Smissline Classic- S450M - Miniature Circuit Breaker

PEP ecopassport®

Product Environmental Profile

Registration number:	**ABBG-00560-V01.01-EN**	Drafting rules:	**PCR-ed4-EN-2021 09 06**
Contact information:	**EPD_ELSB@abb.com**	Supplemented by:	**PSR-0005-ed3.1-EN-2023 12 08**
Verifier accreditation number:	**VH51**	Information and reference documents:	**www.pep-ecopassport.org**
Date of issue:	**July-24**	Validity period:	**5 years**

Independent verification of the declaration and data in compliance with ISO 14025: 2006

Internal: ☐ **External:** ☒

The PCR review was conducted by a panel og experts chaired by Julie Orgelet (Ddemain)

PEPs are compliant with XP C08-100-1:2016 and EN 50693:2019 or NF E38-500 :2022
The components of the present PEP may not be compared with components from any other program.

Document complies with ISO 14025:2006 "Environmental labels and declarations. Type III environmental declarations"

ABB Purpose & Embedding Sustainability

ABB is committed to continually promoting and embedding sustainability across its operations and value chain, aspiring to become a role model for others to follow.
With its ABB Purpose, ABB is focusing on reducing harmful emissions, preserving natural resources and championing ethical and humane behavior.
The contect of this PEP cannot be compared with the content based on another program/database.
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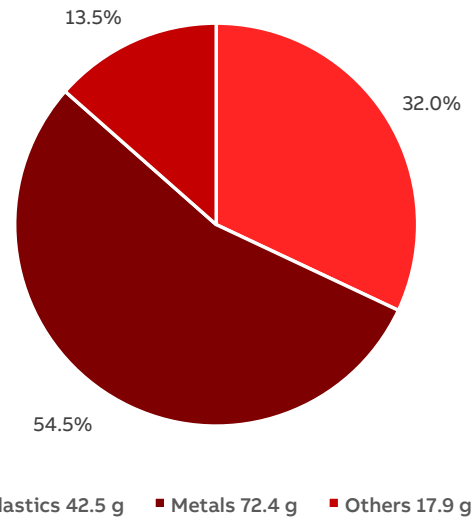
General information

Reference product	Smissline Classic - S451M-C13 - Miniature Circuit Breaker (MCB) - 1 Pole,13A,C Curve , 10kA (2CCS471001R0134)
Description of the product	Miniature circuit breakers are a small version of the Electrical circuit breaker family, which is widely used for domestic and industrial applications, the purpose of an Miniature circuit breaker (MCB) is as a protective device to protect the infrastructure and human beings from the fire which can happen due to overcurrent and short circuit. Parallelly MCB can be used for ON/OFF the electric current. S450M Miniature Circuit Breaker (MCB), 1 Pole, 13A, 240 V AC, C Curve, 10kA
Functional unit	Protect the commercial /household installations from overloads and short circuits in a circuit with rated voltage 240 V AC, rated current 13A with 1 Pole (1P), a rated Breaking capacity 10kA and tripping curve C, according to the appropriate use scenario, and during the reference service life of the product of 20 years
Other products covered	It is a "Product family declaration" which covers Miniature Circuit Breaker (MCB) - S450M, S450E and S450 - UC Series with Standard Product Characteristics Rated current (In): 0.5A to 63A, Rated Voltage (Ue): 240 V AC Number of Poles (Np): 1Pole,2Poles ,3Poles & 3Pole+N Rated Breaking Capacity(Icn): 6kA and 10kA Tripping Curve (Cd): B,C,D,K,UC-C and UC - Z Curves
Manufacturing address	ABB Schweiz Ltd. CMC Low Voltage Products. Fulachtrasse 150, 8200 Schaffhausen,Switzerland

Constituent Materials



Total weight of Reference product with Packaging	**132.8**	**g**

Plastics as % of weight		**Metals as % of weight**		**Others as % of weight**	
Name and CAS number	Weight%	Name and CAS number	Weight%	Name and CAS number	Weight%
PA	28.0	**Steel**	46.7	**Corrugated Box**	13.4
PA Glass Reinforced	1.1	**Copper**	5.6	**Miscellaneous other materials**	0.1
POM	0.9	**Aluminium**	1.7		
Miscellaneous Plastics	2.0	**Miscellaneous Metals**	0.5		

These products comply with actual requirements of Low Voltage Directives - 2014/35/EU and RoHS Directives 2011/65/EU including 2014/13/EU & 2015/863/EU and do not contain or only contain in the authorised proportions lead, mercury, cadmium, hexavalent chromium or flame retardants (polybrominated biphenyls -PBB, polybrominated diphenyl ethers - PBDE) as mentioned in the Directive.

