



Evolume 1

ENVIRONMENTAL PRODUCT DECLARATION

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:
Fagerhults Belysning AB, Ävägen 1, 566 80 Habo, Sweden

Programme:	<i>The International EPD® System, www.environdec.com</i>
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com

FAGERHULT



General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): <i>pcr2019-14 Construction products v1.11 and UN CPC code(s)></i> Together with EN 15804:2012+A2:2019
PCR review was conducted by: <i>The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com</i>
Independent third-party verification of the declaration and data, according to ISO 14025:2006: <input type="checkbox"/> EPD process certification <input checked="" type="checkbox"/> EPD verification
Third-party verifier: Martyna Mikusinska, Sweco Environment AB, Martyna.Mikusinska@sweco.se
Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves a third-party verifier: <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 (Svensk Standard Ss-En 15804:2012+a2:2019, 2020) and ISO 14025 (ISO, 2006a). And the General Product Instructions (EPD International, 2021b).

The LCA approach harmonizes with the Product Environmental Footprint Category Rules for building products, cradle to grave (EPD International, 2021a). The Life Cycle Assessment report (Wendin, 2022) is available to EPD-auditor on request and includes all the detailed information required according to ISO 14044 (ISO, 2006b).

The EPD is for one specific product produced at a particular site.



Company information

Owner of the EPD:

Fagerhults Belysning AB

Contact:

Niclas Thulin, Sustainability Manager.

Description:

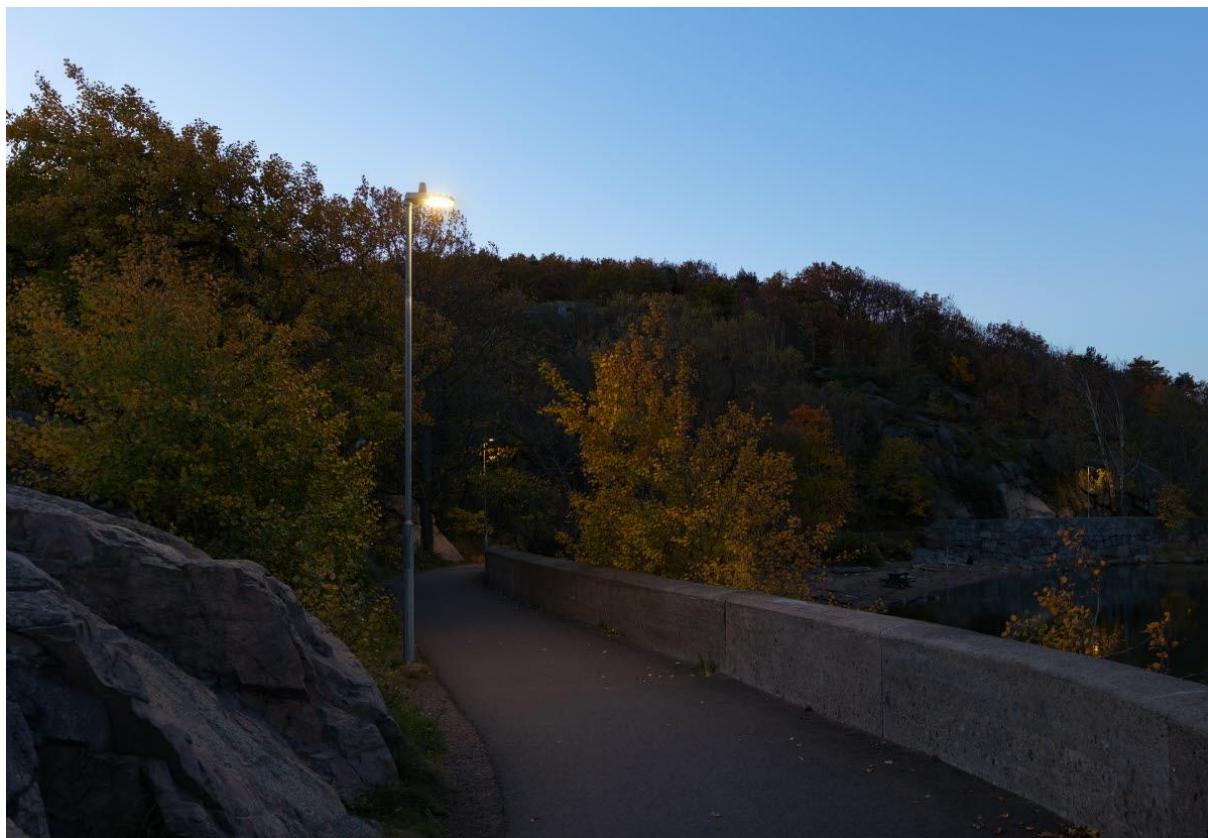
Fagerhult develops, produces and markets professional lighting solutions for public environments such as offices, schools, retail areas, industries and hospitals, indoor and outdoor. Our lighting knowledge, combined with a wide range of innovative, energy-efficient, less environmental impact lighting solutions, makes us a natural partner for the entire project. Fagerhult is a part of the Fagerhult Group, one of Europe's leading lighting companies with 4,200 employees in 28 countries worldwide.

