
PRODUCT ENVIRONMENTAL PROFILE

HiPerGuard MV UPS

General Information

ABB Limited - Power Conditioning Products
111 Main North Road
Napier, 4110,
New Zealand
<https://new.abb.com/ups/systems/medium-voltage-ups/zisc>

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Reference Product

This PEP covers HiPerGuard MV UPS product manufactured.

Table 1: Reference product

Commercial reference of the reference product and all the product covered	HiPerGuard MV UPS
Power (rated and apparent) in kVA and kW	2500 / 2500
Rated Output Voltage	6 / 6.6 / 10 / 11 / 12.47 / 13.8 / 20 / 22 kV
UPS configuration (see Annex A of IEC 62040-3:2011),	Parallel UPS with common bypass
UPS performance classification (see 5.3.4. of IEC 62040-3:2011)	IEC62040-3 SS 111
Product dimensions (height × width × depth)	PCU: 2430 x 2295 x 1804 MVM: 2099 x 2189 x 2432
Mass without energy storage system e.g. batteries	12,138 kg
Input Dependency Characteristics according to IEC 62040-3 (VFI, VFD, VD): monomode or multimode	IEC62040-3 VI
Input power factor (displacement)	> 0.96
Expected life time of the UPS	15 years
Redundancy	N + 1

Functional Unit

The functional unit for the PEP is: To protect the load of 2500 kW against input power failure during 15 years and switch to the energy storage system to avoid power outage.

Product category: UPS with P > 10000W.

Constituent Materials

Total mass of reference product, packaging and elements supplied with reference products: 13,072 kg. In the following table the distribution data for material, expressed as percentage of the total mass, is reported.

Table 2: Content declaration – Product

Materials	Unit	%	Environmental / hazardous properties
Metals			
Iron, steel, and stainless steel	7,486	59.5%	
Aluminium and aluminium alloys	1,352	10.7%	
Copper and copper alloys	509	4.0%	
Other metals	410	3.3%	
Plastics			
Polycarbonate	308	2.4%	
Polyamide	178	1.4%	
ABS	8.32	<0.1%	
Other Thermoplastics	306	2.4%	
Elastomers	6.34	<0.1%	
Other plastics	289	2.3%	
Electronics			
PCBAs	68.8	0.5%	
Electric cables	72.9	0.6%	
LCD screen	1.54	<0.1%	
Batteries	0.00600	<0.1%	
Other electronics components	418	3.3%	
Other materials	238	1.9%	
Subtotal (Product)	11,652	92.6%	

Table 3: Content declaration –Packaging

Materials	Unit	%	Environmental / hazardous properties
Paper and cardboard	1.00	<0.1%	
Wood	931	7.4%	
Metals	3.00	<0.1%	
Subtotal (packaging)	935	7.4%	

Table 4: Content declaration – Summary (Product and Packaging)

Materials	Unit	%
Metals	9,760	74.7%
Plastics	1,560	12.0%
Others	1,750	13.4%

Environmental Impacts

System Boundaries

The life cycle assessment has been performed on HiPerGuard MV UPS including installation materials and packaging. The following life cycle stages are considered: manufacturing, distribution, installation, use and end-of-life. The life cycle stages taken into account in the environmental impact analysis are:

Manufacturing

The manufacturing stage includes the environmental impacts associated with extraction and processing of raw materials used to produce the product and its packaging, transport to the manufacturing site, and assembly at the manufacturing site.

Location of the manufacturing plant: ABB Limited - Power Conditioning Products, 111 Main North Road, Napier, 4110, New Zealand.

The energy model used in the manufacturing stage is the ecoinvent v3.7.1 electricity mix for New Zealand: Electricity, medium voltage {NZ}| market for electricity, medium voltage.

Distribution

The distribution stage includes the transportation in its packaging from the manufacturer's last logistics platform to the distributor and from the distributor to the installation place. The distribution is modeled by considering the distances from the manufacturing site to the countries where the product will be distributed in the year 2022.

End-of-life management of the packaging materials leaving the last logistic platform up to their end-of-waste status or disposal of the final residues are also included in the distribution stage.

Installation

The installation stage of the product at the place of use includes manufacturing, packaging and procurement of materials and components not supplied with the reference product but required for its installation, and management of the waste generated at the installation place.

Use

The use stage considers the product operation during 15 years of reference life time and includes energy consumption and production, distribution, installation and end-of-life of the components required to maintain the UPS over the reference life time.

Energy consumption is calculated by following the PSR, considering a calculated average efficiency of 97.83%. The energy models used in this phase are the specific energy mixes

based on ABB sales. For European target countries the energy models used are from ELCD v3.2 while for extra-European target countries the energy models are from ecoinvent v3.7.1.

Table 5: Countries selected for modelling HiPerGuard use phase, and respective emission factors

Item description	Percentage used for weighted average	Emission factor (kg CO2/kwh)
Belgium	20.0%	0.268
Germany	20.0%	0.613
USA	16.7%	0.544
Canada	23.3%	0.206
Japan	10.0%	0.718
Korea	10.0%	0.690

The maintenance operations include an annual inspection and also the substitution of the components reported in the following table, with the frequency given by the PSR.

