PRODUCT ENVIRONMENTAL PROFILE
Environmental Product Declaration

ABB Spec-Setter™ heavy-duty safety switch

Production site: Saltillo, Mexico
June 2024

REGISTRATION NUMBER ABBG-00409-V01.01-EN	DRAFTING RULES: PCR-ED4-EN-2021 09 06 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 06-2024	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 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 MAYNOT BE COMPARED WITH COMPONENTS FROM ANY OTHER PROGRAM.	
DOCUMENT IN COMPLIANCE WITH ISO 14025: 2006 « ENVIRONMENTAL LABELS AND DECLARATIONS. TYPE III ENVIRONMENTAL DECLARATIONS »	

EPD Owner	ABB ELECTRICAL CONTROL SYSTEMS S. DE R.L. DE C.V. www.abb.com
Manufacturer name and address	ABB ELECTRICAL CONTROL SYSTEMS S. DE R.L. DE C.V. Blvd. Kappa No. 110, Parque Industrial Santa Maria, C.P. 25900, Ramos Arizpe, Coahuila, México.
Company contacts	EPD_ELSP@in.abb.com
Reference product	THN3361R
Description of the product	Type TH heavy-duty switches are available in 30 to 1200 A, 600 V AC, 600 V DC maximum, fusible and non-fusible, in NEMA Type 1 indoor, 3R outdoor, 4/4X stainless steel and 5/12 dust tight enclosures. THN3361R is a non-fusible 30A, 3 pole heavy duty safety switch with NEMA type 3R enclosure which is best suited for commercial and industrial applications.
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 600V, and rated current 30A ensuring isolation characterised by a rated voltage 600V and is applicable for low voltage application during the reference service life of the product of 20 years. U = Rated voltage (V): 600 In = Rated current in continuous operation (A): 30 Ui = Rated isolation voltage (V): 600 Np = No. of poles: 3 Load rate = 50% of In Use time rate = 30%
Other products covered	The PEP covers offerings for: THN3361, THN3362R, THN3362, THN3363R, THN3363, THN3364R, THN3364
Reference lifetime	20 years
Product category	Electrical, Electronic and HVAC-R Products (Disconnectors-Low Voltage)
Use Scenario	The use phase has been modeled based on the sales mix data (2023), and the corresponding low voltage electricity countries mix.
Geographical representativeness	Raw materials & Manufacturing: [Mexico / Global] Assembly: [Mexico] Distribution / Use: [Global] specific sales mix EoL: [Global]
Technological representativeness	Primary data are specific for the production of THN3361R and secondary data are based on ecoinvent database v.3.9.1.
LCA Study	This study is based on the LCA study described in the LCA report 1SQC920131D0201.
EPD type	Products family declaration
EPD scope	“Cradle to grave”
Year of reported primary data	2023
LCA software	SimaPro 9.5.0.1 (2023)
LCI database	Ecoinvent v3.9.1 (2023)
LCIA methodology	EN 50693:2019

Contents

ABB Purpose & Embedding Sustainability

ABB is a leading global technology company that energizes the transformation of society and industry to achieve a more productive, sustainable future. By connecting software to its electrification, robotics, automation and motion portfolio, ABB pushes the boundaries of technology to drive performance to new levels. With a history of excellence stretching back more than 130 years, ABB's success is driven by about 110 thousand talented employees in over 100 countries.
ABB's Electrification business offers a wide-ranging portfolio of products, digital solutions and services, from substation to socket, enabling safe, smart and sustainable electrification. Offerings encompass digital and connected innovations for low voltage and medium voltage, including EV infrastructure, solar inverters, modular substations, distribution automation, power protection, wiring accessories, switchgear, enclosures, cabling, sensing and control.
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 human behaviour.

