

# **Product Environmental Profile**





93PS three phase UPS without Internal Battery

# Representative product

93PS 40 kW UPS with 2 Power Module without internal battery [BD04A0206A01000000] Product Category: Uninterruptible Power Supply (UPS)

# Description of the product

The Eaton 93PS has been developed to meet current and future needs for efficiency, resilience and scalability. It provides two operational modes- online Double Conversion Mode (DCM) and Energy Efficiency Mode (ESS). It is the most efficient UPS in its class, offering the lowest Total Cost of Ownership due to its advanced algorithms and energy saving features. It is available in small and large frame sizes and 8-40 kW. Moreover, with internal battery models, the 93PS offers the possibility to have either central or separate battery configurations.

# Homogeneous Environmental Families Covered

The PEP concerns product offerings from 93PS 40 kW UPS with Internal Battery series as mentioned below:

- 93PS 40 kW UPS with 2 Power Module without internal battery (Reference product)
- 93PS 40 kW UPS with 1 Power Module without internal battery

#### **Functional unit**

To protect the load of 40,000 Watts against input power failure for 15 years and switch to the energy storage system to avoid power outage.

# Company information

Eaton Power Quality Oy Koskelontie 25, 02920 Espoo, Finland Email: productstewardship-es@eaton.com

Constituent Materials			
Reference product mass	2.32E+02kg (with packaging)		
Materials	Category PEP Material	Mass (kg)	Percentage (%)
Steel	Metals	131.2	74.56%
Acrylonitrile Butadiene Styrene	Plastics	7.9	4.50%
Cable (high current)	Others	7.1	4.04%
Wood	Others	6.9	3.92%
Heatsink	Others	6.2	3.51%
Electronic board (Power)	Others	3.6	2.05%
Polyamide	Plastics	2.8	1.57%
Other metals	Metals	2.5	1.40%
Cardboard	Others	2.2	1.22%
Polybutylene Terephthalate	Plastics	2.0	1.15%
Paper	Others	1.3	0.73%
Polycarbonate	Plastics	0.7	0.41%
Copper	Metals	0.7	0.40%
Polyethylene	Plastics	0.6	0.35%
Liquid-Crystal Display	Others	0.3	0.18%
Miscellaneous	Others	25.2	14.32%
	Total	2.32E+02	100%

# **Substance Assessment**

The representative product is compliant with the EU-RoHS Directive (2011/65/EU) by application of exemptions and the product contains lead (Pb), Perfluorobutanesulfonic acid (PFBS) and its salts and 1,2-dimethoxyethane which are listed as Substance-of-Very-High-Concern (SVHC) on the Candidate List of the EU-REACH Regulation (1907/2006/EC).

Additional Envir	onmental Information
Manufacturing	The reference product is assembled at an Eaton plant holding management system certifications according to
	ISO 14001 standards.
Distribution	Eaton is committed to minimizing weight and volume of product and its associated packaging material with
Distribution	focus to optimize transport efficiency.
Installation	During installation of the product only standard tools are needed, which do not require any additional energy
installation	source and no waste other than the obsolete product packaging is generated during this step.
	Though maintenance requirements of the UPS have been minimized, the current Product Specific Rule
	applicable to this kind of product requires the replacement of parts including— manufacturing, delivery to the
	site of use and waste collection & treatment of replaced components of:
Use	<ul> <li>DC and AC capacitors of filtering (2 times)</li> </ul>
	o Fans (3 times)
	<ul> <li>Power supply PCBs (2 times)</li> </ul>
	Batteries (2 times)
	The recyclability rate of the overall product is 75% if properly dismantled prior to further processing at a
End of life	recycling facility. The rate is calculated based on "ECO'DEEE recyclability and recoverability calculation
End of file	method" (version V1, 20 Sep. 2008 presented to the French Agency for Environment and Energy
	Management: ADEME).

# **Environmental Impacts**

The calculation of the environmental impacts is the result of the Product's Life Cycle Analysis in accordance with ISO 14040/44, covering the entire lifecycle, i.e. "Cradle-to-Grave" including the following life cycle phases: production, distribution, installation, use and end of life.

