic	1.64
Other	0.82
Total	**100.0**

2.7 Manufacture

The Aperio AH20 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 AH20 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 in 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 AH20 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 AH20 hub
Mass (without packaging)	0.1219	kg
Conversion factor to 1 kg	8.203	-

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 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 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 transport		
Volume of heavy fuel oil with maximum load (27500 DWT)	5.3	m³/100 km
Transport distance ship	5500	km
Plane transport		
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 utilization volume factor	-	

Installation into the building (A5)

Name	Value	Unit
Output substances following waste treatment on site Packaging (paper and plastic)	0.09	kg

Reference service life

Name	Value	Unit
Reference service life	7	a

Operational energy use (B6)

Name	Value	Unit
Electricity consumption	123	kWh
Days per year in use	365	d
Hours per day in on mode	24	h
Power consumption per mode in W	2	W

End of life (C1-C4)

Name	Value	Unit
Collected separately Stainless steel, electronic, electro mechanics plastic parts	0.1219	kg
Collected as mixed construction waste construction waste for landfilling	0	kg
Reuse plastic	0.08	kg
Recycling Stainless steel, electronic, electro mechanics	0.041	kg
Landfilling construction waste for landfill	0	kg

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

Name	Value	Unit
Collected separately waste type (with packaging)	0.2114	kg
Recycling Brass	0.47	%
Recycling Steel	0.95	%
Recycling Stainless steel	0.24	%
Recycling/Reuse Electronic	19.87	%
Reuse Plastic parts	36.14	%
Packaging Recovers (paper+plastic) (from Module A5)	42.33	%

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 Aperio AH20 Hub

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	1.43E+01	2.66E-03	1.32E-01	5.82E+01	7.10E-03	7.77E-03	2.08E-01	-1.88E+00
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.66E-09	1.39E-12	5.87E-13	3.99E-08	1.41E-12	5.32E-12	6.22E-13	-9.95E-11
AP	Acidification potential of land and water	[kg SO_2-Eq.]	7.83E-02	1.24E-05	3.03E-05	2.75E-01	3.31E-05	3.66E-05	5.71E-05	-2.05E-02
EP	Eutrophication potential	[kg $(PO_4)^{3-}$- Eq.]	6.08E-03	1.01E-06	5.04E-06	1.55E-02	5.86E-06	2.06E-06	5.78E-06	-1.20E-03
POCP	Formation potential of tropospheric ozone photochemical oxidants	[kg Ethen Eq.]	5.19E-03	7.45E-07	2.09E-06	1.63E-02	-6.78E-06	2.18E-06	3.02E-06	-1.07E-03
ADPE	Abiotic depletion potential for non-fossil resources	[kg Sb Eq.]	1.08E-03	3.20E-10	2.86E-09	8.06E-06	4.90E-10	1.08E-09	1.83E-08	-1.39E-03
ADPF	Abiotic depletion potential for fossil resources	[MJ]	1.76E+02	3.87E-02	3.83E-02	6.61E+02	9.99E-02	8.83E-02	9.49E-02	-1.99E+01

RESULTS OF THE LCA - RESOURCE USE: One piece of Aperio AH20 Hub

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.42E+01	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.42E+01	6.91E-03	3.49E-03	1.89E+02	9.60E-03	2.53E-02	7.86E-03	-8.71E-01
PENRE	Non-renewable primary energy as energy carrier	[MJ]	2.05E+02	-	-	-	-	-	-	-
PENRM	Non-renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non-renewable primary energy resources	[MJ]	2.05E+02	5.18E-02	4.47E-02	1.04E+03	1.13E-01	1.38E-01	1.07E-01	-2.10E+01
SM	Use of secondary material	[kg]	2.94E-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]	7.10E-02	1.65E-05	3.79E-04	4.68E-01	1.84E-05	6.24E-05	5.59E-04	-1.17E-02

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of Aperio AH20 Hub

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	6.36E-03	5.01E-06	3.08E-06	1.44E-01	5.16E-06	1.92E-05	9.32E-06	-2.67E-04
NHWD	Non-hazardous waste disposed	[kg]	1.95E-01	1.27E-05	3.99E-03	3.35E-01	2.13E-05	4.47E-05	2.17E-02	-3.16E-02
RWD	Radioactive waste disposed	[kg]	1.11E-02	5.20E-06	2.53E-06	1.49E-01	5.28E-06	1.99E-05	4.71E-06	-4.32E-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	8.60E-02	0.00E+00	0.00E+00	3.50E-03	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	1.73E-01	0.00E+00	0.00E+00	0.00E+00	3.63E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	4.87E-01	0.00E+00	0.00E+00	0.00E+00	9.95E-01	-

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 6% and 28% 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. 56%, 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 72% and 94%, 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

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

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
EN60950-1: 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 §15.225: 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

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

UL94 HB
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.