General Information

The ABB Saltillo plant supplies the market with safety switches, load centers for houses, apartments and residential complexes located in the United States. The plant is located in the Santa María Industrial Park, in the Coahuila municipality of Ramos Arizpe, Mexico.
The plant uses several environmentally friendly practices, such as having its own water treatment facility, using QR codes instead of paper for process documentation, and using skylights for illumination.
ABB adopts and implements for its own activities an integrated Quality/Environmental/ Health & Safety management system in compliance with the following standards:

- NMX-CC-9001-IMNC-2015/ISO 9001: 2015 Quality management systems
- ISO 14001: 2015 Environmental management systems
- ISO 45001:2018 Occupational health and safety management systems

Safety Switch Product cluster

The Spec-Setter™ safety switch line encompasses general-duty, heavy-duty, double-throw and emergency-power transfer versions to suit a wide range of applications. All Spec-Setter safety switches are UL listed and designed for safety, ease of installation and long, reliable service life.
In this LCA study only heavy-duty safety switch has been considered. Type TH heavy duty safety switches are designed for commercial and industrial applications where safety, high performance and continuity of service are essential. Heavy duty switches are available in 30–1200 amps, 600 V AC, 600 V DC maximum, fusible and non–fusible units, and in NEMA type 1 (indoor), type 3R (outdoor), type 4/4X (water- and dust-tight, corrosion-resistant), and type 5/12 (drip- and dust-tight) enclosures.

Product cluster declared in this LCA includes the following safety switch:

Product	Duty Level	Rated Current in continuous operation, In (A)	NEMA Enclosure type	Rated Voltage, U (V) AC	Fusing	No. of Poles (Np)
THN3361R	Heavy	30	NEMA 3R	600	Non-fusible	3
THN3361		30	NEMA 1			
THN3362R		60	NEMA 3R			
THN3362		60	NEMA 1			
THN3363R		100	NEMA 3R			
THN3363		100	NEMA 1			
THN3364R		200	NEMA 3R			
THN3364		200	NEMA 1			

Table 1: Technical characteristics of Safety Switch (Refer catalog for detail)

Reference Product:
The reference product for the LCA of the range 30-200A of heavy-duty safety switch is THN3361R.

Constituent Materials

The weight of the reference product **THN3361R**, with installed accessories and packaging, is about 4.3 kg.

Materials	Name	IEC 62474 MC	[g]	Weight %
Metals	Steel	M-119	3208.4	74.7%
	Cu and Cu Alloys	M-121	111.9	2.6%
	Aluminium	M-120	31.0	0.7%
	Zinc Alloys	M-124	18.3	0.4%
	Stainless Steel	M-100	6.0	0.1%
Plastics	Unsaturated Polyester	M-301	476.0	11.1%
	Polycarbonate	M-254	54.5	1.3%
	PolyButyleneTerephthalate	M-261	22.2	0.5%
	Polyphenylene	M-263	22.1	0.5%
	Other Polymer	N/A	2.7	0.1%
Others	Paper/Cardboard	M-341	341.7	8.0%
Total			4294.8	100.0%

Table 2: Weight of materials THN3361R

Packaging weight for THN3361R and its composition is tabulated below.

Materials	Name	IEC 62474 MC	[g]	Weight % (Total)
Others	Paper/Cardboard	M-341	340.0	7.9%
Plastic	Polyethylene	M-251	2.4	<0.1%
	Unsaturated Polyester	M-301	0.4	<0.1%

Table 3: Weight of materials THN3361R Packaging

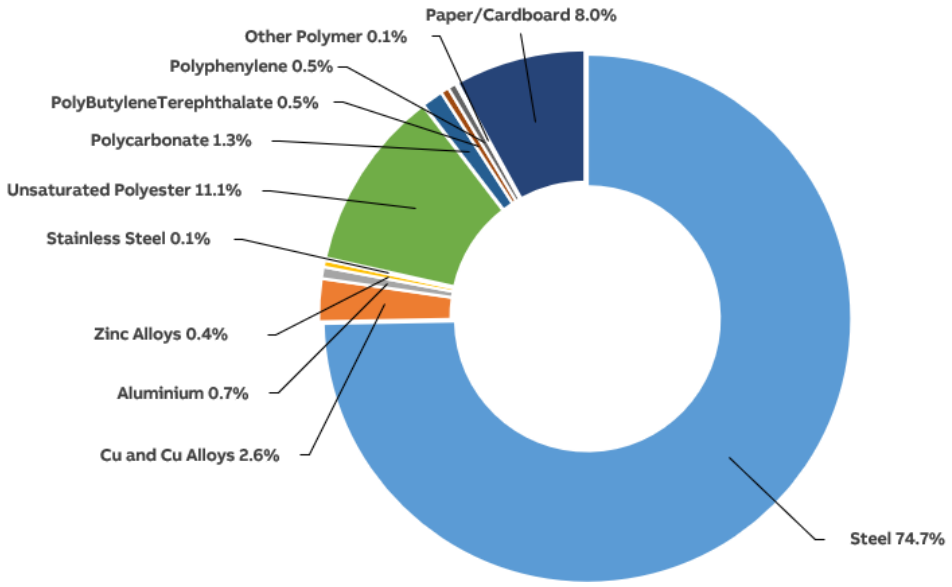

Figure 1: Composition of THN3361R

LCA background information

Functional unit and Reference Flow

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 600V, and rated current In (refer Table 1) ensuring isolation characterised by a rated voltage 600V, and is applicable for low voltage application during the reference service life of the product of 20 years.