Additional Environmental Information

Manufacturing	Manufactured at ABB Schweiz AG that is ISO 14001 Certified. In the manufacturing stage, raw material and the processes are considered. Packaging of the raw material, transport to the manufacturing site is considered.
Distribution	Distribution of this product is in Switzerland. The distribution is done with complete packaging.
Installation	End of life of MCB packaging considered in Installation phase.
Use	MCB does not require special maintenance or operations or consumables. And does not need any special process while in use.The energy consumption of the MCB is 2.073kWh at 15% loading rate.
End of life	Standard procedure according to PCR has been considered.

Environmental Impacts

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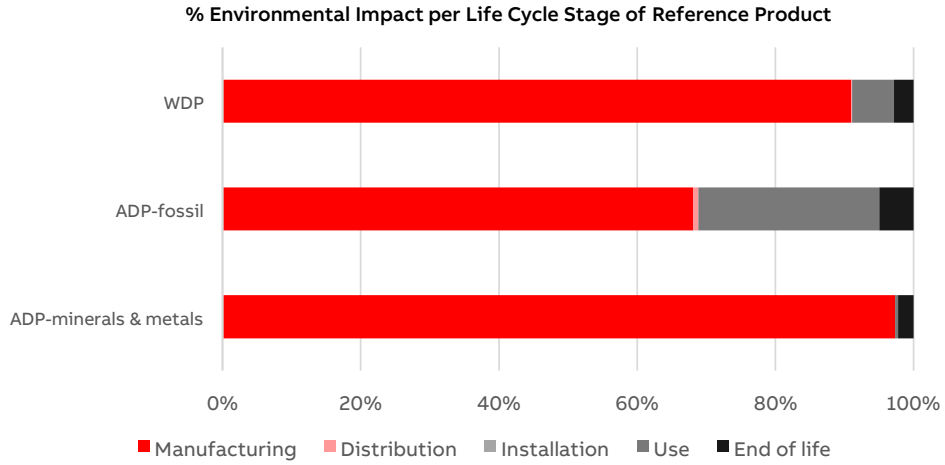
Reference lifetime	20 years
Product category	Circuit Breakers
Installation elements	Does not required any special process. Packaging waste generated as output in installation phase.
Use scenario	Switzerland - Europe
Geographical representativeness	Manufacutring Stage - Europe Distribution, Installation, Use and End of Life stages - Europe
Technological representativeness	Technology is specific to ABB MCBs which is common for all ABB manufacturing factories at global level
Software and database used	SimaPro 9.5.0.2 and ecoinvent 3.9
Energy model used	
Manufacturing	Electricity Medium Voltage, Switzerland and Bulgaria
Installation	Electricity Medium Voltage, Switzerland
Use	Electricity Medium Voltage, Switzerland
End of life	Electricity Medium Voltage, Switzerland

Common base of mandatory indicators



Environmental impact indicators

Indicator		Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
GWP	Total	kg CO2 eq.	1.47E+00	1.19E+00	1.37E-02	7.43E-03	1.06E-01	1.52E-01
	Fossil	kg CO2 eq.	1.40E+00	1.18E+00	1.37E-02	7.01E-04	6.13E-02	1.50E-01
	Biogenic	kg CO2 eq.	6.94E-02	1.54E-02	2.66E-05	6.73E-03	4.47E-02	2.49E-03
	Luluc	kg CO2 eq.	2.03E-03	1.88E-03	6.54E-06	2.37E-07	8.07E-05	6.16E-05
ODP		kg CFC-11 eq.	2.27E-08	1.79E-08	3.02E-10	1.69E-11	2.22E-09	2.24E-09
AP		H+ eq.	1.54E-02	1.42E-02	3.29E-05	2.36E-06	3.44E-04	8.34E-04
EP	Freshwater	kg P eq.	1.09E-03	1.00E-03	9.82E-07	7.50E-08	2.69E-05	5.96E-05
	Marine	kg N eq.	2.06E-03	1.82E-03	8.97E-06	3.67E-06	7.70E-05	1.57E-04
	Terrestrial	mol N eq.	1.86E-02	1.65E-02	9.21E-05	7.95E-06	8.34E-04	1.21E-03
POPCD		kg NMVOC eq.	6.31E-03	5.49E-03	5.38E-05	3.45E-06	2.13E-04	5.45E-04
ADP	Minerals & metals	kg SB eq.	2.81E-04	2.74E-04	3.72E-08	4.15E-09	1.17E-06	6.37E-06
	Fossil	MJ	2.58E+01	1.75E+01	2.02E-01	5.27E-03	6.74E+00	1.28E+00
WDP		m^3 eq. depr.	7.82E-01	7.11E-01	9.77E-04	6.63E-05	4.72E-02	2.22E-02