Product-related or management system-related certifications:

Fagerhults Belysning AB are ISO 9001 and ISO 14001 certified.

Name and location of production site:

Fagerhults Belysning AB, Habo, Ävägen 1, 566 80 Habo.



Product information

Product family:

Evolume 1

Product description:

Evolume 1 is part of the Evolume product family of weather-resistant, post-mounted luminaires for streets and roads, with high performance and light comfort. It is available with several different lenses to meet the diverse requirements of road types and locations. The advanced lens technology ensures pleasant light distribution across pavements, car parks or roads, improving visibility, safety and security.

Product identification:

Evolume 1 with a weight 7,8 kg (conversion factor 0,1282) and effect 94 watt. Includes article number 550500, including suffixes. The product comes in alternatives of components, for which the EPD represents a specific setup (represented by article 550500-20076) with the most components possible (conservative assumption).

No substances on the Candidate List of SVHC¹ are present in the product or packaging.

¹ Candidate List of substances of very high concern for Authorisation - ECHA (europa.eu)

LCA information

Declared Unit	One Evolume 1
The functional unit	4000 hours of light per year during the lifetime.
The functional	Street and road light during the lifetime of one luminaire.
Lifetime - Reference Service Life	Twenty-five years based on technical lifetime and requirements in public procurement (Frank & Asp, 2015).
Technical lifetime	Minimum of 100 000 operation hours (25 years). Imply that parts are not exchanged.
Product group classification	UN CPC 429 Other metal products (no more relevant found).
Goal	Understanding the environmental impact throughout the product life cycle. Internal benefits during product development to reduce the environmental impact. External benefits for stakeholders when they select luminaires in outdoor environments.
Audience	Purchasers of luminaires, lighting installers, lighting designers, architects, property owners and constructors.
Scope	Cradle-to-grave and module D (A, B, C and D).
Time	Data regarding manufacturing is based on the environmental report for 2021, and the allocation to Evolume 1 is based on the sales in 2021.
Manufacturing Site	Fagerhults Belysning AB, Habo, Sweden.
Geographical Area	Europe. Use and disposal are represented by Sweden.
Compliant with	ISO 14040-44, attributional LCA ISO 14025 EN 15804:2012+A2:2019 Product category rules (PCR): pcr2019-14 Construction products v1.11
Cut-Off Rules	Environmental aspects that contribute less than 1% to any impact category.
Background Data	Ecoinvent 3.8 - allocation, Cut off.
Foreground Data -primary	Weight of articles and composition of raw materials. Suppliers' location for transport. Packaging, rest materials, water, electricity, heat and waste. Customers distance for distribution to the client. Disposal scenario.
Foreground Data -specific	Manufacturing at Fagerhult, Waste at Fagerhult, Component models with raw material, processing and transport. Driver from EPD (GmbH, 2020).
Electricity data	Electricity consumption in the A3 module is GoO-certified hydropower (Bixia, 2022), and B6 electricity is represented by data for the national production mix in Ecoinvent 3.8 regionalized for Sweden.
LCA software and database	SimaPro 9.303 on Ember/Miljogiraff/SimaPro@192.168.15.21/ MiljogiraffUpdate930/675

