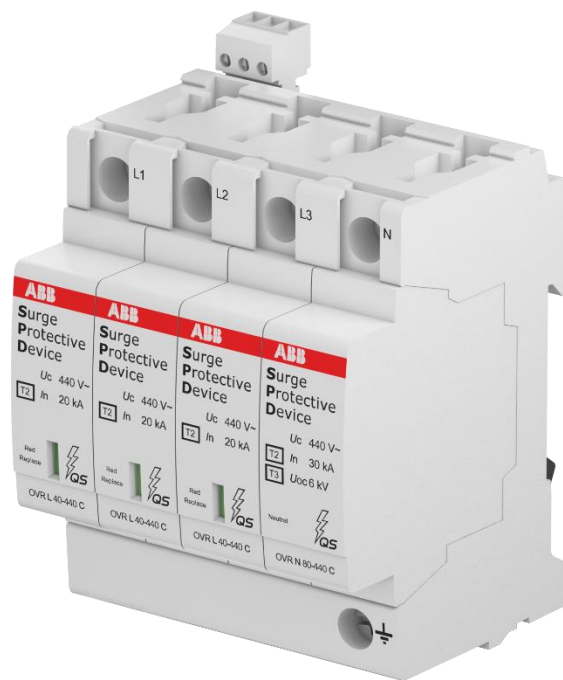


PRODUCTS FAMILY DECLARATION FOR T1-T2/T2 SPD - SURGE PROTECTIVE DEVICE OF ABB

PRODUCT ENVIRONMENTAL PROFILE

Environmental Product Declaration



Document in compliance with ISO 14025: 2010 "Environmental labels and declarations. Type III environmental declarations"

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ABB Purpose & Embedding Sustainability

ABB is demonstrating their commitment to sustainability by making themselves sustainable. Across their own operations and value chain, aspiring to become a role model for others to follow. With **ABB Purpose** ABB is focusing on reducing harmful emissions, preserving natural resources and championing ethical and humane behavior.



General Information

Reference product	The reference product is one unit of the T1-T2/T2 SPD - SURGE PROTECTIVE DEVICE produced by ABB, the representative product is OVR T2 3N 40-440 P TS QS.
Description of the product	<p>Functional Units for the products family covered by this LCA and PEP include: Through limiting transient voltages to safe operation levels and diverting surge currents into earth, the product protects during 20 years installations from the risk of permanent failures or damage and safeguards people and premise at risk against surges. This protection is ensured in accordance with the following parameters for the products family covered by this PEP:</p> <ul style="list-style-type: none"> - Maximum continuous operating voltage (Uc) (V): 75, 150, 255, 275, 350, 385, 440, 600, 660, 1000, 1500 (d.c.) - Impulse discharge current for class I test (Iimp) (kA): 12.5, 15, 20, 25, 50, 100 - Nominal discharge current (In) (kA): 10, 15, 20, 30, 40, 50, 60, 80, 100 - Open circuit voltage of the combination wave generator for surge protective devices type 3 (Uoc) (kV): 6 - Voltage protection level (Up) (kV): 0.5, 0.9, 1.0, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.3, 2.6, 2.8, 2.9, 3.0, 3.75, 3.8, 4.0, 4.5 - Current drawn by the surge protective device and his related functions (Ic) (µA): 30, 60, 70, 80, 100, 120, 130, 160, 170, 180, 210, 240, 260, 300, 390, 400, 460, 510, 640, 780, 1380 - Frequency range of the low voltage system (F): a.c. from 47Hz to 63Hz, d.c - Number of protected conductors (N): NA, 2, 3, 4, 5 - Surge protective devices type according standard IEC 61643-11.: T1-T2, T2, T2-T3
Functional unit of the representative product	<p>Protect during 20 years against direct or indirect effects of lightning or against transient overvoltages electrical equipments connected to electrical networks with a rated operational voltage up to 1000 V AC or 1500 V DC. This protection is ensured in accordance with the following parameters for the product in this PEP:</p> <ul style="list-style-type: none"> - Maximum continuous operating voltage (Uc) (V): 440 - Impulse discharge current for class I test (Iimp) (kA): NA - Nominal discharge current (In) (kA): 20 - Open circuit voltage of the combination wave generator for surge protective devices type 3 (Uoc) (kV): NA - Voltage protection level (Up) (kV): 1.8 - Current drawn by the surge protective device and his related functions (Ic) (µA): 300 - Frequency range of the low voltage system (F): AC, 47 - 63Hz - Number of protected conductors (N): 5 - Surge protective devices type according standard IEC 61643-11.: T2
Products concerned	The products covered by this PEP are: OVR T1-T2 s QS, OVR T2 s QS, and OVR T2 QS series.