System modelling was carried out using the commercial LCA software EIME v5.9.4 with database version CODDE-2022-01

System modelling	g was carried out using the comm	nercial LCA	software	EIME V5.9.4	4 with databas	e version CODDE-2022-01.						
Manufacturing	Product is assembled and prep	pared for s	hipment a	the Eaton	facility, Eaton	Power Quality Oy Espoo, Finland.						
Phase	Energy model used: Finland											
Distribution	Distribution of the product in its packaging from the Eaton's last logistics platform to the installation place in											
Phase	Europe is considered as per PCR rules.											
In the Head are	roduct is installed in in any European country. Hence, packaging waste treatment is considered in this phase											
Installation	considering average values											
Phase	Energy model used: Europe											
	Reference lifetime: 15 years											
	Energy model used: Europe											
	Usage profile: The product op	erates in tv	vo modes.	It has an av	erage energy	efficiency of 96% in Double						
	Conversion mode and 98.5% i	n Energy S	aver Syste	m mode. Tł	ne methodolog	gy for the calculation of the						
	electricity consumption is base	ed on Unint	erruptible	Power Sup	plies (UPS) PS	R with load profile -						
Use Phase	Operating loads	25%	50%	75%	100%							
	Proportion of Time spent at	0.25	0.50	0.25	0.00							
	Total energy losses are 103.14	19 MWh in	double co	nversion m	ode and 36.7	92 MWh in energy saver system						
	mode over 15 years. Maintena	ance is requ	uired for A	C/DC capa	citors, Fans & F	PCB as per the maintenance						
	frequency given in PSR.											
End of life	Product disposed according to	European	WEEE gui	delines.								
Phase	Energy model used: Europe	•	_									
End of life		European	WEEE gui	delines.								
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#### **Environmental Impact considering Double Conversion mode**

# **Environmental Impact Indicators: Mandatory**

Environmental impact indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Resource use, minerals and metals (ADPe)	kg Sb eq.	3.84E-01	2.21E-01	1.89E-06	1.48E-07	1.60E-01	3.06E-03	1.83E-04
Resource use, fossils (ADPf)	MJ	1.17E+06	5.10E+04	6.70E+02	2.91E+01	1.87E+04	1.08E+06	2.67E+04
Acidification Potential (AP)	mole of H+ eq.	2.71E+02	1.79E+01	3.04E-01	1.38E-02	1.02E+01	2.41E+02	1.61E+00
Eutrophication, freshwater (Epf)	kg P eq.	1.59E-01	1.58E-02	1.80E-05	6.43E-05	2.09E-02	1.16E-01	6.17E-03
Eutrophication marine (Epm)	kg N eq.	3.25E+01	2.36E+00	1.42E-01	8.13E-03	2.18E+00	2.74E+01	3.87E-01
Eutrophication, terrestrial (Ept)	mol N eq.	4.53E+02	2.63E+01	1.56E+00	3.45E-02	1.07E+01	4.12E+02	2.77E+00
Climate change-Total (GWP)	kg CO₂ eq.	4.67E+04	2.63E+03	4.80E+01	1.12E+01	1.32E+03	4.23E+04	3.94E+02
Climate change-Biogenic (GWPb)	kg CO₂ eq.	9.92E+01	3.71E+01	0.00E+00	1.15E-01	4.24E+00	5.64E+01	1.42E+00
Climate change-Fossil (GWPf)	kg CO₂ eq.	4.66E+04	2.59E+03	4.80E+01	1.11E+01	1.32E+03	4.22E+04	3.93E+02
Climate change-Land use and land use change (GWPlu)	kg CO₂ eq.	1.31E-05	7.84E-06	0.00E+00	-8.99E-08	2.16E-06	0.00E+00	3.18E-06
Ozone depletion (ODP)	kg CFC-11 eq.	7.46E-04	3.21E-04	7.36E-08	1.93E-07	2.37E-04	1.81E-04	6.84E-06
Photochemical ozone formation - human health (POCP)	kg NMVOC eq.	1.02E+02	8.28E+00	3.94E-01	1.11E-02	4.10E+00	8.80E+01	9.96E-01
Water use (WU)	m³ eq.	2.76E+04	7.85E+02	1.82E-01	1.74E+00	2.25E+04	1.50E+03	2.88E+03

<sup>\*</sup>Note: B2 (Maintenance) and B6 (energy requirements during the use stage) are considered. Other sub modules in the use stage (B1, B3-B5, B7) are equal to zero. So, it is not listed in the result tables.