The Reference Flow of the study is a single safety switch (including its packaging and accessories) with mass described in chapter 1.3, table 2 & 3.

System boundaries and life cycle stages

The life cycle of the safety switch, an EEPS (Electronic and Electrical Products and Systems), is a “from cradle to grave” analysis and covers the following main life cycle stages: manufacturing, including the relevant acquisition of raw material, preparation of semi-finished goods, etc. and processing steps; distribution; installation, including the relevant steps for the preparation of the product for use; use including the required maintenance steps within the RSL (reference service life of the product) associated to the reference product; end-of-life stage, including the necessary steps until final disposal or recovery of the product system.

The following table shows the stages of the product life cycle and the information stages according to EN 50693:2019 [3] for the evaluation of electronic and electrical products and systems.

Manufacturing	Distribution	Installation	Use	End-of-Life (EoL)
Acquisition of raw materials Transport to manufacturing site Components/parts manufacturing Assembly Packaging EoL treatment of generated waste	Transport to distributor/ logistic center Transport to place of use	Installation EoL treatment of generated waste (packaging)	Usage Maintenance EoL treatment of generated waste	Deinstallation Collection and transport EoL treatment

Table 4: Phases for the evaluation of construction products according to EN50693:2019 [3].

Temporal and geographical boundaries

The ABB component suppliers are sourced all over the world. All primary data collected are from 2023, which is a representative production year for production technology of safety switch at ABB Electrical Control Systems, S. de R.L. de C.V (Mexico). The technological representativeness for the secondary data is ecoinvent [4].

The selected ecoinvent [4] processes in the LCA model have a global representativeness, due to the unclear origin of each component. In this way, a conservative approach has been adopted.

Boundaries in the life cycle

As indicated in the PCR capital goods such as buildings, machinery, tools and infrastructure, the packaging for internal transport which cannot be allocated directly to the production of the reference product, may be excluded from the system boundary.

Infrastructures, when present, such as processes deriving from the ecoinvent [4] database have not been excluded.

Data quality

In this LCA, both primary and secondary data are used. Site specific foreground data have been provided by ABB. Main data sources are the bill of materials & drawings which are available on the ERP (SAP) & Windchill. For all processes for which primary are not available, generic data originating from the ecoinvent database [4], allocation cut-off by classification, are used. The ecoinvent database available in the SimaPro software [5] is used for the calculations.

The data quality characterized by quantitative and qualitative aspects, is presented in Appendix 1. Each data quality parameter has been rated according to DQR tables from Chapter 7.19.2.2 of the Product Environmental Footprint Guide v.6.3 to give an indication of geography, technology and temporal representativeness.

Environmental impact indicators

The information obtained from the inventory analysis is aggregated according to the effects related to the various environmental issues. According to “PCR-ed4-EN-2021 09 06” and EN

50693:2019 [3] the environmental impact indicators must be determined using the characterization factors and impact assessment methods specified in EN 15804:2012+A2:2019 [6].

PCR-ed4-EN-2021 09 06 and the EN 50693:2019 [3] standard establish four indicators for climate change: Climate change (total) which includes all greenhouse gases; Climate change (fossil fuels); Climate change (biogenic) which includes the emissions and absorption of biogenic carbon dioxide and biogenic carbon stored in the product; Climate change (land use) - land use and land use transformation. Other indicators as per the PCR [1].

Allocation rules

For safety switches, allocation coefficients are determined by the occupancy area. Based on this criterion, only a portion of the factory's total water, waste, thermal energy and electrical energy consumption for the year 2023 is designated for safety switches.

