Powering Business Worldwide	**Product Environmental Profile**	PEP ecopassport®

	**NZM3 Molded Case Circuit Breaker (UL) with Thermomagnetic Trip Unit and STD Technology**

Representative product	NZMN3-SE450-CNA (Y7-284465) Product Category: Circuit Breakers
Description of the product	Eaton Moeller series NZM molded case circuit breaker (UL) with thermomagnetic trip unit and STD technology is designed to protect the installation from overload and short circuits. It is used in unearthed supply systems up to 690 V.
Homogeneous Environmental Families Covered	The PEP concerns following product offerings from Eaton Moeller series NZM molded case circuit breaker with thermomagnetic trip unit as mentioned below: • Series: NZM Circuit Breaker • Switching Capacity: N (Normal) • Rated Current – Release type SE (Short circuit protection / Motor Protection with overload release, electronic): 220A, 350A, 450A • No. of Poles: 3 • Region of Usage: North America, approved as UL / CSA Combination Component
Functional unit	"Protect the installation from overloads and short circuits and protect people and premises at risk of fire or explosion against insulation defects in a circuit with rated voltage 690V, rated current 450A, with 3 poles, a rated breaking capacity 20 kA, and IP20 Rating, in the Industrial application area, according to the appropriate use scenario, and during the reference service life of the product of 20 years."
Company information	Eaton Electro Productie s.r.l, Independentei 8, Sarbi, Romania, 437157 Email: productstewardship-es@eaton.com

Constituent Materials			
Reference product mass	7.71E+00 Kg (With packaging)		
Category PEP Material	**Material constituent**	**Mass (kg)**	**% Contribution**
Metal	Copper	1.81E+00	23.5%
Metal	Steel	1.53E+00	19.9%
Plastic	Unsaturated Polyester Resin	1.24E+00	16.1%
Plastic	Polycarbonate	9.67E-01	12.5%
Metal	Stainless Steel	5.44E-01	7.1%
Other	Cardboard	4.08E-01	5.3%
Plastic	PA66-GF30	3.07E-01	4.0%
Other	Laminated glass fiber	2.04E-01	2.6%
Plastic	Polyurethane	1.39E-01	1.8%
Plastic	Polyether sulfone	1.37E-01	1.8%
Other	Wood	1.17E-01	1.5%
Plastic	Polyamide	7.94E-02	1.0%
Other	Circuit Board Assembly	7.72E-02	1.0%
Plastic	Polyether Imide	3.30E-02	0.4%
Metal	Silver	2.82E-02	0.4%
Other	Miscellaneous	7.80E-02	1.0%
Total		7.71E+00	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, Diboron Trioxide, Lead, Lead monoxide and Lead Titanium Zirconium Oxide 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 Sarbi, Romania 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 Product is Assumed to disposed with 100% incineration without energy recovery.

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 v6.2.4-11 with database version CODDE-2024-04. Indicators Set: PEF EF 3.1 (Compliance: PEP ed.4, EN15804+A2) v2.0	
Manufacturing Phase	The product is assembled as well as packed at Eaton facility in Romania and then transported to distribution centre in Rheinbach, Germany. Energy model used: Romania
Distribution Phase	Distribution of the product in its packaging from the Eaton's last logistics platform to the installation place in North America, United States is considered as per PCR rules.
Installation Phase	Product is installed in North America, United States. Installation of product and treatment of packaging waste are considered in this phase. There is no installation energy consumption for reference product.
Use Phase	Reference lifetime: 20 Years Usage profile: The product has power loss of 60.75 W at full load condition. For Industrial applications considering 50% of the loading rate and 30% of the use time rate, total losses are 798.255 kWh over the 20 years. Product do not require any maintenance/replacement during useful life Energy model used: United States
End of life Phase	Product End of life is considered as per WEEE guidelines with default scenario.
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.	4.44E+02	5.40E+01	2.46E+00	1.04E+00	3.82E+02	3.83E+00	0.00E+00
Climate change - fossil fuels (GWP-f)	kg CO2 eq.	4.42E+02	5.39E+01	2.46E+00	2.00E-01	3.82E+02	3.82E+00	0.00E+00
Climate change – biogenics (GWP-b)	kg CO2 eq.	1.43E+00	2.73E-02	0.00E+00	8.43E-01	5.47E-01	9.82E-03	0.00E+00
Climate change - land use and land use transformation (GWP-lu)	kg CO2 eq.	1.34E-03	1.34E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Ozone depletion (ODP)	kg eq. CFC-11	7.95E-06	6.10E-06	3.23E-09	6.84E-09	1.52E-06	3.25E-07	0.00E+00
Acidification (AP)	mole of H+ eq.	2.50E+00	6.50E-01	8.15E-02	1.19E-03	1.74E+00	2.61E-02	0.00E+00