Resource use indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
PERE	MJ	9.99E+00	3.65E+00	2.95E-03	8.09E-04	6.25E+00	9.00E-02
PERM	MJ	2.65E-01	2.65E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.03E+01	3.91E+00	2.95E-03	8.09E-04	6.25E+00	9.00E-02
PENRE	MJ	2.45E+01	1.63E+01	2.02E-01	5.27E-03	6.74E+00	1.28E+00
PENRM	MJ	1.28E+00	1.28E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.58E+01	1.75E+01	2.02E-01	5.27E-03	6.74E+00	1.28E+00

Common base of mandatory indicators

Use of secondary materials, water, and energy resources

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
SM	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	4.91E-02	2.65E-02	3.17E-05	5.00E-06	2.19E-02	7.31E-04

Waste category indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
HWD	kg	2.40E-04	2.15E-04	1.25E-06	3.18E-08	3.22E-06	2.10E-05
N-HWD	kg	4.26E-01	3.11E-01	1.77E-02	1.98E-03	2.37E-02	7.09E-02
RWD	kg	1.47E-04	5.43E-05	6.15E-08	9.60E-09	9.07E-05	2.22E-06

Output flow indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
CfRu	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MfR	kg	1.55E-02	3.47E-03	0.00E+00	1.20E-02	0.00E+00	0.00E+00
MfER	kg	6.00E-03	1.51E-03	0.00E+00	4.49E-03	0.00E+00	0.00E+00
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Other indicators

Indicator		Unit	Total
Biogenic Carbon	Product	kg of C	0.00E+00
	Packaging	kg of C	8.90E-03
Environmental Cost		€	0.00E+00

Optional indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Tot PE	MJ	3.60E+01	2.14E+01	2.05E-01	6.07E-03	1.30E+01	1.37E+00
Efp	Dise inc	8.10E-08	6.77E-08	#REF!	3.36E-11	3.77E-09	8.51E-09
IrHH	kBq U-235 eq	6.47E-01	2.32E-01	2.55E-04	4.18E-05	4.07E-01	8.73E-03
ETX FW	CTUe	1.53E+01	1.41E+01	1.06E-01	1.40E-02	4.49E-01	6.20E-01
HTX CE	CTUh	5.24E-09	3.85E-09	5.92E-12	1.12E-12	7.56E-11	1.31E-09
HTX N-CE	CTUh	1.60E-07	1.34E-07	1.82E-10	1.80E-11	1.80E-09	2.41E-08
IrLS	Pt	1.65E+00	1.39E+00	3.83E-02	1.44E-03	4.06E-02	1.79E-01

Extrapolation Factors

Extrapolation rules are established according to EN 50693. Results of LCA performed for a reference product extrapolated to other products, these products are belonged to a same homogeneous product family as the reference product. The group of products have the following same characteristics:
-Same main function, Same product standards,
-Similar manufacturing technology: same type of materials and manufacturing processes
Coefficients factors have been extrapolated with division of environment indicators value of homogeneous product by reference product environment indicator value.
For other products than the Reference product covered by this PEP, the environmental impacts for each phase of the lifecycle are obtained by multiplying the values of the Reference product by the following coefficients:

Note: If the coefficient is "1", the impacts of the phase of the life cycle are assimilated to the Reference product, meaning that the impacts are unchanged in comparison to the Reference product.
Manufacturing and Distribution phase: To calculate environmental impact of covered product, nominal value of reference product environment category to be multiplied with corresponding rating Impact category's coefficient, then value to be multiplied by the number of poles.
i.e. y=a*x/2*n
Where a= Coefficient of corresponding rating impact category
y= Homogeneous product environmental category
x=Nominal value of reference product environmental category
n=Number of poles including neutral poles

