Product Environmental Profile

NZM3 Molded Case Circuit Breaker 3-Pole (IEC) with thermo-magnetic Trip Unit and withdrawable unit

Representative product	NZMH3-S500-AVE (Y7-113569) Product Category: Circuit Breakers
Description of the product	Eaton Moeller series NZM molded case circuit breaker thermo-magnetic trip unit are designed to provide circuit protection for low-voltage distribution systems. The NZM circuit breakers protect entire systems and cables across all levels, from the main distribution board all the way to the load itself.
Homogeneous Environmental Families Covered	The PEP concerns following product offerings from Eaton Moeller series NZM molded case circuit breaker thermo-magnetic trip unit as mentioned below: • Series: NZM Circuit Breaker • Switching Capacity: C (Comfort), H (High), N (Normal), S (Strong) • Rated Current: 250, 320, 400, 500 A • Release: A (System protection, thermo-magnetic), S (Short-circuit protection / motor protection with overload release, magnetic) • No. of Poles: 3 • Suffixes: BT (Box Terminal)
Functional unit	"Protect the installation from overloads and short circuits in a circuit with rated voltage 690V, rated current 500A, with 3 poles, a rated breaking capacity 130kA, 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	1.08E+01 Kg (With packaging)		
Category PEP Material	Material constituent	Mass (kg)	% Contribution
Metals	Steel	4.27	39.6%
Metals	Copper	2.08	19.3%
Others	Cardboard	1.04	9.7%
Plastics	Polyester resin	1.04	9.6%
Plastics	Polycarbonate (PC)	0.81	7.5%
Plastics	Polyester	0.54	5.0%
Metals	Stainless steel	0.33	3.0%
Plastics	PA6.6 GF30	0.21	1.9%
Others	Plain wood	0.12	1.1%
Others	Paper	0.11	1.0%
Plastics	Polyamide 66	0.05	0.5%
Plastics	Phenolic resin	0.04	0.4%
Metals	Silver	0.03	0.3%
Plastics	Teflon (PTFE)	0.03	0.2%
Plastics	Polybuthylene terephthalate (PBT)	0.02	0.2%
Others	Miscellaneous	0.05	0.5%
Total		1.08E+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 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 recyclability rate of the overall product is 55.3% if it is properly dismantled prior to shredding. The rate is calculated based on "ECO'DEEE recyclability and recoverability calculation 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 v6.2.3 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. 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 Europe is considered as per PCR rules.
Installation Phase	Product is installed in Europe. Installation of product and treatment of packaging waste are considered in this phase. There is no energy consumption for reference product. Energy model used: Europe
Use Phase	Reference lifetime: 20 Years Usage profile: The product has power loss of 93 W at full load condition. As per PSR-0005 section 3.2.2, for Industrial applications considering 50% of the loading rate and 30% of the use time rate, total losses are 1222 kWh over the 20 years. Product do not require any maintenance/replacement during useful life. Energy model used: Europe
End of life Phase	Product disposed with WEEE guidelines. Energy model used: Europe
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 CO_2 eq.	2.00E+03	1.51E+03	2.42E+00	1.71E+00	4.11E+02	1.50E+01	-1.80E+01
Climate change - fossil fuels (GWP-f)	kg CO_2 eq.	2.00E+03	1.51E+03	2.42E+00	1.31E+00	4.10E+02	1.41E+01	-1.91E+01
Climate change - biogenic (GWP-b)	kg CO_2 eq.	8.18E-01	-2.22E-01	9.90E-06	4.03E-01	7.55E-01	8.93E-01	1.11E+00
Climate change - land use and land use transformation (GWP-lu)	kg CO_2 eq.	1.14E-03	1.13E-03	3.66E-06	4.78E-08	0.00E+00	4.65E-06	0.00E+00
Ozone depletion (ODP)	kg eq. CFC-11	8.13E-05	1.57E-04	2.94E-08	1.80E-08	1.99E-06	2.74E-07	-3.45E-06
Acidification (AP)	mole of H^+ eq.	1.17E+01	9.63E+00	3.82E-03	3.81E-03	2.10E+00	7.34E-02	-3.10E-01
Freshwater eutrophication (Ep-fw)	kg P eq.	3.74E-02	5.50E-02	9.04E-06	2.86E-05	1.08E-03	8.15E-03	-7.52E-05

