Product Environmental Profile

N4 Switch-Disconnector (IEC), DC with STD Technology

Representative product	N4-4-800-S15-DC (Y7-166413) Product Category: Disconnector
Description of the product	Eaton Moeller series NZM Switch-disconnectors have robust design with current rating upto 1600A and voltage rating of 1500VDC especially designed for high-performance applications. Its positive drive mechanism and isolating characteristics make it ideal for use as an emergency stop, maintenance/service switch, and main switch. It consists of 3 switch positions : I (ON), 0 (OFF), and + (Intermediate).
Homogeneous Environmental Families Covered	The PEP concerns following product offerings from Eaton Moeller series NZM switch disconnector as mentioned below: • Series: N Switch Disconnector • Rated Current: 800 A, 1000A, 1250A, 1400A, 1600A. • No. of Poles: 4 • Type of DC Device: S1, S15
Functional unit	"Turn off all or part of an installation by separating the installation or part of the installation of all electrical energy or earth, for safety reasons with a rated voltage 1500V DC, and rated current 800A ensuring isolation characterised by a rated voltage 1500V, and with IP Rating of IP20, 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	2.31E+01 Kg (With packaging)		
Category PEP Material	**Material constituent**	**Mass (kg)**	**% Contribution**
Metals	Copper	8.45E+00	36.6%
Plastics	Polycarbonate	7.35E+00	31.8%
Metals	Steel	3.37E+00	14.6%
Metals	Stainless steel	1.20E+00	5.2%
Others	Corrugated cardboard	8.27E-01	3.6%
Plastics	Unsaturated Polyester Resin	6.90E-01	3.0%
Plastics	Polyethylene low density Film	4.00E-01	1.7%
Plastics	Continuous Filament Glass Fiber	3.31E-01	1.4%
Plastics	Polyamide66 Glass Fiber 30	1.96E-01	0.8%
Plastics	Polybutylene Terephthalate	8.11E-02	0.4%
Others	Wood	7.00E-02	0.3%
Metals	Silver	5.80E-02	0.3%
Plastics	Polyamide 66	1.93E-02	0.1%
Plastics	Teflon Granulate	1.80E-02	0.1%
Metals	Bronze	1.43E-02	0.1%
Other	Miscellaneous	2.04E-02	0.1%
Total		2.31E+01	100.0%

Substance Assessment
The representative product is compliant with the EU-RoHS Directive (2011/65/EU) and the product does contain 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 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 88.29% 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 v6.2.2 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 Eaton Electro Productie s.r.l, Independentei 8, Sarbi, Romania plant. 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 95 W at full load condition. For Industrial applications considering 50% of the loading rate and 30% of the use time rate, total losses are 1248.30 kWh over the 20 years. Product do not require any maintenance/replacement during useful life. Industrial application is considered as per PSR-0005 section 3.2.2. 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.	6.23E+02	1.44E+02	5.50E+00	2.72E+00	4.40E+02	3.14E+01	-7.93E+01
Climate change - fossil fuels (GWP-f)	kg CO_2 eq.	6.16E+02	1.41E+02	5.50E+00	1.26E+00	4.39E+02	2.97E+01	-7.76E+01
Climate change - biogenics (GWP-b)	kg CO_2 eq.	6.87E+00	2.96E+00	0.00E+00	1.46E+00	8.10E-01	1.65E+00	-1.72E+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
Climate change - land use and land use transformation (GWP-lu)	kg CO_2 eq.	1.02E-02	1.02E-02	0.00E+00	0.00E+00	0.00E+00	2.73E-05	-9.33E-03
Ozone depletion (ODP)	kg eq. CFC-11	3.87E-05	3.55E-05	8.45E-09	1.72E-08	2.13E-06	1.06E-06	-8.84E-06
Acidification (AP)	mole of H^+ eq.	4.99E+00	2.44E+00	3.49E-02	3.85E-03	2.25E+00	2.55E-01	-1.53E+00
Freshwater eutrophication (Ep-fw)	kg P eq.	7.31E-02	2.05E-02	2.07E-06	1.59E-05	1.16E-03	5.14E-02	-2.98E-04
Marine aquatic eutrophication (Ep-m)	kg of N eq.	4.36E-01	1.15E-01	1.64E-02	1.54E-03	2.75E-01	2.89E-02	-5.44E-02
Terrestrial eutrophication (Ep-t)	mole of N eq.	6.33E+00	1.34E+00	1.79E-01	1.16E-02	4.41E+00	3.81E-01	-6.25E-01
Photochemical ozone formation (POCP)	kg of NMVOC eq.	1.54E+00	5.33E-01	4.53E-02	2.69E-03	8.64E-01	9.96E-02	-2.80E-01
Depletion of abiotic resources - elements (ADP-e)	kg eq. Sb	1.01E-01	9.89E-02	2.17E-07	5.63E-08	1.56E-04	1.67E-03	-4.24E-02
Depletion of abiotic resources - fossil fuels (ADP-f)	MJ	1.53E+04	2.94E+03	7.69E+01	1.23E+01	1.11E+04	1.20E+03	-1.46E+03
Water scarcity (WDP)	m^3 eq. deprivation worldwide	2.60E+02	1.77E+02	2.09E-02	8.82E-02	3.37E+01	4.88E+01	-1.05E+02