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 Aperio AH20 Hub

Parameter	Parameter	Unit	A1-3	A4	A5	B6	C2	C3	C4	D
GWP	Global warming potential	[kg CO_2-Eq.]	1.43E+01	2.66E-03	1.32E-01	5.82E+01	7.10E-03	7.77E-03	2.08E-01	-1.88E+00
ODP	Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.87E-09	1.47E-12	6.25E-13	4.24E-08	1.50E-12	5.66E-12	6.61E-13	-1.51E-10
AP	Acidification potential of land and water	[kg SO_2-Eq.]	7.79E-02	1.23E-05	3.66E-05	2.60E-01	3.97E-05	3.47E-05	6.79E-05	-1.96E-02
EP	Eutrophication potential	[kg N-eq.]	5.23E-03	5.86E-07	2.03E-06	1.11E-02	2.57E-06	1.48E-06	2.66E-06	-5.10E-04
Smog	Ground-level smog formation potential	[kg O_3-eq.]	9.91E-01	1.59E-04	8.09E-04	2.35E+00	7.05E-04	3.14E-04	8.08E-04	-2.20E-01
Resources	Resources – fossil fuel	[MJ]	1.38E+01	3.90E-03	4.44E-03	4.71E+01	1.27E-02	6.29E-03	9.67E-03	-9.59E-01

RESULTS OF THE LCA - RESOURCE USE: One piece of Aperio AH20 Hub

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
PERE	Renewable primary energy as energy carrier	[MJ]	1.42E+01	-	-	-	-	-	-	-
PERM	Renewable primary energy resources as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PERT	Total use of renewable primary energy resources	[MJ]	1.42E+01	6.91E-03	3.49E-03	1.89E+02	9.60E-03	2.53E-02	7.86E-03	-8.71E-01
PENRE	Non-renewable primary energy as energy carrier	[MJ]	2.05E+02	-	-	-	-	-	-	-
PENRM	Non-renewable primary energy as material utilization	[MJ]	0.00E+00	-	-	-	-	-	-	-
PENRT	Total use of non-renewable primary energy resources	[MJ]	2.05E+02	5.18E-02	4.47E-02	1.04E+03	1.13E-01	1.38E-01	1.07E-01	-2.10E+01
SM	Use of secondary material	[kg]	2.94E-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]	7.10E-02	1.65E-05	3.79E-04	4.68E-01	1.84E-05	6.24E-05	5.59E-04	-1.17E-02

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: One piece of Aperio AH20 Hub

Parameter	Parameter	Unit	A1 - A3	A4	A5	B6	C2	C3	C4	D
HWD	Hazardous waste disposed	[kg]	6.36E-03	5.01E-06	3.08E-06	1.44E-01	5.16E-06	1.92E-05	9.32E-06	-2.67E-04
NHWD	Non-hazardous waste disposed	[kg]	1.95E-01	1.27E-05	3.99E-03	3.35E-01	2.13E-05	4.47E-05	2.17E-02	-3.16E-02
RWD	Radioactive waste disposed	[kg]	1.11E-02	5.20E-06	2.53E-06	1.49E-01	5.28E-06	1.99E-05	4.71E-06	-4.32E-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	8.60E-02	0.00E+00	0.00E+00	3.50E-03	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	1.73E-01	0.00E+00	0.00E+00	0.00E+00	3.63E-01	-
EET	Exported thermal energy	[MJ]	0.00E+00	0.00E+00	4.87E-01	0.00E+00	0.00E+00	0.00E+00	9.95E-01	-

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

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@bau-umwelt.com
Web **www.bau-umwelt.com**

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

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@bau-umwelt.com
Web **www.bau-umwelt.com**

Author of the Life Cycle Assessment
PE INTERNATIONAL AG
Hauptstraße 111
70771 Leinfelden-Echterdingen
Germany

Tel +49 711 34 18 17 22
Fax +49 711 34 18 17 25
Mail consulting@pe-international.com
Web **www.pe-international.com**

Owner of the Declaration
ASSA ABLOY AB
Förmansvägen 11
SE-117 43 Stockholm
Sweden

Tel +46 8 775 1860
Web **www.assaabloy.com/aperio**