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
Marine aquatic eutrophication (Ep-m)	kg of N eq.	2.67E+00	1.20E-01	6.93E-04	1.58E-03	2.56E-01	1.07E-02	-1.49E-02
Terrestrial eutrophication (Ep-t)	mole of N eq.	2.38E+01	6.22E+00	7.61E-03	1.12E-02	4.12E+00	1.28E-01	-1.66E-01
Photochemical ozone formation (POCP)	kg of NMVOC eq.	4.87E+00	1.23E+00	2.46E-03	2.58E-03	8.06E-01	3.89E-02	-6.72E-02
Depletion of abiotic resources - elements (ADP-e)	kg eq. Sb	4.79E-02	5.48E-02	8.63E-07	5.42E-08	1.45E-04	2.62E-04	-2.31E-02
Depletion of abiotic resources - fossil fuels (ADP-f)	MJ	1.35E+04	3.92E+04	4.30E+01	1.34E+01	1.04E+04	8.32E+02	-4.01E+02
Water scarcity (WDP)	m^3 eq. deprivation worldwide	8.18E+01	3.76E+02	8.71E-02	8.91E-02	3.14E+01	1.09E+01	-1.67E+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	2.79E+03	4.17E+01	1.35E-01	2.19E+00	2.74E+03	7.89E+00	-6.53E+00
Use of renewable primary energy resources used as raw materials	MJ	3.88E+01	2.48E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.76E+01
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	2.83E+03	6.65E+01	1.35E-01	2.19E+00	2.74E+03	7.89E+00	-2.42E+01
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	1.35E+04	2.52E+04	4.30E+01	1.34E+01	1.04E+04	8.32E+02	-4.01E+02
Use of non-renewable primary energy resources used as raw materials	MJ	6.19E+01	1.41E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.35E+04	3.92E+04	4.30E+01	1.34E+01	1.04E+04	8.32E+02	-4.01E+02
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

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 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	m^3	1.91E+00	8.76E+00	2.03E-03	2.11E-03	7.39E-01	2.55E-01	-3.88E-01
Hazardous waste disposed of	kg	5.08E+02	6.71E+02	1.01E-02	8.44E-02	1.80E+01	1.07E+01	-5.38E+02
Non-hazardous waste disposed of	kg	1.04E+02	9.36E+02	2.25E-01	4.81E-01	6.93E+01	2.34E+00	-1.32E+01
Radioactive waste disposed of	kg	3.38E-02	6.40E-02	1.78E-04	7.15E-05	1.59E-02	4.67E-04	-5.93E-03
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	7.39E+00	2.38E+00	0.00E+00	3.62E-02	0.00E+00	4.98E+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	0.00E+00
Exported energy	MJ by energy vector	7.14E-01	1.95E-01	0.00E+00	8.87E-02	0.00E+00	4.30E-01	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.	5.39E-01	5.39E-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	1.15E-04	1.23E-04	3.28E-08	2.31E-08	1.69E-05	3.93E-07	-8.93E-06
Ionizing radiation, human health	kBq of U235 eq.	1.38E+03	8.35E+02	8.56E-02	2.10E-01	7.76E+02	1.01E+00	-3.45E+02
Ecotoxicity, fresh water	CTUe	4.05E+03	5.06E+03	7.06E+01	1.84E+01	5.16E-08	2.82E+02	-1.55E+02
Human toxicity, cancer effects	CTUh	4.77E-06	4.78E-06	4.74E-10	1.38E-07	1.23E-06	1.07E-08	-5.04E-05
Human toxicity, non-cancer effects	CTUh	3.47E-05	2.55E-05	9.04E-09	3.88E-09	1.14E+01	7.19E-07	-3.69E-06
Impacts related to land use/soil quality	-	4.94E+01	1.37E+01	1.04E-02	4.50E-03	5.90E+02	2.43E+01	0.00E+00
Total use of primary energy during the life cycle	MJ	1.64E+04	3.93E+04	4.31E+01	1.56E+01	1.31E+04	8.40E+02	-4.25E+02