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	3.22E+03	2.22E+02	1.03E-01	1.96E+00	2.94E+03	5.43E+01	-9.68E+01
Use of renewable primary energy resources used as raw materials	MJ	1.69E+01	1.69E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-1.26E+01
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	3.23E+03	2.39E+02	1.03E-01	1.96E+00	2.94E+03	5.43E+01	-1.09E+02
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	MJ	1.50E+04	2.66E+03	7.69E+01	1.23E+01	1.11E+04	1.20E+03	-1.23E+03
Use of non-renewable primary energy resources used as raw materials	MJ	2.78E+02	2.78E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.26E+02

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
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ	1.53E+04	2.94E+03	7.69E+01	1.23E+01	1.11E+04	1.20E+03	-1.46E+03
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	m^3	6.07E+00	4.13E+00	4.87E-04	6.33E-03	7.92E-01	1.14E+00	-2.44E+00
Hazardous waste disposed of	kg	1.75E+03	1.71E+03	0.00E+00	1.15E-01	1.93E+01	2.20E+01	-1.12E+03
Non-hazardous waste disposed of	kg	1.65E+02	8.60E+01	1.93E-01	5.07E-01	7.43E+01	4.13E+00	-5.05E+01
Radioactive waste disposed of	kg	5.78E-02	3.96E-02	1.38E-04	7.86E-05	1.70E-02	9.73E-04	-2.73E-02
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	2.62E+01	5.76E+00	0.00E+00	8.62E-01	0.00E+00	1.95E+01	-2.34E-06
Materials for energy recovery	kg	3.76E-01	1.44E-02	0.00E+00	2.44E-01	0.00E+00	1.17E-01	0.00E+00
Exported energy	MJ by energy vector	2.32E-02	0.00E+00	0.00E+00	2.32E-02	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.	3.97E-01	3.97E-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	B1-B7 - Use	C1-C4 - End of life	D - Benefits and loads beyond the system boundaries
Emission of fine particles	incidence of diseases	3.82E-05	1.83E-05	2.84E-07	2.38E-08	1.81E-05	1.40E-06	-1.13E-05
Ionizing radiation, human health	kBq U^{235} eq.	3.84E+03	3.20E+03	1.34E-02	2.43E-01	6.33E+02	7.06E+00	-2.21E+03
Ecotoxicity, fresh water	CTUe	4.32E+03	1.95E+03	3.61E+00	1.61E+01	8.31E+02	1.52E+03	-1.01E+03
Human toxicity, cancer effects	CTUh	1.67E-05	1.64E-05	9.68E-11	9.95E-08	5.53E-08	5.25E-08	-9.62E-06
Human toxicity, non-cancer effects	CTUh	3.42E-05	2.88E-05	1.87E-09	3.94E-09	1.32E-06	4.03E-06	-1.86E-05
Impacts related to land use/soil quality	-	2.56E+02	8.89E+01	0.00E+00	3.81E-03	1.22E+01	1.55E+02	-2.60E+01
Total use of primary energy during the life cycle	MJ	1.86E+04	3.18E+03	7.70E+01	1.43E+01	1.40E+04	1.25E+03	-1.57E+03

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

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

Part No.	Description	Factors for Manufacturing, Distribution, Installation, End of Life and Module-D phase	Use Phase Extrapolation Factors
Y7-166413 (Reference)	N4-4-800-S15-DC	1.00	1.00
Y7-119886	N4-4-1250-S1-DC	1.00	2.43
Y7-119887	N4-4-1400-S1-DC	1.00	3.05
Y7-119891	N4-4-1000-S1-DC	1.00	1.56
Y7-119890	N4-4-800-S1-DC	1.00	1.00
Y7-166415	N4-4-1250-S15-DC	1.00	2.43
Y7-166416	N4-4-1400-S15-DC	1.00	3.05
Y7-166417	N4-4-1600-S15-DC	1.00	3.99
Y7-166414	N4-4-1000-S15-DC	1.00	1.56
Y7-152552	N4-4-1600-S1-DC	1.00	3.99

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Date of issue	08-2024	*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: 2006 « Environmental labels and declarations. Type III environmental declarations »			