Description of the manufacturing process (A3)



The production site at Habo is a modern industrial facility including research and development, production, and assembly of the products. The main environmental aspects are the consumption of raw materials (mostly steel and aluminium), electricity (from renewable sources), heat (from next-door plant burning wood residues), waste to treatment, water and construction of the facilities.



Assumptions: transportation, usage and end-of-life treatment (A4-D)

The distribution to clients is represented by an estimated average-sized truck (32-ton payload) with the average level of filling (45%) and a calculated average distance to the client of 349 km. It is calculated from the sales per market and the distance from Fagerhult Habo (Jönköping) to the ten largest cities per market.

The product is most often used in the application "Street and Pathways", with an annual operating of 4000 hours. It is usually used for 25 years. Electricity is represented by data for the national production mix in Sweden, and an on-and-off solution describes the usage of the product as the worst case.

Usually, the installation takes place on the road, with two people using a truck with a sky-lift (crane). Evolume 1 is mounted on the post before the post is placed in place in the foundation by means of a crane. If it is an exchange, the work takes place from the sky lift on the existing pole. On major roads, a "barrier car" will be added.

Assumptions:

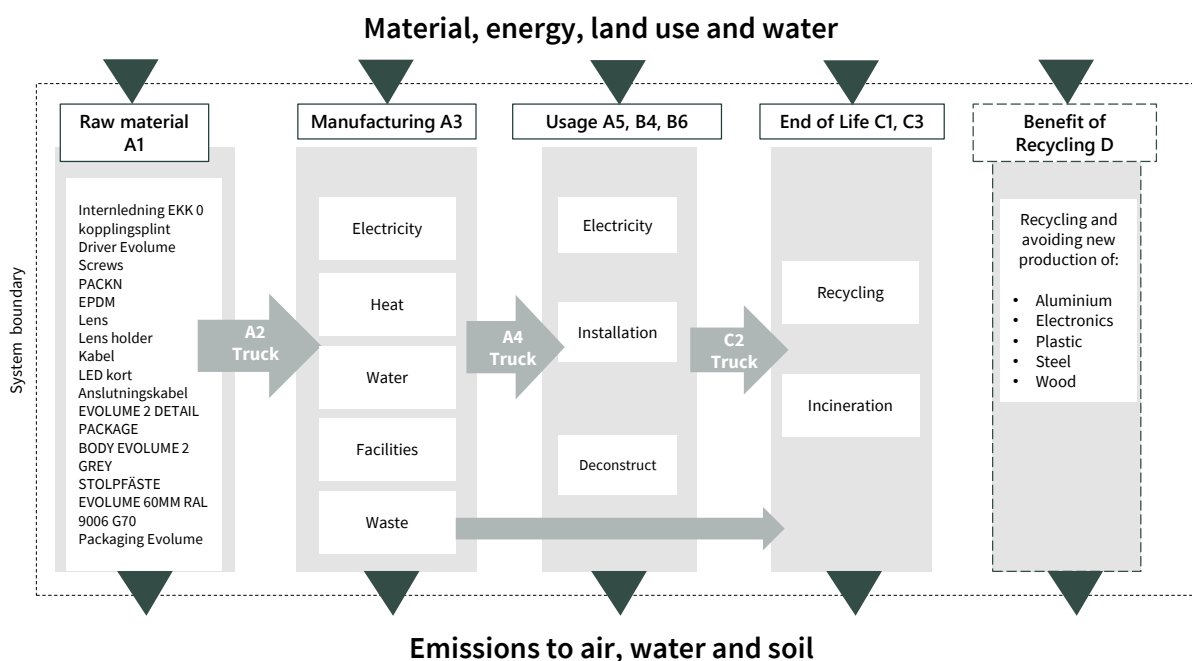
- The assumption is made (based on experience from an LCA on Steel lamp posts) that the relevant environmental aspect is transporting, and that > 100 installations are made per transport route.
- You work one day at a time and have time for 100 installations daily.
- That there is 0.2 km between each post
- That it is 200 km on average to the stretch of road
- That you use a car with 16-32 tons payload (euro 5 to install and euro 6 to deconstruct).