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
Freshwater eutrophication (EP-fw)	kg P eq.	5.29E-03	4.60E-03	8.49E-07	1.56E-07	6.85E-04	5.82E-06	0.00E+00
Marine aquatic eutrophication (EP-m)	kg of N eq.	2.92E-01	4.47E-02	1.94E-02	2.95E-04	2.20E-01	6.80E-03	0.00E+00
Terrestrial eutrophication (EP-t)	mole of N eq.	3.42E+00	4.91E-01	2.13E-01	3.85E-03	2.63E+00	8.72E-02	0.00E+00
Photochemical ozone formation (POCP)	kg of NMVOC eq.	9.80E-01	1.79E-01	5.48E-02	8.32E-04	7.26E-01	1.94E-02	0.00E+00
Depletion of abiotic resources – elements (ADPe)	kg eq. Sb	4.38E-02	4.38E-02	8.83E-08	1.42E-08	5.11E-05	2.55E-07	0.00E+00
Depletion of abiotic resources - fossil fuels (ADP-f)	MJ	1.00E+04	1.42E+03	3.13E+01	3.68E+00	8.51E+03	6.41E+01	0.00E+00
Water scarcity (WDP)	m3 of eq.. deprivation worldwide	5.90E+01	4.07E+01	8.15E-03	8.21E-03	1.79E+01	3.38E-01	0.00E+00

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	9.82E+02	5.64E+01	4.01E-02	2.73E-01	9.22E+02	3.71E+00	0.00E+00
Use of renewable primary energy resources used as raw materials	MJ	1.06E+01	1.06E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	9.93E+02	6.70E+01	4.01E-02	2.73E-01	9.22E+02	3.71E+00	0.00E+00
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	9.95E+03	1.34E+03	3.13E+01	3.68E+00	8.51E+03	6.41E+01	0.00E+00
Use of non-renewable primary energy resources used as raw materials	MJ	8.17E+01	8.17E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	1.00E+04	1.42E+03	3.13E+01	3.68E+00	8.51E+03	6.41E+01	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
(primary energy and primary energy resources used as raw materials)								
Use of secondary materials	kg	2.48E-05	2.48E-05	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	1.38E+00	9.48E-01	1.90E-04	3.20E-04	4.18E-01	9.52E-03	0.00E+00
Hazardous waste disposed of	kg	4.67E+02	4.46E+02	0.00E+00	2.04E-01	8.28E+00	1.21E+01	0.00E+00
Non-hazardous waste disposed of	kg	7.89E+01	2.15E+01	7.56E-02	2.84E-02	5.69E+01	4.90E-01	0.00E+00
Radioactive waste disposed of	kg	3.75E-02	2.36E-02	5.26E-05	1.18E-05	1.36E-02	2.36E-04	0.00E+00
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	1.86E+00	1.86E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.10E-03	5.10E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ by energy vector	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	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
Biogenic carbon content of the associated packaging	kg of C.	2.29E-01	2.29E-01	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	1.85E-05	5.15E-06	4.32E-07	8.33E-09	1.27E-05	1.76E-07	0.00E+00
Ionizing radiation, human health	kBq of U235 eq.	1.08E+03	7.03E+02	5.13E-03	8.16E-02	3.74E+02	1.27E+00	0.00E+00
Ecotoxicity, fresh water	CTUe	2.50E+03	1.85E+03	1.48E+00	4.67E+00	5.24E+02	1.15E+02	0.00E+00
Human toxicity, cancer effects	CTUh	7.60E-06	7.48E-06	3.69E-11	3.42E-11	4.50E-08	8.08E-08	0.00E+00
Human toxicity, non-cancer effects	CTUh	7.89E-06	6.66E-06	8.16E-10	1.40E-09	1.16E-06	5.98E-08	0.00E+00
Impacts related to land use/soil quality	-	2.39E+01	1.67E+01	0.00E+00	3.80E-03	7.04E+00	9.36E-02	0.00E+00
Total use of primary energy during the life cycle	MJ	1.10E+04	1.49E+03	3.13E+01	3.95E+00	9.43E+03	6.78E+01	0.00E+00

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

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

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.)
Y7-284465 (Reference)	NZMN3-SE450-CNA	Manufacturing	1.00												
		Distribution													
		Installation													
		End of Life													
		Module-D													
Y7-269341	NZMN3-SE220-CNA	Manufacturing	1.00												
		Distribution													
		Installation													
		End of Life													
		Module-D													
Y7-269342	NZMN3-SE350-CNA	Manufacturing	1.00												
		Distribution													
		Installation													
		End of Life													
		Module-D													

Multiplying Factors for Use Phase for homogenous products:

Part Number	Product Description	Use Phase Extrapolation Factors
Y7-284465 (Reference)	NZMN3-SE450-CNA	1.00
Y7-269341	NZMN3-SE220-CNA	0.24
Y7-269342	NZMN3-SE350-CNA	0.60

Disclaimer
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		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: 2006 « Environmental labels and declarations. Type III environmental declarations »			