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Constituent materials

Total weight of Reference product	432.1 g including the product, its packaging and additional elements and accessories
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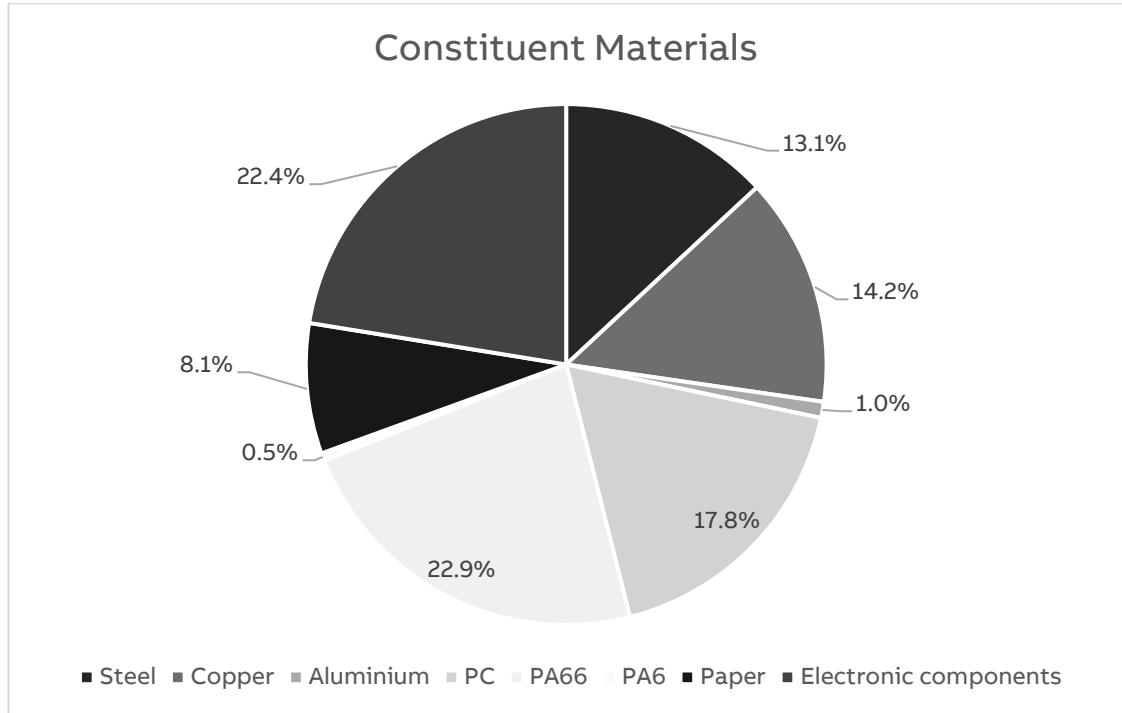


Figure 1 Constituent materials of the reference product

Table 1 Materials distribution of the reference product

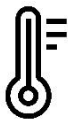
Plastics as % of weight		Metals as % of weight		Other as % of weight	
Name and CAS number	Weight-%	Name and CAS number	Weight-%	Name and CAS number	Weight-%
PA66	22.9	Steel	13.1	Electronic components	22.4
PC	17.8	Copper	14.2	Paper	8.1
PA6	0.5	Aluminum	1.0		



