



PKZ-SOL String Circuit Breaker

Representative product	PKZ-SOL30 (Y7-120939) Product Category: Circuit Breakers
Description of the product	The PKZ-SOL is a string circuit breaker from Eaton's Moeller series. It's designed for use in photovoltaic (solar) systems to protect against short-circuit currents.
Homogeneous Environmental Families Covered	The PEP concerns following product offerings from Eaton Moeller series PKZ-SOL String circuit-breaker as mentioned below: Y7-120939 PKZ-SOL30 (Reference); Y7-120938 PKZ-SOL20; Y7-120937 PKZ-SOL12
Functional unit	"Protect the installation from overloads and short circuits in a circuit with rated voltage 900V, rated current 30A, with 2 poles, a rated breaking capacity 5 kA, and the tripping curve C in the Household/Commercial application area, according to the appropriate use scenario, and during the reference service life of the product of 20 years."
Company information	Eaton Industries GmbH - Werk Gladbach, Alteckstraße 48, 56566 Neuwied, Germany Email: productstewardship-es@eaton.com

Constituent Materials			
Reference product mass	3.28E-01 Kg (With packaging)		
Category PEP Material	Material constituent	Mass (kg)	% Contribution
Plastic	Polyamide	1.12E-01	34.1%
Metal	Steel	9.16E-02	27.9%
Plastic	Polybutylenes Terephthalate	3.42E-02	10.4%
Other	Paper and Cardboard	2.23E-02	6.8%
Metal	Copper	1.67E-02	5.1%
Metal	Stainless Steel	1.57E-02	4.8%
Metal	Ferronickel	1.06E-02	3.2%
Metal	Brass	8.94E-03	2.7%
Other	Wood	5.80E-03	1.8%
Metal	Ferrite Magnet	4.00E-03	1.2%
Plastic	Polypropylene	2.13E-03	0.6%
Plastic	Liquid Crystal Polymer	1.83E-03	0.6%
Metal	Silver	9.49E-04	0.3%
Plastic	Polyethylene low density film	5.00E-04	0.2%
Plastic	Polyetherimide	3.35E-04	0.1%
Other	Miscellaneous	9.36E-04	0.3%
Total		3.28E-01	100.0%

Substance Assessment

The representative product is compliant with the EU-RoHS Directive (2011/65/EU) with exemption and the product does contain lead and Perfluoro butane sulfonic acid (PFBS) and its salts as substance listed as Substance-of-Very-High-Concern (SVHC) on the Candidate List of the EU-REACH Regulation (1907/2006/EC).

Additional Environmental Information

Manufacturing	The reference product is assembled at an Eaton plant in Germany, holding management system certifications according to ISO 14001 standards.
Distribution	Eaton is committed to minimizing weight and volume of product and packaging with focus to optimize transport efficiency.
Installation	The installation process does not require any energy consumption and there is no waste other than the obsolete product packaging generated during this step.
Use	The product requires energy consumption during operation.
End of life	The recyclability rate of the overall product is 40.82% if it is properly dismantled prior to shredding. The rate is calculated based on ratios in "Product Category Rules for Electrical, Electronic and HVAC-R Products (PCR-4-ed4-EN-2021 09 06).

Environmental Impacts	
<p>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.</p> <p>System modelling was carried out using the commercial LCA software EIME v6.2.2 with database version CODDE-2024-04.</p> <p>Indicators Set: PEF EF 3.1 (Compliance: PEP ed.4, EN15804+A2) v2.0</p>	
Manufacturing Phase	<p>The product is assembled as well as packed at Eaton facility Eaton Industries GmbH - Werk Gladbach, Alteckstraße 48, 56566 Neuwied, Germany plant.</p> <p>Energy model used: Germany</p>
Distribution Phase	Distribution of the product in its packaging from the Eaton's last logistics platform to the installation place in Europe is considered as per PCR rules.
Installation Phase	<p>Product is installed in Europe. Installation of product and treatment of packaging waste are considered in this phase. There is no installation energy consumption for reference product.</p> <p>Energy model used: Europe</p>
Use Phase	<p>Reference lifetime: 20 Years</p> <p>Usage profile: The product has power loss of 6.3 W at full load condition.</p> <p>As per PSR-0005 section 3.2.2., for Household/Commercial applications considering 15% of the loading rate and 30% of the use time rate, total losses are 7.45 kWh over the 20 years.</p> <p>Product do not require any maintenance/replacement during useful life.</p> <p>Energy model used: Europe</p>
End of life Phase	<p>Product disposed with WEEE guidelines.</p> <p>Energy model used: Europe</p>
Module-D	Module D is calculated according to PCR-ed4-EN-2021 09 06 based on the materials recycled and the modelled end-of-life scenario. It expresses the net benefits and loads beyond the boundaries of the system and are not to be included in the life cycle totals.