# **Inventory Flow Indicators: Mandatory**

Inventory flow indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Use of renewable primary energy excluding renewable primary energy used as raw material	MJ	2.09E+05	1.37E+03	8.94E-01	2.21E+00	3.40E+02	2.07E+05	4.94E+01
Use of renewable primary energy resources used as raw material	MJ	4.76E+02	4.76E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	2.09E+05	1.85E+03	8.94E-01	2.21E+00	3.40E+02	2.07E+05	4.94E+01
Use of non-renewable primary energy excluding non- renewable primary energy used as raw material	MJ	1.17E+06	4.97E+04	6.70E+02	2.91E+01	1.82E+04	1.08E+06	2.67E+04
Use of non-renewable primary energy resources used as raw material	MJ	1.89E+03	1.37E+03	0.00E+00	0.00E+00	5.28E+02	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	1.17E+06	5.10E+04	6.70E+02	2.91E+01	1.87E+04	1.08E+06	2.67E+04
Use of secondary material	Kg	3.56E+00	3.56E+00	0.00E+00	0.00E+00	1.70E-03	0.00E+00	0.00E+00
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
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
Net use of freshwater	m³	7.17E+02	1.83E+01	4.24E-03	4.06E-02	5.88E+02	3.48E+01	7.61E+01
Components for reuse	Kg	2.75E-04	2.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	Kg	1.62E+02	1.59E+01	0.00E+00	1.52E+00	0.00E+00	0.00E+00	1.45E+02

Inventory flow indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Materials for energy recovery	Kg	3.64E+01	4.08E+00	0.00E+00	3.71E+00	2.84E+01	0.00E+00	2.91E-01
Exported Energy	MJ	3.37E+00	0.00E+00	0.00E+00	3.06E+00	0.00E+00	0.00E+00	3.15E-01
Hazardous waste disposed	Kg	7.72E+03	5.52E+03	0.00E+00	3.43E-02	1.18E+03	7.90E+02	2.29E+02
Non-hazardous waste disposed	Kg	8.29E+03	1.33E+03	1.68E+00	1.73E+01	8.04E+02	6.08E+03	5.30E+01
Radioactive waste disposed	Kg	1.74E+00	3.14E-01	1.20E-03	1.29E-03	1.21E-01	1.27E+00	3.35E-02
Biogenic carbon content of the product	Kg C	3.93E-01	3.93E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	Kg C	3.42E+00	3.42E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

<sup>\*</sup>Note: B2 (Maintenance) and B6 (energy requirements during the use stage) are considered. Other sub modules in the use stage (B1, B3-B5, B7) are equal to zero. So, it is not listed in the result tables.

# **Environmental Impact Indicators: Optional**

Environmental impact indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Ecotoxicity, freshwater	CTUe	5.88E+05	5.87E+05	5.23E+04	3.23E+01	5.98E+01	7.03E+04	4.55E+05
Human toxicity, cancer	CTUh-c	5.81E-04	5.81E-04	5.69E-04	8.44E-10	9.49E-07	1.04E-06	4.93E-06
Human toxicity, non-cancer	CTUh-nc	4.19E-04	4.19E-04	1.12E-04	9.13E-08	3.46E-08	1.01E-04	1.96E-04
lonising radiation, human health	kBq U235 eq.	2.29E+05	2.29E+05	6.10E+04	1.17E-01	1.78E-01	1.04E+05	6.29E+04
Land Use*		1.17E+03	1.17E+03	3.74E+01	0.00E+00	1.17E+00	2.43E+02	8.41E+02
EF-particulate Matter	Disease occurrence	2.11E-03	2.12E-03	1.93E-04	2.47E-06	8.24E-08	4.98E-05	1.87E-03
Total Primary Energy	MJ	1.38E+06	1.38E+06	5.29E+04	6.71E+02	3.14E+01	1.91E+04	1.28E+06

<sup>\*</sup>Note: B2 (Maintenance) and B6 (energy requirements during the use stage) are considered. Other sub modules in the use stage (B1, B3-B5, B7) are equal to zero. So, it is not listed in the result tables..