Additional Environmental Information

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Manufacturing	Manufacturing takes place in ABB plant in Beijing. The plant has the ISO 14001, ISO9001 certification
Distribution	Packaging and logistic flows are continuously improved in order to reduce their impact.
Installation	For the installation of the product, only standard tools (electric screw) are needed.
Use	This product requires no servicing, no maintenance or additional products. Greener electricity (e.g., electricity from PV) can reduce the environmental impact in use stage.
End of life	The reference product is assumed to be landfilled.
Software and database used	Simapro version 9.4.04 & databases ecoinvent 3.8
Standards	All the products apply to standards as below: GB/T 16917.1/IEC61009.2/ IEC 61009-1



Environmental impacts

Modules	Life cycle stage
A1-A3 Manufacturing Stage	Production of the materials and components making up the reference product and assembly. The refining and production process of raw materials and basic materials for major components Production (extraction, treatment, transformation, etc.) of packaging raw materials and transportation of the packaging from its manufacturing site to the product packaging site. Industrial processes used to assemble the reference product and packaging components.
A4 Distribution Stage	Transportation of the product in its packaging from the manufacturer's last logistics platform to the distributor and from the distributor to the installation place.
A5 Installation Stage	Packaging waste management. Installation processes.
B1-B7 Use stage	Energy consumption of the product during its use over RSL.
C1-C4 End-of-life stage	Processes required for the deinstallation, Transportation required to collect the end-of-life product and transport it from the installation site to the final treatment site, Disposal (landfill).

Table 2 Environmental Impacts information

Reference lifetime	20 years.			
Product category	Surge arresters, PSR-0005-ed2-EN-2016 03 29			
Installation elements	Electric screw is used for installation, not other material is needed.			
Use scenario	The representative product is only used in China. The calculation is based on the use scenario in China. Operation for 20 years, Load factor: 100% of I _c , Use rate: 100 % of the RLT All the products covered by this PEP were sold and used in China in year 2021.			
Geographical representativeness	China.			
Technological representativeness	As per the functional unit.			
Energy model used	Manufacturing	Installation	Use	End of life

	Average electricity mix in China	Average electricity mix in China	Average electricity mix in China	Global average electricity mix
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Table 3 Environmental impact indicators of life cycle Impact assessment

Compulsory Indicators							
Impact indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Climate change	kg CO2 eq	3.16E+01	7.99E+00	9.84E-02	1.13E-01	2.33E+01	1.43E-01
Climate change - Fossil	kg CO2 eq	3.14E+01	7.95E+00	9.83E-02	4.91E-04	2.32E+01	1.43E-01
Climate change - Biogenic	kg CO2 eq	2.48E-01	2.19E-02	5.75E-05	1.13E-01	1.13E-01	7.62E-05
Climate change - Land use and LU change	kg CO2 eq	1.74E-02	1.43E-02	4.01E-05	1.26E-07	2.93E-03	4.71E-05
Ozone depletion	kg CFC11 eq	5.54E-07	3.91E-07	2.17E-08	5.32E-11	1.21E-07	1.97E-08
Acidification	mol H+ eq	5.25E-01	4.03E-01	4.07E-04	1.71E-05	1.22E-01	3.98E-04
Eutrophication, freshwater	kg P eq	1.21E-02	7.71E-03	7.39E-06	4.02E-08	4.33E-03	8.43E-06
Eutrophication, marine	kg N eq	4.39E-02	1.73E-02	1.20E-04	2.71E-05	2.58E-02	6.74E-04
Eutrophication, terrestrial	mol N eq	4.92E-01	2.15E-01	1.31E-03	6.70E-05	2.75E-01	1.25E-03
Photochemical ozone formation	kg NMVOC eq	1.44E-01	7.19E-02	3.99E-04	4.72E-05	7.12E-02	3.92E-04
Resource use, minerals and metals	kg Sb eq	2.28E-03	2.21E-03	3.35E-07	9.77E-10	6.98E-05	4.03E-07
Resource use, fossils	MJ	3.15E+02	1.08E+02	1.45E+00	4.22E-03	2.05E+02	1.36E+00
Water use	m3 depriv.	6.91E+00	4.47E+00	5.01E-03	1.77E-04	2.43E+00	6.28E-03
Resource use indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	3.58E+01	1.48E+01	1.67E-02	1.19E-04	2.10E+01	1.99E-02
Use of renewable primary energy resources used as raw materials	MJ	4.50E-01	4.50E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.62E+01	1.52E+01	1.67E-02	1.19E-04	2.10E+01	1.99E-02
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	3.10E+02	1.02E+02	1.45E+00	4.22E-03	2.05E+02	1.36E+00
Use of non-renewable primary energy resources used as raw materials	MJ	5.39E+00	5.39E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