Limitations and simplifications

Raw materials life cycle stage includes the extraction of raw materials as well as the transport distances to the manufacturing suppliers. These distances are assumed to be 1000 km as per PCR. This distance has been added to the one already included in the market processes used for the model, as a result of a conservative choice made by the LCA operators. Surface treatments as well as their related transport processes (back and forth from the finishing suppliers) have been considered in the LCA model. Default scraps for metal working, plastic and packaging processes are included as per PSR [2].

Energy Models

LCA Stage	EN 15804:2012 +A2:2019 module	Energy model	Notes
Raw material extraction and processing	A1-A2	Electricity, {GLO}| market group for | Cut-off Electricity, {RoW}| market group for | Cut-off	Based on materials and supplier's locations
Manufacturing	A3	ABB Green Mix Low Voltage	Specific Energy model for ABB Saltillo manufacturing plant
Installation (Packaging EoL)	A5	Electricity, {GLO}| market group for | Cut-off	-
Use Stage	B1	Electricity, [country]x | market for | Cut-off, S	Low voltage, based on 2023 country sales mix
EoL	C1-C4	Electricity, {GLO}| market group for | Cut-off	-

Table 5: Energy models used in each LCA stage.

Inventory analysis

In this LCA, both primary and secondary data are used. Site specific foreground data have been provided by ABB. For data collection, Bills of Material (BOM) extracted from ABB's internal SAP and Windchill ERP were used. They are a list of all the components and assemblies that constitute the finished product, organized by hierarchy level. Each item is matched with its code, quantity, weight and supplier. The BOMs were then processed, adding material, surface area, volume and weight data, taken from technical drawings/datasheets. Finally, the manufacturing process and surface treatment were assigned, according to information provided by R&D personnel. Road distances between the suppliers and ABB were calculated using Google Maps.

All primary data collected from ABB are for 2023, which was a representative production year. The ecoinvent cut-off by classification system processes [4] are used to represent the LCA model.

Due to the large amounts of components in the safety switch, raw material inputs have been modelled with data from ecoinvent [4] representing Global [GLO] or Rest of World [RoW] market coverage. These datasets are assumed to be representative.

Manufacturing stage

The safety switch is composed of a multitude of components, all of which are made from of numerous materials. Most of the inputs to the products' manufacturing stage are already produced component parts.

The single use packaging as well as paper documentation are also included in the analysis in the manufacturing stage. ABB receives packaging components from outside suppliers and packages the safety switch before shipping them. An average raw material packaging content of 5% of the mass of the reference equipment has been considered as per PSR [2].

The entire supplier's network has been modelled with the calculation of each transportation stage, from the first manufacturing supplier to the next. All the specific distances from the last subassembly supplier's factories up to the ABB manufacturing facility have been calculated.

The electric energy mix used for the production phase is representative for ABB Saltillo production site (year 2023).

The complete energy mix has been modeled considering the energy certificate.

Distribution

The transport distances from ABB manufacturing plant to the distribution centers (regional distribution centers / local sales organizations) have been calculated considering the specific 2023 sales mix data.

Since no specific data is available for the transport distances from the Distribution Centre to place of actual use (Customer site), distances of 1000 km are assumed (local/domestic transport by lorry, according to PCR [1]).

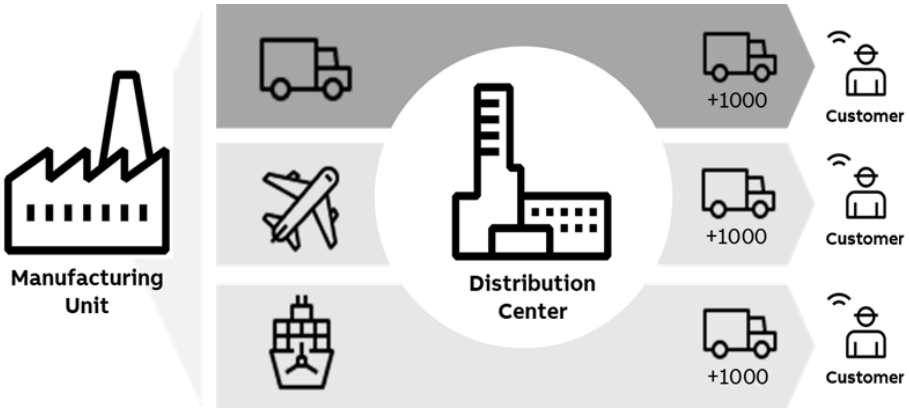

Figure 2: Distribution methodology

Installation

The installation phase only implies manual activities, and no energy is consumed. This phase also includes the disposal of the packaging of the safety switch.