Allocation was done for A3, the general manufacturing, based on the production volumes (3% to Evolume 1).

Two times a year, all the lightning points in the big cities in Sweden are checked. According to the Swedish Road Authority, around 1/9000 are severely damaged every year, so the whole post needs to be changed. The amount is too small to have an impact on the overall results.

Deconstruction according to the same procedure as installation followed by sorting and recycling as electronic waste. At the end of life, the product is transported 20 km to the municipal treatment of electronic waste. If necessary, the waste is sorted manually, but primarily the product is shredded, and the material's final disposal is a treatment to material recycling.

System diagram:



This study includes a cradle-to-grave perspective. That means that all processes needed for raw material extraction, manufacturing, transport, usage and end-of-life are included in the study.

Module	Excluded	Reason
A1	Production of machines.	(cut-off 1% rule)
A3	Labour and related aspects, Business travel, Research and development activities.	An aspect not included in PCR.
A4	Transport of returned products	An aspect not included in PCR.
B1,2,3,5	Use, Maintenance, repair	No environmental aspect
B4	Replacement	(cut-off 1% rule)
B7	Water use	No environmental aspect
C4	Landfill	No environmental aspect

	Raw material		Manufacturing & Transport			Use							End of life				Reuse
	Raw material	Transport	Manufacturing	Transport	Installation	Use	Maintenance	Repair	Replacement	Renovation	Energy during use	Water use	Demolition	Transport	Waste process	Final disposal	Potential benefits of recycling
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Module declared	X	X	X	X	X ²	X ²	X ²	X ²	X ²	X ²	X	X ²	X ²	X	X	X ²	X
Geography	GLO	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE	SE
Type of data	G/S	G	S	G	-	-	-	-	S	-	G	-	S	G	G	-	G

Modules declared: (X = included ND = not declared), geographical scope, share of specific data (in GWP-GHG indicator) and data variation: EPD modules included (G = generic data, S = Specific data).

² Considered to have no relevant environmental aspects.

Material content

The product weight is at most 7.8 kg per product, excluding packaging material. The product family has several variations not using all components. The product Evolume 1 includes all components. The biogenic content in packaging is for pallet 0,036 kg and cardboard 0,0926 kg).

Material	Specification	Share (% wt)	Weight (kg)	Secondary (%)	Renewable (%)
Evolume		100%	7,8		
Aluminium	EN AB-44300	53,59%	4,17	100%	
External wire	Halogen free	17,61%	1,4		
Glass		16,58%	1,29		
Driver		12,00%	0,9		
Plastic	PMMA	4,63%	0,4		
Powder coating	Polyester	2,02%	0,16		
LED-module		1,91%	0,15		
Steel	Unspecified	0,15%	0,01		
Plastic (in cable)	TPE	0,90%	0,07		
Plastic	PA	0,28%	0,02		
Plastic	PC	0,90%	0,07		
Plastic (in cable)	PBT	0,64%	0,05		
Internal wires	Halogen free	0,55%	0,04		
Rubber	Unspecified	0,57%	0,04		
Packaging material		12,54%	0,98		
Cardboard	secondary	11,90%	0,93	81%	29%
Paper	primary	0,13%	0,01		100%
Pallet	tertiary	0,51%	0,04	10%	90%

Environmental Information

Results per one Evolume 1 (7,8 kg).