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Total use of non-renewable primary energy resources	MJ	3.15E+02	1.08E+02	1.45E+00	4.22E-03	2.05E+02	1.36E+00
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Use of secondary materials and energy resources	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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
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
Net use of fresh water	M3	1.79E-01	1.21E-01	1.62E-04	5.88E-06	5.82E-02	1.95E-04

Waste category indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Hazardous waste disposed of	kg	3.87E-04	3.41E-04	3.77E-06	9.64E-09	3.85E-05	3.55E-06
Non-hazardous waste disposed of	kg	3.64E+00	1.50E+00	7.35E-02	2.02E-04	1.89E+00	1.78E-01
Radioactive waste disposed of	kg	4.18E-04	2.82E-04	9.40E-06	2.10E-08	1.18E-04	8.58E-06

Output flow indicators	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.01E-02	6.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Biogenic Carbon of product and packaging

As no biogenic carbon in the product, thus, only the biogenic carbon in the packaging was calculated.

Table 4 Amount of biogenic carbon of product and packaging

	Unit	Total
Biogenic carbon content of the product	kg of C	0.00E+00
Biogenic carbon content of the associated packaging	kg of C	1.58E-02

Family of Products information lists

To determine the environmental impact of a product covered by the PEP other than the representative product, the following rules apply:

- ✓ Manufacturing, Distribution, Installation End of life phases are proportional to the mass of the product. So the environmental impact for those phases of a product covered by the PEP other than the representative product should be calculated by multiple the coefficients in Table 5 by the environmental impact for those phases of the representative product.

- ✓ Use phase is proportional to the rated power. So the environmental impact for use phase of a product covered by the PEP other than the representative product should be calculated by multiple the coefficients in Table 6 by the environmental impact for use phase of the representative product.

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Table 5 Extrapolation rules for Manufacturing, Distribution, Installation, and End of life phases (Weight factors)

