PRODUCT ENVIRONMENTAL PROFILE

Environmental Product Declaration

ABB Switch disconnector fuses SlimLine XRG3 (BG)

May 2025

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PEP ARE COMPLIANT WITH XP C08-100-1 :2016 OR EN 50693:2019 OR NF E38-500:2022 THE COMPONENTS OF THE PRESENT PEP CANNOT BE COMPARED WITH COMPONENTS FROM ANOTHER PROGRAM.	
DOCUMENT IN COMPLIANCE WITH ISO 14025: 2006 « ENVIRONMENTAL LABELS AND DECLARATIONS. TYPE III ENVIRONMENTAL DECLARATIONS »	

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Manufacturer name and address	ABB Bulgaria EOOD- - Rakovski Branch Industrial Road One No. 14, 4142 Stryama, Plovdiv
Company contacts	EPD_ELSP@in.abb.com
Reference product	SlimLine XR Gold (XRG) Switch disconnector fuse: XRG3-185/10-3P
Description of the product	SlimLine XR Gold (XRG) Switch disconnector fuse; XRG3-185/10-3P*# is a three-pole switch disconnector fuse for 185mm busbar distance and 10mm busbar thickness. The SlimLine XRG drives exceptional energy efficiency, reducing temperature rise and enabling higher performance across the panel board.
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 690V (U), and 630A (In) ensuring isolation characterised by a rated insulation voltage 1000V (Ui), according to the appropriate use scenario, and during the reference service life of the product of 20 years.
Other products covered	XRG3 185/10 3P*# XRG3 185/10 4P*# XRG3 185/10 DC*# XRG3 185/10 3P MOT*# XRG3 185/10 4P MOT*# XRG3 185/10 3P EFM*# XRG3 185/10 4P EFM*# XRG3 185/10 DC EFM*# XRG3 185/10 3P ITS2.1/ITS2.D*# XRG3 185/10 4P ITS2.1/ITS2.D*# XRG3 185/10 3P MOT EFM*# XRG3 185/10 4P MOT EFM*# XRG3 185/10 3P MOT ITS2.1/ITS2.D*# XRG3 185/10 4P MOT ITS2.1/ITS2.D*# *= NH and BS; #= 50/5 and 50/10
Reference lifetime	20 years
Product category	other equipment
Use Scenario	Load rate: 50% of In Use time rate: 30% of RLT
Geographical representativeness	Raw materials & Manufacturing: [Bulgaria] Assembly: [Bulgaria] Distribution / Use: [Global] specific sales mix EoL: [Global]
Technological representativeness	Materials and processes data are specific to the production of XRG3-185/10-3P*#
LCA Study	This study is based on the LCA study described in the LCA report 1SDH002542A1005
EPD type	Product Family Declaration
EPD scope	“Cradle to grave”
Year of reported primary data	2023
LCA software	SimaPro 9.6.0.1 (2024)
LCI database	Ecoinvent v3.10 (2024)
LCIA methodology	EN 15804:2012+A2:2019; EF3.1

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 105 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 humane behavior.

General Information

ABB has over 2800 employees in Bulgaria and operates with head office in Sofia and five branches across the country. Two of the manufacturing units are located in Industrial area Rakovski (about 25km to the second largest city – Plovdiv). The production has already been certified ISO 9001, ISO 14001, ISO 45001, and ISO 50001, as a recognition for the company's strong process management and organizational structure, which are capable to Increase the efficiency in the development of the products, as well as in the supply and service activities. Both factories successfully combine several different types of production for low and medium voltage components:

- Line Protection Devices
- Components for medium voltage equipment
- Low Voltage Breakers Components
- Miniature Circuit Breakers
- Safety switches and enclosed switch disconnectors
- Surge Protection Device
- Low voltage cabinets
- Low Voltage Contactors components
- Semi-Finished and Finished Contactors
- Fusegears (Fuse switch disconnectors)

Product cluster

The SlimLine fuse and disconnector serve several important functions:

- Easy Installation: Designed for safe installation with or without live voltage, making it user-friendly.
- Automatic Quick-Break Contact: Allows for operator-independent switching, ensuring reliable disconnection of contacts.
- Position Indicator: Provides a reliable position indicator for easy monitoring of the disconnector's status.
- Fuse Monitoring: Features an integrated fuse monitor that indicates when a fuse has blown and resets automatically.
- Power Loss Reduction: Upgraded models reduce power losses by up to 35%, enhancing efficiency.

The switch-disconnector-fuses SlimLine XR are designed for easy installation. The plug contact design makes it possible to install it safely with or without live voltage. SlimLine XR can be operated safely with a folded operated handle and has a reliable position indicator. These features make the SlimLine fuse and disconnector a reliable choice for low-voltage applications.

Constituent Materials

XRG3-185/10-3P*#

The representative product is XRG3-185/10-3P*# which weighs 16.384 kg including paper documentation and packaging.