Potential environmental impact – mandatory indicators according to EN 15804

Impact category	Unit	A1-A3	A4	A5	B6	C1	C2	C3	D
GWP - Fossil	kg CO2 eq	5,77E+01	3,77E-01	2,78E-01	4,32E+02	2,72E-01	5,28E-01	1,62E+00	-2,60E+00
GWP - Biogenic	kg CO2 eq	2,41E+00	9,10E-04	7,35E-04	2,06E+02	7,31E-04	4,68E-04	-1,47E-03	-1,23E+00
GWP - LU LUC	kg CO2 eq	5,50E-01	1,40E-04	1,09E-04	3,05E+01	1,09E-04	5,79E-05	1,07E-03	-1,97E-02
GWP	kg CO2 eq	8,27E+01	3,78E-01	2,79E-01	6,68E+02	2,73E-01	5,28E-01	1,62E+00	-3,85E+00
ODP	kg CFC11 eq	3,33E-06	8,67E-08	6,43E-08	2,10E-05	6,31E-08	1,14E-07	2,33E-08	-4,57E-07
AP	mol H+ eq	4,42E-01	1,61E-03	1,13E-03	3,01E+00	7,74E-04	3,33E-03	3,43E-03	-2,95E-02
EP - freshwater	kg PO4 eq	1,70E-01	8,43E-05	5,50E-05	7,78E-01	5,48E-05	2,90E-05	8,83E-04	-3,13E-03
EP - freshwater	kg P eq	5,52E-02	2,74E-05	1,79E-05	2,53E-01	1,78E-05	9,45E-06	2,88E-04	-1,02E-03
EP - marine	kg N eq	5,41E-02	4,82E-04	3,40E-04	6,76E-01	1,57E-04	1,34E-03	6,90E-04	-4,88E-03
EP - terrestrial	mol N eq	6,26E-01	5,26E-03	3,71E-03	6,44E+00	1,71E-03	1,47E-02	7,17E-03	-5,07E-02
POCP	kg NMVOC eq	1,75E-01	1,68E-03	1,14E-03	1,52E+00	6,58E-04	5,18E-03	1,83E-03	-1,34E-02
ADPE*	kg Sb eq	4,21E-03	8,60E-07	9,66E-07	2,98E-02	9,65E-07	4,60E-07	8,85E-06	-4,02E-04
ADPF*	MJ	8,19E+02	5,77E+00	4,20E+00	5,90E+04	4,13E+00	7,18E+00	7,61E+00	-5,01E+01
WSF*	m3 deprive.	1,60E+01	2,16E-02	1,22E-02	7,46E+02	1,22E-02	6,23E-03	1,02E-01	-1,47E+01
PM	disease inc.	2,29E-06	3,34E-08	1,93E-08	3,10E-05	1,72E-08	7,14E-08	2,53E-08	-2,76E-07
IR**	kBq U-235 eq	5,60E+00	2,70E-02	2,16E-02	4,22E+03	2,13E-02	3,21E-02	8,33E-02	-8,84E-01
ETP – FW*	CTUe	4,17E+03	4,88E+00	3,28E+00	2,78E+04	3,24E+00	4,03E+00	1,82E+01	-1,60E+02
HTP-C*	CTUh	3,97E-08	1,27E-10	1,06E-10	9,63E-07	1,04E-10	7,22E-11	4,36E-10	-4,00E-08
HTP-NC*	CTUh	1,17E-06	4,99E-09	3,44E-09	2,20E-05	3,27E-09	2,73E-09	2,32E-08	-1,57E-07
Land use	Pt	2,64E+02	6,68E+00	2,89E+00	1,38E+04	2,88E+00	1,25E+00	2,38E+00	-1,08E+02

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

** Disclaimer: The impact category for IR deals mainly with the eventual impact of low dose ionizing radiation on the human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure, or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and some construction materials is also not measured by this indicator.