Series	T2 QS											T2 s QS								T1-T2 s QS								
	20-75	40-150	20-275	20-440	40-275	40-350	40-385	40-440	40-600	40-660	40-1000	80-1000	40-275s	80-275s	100-275s	120-275s	160-275s	40-440s	80-440s	100-440s	120-440s	160-440s	12.5-275s	12.5-440s	15-275s	20-275s	25-275s	
C	0.152	0.155	0.166	0.182	0.166	0.175	0.178	0.182	0.210	0.215	0.210	0.379	0.224	0.224	0.406	0.406	0.406	0.268	0.268	0.494	0.494	0.494	0.291	0.434	0.540	0.540	0.540	
1L	0.281	0.283	0.295	0.311	0.295	0.304	NA	0.311	0.339	NA	0.339	0.581	0.364	0.364	0.608	0.608	0.608	0.408	0.408	0.696	0.696	0.696	0.419	0.633	0.743	0.743	0.743	
1L TS	0.288	0.291	0.302	0.318	0.302	0.311	NA	0.318	0.346	NA	0.346	0.591	0.371	0.371	0.619	0.619	0.619	0.415	0.415	0.707	0.707	0.707	0.438	0.644	0.753	0.753	0.753	
1N & N1	0.542	NA	0.556	NA	0.556	0.565	NA	0.572	NA	NA	NA	NA	0.620	0.620	NA	NA	NA	NA	NA	NA	NA	NA	0.699	0.875	NA	NA	NA	
1N & N1 TS	0.552	NA	0.566	NA	0.566	0.575	NA	0.582	NA	NA	NA	NA	0.630	0.630	NA	NA	NA	NA	NA	NA	NA	NA	0.709	2.266	NA	NA	NA	
3L	NA	NA	0.737	NA	0.737	0.765	NA	0.786	0.869	NA	NA	NA	0.910	0.910	NA	NA	NA	NA	1.042	NA	NA	NA	1.111	1.694	2.031	2.031	2.031	
3L TS	NA	NA	0.751	NA	0.751	0.778	NA	0.799	0.882	NA	NA	NA	0.923	0.923	NA	NA	NA	NA	1.055	NA	NA	NA	1.125	1.713	2.050	2.050	2.050	
3N & N3	NA	NA	0.940	0.989	0.940	0.968	0.975	0.989	NA	NA	NA	NA	1.120	1.120	NA	NA	NA	1.252	1.252	NA	NA	NA	1.333	1.926	2.265	2.442	2.442	
3N & N3 TS	NA	NA	0.956	1.005	0.956	0.984	0.991	1.000	NA	1.165	NA	NA	1.136	1.136	2.049	2.049	2.049	1.268	1.268	2.313	2.313	2.313	1.349	1.948	2.287	2.447	2.447	
4L	NA	NA	NA	NA	0.957	NA	NA	1.022	1.133	NA	NA	NA	1.187	1.187	NA	NA	NA	NA	1.363	NA	NA	NA	1.455	2.242	2.711	2.711	2.711	
4L TS	NA	NA	NA	NA	0.970	NA	NA	1.035	1.146	NA	1.146	NA	1.201	1.201	2.178	2.178	2.178	NA	1.376	2.530	2.530	2.530	1.469	2.266	2.715	2.715	2.715	
N C	NA	NA	NA	NA	0.152	0.152	NA	0.152	NA	NA	NA	NA	NA	0.159	NA	NA	NA	NA	NA	0.159	NA	NA	NA	0.171	0.168	NA	0.272	NA
N	NA	NA	0.281	0.281	0.281	0.281	NA	0.281	NA	NA	NA	NA	NA	0.299	NA	NA	NA	NA	NA	0.299	NA	NA	NA	0.299	0.297	NA	0.474	NA
PV	NA	NA	NA	NA	NA	0.708	NA	0.835	NA	0.849	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PV TS	NA	NA	NA	NA	NA	0.721	NA	0.848	NA	0.862	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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Table 6 Extrapolation rules for Manufacturing, Distribution, Installation, and End of life phases (Power consumption factors)