# Environmental Impact considering Energy Saver System (ESS) mode

# **Environmental Impact Indicators: Mandatory**

Environmental impact indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Resource use, minerals and metals (ADPe)	kg Sb eq.	3.82E-01	2.21E-01	1.89E-06	1.48E-07	1.60E-01	1.09E-03	1.83E-04
Resource use, fossils (ADPf)	MJ	4.81E+05	5.10E+04	6.70E+02	2.91E+01	1.87E+04	3.84E+05	2.67E+04
Acidification Potential (AP)	mole of H+ eq.	1.16E+02	1.79E+01	3.04E-01	1.38E-02	1.02E+01	8.60E+01	1.61E+00
Eutrophication, freshwater (Epf)	kg P eq.	8.42E-02	1.58E-02	1.80E-05	6.43E-05	2.09E-02	4.13E-02	6.17E-03
Eutrophication marine (Epm)	kg N eq.	1.48E+01	2.36E+00	1.42E-01	8.13E-03	2.18E+00	9.78E+00	3.87E-01
Eutrophication, terrestrial (Ept)	mol N eq.	1.88E+02	2.63E+01	1.56E+00	3.45E-02	1.07E+01	1.47E+02	2.77E+00
Climate change-Total (GWP)	kg CO₂ eq.	1.95E+04	2.63E+03	4.80E+01	1.12E+01	1.32E+03	1.51E+04	3.94E+02
Climate change-Biogenic (GWPb)	kg CO₂ eq.	6.29E+01	3.71E+01	0.00E+00	1.15E-01	4.24E+00	2.01E+01	1.42E+00
Climate change-Fossil (GWPf)	kg CO₂ eq.	1.94E+04	2.59E+03	4.80E+01	1.11E+01	1.32E+03	1.51E+04	3.93E+02
Climate change-Land use and land use change (GWPlu)	kg CO₂ eq.	1.31E-05	7.84E-06	0.00E+00	-8.99E-08	2.16E-06	0.00E+00	3.18E-06
Ozone depletion (ODP)	kg CFC-11 eq.	6.29E-04	3.21E-04	7.36E-08	1.93E-07	2.37E-04	6.45E-05	6.84E-06
Photochemical ozone formation - human health (POCP)	kg NMVOC eq.	4.52E+01	8.28E+00	3.94E-01	1.11E-02	4.10E+00	3.14E+01	9.96E-01
Water use (WU)	m³ eq.	2.67E+04	7.85E+02	1.82E-01	1.74E+00	2.25E+04	5.34E+02	2.88E+03

<sup>\*</sup>Note: B2 (Maintenance) and B6 (energy requirements during the use stage) are considered. Other sub modules in the use stage (B1, B3-B5, B7) are equal to zero. So, it is not listed in the result tables.

#### **Inventory Flow Indicators: Mandatory**

Inventory flow indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Use of renewable primary energy excluding renewable primary energy used as raw material	MJ	7.55E+04	1.37E+03	8.94E-01	2.21E+00	3.43E+02	7.38E+04	4.94E+01
Use of renewable primary energy resources used as raw material	MJ	4.76E+02	4.76E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	M)	7.60E+04	1.85E+03	8.94E-01	2.21E+00	3.43E+02	7.38E+04	4.94E+01
Use of non-renewable primary energy excluding non- renewable primary energy used as raw material	MJ	4.79E+05	4.97E+04	6.70E+02	2.91E+01	1.82E+04	3.84E+05	2.67E+04
Use of non-renewable primary energy resources used as raw material	MJ	1.89E+03	1.37E+03	0.00E+00	0.00E+00	5.28E+02	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	4.81E+05	5.10E+04	6.70E+02	2.91E+01	1.87E+04	3.84E+05	2.67E+04
Use of secondary material	Kg	3.56E+00	3.56E+00	0.00E+00	0.00E+00	1.70E-03	0.00E+00	0.00E+00
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
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
Net use of freshwater	m³	6.95E+02	1.83E+01	4.24E-03	4.06E-02	5.88E+02	1.24E+01	7.61E+01
Components for reuse	Kg	2.75E-04	2.75E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	Kg	1.62E+02	1.59E+01	0.00E+00	1.52E+00	0.00E+00	0.00E+00	1.45E+02
Materials for energy recovery	Kg	3.64E+01	4.08E+00	0.00E+00	3.71E+00	2.84E+01	0.00E+00	2.91E-01

Inventory flow indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Exported Energy	MJ	3.37E+00	0.00E+00	0.00E+00	3.06E+00	0.00E+00	0.00E+00	3.15E-01
Hazardous waste disposed	Kg	7.21E+03	5.52E+03	0.00E+00	3.43E-02	1.18E+03	2.82E+02	2.29E+02
Non-hazardous waste disposed	Kg	4.38E+03	1.33E+03	1.68E+00	1.73E+01	8.04E+02	2.17E+03	5.30E+01
Radioactive waste disposed	Kg	9.25E-01	3.14E-01	1.20E-03	1.29E-03	1.21E-01	4.54E-01	3.35E-02
Biogenic carbon content of the product	Kg C	3.93E-01	3.93E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Biogenic carbon content of the associated packaging	Kg C	3.42E+00	3.42E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

<sup>\*</sup>Note: B2 (Maintenance) and B6 (energy requirements during the use stage) are considered. Other sub modules in the use stage (B1, B3-B5, B7) are equal to zero. So, it is not listed in the result tables.