For the disposal of the packaging after installation of the safety switch at the end of its life, a transport distance of 100 km (according to PSR [2]) was assumed. The chosen transportation dataset is from Ecoinvent [4].

The actual disposal site is unknown and is managed by the customer.

Use

During the use phase, safety switch dissipates some electricity due to power losses. The respective energy for each specific configuration has been calculated following the PCR [1] & PSR [2] rules:

Parameters	
Load rate	50% In
h/year	8760 h
Reference service life, RSL	20 years
Use time rate,α	30% RSL

Table 6: Use phase parameters

The formula for the calculation of the electricity consumed is shown below and it is described as follows, where P_{use} is the power consumed by the safety switch at a given value of current:

$$E_{use}\ [kWh] = \frac{P_{use} * 8760 * RSL * \alpha}{1000}$$

The above calculations have been performed according to the number of poles on which relevant current flows during use phase.

The Energy model used for this phase has been modeled based on the 2023 actual sales mix data (SAP ERP sales data as a source). From the Ecoinvent [4] database, the low voltage

electricity country mix for each country(x) has been selected with its respective percentage on the total sales mix (Electricity, low voltage [country]x | market for electricity, low voltage | Cut-off, S).

Since no maintenance happens during the use phase, the environmental impacts linked to this procedure have been considered as null in the analysis.

End of life

The end-of-life stage is modelled according to IEC/TR 62635 [7]. The percentages for end-of-life treatments of materials are taken from IEC/TR 62635 [7].

Since no specific data is available, the transport distances from the place of use to the place of disposal are assumed to be 1000 km (local/domestic transport by lorry, according to PCR [1]).

Environmental impacts

The following table show the environmental impact indicators of the life cycle of a single safety switch as indicated by PCR [1] and EN 50693:2019 [3]. The indicators are divided into the contribution of the processes to the different stages (manufacturing, distribution, installation, use and end-of-life).

THN3361R

Impact category	Unit	Total	Manufacturing	Distribution	Installation	Use	End of Life
GWP-total	kg CO2 eq	4.53E+01	2.47E+01	2.19E+00	9.25E-01	1.71E+01	3.06E-01
GWP-fossil	kg CO2 eq	4.41E+01	2.44E+01	2.18E+00	9.52E-02	1.71E+01	3.02E-01
GWP-biogenic	kg CO2 eq	1.13E+00	2.65E-01	8.47E-04	8.29E-01	3.29E-02	3.67E-03
GWP-luluc	kg CO2 eq	7.19E-02	6.60E-02	1.13E-03	7.84E-06	4.59E-03	1.99E-04
ODP	kg CFC11-eq	1.05E-06	7.95E-07	3.49E-08	7.14E-10	2.16E-07	1.51E-09
AP	mol H+ eq	2.77E-01	1.75E-01	1.49E-02	1.70E-04	8.58E-02	1.12E-03
EP-freshwater	kg P eq	1.90E-02	1.46E-02	1.63E-04	2.98E-06	4.19E-03	5.53E-05
EP-marine	kg N eq	4.85E-02	2.90E-02	4.70E-03	8.42E-05	1.35E-02	1.24E-03
EP-terrestrial	mol N eq	5.03E-01	3.11E-01	5.08E-02	7.69E-04	1.38E-01	2.36E-03
POCP	kg NMVOC eq	1.84E-01	1.14E-01	1.67E-02	2.06E-04	5.19E-02	7.64E-04
ADP-m&m	kg Sb eq	2.31E-03	2.22E-03	5.42E-06	4.59E-08	9.06E-05	1.69E-07
ADP-fossil	MJ	5.95E+02	3.08E+02	3.07E+01	2.02E-01	2.54E+02	2.20E+00
WDP	m3 of equiv. depriv.	7.45E+00	5.19E+00	1.49E-01	1.41E-02	2.07E+00	2.69E-02
PENRE	MJ	5.84E+02	2.98E+02	3.07E+01	2.02E-01	2.54E+02	2.20E+00
PENRM	MJ	1.06E+01	1.06E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.95E+02	3.08E+02	3.07E+01	2.02E-01	2.54E+02	2.20E+00
PERE	MJ	4.19E+01	2.71E+01	3.74E-01	5.58E-03	1.42E+01	2.09E-01
PERM	MJ	5.87E+00	5.87E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	4.78E+01	3.29E+01	3.74E-01	5.58E-03	1.42E+01	2.09E-01
SM	kg	4.50E-02	4.50E-02	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
PET	MJ	6.43E+02	3.41E+02	3.11E+01	2.07E-01	2.68E+02	2.41E+00
FW	m3	2.30E-01	1.65E-01	4.70E-03	5.05E-04	5.86E-02	9.50E-04
HWD	kg	3.16E-02	3.05E-02	1.90E-04	1.17E-06	9.51E-04	6.55E-06
N-HWD	kg	9.20E+00	5.37E+00	2.45E+00	1.93E-02	6.29E-01	7.26E-01
RWD	kg	8.67E-04	3.49E-04	6.42E-06	7.72E-08	5.09E-04	2.87E-06
CfR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MfR	kg	4.74E+00	1.48E+00	0.00E+00	0.00E+00	0.00E+00	3.26E+00
MfER	kg	5.84E-01	0.00E+00	0.00E+00	5.57E-01	0.00E+00	2.67E-02
EN	MJ by energy vector	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PM	disease inc.	2.62E-06	1.81E-06	2.04E-07	1.80E-09	5.96E-07	1.81E-08
IRP	kBq U-235 eq	3.68E+00	1.40E+00	2.70E-02	3.10E-04	2.24E+00	1.16E-02
ETP-fw	CTUe	7.01E+02	6.23E+02	1.76E+01	8.19E-01	5.81E+01	9.76E-01
HTP-c	CTUh	9.52E-08	8.87E-08	9.28E-10	4.70E-11	5.36E-09	1.92E-10
HTP-nc	CTUh	1.89E-06	1.69E-06	2.84E-08	2.02E-09	1.53E-07	1.11E-08
SQP	Pt	2.31E+02	1.76E+02	2.86E+01	1.22E-01	2.53E+01	1.57E+00