Table 6: Maintenance frequency

Item description	Total number of units
Float charger Li-Ion 735Vdc	1
Fan 120mm 24Vdc*	1
Fan 92mm 24V enclosure ventilation	2
Busbar terminal contact grease	1
PEBB 120 fan	18
PEBB 120 air filter	18
Enclosure air filter cartridge	50
MVM fan	6
I/O Power module	3
Network switch	1
Insulation relay	1

End of Life

This stage, as described in the PCR, includes impacts associated with transportation to collect the product, its transportation from the installation site to the final end of life treatment site, and end of life treatment processes. A value of 1,000 km transport by lorry is used for the transportation to treatment, as provided the PCR for local transport.

Geographical and Representativeness

Data used are site specific: the manufacturing stage occurs at ABB, while the installation, use, and end of life stages occur in the specific target countries in which the UPS will be distributed in 2022 (as per Table 5).

Technological Representativeness

Materials and processes data are specific for the production of HiPerGuard MV UPS.

Life Cycle Impact Assessment

The environmental impacts, reported in the following table, are calculated by using SimaPro v9.2 and the databases ecoinvent v3.7.1 and ELCD v3.2.

Environmental Impact Indicators

Parameter	Unit	Total	Manufacturing		Distribution		Installation		Use		End of life	
Global warming potential (GWP)	kg CO2 eq.	1.65E+06	8.35E+04	5.0%	1.99E+03	0.1%	- 1.68E+03	<0.1%	1.57E+06	94.9%	7.91E+02	<0.1%
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	7.86E-02	4.35E-03	5.5%	3.79E-04	0.5%	2.60E-05	<0.1%	7.36E-02	93.6%	2.40E-04	0.3%
Acidification potential (AP)	kg SO2 eq.	4.92E+03	4.91E+02	10.0%	4.13E+01	0.8%	1.45E-01	<0.1%	4.38E+03	89.1%	3.80E+00	<0.1%
Eutrophication potential (EP)	kg PO43- eq.	2.71E+03	2.56E+02	9.4%	4.58E+00	0.2%	- 1.71E+00	<0.1%	2.46E+03	90.6%	- 3.52E+00	<0.1%
Formation potential of tropospheric ozone (POCP)	kg C2H4 eq.	2.57E+02	4.93E+01	19.2%	1.03E+00	0.4%	-2.94E-01	<0.1%	2.07E+02	80.5%	5.22E-02	<0.1%
Abiotic depletion potential – Elements	kg Sb eq.	1.85E+01	1.48E+01	80.3%	2.85E-03	<0.1%	4.32E-04	<0.1%	3.63E+00	19.6%	2.49E-03	<0.1%
Abiotic depletion potential – Fossil fuels	MJ, net calorific value	2.85E+07	1.02E+06	3.6%	2.67E+04	<0.1%	8.69E+02	<0.1%	2.74E+07	96.3%	1.30E+04	<0.1%
Total use of primary energy during the life cycle	MJ	3.18E+07	1.11E+06	3.5%	2.69E+04	<0.1%	8.84E+02	<0.1%	3.07E+07	96.4%	1.31E+04	<0.1%
Net use of fresh water	m3	4.02E+04	8.91E+02	2.2%	1.84E+00	<0.1%	-1.38E-01	<0.1%	3.93E+04	97.8%	1.74E+00	<0.1%

References

B.V., ©. P. (2021). SimaPro 7.3.3. Amersfoort, The Netherlands.

ISO. (2006a). *ISO 14025: Environmental labels and declarations — Type III environmental declarations — Principles and procedures*. Geneva: International Organization for Standardization.

ISO. (2006b). *ISO 14040: Environmental management – Life cycle assessment – Principles and framework*. Geneva: International Organization for Standardization.

ISO. (2006c). *ISO 14044: Environmental management – Life cycle assessment – Requirements and guidelines*. Geneva: International Organization for Standardization.

PEP ecopassport® PROGRAM. (2015). *Product Category Rules for Electrical, Electronic and HVAC-R Products, PCR-ed3-EN-2015 04 02*. <https://www.pep-ecopassport.org/>.

PEP ecopassport® PROGRAM. (2015). *SPECIFIC RULES FOR Uninterruptible Power Supply (UPS), PSR-0010-ed1.1-EN-2015 10 16*. <https://www.pep-ecopassport.org/>.

Wernet, G. B.-R. (2016). The ecoinvent database version 3 (part I): overview and methodology. . *The International Journal of Life Cycle Assessment*, [online] , 21(9), pp.1218–1230.

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Internal: ☐	External: ☒
The PCR review was conducted by a panel of experts chaired by Philippe Osset (SOLINNEN)	
PEP are compliant with XP C08-100-1 :2016 The elements of the present PEP cannot be compared with elements from another program.	
Document in compliance with ISO 14025 : 2010 « Environmental labels and declarations. Type III environmental declarations »	