#### **Environmental Impact Indicators: Optional**

Environmental impact indicators	Units	Total	Manufacturing (A1-A3)	Distribution (A4)	Installation (A5)	Use* (B2)	Use* (B6)	End of Life (C1-C4)
Ecotoxicity, freshwater	CTUe	2.94E+05	5.23E+04	3.23E+01	5.98E+01	7.03E+04	1.62E+05	9.36E+03
Human toxicity, cancer	CTUh-c	5.78E-04	5.69E-04	8.44E-10	9.49E-07	1.04E-06	1.76E-06	4.73E-06
Human toxicity, non-cancer	CTUh-nc	2.93E-04	1.12E-04	9.13E-08	3.46E-08	1.01E-04	6.98E-05	1.03E-05
lonising radiation, human health	kBq U235 eq.	1.88E+05	6.10E+04	1.17E-01	1.78E-01	1.04E+05	2.24E+04	7.59E+02
Land use		6.24E+02	3.74E+01	0.00E+00	1.17E+00	2.43E+02	3.00E+02	4.27E+01
EF-particulate Matter	Disease occumence	9.21E-04	1.93E-04	2.47E-06	8.24E-08	4.98E-05	6.68E-04	8.02E-06
Total Primary Energy	MJ	5.57E+05	5.29E+04	6.71E+02	3.14E+01	1.90E+04	4.58E+05	2.68E+04

<sup>\*</sup>Note: B2 (Maintenance) and B6 (energy requirements during the use stage) are considered. Other sub modules in the use stage (B1, B3-B5, B7) are equal to zero. So, it is not listed in the result tables.

To evaluate the environmental impact of other product covered by this PEP, apply the following conversion factors to the Environmental Impact shown above:

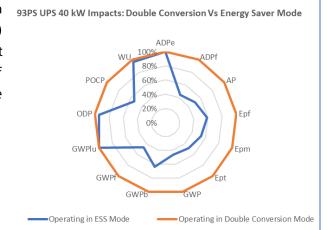
#### Conversion factors for Manufacturing, Distribution, Installation, Use and End-of-Life Phase:

		ADPe	ADPf	AP	Epf	Epm	Ept	GWP	GWPb	GWPf	GWPlu	ODP	POCP	WU
Product	Phases	(kg Sb eq.)	(MJ)	(mol H+ eq.)	(kg P eq.)	(kg N eq.)	(mol N eq.)	(kg CO2 eq.)	(kg CO2 eq.)	(kg CO2 eq.)	(kg CO2 eq.)	(kg CFC- 11)	(kg NMVOC eq.)	(m³ eq.)
93PS 40 kW UPS with 2 Power Module without internal battery (Reference product)	All Phases							:	1.0					
	Manufacturing	0.7	0.8	0.8	1.0	0.8	0.8	0.8	1.0	0.8	0.9	0.8	0.8	0.8
93PS 40 kW	Distribution	0.9	0.9	0.9	0.9	0.9	0.9	0.9	1.0	0.9	1.0	0.9	0.9	0.9
UPS with 1	Installation								1.0					
Power Module without	Use B2**							(	0.5					
internal battery	Use B6**								1.0					
mema buttery	End of Life	0.8	0.9	0.9	0.8	0.8	0.9	0.9	0.9	0.9	0.8	0.9	0.9	0.7

<sup>\*\*</sup>Extrapolation factor of Use B6 i.e., Energy requirements during the use stage shows extrapolation factor for both modes that Double conversion and Energy Saver System (ESS). Sub-modules other then B2 and B6 in Use phase are zero.

#### Additional Information

Operating the Eaton 93PS UPS in Energy Saver System mode results in a significantly reduced environmental impact (up to 58 % reduction) compared to operation in Double Conversion Mode (as shown in radar chart to the right). This is mainly due to an improved energy efficiency in ESS of 98.5% (average) compared to an efficiency of 96.0% (average) in Double Conversion mode.



#### Disclaimer

This Product Environmental Profile and its content is based on information available to us. It refers to the product at the date of issue. We make no express or implied representations or warranties with respect to the information contained herein.

Registration N°	EATO-00087-V01.01-EN	Drafting rules	PCR-ed4-EN-2021 09 06
Verifier accreditation N°	VH47	Supplemented by	PSR-0010-ed1.1-EN-2015 10 16
Date of issue	05-2023	Information and reference	www.pep-ecopassport.org
		documents	
		Validity period	15 years
Independent verification of the declaration and data, in compliance with ISO 14025: 2010			
Internal	X	External	
The PCR review was conducted by a panel of experts chaired by Julie ORGELET (DDemain)			
PEPs are compliant with XP C08-100-1:2016 or EN 50693:2019			
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