Table 7: Impact indicators for THN3361R

Impact category	Unit	THN3361R
Biogenic Carbon content of the product	kg	9.35E-04
Biogenic Carbon content of the associated packaging	kg	1.22E-01

Table 8: Inventory flow other indicators

Environmental impact indicators

GWP-total	Global Warming Potential total (Climate change)
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 reaching 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	Water deprivation potential

Resource use indicators

PERE	Use of renewable primary energy excluding 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)
PENRE	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material
PNERM	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)
PET	Total use of primary energy in the lifecycle

Secondary materials, water and energy resources

SM	Use of secondary materials
RSF	Use of renewable secondary fuels
NRSF	Use of non-renewable secondary fuels
FW	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

CfR	Components for reuse
MfR	Materials for recycling
MfER	Materials for energy recovery
EN	Exported energy

Other indicators

PM	Emissions of Fine particles
IRP	Ionizing radiation, human health
ETP-fw	Ecotoxicity, freshwater
HTP-c	Human toxicity, carcinogenic effects
HTP-nc	Human toxicity, non-carcinogenic effects
SQP	Impact related to Land use / soil quality

Extrapolation for Homogeneous environmental family

This LCA covers different build configurations than the representative product. All the analyzed configurations have the same main functionality, product standards and manufacturing technology. The LCA SimaPro model has been fully parametrized to fulfill each different configuration.

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 factor in listed table.

* If the factor is "1", the impacts of the phase of the life cycle are same in comparison to the Reference product.

Product	GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater	EP-marine	EP-terrestrial	POCP	ADP-m&m	ADP-fossil	WDP
THN3361R	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
THN3361	0.80	0.80	0.63	0.86	0.52	0.84	0.82	0.78	0.77	0.81	0.63	0.81	0.66
THN3362R	1.41	1.41	1.74	1.18	1.16	1.21	1.17	1.31	1.28	1.38	0.77	1.38	0.88
THN3362	1.38	1.38	1.74	1.17	0.82	1.22	1.18	1.28	1.25	1.35	0.79	1.35	0.88
THN3363R	1.43	1.42	1.76	1.20	1.17	1.15	1.11	1.31	1.27	1.38	0.69	1.40	0.86
THN3363	1.39	1.39	1.75	1.19	0.82	1.16	1.13	1.28	1.24	1.34	0.72	1.36	0.86
THN3364R	3.16	3.17	3.08	2.50	2.27	2.70	2.73	3.06	3.00	3.07	2.46	3.09	2.47
THN3364	3.03	3.03	2.48	2.37	1.78	2.55	2.52	2.92	2.84	2.96	2.01	2.97	2.08