Series	T2 QS						T2 s QS												T1-T2 s QS								
com- pound mode	20-75	40-150	20-275	20-440	40-275	40-350	40-385	40-440	40-600	40-660	40-1000	80-1000	40-275s	80-275s	100-275s	120-275s	160-275s	40-440s	80-440s	100-440s	120-440s	160-440s	12.5-275s	12.5-440s	15-275s	20-275s	25-275s
C	0.050	0.100	0.192	0.333	0.192	0.153	0.134	0.333	0.458	0.500	0.250	0.500	0.249	0.249	0.498	0.498	0.498	0.433	0.433	0.867	0.867	0.867	0.326	0.600	0.652	0.652	0.652
1L	0.050	0.100	0.192	0.333	0.192	0.153	NA	0.333	0.458	0.500	0.250	0.500	0.249	0.249	0.498	0.498	0.498	0.433	0.433	0.867	0.867	0.867	0.326	0.600	0.652	0.652	0.652
1L TS	0.050	0.100	0.192	0.333	0.192	0.153	NA	0.333	0.458	0.500	0.250	0.500	0.249	0.249	0.498	0.498	0.498	0.433	0.433	0.867	0.867	0.867	0.326	0.600	0.652	0.652	0.652
1N & N1	0.050	NA	0.192	NA	0.192	0.153	NA	0.333	NA	NA	NA	NA	0.249	0.249	NA	NA	NA	NA	NA	NA	NA	NA	0.326	NA	NA	NA	NA
1N & N1 TS	0.050	NA	0.192	NA	0.192	0.153	NA	0.333	NA	NA	NA	NA	0.249	0.249	NA	NA	NA	NA	NA	NA	NA	NA	0.326	NA	NA	NA	NA
3L	NA	NA	0.575	NA	0.575	0.460	NA	1.000	1.375	NA	NA	NA	0.748	0.748	NA	NA	NA	NA	1.300	NA	NA	NA	0.978	1.800	1.955	1.955	1.955
3L TS	NA	NA	0.575	NA	0.575	0.460	NA	1.000	1.375	NA	NA	NA	0.748	0.748	NA	NA	NA	NA	1.300	NA	NA	NA	0.978	1.800	1.955	1.955	1.955
3N & N3	NA	NA	0.575	1.000	0.575	0.460	0.403	1.000	NA	NA	NA	NA	0.748	0.748	NA	NA	NA	1.300	1.300	NA	NA	NA	0.978	1.800	1.955	1.955	1.955
3N & N3 TS	NA	NA	0.575	1.000	0.575	0.460	0.403	1.000	NA	1.500	NA	NA	0.748	0.748	1.495	1.495	1.495	1.300	1.300	2.600	2.600	2.600	0.978	1.800	1.955	1.955	1.955
4L	NA	NA	NA	1.000	0.575	NA	NA	1.000	1.375	NA	NA	NA	0.748	0.748	NA	NA	NA	NA	1.300	NA	NA	NA	0.978	1.800	1.955	1.955	1.955
4L TS	NA	NA	NA	1.000	0.575	NA	NA	1.000	1.375	NA	0.750	NA	0.748	0.748	1.495	1.495	1.495	NA	1.300	2.600	2.600	2.600	0.978	1.800	1.955	1.955	1.955
N C	NA	NA	NA	NA	0.000	0.000	NA	0.000	NA	NA	NA	NA	NA	0.000	NA	NA	NA	NA	0.000	NA	NA	NA	0.000	0.000	NA	0.000	NA
N	NA	NA	NA	NA	0.000	0.000	NA	0.000	NA	NA	NA	NA	NA	0.000	NA	NA	NA	NA	0.000	NA	NA	NA	0.000	0.000	NA	0.000	NA
PV	NA	NA	NA	NA	NA	0.400	NA	0.667	NA	1.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
PV TS	NA	NA	NA	NA	NA	0.400	NA	0.667	NA	1.000	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Note: NA indicates no product in this combination.

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Registration number: ABBG-00141-V01.01-EN	Drafting Rules <i>PCR-ed4-EN-2021 09 06</i> Supplemented by <i>PSR-0005-ed2-EN-2016 03 29</i>
Verifier accreditation number: VH42	Information and reference documents: www.pep-ecopassport.org
Date of issue: <i>01/2023</i>	Validity period: 5 years
Independent verification of the declaration and data, in compliance with ISO 14025: 2010	
Internal: <input type="checkbox"/>	External: <input checked="" type="checkbox"/>
The PCR review was conducted by a panel of experts chaired by Julie Orgelet (DDemain)	
PEP are compliant with XP C08-100-1: 2016 or EN 50693:2019 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"	

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Approved	Public	ABBG-00141-V01.01-EN	A	en	10/10