Materi-als	Name	IEC 62474 MC	[g]	Weight %
Metals	Cu and Cu Alloys	M-121	6409.5	39.1%
	Steel	M-119	3557.5	21.7%
	Stainless Steel	M-100	195.7	1.2%
Plastics	Unsaturated Polyester	M-301	2429.9	14.8%
	Polyamide	M-258	1753.6	10.7%
	Polycarbonate	M-254	1365.8	8.3%
	Polypropylene	M-252	0.3	<0.1%
	Polyethylene	M-251	<0.1	<0.1%
Other	Paper/Cardboard	M-341	672.3	4.1%
Total			16383.9	100.0%

Table 1: Weight of materials

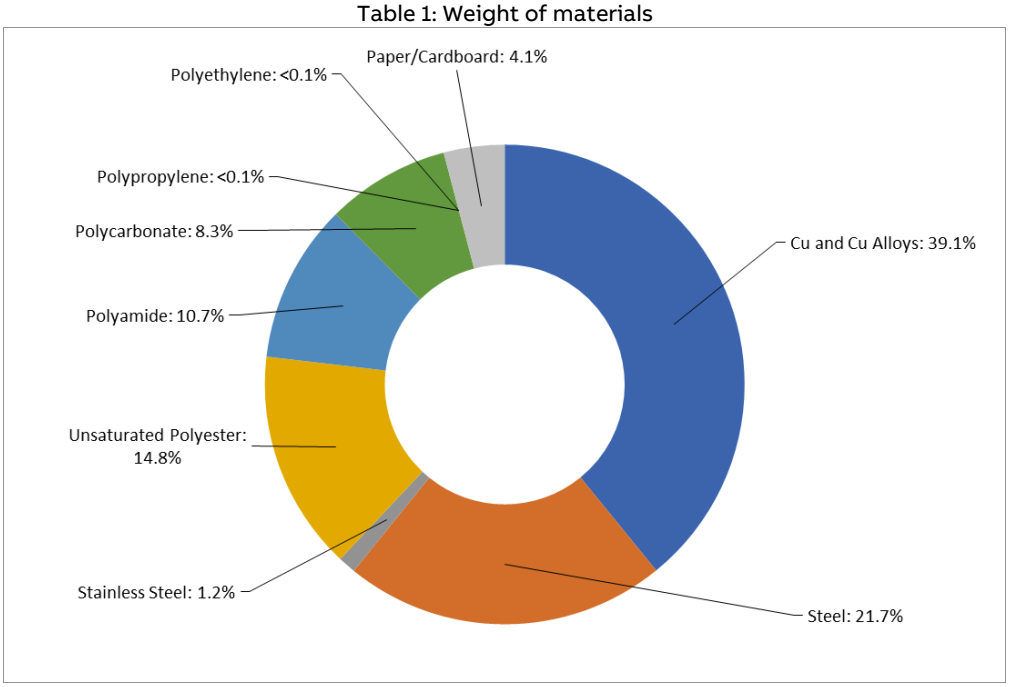

Figure 1: Composition of XRG3-185/10-3P*#

Packaging for reference product XRG3-185/10-3P weighs 670.2 g, with the following sub-stance composition:

Material	Unit	XRG3-185/10-3P*#
Corrugated Cardboard	g	669.6
Adhesive label (paper)	g	0.6

Table 2: Weight of packaging materials XRG3-185/10-3P*#

LCA background information

Functional unit and Reference Flow

The functional unit is the reference unit used to quantify the performance of the service delivered by a product to the user. The main purpose of the functional unit is to provide a reference to which inputs and outputs are related in the LCA.

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 690V (U), and 630A (In) ensuring isolation characterised by a rated voltage 1000V (Ui), according to the appropriate use scenario, and during the reference service life of the product of 20 years.

The Reference Flow of the study is a XRG3-185/10-3P*# (including packaging) with mass described in chapter 1.3, table 1 & 2.

System boundaries and life cycle stages

The life cycle of a SlimLine XR Gold (XRG) Switch disconnector fuse, 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)	Benefits
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	Deinstallation Collection and transport EoL treatment	Benefits from the recycling and energy recovery from the EOL

Table 3: 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 SlimLine at

ABB Electrification Bulgaria facility. Secondary data are also representative for this year, as provided by ecoinvent [6].
The selected ecoinvent [6] processes in the LCA model have a regional representativeness, absence of regional dataset, global representativeness of datasets has been chosen. In this way, a conservative approach has been adopted. The primary data for use phase is subjected to the catalogue data, and for the distribution is subjected to sales data from SAP ERP. The geographical representativeness of the other life cycle is global.

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 [6] database have not been excluded.

Data quality

In this PEP, 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 [6], allocation cut-off by classification, are used. The ecoinvent database available in the SimaPro software [7] 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. The geographical representativeness of the other life cycle is global.