Environmental Impact Indicators: Mandatory

Mandatory environmental impact indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B6 - Operational energy use	C1-C4 - End of life	D - Benefits and loads beyond the system boundaries
Climate change – total (GWP)	kg CO2 eq.	5.47E+00	2.32E+00	7.38E-02	4.19E-02	2.63E+00	4.05E-01	-5.06E-01
Climate change - fossil fuels (GWP-f)	kg CO2 eq.	5.45E+00	2.33E+00	7.38E-02	2.82E-02	2.62E+00	3.89E-01	-5.30E-01
Climate change – biogenics (GWP-b)	kg CO2 eq.	2.45E-02	-9.42E-03	3.02E-07	1.37E-02	4.83E-03	1.54E-02	2.44E-02
Climate change - land use and land use transformation (GWP-lu)	kg CO2 eq.	2.93E-07	9.98E-08	1.12E-07	1.08E-09	0.00E+00	8.01E-08	0.00E+00
Ozone depletion (ODP)	kg eq. CFC-11	1.58E-07	1.30E-07	8.96E-10	3.69E-10	1.27E-08	1.38E-08	-8.36E-08
Acidification (AP)	mole of H+ eq.	3.15E-02	1.58E-02	1.17E-04	7.77E-05	1.35E-02	2.06E-03	-5.84E-03
Freshwater eutrophication (EP-fw)	kg P eq.	2.13E-04	9.87E-05	2.76E-07	5.58E-07	6.91E-06	1.06E-04	-1.99E-06
Marine aquatic eutrophication (EP-m)	kg of N eq.	3.79E-03	1.78E-03	2.11E-05	3.14E-05	1.64E-03	3.19E-04	-4.89E-04
Terrestrial eutrophication (EP-t)	mole of N eq.	4.97E-02	1.92E-02	2.32E-04	2.30E-04	2.63E-02	3.79E-03	-5.52E-03

Mandatory environmental impact indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B6 - Operational energy use	C1-C4 - End of life	D - Benefits and loads beyond the system boundaries
Photochemical ozone formation (POCP)	kg of NMVOC eq.	1.36E-02	7.16E-03	7.50E-05	5.35E-05	5.16E-03	1.11E-03	-1.94E-03
Depletion of abiotic resources – elements (ADPe)	kg eq. Sb	1.39E-03	1.39E-03	2.63E-08	1.16E-09	9.29E-07	3.31E-06	-6.11E-04
Depletion of abiotic resources - fossil fuels (ADP-f)	MJ	1.59E+02	7.12E+01	1.31E+00	2.71E-01	6.63E+01	2.04E+01	-1.04E+01
Water scarcity (WDP)	m3 of eq.. deprivation worldwide	1.25E+00	8.58E-01	2.66E-03	1.75E-03	2.01E-01	1.83E-01	-2.89E-01

Inventory Flow Indicators: Mandatory

Inventory flow indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B6 - Operational energy use	C1-C4 - End of life	D - Benefits and loads beyond the system boundaries
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	MJ	1.95E+01	1.72E+00	4.13E-03	5.90E-02	1.75E+01	2.01E-01	-1.18E-01
Use of renewable primary energy resources used as raw materials	MJ	7.76E-01	7.76E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.56E-01
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	2.03E+01	2.49E+00	4.13E-03	5.90E-02	1.75E+01	2.01E-01	-4.74E-01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	1.55E+02	6.62E+01	1.31E+00	2.71E-01	6.63E+01	2.04E+01	-1.03E+01
Use of non-renewable primary energy resources used as raw materials	MJ	4.94E+00	4.94E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.04E-02
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.59E+02	7.12E+01	1.31E+00	2.71E-01	6.63E+01	2.04E+01	-1.04E+01
Use of secondary materials	kg	0.00E+00	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	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 fresh water	m3	2.91E-02	2.00E-02	6.19E-05	4.19E-05	4.73E-03	4.30E-03	-6.72E-03
Hazardous waste disposed of	kg	9.49E+00	9.02E+00	3.09E-04	2.24E-03	1.15E-01	3.50E-01	-1.06E+01
Non-hazardous waste disposed of	kg	1.43E+00	7.59E-01	6.85E-03	1.09E-02	4.43E-01	2.07E-01	-6.91E-01
Radioactive waste disposed of	kg	2.99E-04	8.42E-05	5.43E-06	1.47E-06	1.02E-04	1.07E-04	-1.33E-04
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.77E-01	6.11E-02	0.00E+00	2.01E-03	0.00E+00	1.14E-01	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	0.00E+00
Exported energy	MJ by energy vector	1.78E-02	6.46E-03	0.00E+00	2.88E-03	0.00E+00	8.49E-03	0.00E+00
Biogenic carbon content of the product	kg of C.	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Inventory flow indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B6 - Operational energy use	C1-C4 - End of life	D - Benefits and loads beyond the system boundaries
Biogenic carbon content of the associated packaging	kg of C.	8.60E-03	8.60E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Environmental Impact Indicators: Optional