	S450M				**S450E**		**S450-UC**	
Rating	B	C	D	K	B	C	C	Z
0.5	N/A	1.015	N/A	1.054	N/A	N/A	1.020	1.028
1	N/A	1.030	N/A	1.070	N/A	N/A	1.035	1.043
1.6	N/A	1.026	N/A	1.066	N/A	N/A	1.031	1.039
2	N/A	1.019	N/A	1.059	N/A	N/A	1.024	1.031
3	N/A	1.008	N/A	1.047	N/A	N/A	1.013	1.020
4	1.029	1.015	N/A	1.054	N/A	N/A	1.020	1.028
6	1.004	0.991	1.022	1.029	1.004	0.991	0.996	1.003
8	1.002	0.989	1.020	1.027	1.002	0.989	0.993	1.001
10	0.987	0.974	1.005	1.012	0.987	0.974	0.979	0.986
13	0.998	**1.000**	1.016	1.023	0.998	0.985	0.990	0.997
16	0.999	0.986	1.017	1.025	0.999	0.986	0.991	0.998
20	1.020	1.007	1.038	1.046	1.020	1.007	1.012	1.019
25	1.035	1.021	1.053	1.061	1.035	1.021	1.026	1.034
32	1.041	1.027	1.059	1.067	1.041	1.027	1.032	1.040
40	1.023	1.009	1.041	1.048	1.023	1.009	1.014	1.021
50	1.073	1.059	1.093	1.100	1.073	1.059	1.005	1.011
63	1.121	1.106	1.142	1.150	1.121	1.106	1.112	1.120

Use phase: To calculate environmental impact of covered product, nominal value of reference product environment category to be multiplied with corresponding rating Impact category's coefficient, then value to be multiplied by the number of poles.
i.e. y=a*x/2*n
Where a= Coefficient of corresponding rating impact category
y= Homogeneous product environmental category
x=Nominal value of reference product environmental category
n=Number of poles including neutral poles
The use phase for Industrial application is at 50% of the energy consumption and 15% for Commercial or Residential use.

	S450M				S450E		S450-UC	
Rating	B	C	D	K	B	C	C	Z
0.5	N/A	0.624	N/A	0.624	N/A	N/A	0.716	1.170
1	N/A	0.747	N/A	0.747	N/A	N/A	0.808	1.221
1.6	N/A	0.681	N/A	0.681	N/A	N/A	0.976	1.359
2	N/A	0.854	N/A	0.854	N/A	N/A	0.796	1.195
3	N/A	0.697	N/A	0.697	N/A	N/A	0.747	1.209
4	1.198	0.772	N/A	0.772	N/A	N/A	0.782	1.193
6	1.056	0.982	0.904	0.982	1.056	0.977	0.956	1.346
8	0.790	0.694	0.693	0.694	0.790	0.778	0.781	1.026
10	1.022	0.746	0.739	0.746	1.022	0.889	0.897	1.122
13	1.205	**1.000**	1.043	1.000	1.205	1.018	0.999	1.446
16	1.152	1.038	1.169	1.038	1.152	1.201	1.199	1.479
20	1.139	1.118	1.104	1.118	1.139	1.162	1.116	1.235
25	1.347	1.274	1.289	1.274	1.347	1.422	1.362	1.450
32	1.727	1.801	1.726	1.801	1.727	1.768	1.656	1.863
40	2.321	1.792	1.808	1.792	2.321	2.787	1.831	2.113
50	2.120	2.098	1.986	2.098	2.120	2.027	2.384	2.443
63	2.603	2.414	2.621	2.414	2.603	2.841	1.000	2.664

Installation phase: To calculate environmental impact of covered product, nominal value of reference product environment category to be multiplied with the number of poles.
i.e. y=a*x/2*n
Where a= Coefficient of corresponding rating impact category
y= Homogeneous product environmental category
x=Nominal value of reference product environmental category
n=Number of poles including neutral poles

End of life phase: To calculate environmental impact of covered product, nominal value of reference product environment category to be multiplied with corresponding rating Impact category's coefficient, then value to be multiplied by the number of poles.
i.e. y=a*x/2*n
Where a= Coefficient of corresponding rating impact category
y= Homogeneous product environmental category
x=Nominal value of reference product environmental category
n=Number of poles including neutral poles
The use phase for Industrial application is at 50% of the energy consumption and 15% for Commercial or Residential