Raw material (A1), Transport (A2), Manufacturing (A3), Distribution (A4), Usage (B6), Transport (C2), Waste treatment (C3), Final disposal (C4), secondary effects of reuse and recycling (D).

Climate impact (IPCC) per one Evolume 1 (7,8kg)

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	D
Climate change	kg CO2 eq	54,49	1,83	2,37	58,70	0,37	0,28	460,14	0,27	0,52	1,61	-2,58

Due to differences in the method EF and IPCC, both results may be necessary to display. The indicator includes all greenhouse gases in the GWP total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Use of resources

The consumption of resources in terms of energy is measured as primary energy demand with the method CED 1.11.

Category	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	D
PERE	MJ	65,6	0,6	56,3	122,4	0,1	0,1	24453	0,1	0,0	1,0	-66,5
PERM	MJ	0	0	18,3	18,3	0	0	0	0	0	0	0
PERT	MJ	65,6	0,6	74,6	140,7	0,1	0,1	24453	0,1	0,0	1,0	-66,5
PENRE	MJ	571,8	28,8	20,4	621,0	6,1	4,5	59190	4,4	7,6	8,1	-53,4
PENRM	MJ	9,9	0,0	0,0	9,9	0,0	0,0	0	0,0	0,0	0,0	0,0
PENRT	MJ	581,7	28,8	20,4	630,9	6,1	4,5	59190	4,4	7,6	8,1	-53,4
SM	Kg	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0,7	0,7	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	M3	1,1	0	0	1,1	0	0	306	0	0	0,02	0

PERE	Use of renewable primary energy excluding renewable primary energy resources used as raw materials.
PERM	Use of renewable primary energy resources used as raw materials.
PERT	Total use of renewable primary energy resources.
PENRE	Use of non-renewable primary energy excl. non-renewable primary energy resources used as raw materials.
PENRM	Use of non-renewable primary energy resources used as raw materials.
PENRT	Total use of non-renewable primary energy resources.
SM	Use of secondary material.
RSF	Use of renewable secondary fuels.
NRSF	Use of non-renewable secondary fuels.
FW	Use of net fresh water

Information on biogenic carbon content

Share of biogenic carbon	Unit	Amount
Biogenic carbon in the product	kg C	0,0
Biogenic carbon in the packaging	kg C	0,48

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Waste production and output flows

Waste and the output of materials for recycling are from selected inventory results. Only flows that are leaving the system are included, why waste flows are not included in the model.

Indicator	Unit	A1	A2	A3	A1-A3	A4	A5	B6	C1	C2	C3	D
Components for reuse	kg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Material for recycling	kg	0,0	0,0	3,2	3,2	0,0	0,0	0,0	0,0	0,0	4,8	0,0
Materials for energy recovery	kg	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Exported energy, electricity	MJ	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
Exported energy, thermal	MJ	0,0	0,0	0,0	0,0	0,0	18	0,0	0,0	0,0	0,0	0,0

Additional information

The environmental impact of Evolume 1, from a lifecycle perspective, comes mainly from the electricity consumption in the use phase and the production of raw materials.

The environmental impact of the electricity is dominated by the environmental effect category "Resource use, fossils". The source is electricity from the grid in Sweden, which has a relatively low impact compared to electricity in other countries. The environmental impact of the raw materials is dominated by the environmental effect category "Resource use, minerals and metals". The model of the product system and value chain is sensitive to the energy source in electricity production. If the product is used instead with European electricity, the Climate impact (GWP) is five times higher.

The components that contribute the most are the connection cable, the driver, the LED card and the body. Thus, any changes in these components or data should be considered in an update.

References

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