Table 9(a): Manufacturing phase extrapolation factors

Reference product: THN3361R

Product	Factor
THN3361R	1.00
THN3361	0.88
THN3362R	1.57
THN3362	1.55
THN3363R	1.58
THN3363	1.56
THN3364R	3.47
THN3364	3.37

Table 9(b): Distribution phase extrapolation factors

Reference product: THN3361R

Product	GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater	EP-marine	EP-terrestrial	POCP	ADP-m&m	ADP-fossil	WDP
THN3361R	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
THN3361	0.82	0.80	0.82	0.82	0.82	0.82	0.83	0.82	0.82	0.82	0.82	0.82	0.81
THN3362R	1.23	1.43	1.20	1.19	1.16	1.20	1.26	1.20	1.21	1.21	1.19	1.20	1.08
THN3362	1.21	1.34	1.20	1.18	1.15	1.19	1.24	1.19	1.19	1.19	1.18	1.19	1.08
THN3363R	1.23	1.44	1.20	1.19	1.16	1.20	1.26	1.20	1.21	1.21	1.19	1.21	1.08
THN3363	1.21	1.35	1.20	1.18	1.15	1.19	1.25	1.19	1.20	1.20	1.18	1.20	1.08
THN3364R	3.68	3.32	3.72	3.71	3.73	3.70	3.67	3.70	3.69	3.69	3.71	3.70	3.79
THN3364	3.63	3.17	3.68	3.67	3.70	3.66	3.62	3.66	3.65	3.65	3.67	3.66	3.77

Table 9(c): Installation phase extrapolation factors

Reference product: THN3361R

Product	Factor
THN3361R	1.00
THN3361	1.00
THN3362R	1.39
THN3362	1.39
THN3363R	4.46
THN3363	4.46
THN3364R	12.50
THN3364	12.50

Table 9(d): Use phase extrapolation factors

Reference product: THN3361R

Product	GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater	EP-marine	EP-terrestrial	POCP	ADP-m&m	ADP-fossil	WDP
THN3361R	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
THN3361	1.00	1.00	1.06	1.05	0.97	1.03	1.05	0.96	1.00	0.99	0.93	1.01	1.01
THN3362R	1.68	1.67	1.84	1.94	1.73	1.90	1.97	1.44	1.82	1.79	1.68	1.85	1.75
THN3362	1.69	1.68	1.90	2.00	1.75	1.95	2.03	1.40	1.85	1.82	1.68	1.89	1.77
THN3363R	1.48	1.48	1.47	1.56	1.57	1.56	1.56	1.39	1.56	1.56	1.59	1.57	1.51
THN3363	1.49	1.49	1.53	1.62	1.58	1.61	1.62	1.36	1.59	1.59	1.59	1.60	1.53
THN3364R	3.11	3.10	3.95	3.37	3.34	3.35	3.37	2.86	3.33	3.32	3.36	3.35	3.28
THN3364	3.06	3.05	3.95	3.35	3.28	3.33	3.36	2.77	3.29	3.28	3.28	3.32	3.24

Table 9(e): End of Life phase extrapolation factors

Reference product: THN3361R

Additional environmental information

According to the waste treatment scenario calculation in Simapro [5], based on the recycling rate in the technical report IEC/TR 62635 Edition 1.0 [7] Table D.6, the following recyclability potentials were calculated. The recyclability potential is calculated based on the product weight (excluding packaging).

	THN3361R
Recyclability potential	82.5%

Table 10: Recyclability potential

References

[1] PCR “PEP-PCR-ed4-EN-2021 09 06” - Product Category Rules for Electrical, Electronic and HVAC-R Products (published: 6th September 2021)

[2] PSR “PSR-0005-ed3.1-EN-2023 12 08” - Specific rules for Electrical switchgear and control gear Solutions (Disconnectors-Low Voltage)

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

[4] ecoinvent v3.9.1 (2023). ecoinvent database version 3.9 - (https://ecoinvent.org/)

[5] SimaPro Software version 9.5.0.1 - PRé Sustainability

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

[7] 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

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

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