Optional Environmental impact indicators	Units	Sum	A1-A3 - Manufacturing	A4 - Distribution	A5 - Installation	B6 - Operational energy use	C1-C4 - End of life	D - Benefits and loads beyond the system boundaries
Emission of fine particles	incidence of diseases	2.49E-07	1.26E-07	1.00E-09	4.75E-10	1.08E-07	1.33E-08	-1.92E-07
Ionizing radiation, human health	kBq of U235 eq.	1.49E+01	1.11E+01	2.61E-03	4.39E-03	3.78E+00	4.69E-02	-3.84E+00
Ecotoxicity, fresh water	CTUe	2.02E+03	2.01E+03	2.15E+00	3.68E-01	4.96E+00	4.45E+00	-3.55E+00
Human toxicity, cancer effects	CTUh	3.79E-07	3.75E-07	1.45E-11	2.61E-09	3.30E-10	1.12E-09	-1.20E-06
Human toxicity, non-cancer effects	CTUh	3.07E-07	2.87E-07	2.76E-10	7.96E-11	7.89E-09	1.14E-08	-8.72E-08
Impacts related to land use/soil quality	-	5.26E-01	1.73E-01	3.16E-04	9.83E-05	7.27E-02	2.79E-01	-3.74E-04
Total use of primary energy during the life cycle	MJ	1.80E+02	7.36E+01	1.32E+00	3.30E-01	8.38E+01	2.06E+01	-1.08E+01

To evaluate the environmental impact of other product covered by this PEP, multiply the impact figures by-

Factors for Manufacturing, Distribution, Installation, End-of-Life, and Module-D Phase:

Part Number	Product Description	Phases	GWP (kg CO ₂ eq.)	GWP-f (kg CO ₂ eq.)	GWP-b (kg CO ₂ eq.)	GWP-lu (kg CO ₂ eq.)	ODP (kg CFC-11 eq.)	AP (mol H+ eq.)	EP-fw (kg P eq.)	EP-m (kg N eq.)	EP-t (mol N eq.)	POCP (kg NMVOC eq.)	ADP-e (kg Sb eq.)	ADP-f (MJ)	WDP (m ³ eq.)
Y7-120939	PKZ-SOL30	Manufacturing	1.00												
		Distribution													
		Installation													
		End of Life													
		Module D													
Y7-120938	PKZ-SOL20	Manufacturing	0.99	0.99	1.08	0.97	0.98	0.96	0.96	0.97	0.97	0.97	0.98	0.99	0.96
		Distribution	0.99												
		Installation	1.00												
		End of Life	0.98	0.98	0.96	0.96	0.93	0.96	0.94	0.98	0.98	0.98	0.94	0.99	0.96
		Module D	0.96	0.96	1.01	1.00	0.99	0.94	0.99	0.93	0.92	0.93	0.99	0.97	0.96
Y7-120937	PKZ-SOL12	Manufacturing	1.02	1.02	0.76	0.98	0.99	1.01	0.99	1.03	1.04	1.03	0.98	1.02	1.00
		Distribution	1.00												
		Installation	1.00												
		End of Life	1.01	1.01	1.00	0.99	0.99	1.00	0.98	1.00	1.00	1.00	0.98	1.01	1.00
		Module D	1.00	1.00	1.00	1.00	1.00	0.99	0.99	0.99	0.99	0.99	0.98	1.01	1.00


Multiplying Factors for Use Phase for homogenous products:

Part Number	Product Description	Equipment heat dissipation, current-dependent (W)	Use Phase Extrapolation Factors
Y7-120939 (Reference)	PKZ-SOL30 (Reference)	6.3	1.00
Y7-120938	PKZ-SOL20	4.8	0.76
Y7-120937	PKZ-SOL12	4.5	0.71

for part numbers intended for industrial application as well, the Use Phase (B6) impacts of Household/commercial application of specific part number should be multiplied by 11.11 to calculate impacts for Industrial application of that specific part number. The impact for other phases remains the same for all applications.

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 Number	EATO-00222-V01.01-EN	Drafting rules	PCR-ed4-EN-2021 09 06
Verifier accreditation Number	VH53	Supplemented by	PSR-0005-ed3.1-EN-2023 12 08
Date of issue	11-2024	Information and reference documents	www.pep-ecopassport.org
		Validity period	5 years
Independent verification of the declaration and data, in compliance with ISO 14025: 2006			
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 and EN 50693:2019			
The components of the present PEP may not be compared with components from any other program.			
Document complies with ISO 14025: 2010 « Environmental labels and declarations. Type III environmental declarations »			