	S450M				S450E		S450-UC	
Rating	B	C	D	K	B	C	C	Z
0.5	N/A	1.017	N/A	1.063	N/A	N/A	1.023	1.032
1	N/A	1.035	N/A	1.081	N/A	N/A	1.040	1.049
1.6	N/A	1.030	N/A	1.077	N/A	N/A	1.036	1.045
2	N/A	1.022	N/A	1.068	N/A	N/A	1.027	1.036
3	N/A	1.010	N/A	1.055	N/A	N/A	1.015	1.023
4	1.033	1.017	N/A	1.063	N/A	N/A	1.023	1.032
6	1.004	0.990	1.025	1.034	1.004	0.990	0.995	1.003
8	1.002	0.987	1.023	1.031	1.002	0.987	0.992	1.001
10	0.985	0.970	1.005	1.014	0.985	0.970	0.976	0.984
13	0.997	**1.000**	1.018	1.027	0.997	0.983	0.988	0.996
16	0.999	0.984	1.020	1.029	0.999	0.984	0.990	0.998
20	1.023	1.008	1.044	1.053	1.023	1.008	1.013	1.022
25	1.040	1.024	1.062	1.070	1.040	1.024	1.030	1.039
32	1.047	1.031	1.069	1.077	1.047	1.031	1.037	1.046
40	1.026	1.010	1.047	1.056	1.026	1.010	1.016	1.024
50	1.084	1.068	1.107	1.116	1.084	1.068	1.006	1.013
63	1.140	1.123	1.164	1.173	1.140	1.123	1.129	1.138

Glossary

Environmental impact Indicators	
GWP-total	Global Warming Potential total (Climate hange)
GWP-fossil	Global Warming Potential fossil
GWP-biogenic	Global Warming Potential biogenic
GWP-luluc	Global Warming Potential land use and land use change
ODP	Depletion potential of the stratospheric ozone layer
AP	Acidification potential
EP-freshwater	Eutrophication potential - freshwater compartment
EP-marine	Eutrophication potential - fraction of nutrients reachin marine end compartment
EP-terrestrial	Eutrophication potential - Accumulated Exceedance
POCP	Formation potential of tropospheric ozone
ADP-m&m	Abiotic Depletion for non-fossil resources potential
ADP-fossil	Abiotic Depletion for fossil resources potential, WDP
WDP	Water deprivation potential

Resource indicators	
PENRE	Use of non-renewable primary energy excluding renewable primary energy resources used as raw
PENRM	Use of non-renewable primary energy resources used as raw material
PENRT	Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials
PERE	Use of renewable primary energy excluding non-renewable primary energy resources used as raw material.
PERM	Use of renewable primary energy resources used as raw material
PERT	Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)

Secondary materials, water and energy resources	
SM	Use of secundary materials
RSF	Use of renewable secondary fuels
NRSF	Use of non-renewable secondary fuels
FW	Net use of fresh water

Waste category indicators	
HWD	Hazardous waste disposed
N-HWD	Non-hazardous waste disposed
RWD	Radioactive waste disposed

Output flow indicators	
CfRu	Components for re-use
MfR	Materials for recycling
MfER	Materials for energy recovery
EE	Exported Energy

Optional indicators	
Tot PE	Total use of primary energy during the life cycle
Efp	Emissions of Fine particles
IrHH	Ionizing radiation, human health
ETX FW	Ecotoxicity, freshwater
HTX CE	Human toxicity, carcinogenic effects
HTX N-CE	Human toxicity, non-carcinogenic effects
IrLS	Impact related to Land use / soil quality

References

[1] PCR “PEP-PCR-ed4-EN-2022_09_06” - Product Category Rules for Electrical, Electronic and HVAC-R Products (published: 6th September 2022)

[2] PSR “PSR-0005-ed3.1-EN-2023 12 08” - SPECIFIC RULES FOR Electrical switchgear and control gear Solutions (Circuit breakers)

[3] EN 50693:2019 - Product category rules for life cycle assessments of electronic and electrical products and systems

[4] ISO 14040:2006 - Environmental management -Life cycle assessment - Principles and framework

[5] ISO 14044:2006 - Environmental management - Life cycle assessment - Requirements and guidelines

[6] ecoinvent v3.8 (2022). ecoinvent database version 3.8 - (https://ecoinvent.org/)

[7] SimaPro Software version 9.3.0.3 - PRé Sustainability

[8] UNI EN 15804:2012+A2:2019: Sustainability of constructions - Environmental product declarations (September 2019)

[9] IEC/TR 62635 - Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment - Edition 1.0 2012-10

[10] https://www.ecosystemspa.com/

[11] LB-DT 17-21D - RoHS II (MCCBs and ACBs)

[12] LB-DT 18-21D - REACH (MCCBs and ACBs)

[13] 1SDL000571R0 Ver 01 - RoHS Exemptions (MCCBs and ACBs)

[14] 1SDL000572R0 Ver 01 - SVHC present in excess of 0.1% (MCCBs and ACBs)