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:

Product Number	Product Number	Phases (Except Use Phase)	GWP	GWP-f	GWP-b	GWP-lu	ODP	AP	Ep-fw	Ep-m	Ep-t	POCP	ADP-e	ADP-f	WDP
Y7-113569	NZMH3-S500-AVE (Reference)	All Phases	1.00												
Y7-113509	NZMC3-A320-AVE	All Phases	1.00												
Y7-113510	NZMC3-A400-AVE	All Phases	1.00												
Y7-113511	NZMC3-A500-AVE	All Phases	1.00												
Y7-113512	NZMC3-S250-AVE	All Phases	1.00												
Y7-113513	NZMC3-S320-AVE	All Phases	1.00												
Y7-113514	NZMC3-S400-AVE	All Phases	1.00												
Y7-113515	NZMC3-S500-AVE	All Phases	1.00												
Y7-110861	NZMH3-A320-AVE	All Phases	1.00												
Y7-110862	NZMH3-A400-AVE	All Phases	1.00												
Y7-110863	NZMH3-A500-AVE	All Phases	1.00												
Y7-113566	NZMH3-S250-AVE	All Phases	1.00												
Y7-113567	NZMH3-S320-AVE	All Phases	1.00												
Y7-113568	NZMH3-S400-AVE	All Phases	1.00												
Y7-110858	NZMN3-A320-AVE	All Phases	1.00												
Y7-110859	NZMN3-A400-AVE	All Phases	1.00												
Y7-110860	NZMN3-A500-AVE	All Phases	1.00												
Y7-113523	NZMN3-S250-AVE	All Phases	1.00												
Y7-113524	NZMN3-S320-AVE	All Phases	1.00												
Y7-113525	NZMN3-S400-AVE	All Phases	1.00												
Y7-113526	NZMN3-S500-AVE	All Phases	1.00												

Multiplying Factors for Use Phase and Distribution phase for homogenous products:

Part Number	Product Description	Use Phase Extrapolation Factors
Y7-113569	NZMH3-S500-AVE (Reference)	1.00
Y7-113509	NZMC3-A320-AVE	0.85
Y7-113510	NZMC3-A400-AVE	0.78
Y7-113511	NZMC3-A500-AVE	1.00
Y7-113512	NZMC3-S250-AVE	0.73
Y7-113513	NZMC3-S320-AVE	0.85
Y7-113514	NZMC3-S400-AVE	0.78
Y7-113515	NZMC3-S500-AVE	1.00
Y7-110861	NZMH3-A320-AVE	0.85
Y7-110862	NZMH3-A400-AVE	0.78
Y7-110863	NZMH3-A500-AVE	1.00
Y7-113566	NZMH3-S250-AVE	0.73
Y7-113567	NZMH3-S320-AVE	0.85
Y7-113568	NZMH3-S400-AVE	0.78
Y7-110858	NZMN3-A320-AVE	0.85
Y7-110859	NZMN3-A400-AVE	0.78
Y7-110860	NZMN3-A500-AVE	1.00

Part Number	Product Description	Use Phase Extrapolation Factors
Y7-113523	NZMN3-S250-AVE	0.73
Y7-113524	NZMN3-S320-AVE	0.85
Y7-113525	NZMN3-S400-AVE	0.78
Y7-113526	NZMN3-S500-AVE	1.00

Disclaimer

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Verifier accreditation Number	VH53	Supplemented by	PSR-0005-ed3.1-EN-2023 08 12
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 »			