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 [1] and EN 50693 [3] the environmental impact indicators must be determined using the characterization factors and impact assessment methods specified in EN 15804:2012+A2:2019 [8].

PCR [1] 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

Allocation coefficients are based on the per piece consumption for electricity, water apart from assembly processes the whole production line is temperature-regulated throughout the year. The allocation of the total amount of waste generated by the production line as well, has been based on this criterion.

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 assuming no specific data available PCR [1]. 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 like galvanizing, silver plating 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].

The only limitations and simplifications applied to this study are listed in the following table.

Category	Description
Coatings	Phosphate surface treatment, stearate coating has been excluded by operational choice
Grease lubricant	Application of grease lubricant on the operating mechanism has been cutoff since its negligible amount
Packaging	An average packaging content of 5% of the mass of the reference equipment has been considered as follow- Wood 50%, Cardboard 40%, Low density polyethylene 10%.
Tranports	Specific transport parameters along the entire supply chain of the reference products have been considered as representative for all the products covered by the study
MU Emissions	Particulate matter (PM) emissions from welding machines have been excluded since their periodic measurement shows negligible amount
MU Emissions	Impacts related to the production, transportation and installation of capital goods (buildings, infrastructure, machinery, internal transport packaging) and general operations that cannot be directly allocated to products have been excluded

Table 4: Limitation and simplification used in each LCA stage.

Energy Models

LCA Stage	EN 15804:2012 +A2:2019 module	Energy model	Notes
Raw material extraction and processing	A1-A2	Electricity, {RER}| market group for | Cut-off Electricity, {GLO}| market group for | Cut-off	Based on materials and supplier's locations
Manufacturing	A3	Electricity, high voltage {BG}| electricity production, hydro, pumped storage | Cut-off, S Electricity, low voltage {BG}| electricity production, photovoltaic, 3kWp	-

		slanted-roof installation, single-Si, panel, mounted | Cut-off, S	
Installation (Packaging EoL)	A5	Electricity, {GLO}| market group for | Cut-off	-
Use Stage	B1	Electricity, {country mix}| market group for | Cut-off	-
EoL	C1-C4	Electricity, {GLO}| market group for | Cut-off	-
Benefits	D	Electricity, {GLO}| market group for | Cut-off	-

Table 5: Energy models used in each LCA stage.

** Please refer the use phase for further description

Inventory analysis

In this PEP, 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, and marine distances using Distances & Time (Searates).

All primary data collected from ABB are from 2023, which was a representative production year. The ecoinvent cut-off by classification system processes [6] are used to represent the LCA model.

To improve both the inventory and modelling phase of the product, a specific modular dataset framework has been adopted. Raw materials and Manufacturing processes datasets from Ecoinvent database [6] have been clustered and listed inside two distinct mater data tables ABB Raw Materials and ABB Materials & Processes. Data used in the analysis is not older than 10 years.

Manufacturing stage

The SlimLine XRG is composed of a multitude of components, all of which are made from of numerous materials.
All the SlimLine XRG's components have been modelled according to their specific raw materials and manufacturing processes.

The single use packaging as well as paper documentation are also included in the analysis in the manufacturing stage. ABB receives packaged product from supplier, sorts, repacks and delivers to the customer according to the orders.

Most of the inputs to the products' manufacturing stage are already produced component parts from the supply chain.

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 distances from the last subassembly suppliers' factories to the ABB facility have been calculated.
The complete energy mix has been modeled considering the GO on energy origins provided to ABB for the year 2023.

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 for cluster (SAP ERP sales data as a source). An additional 1000km distance is considered as per the PCR [1].

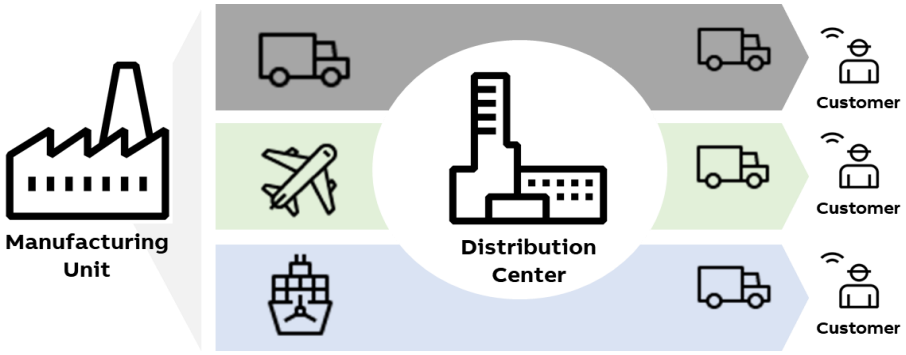

Figure 2: Distribution methodology.

Installation

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

For the disposal of the packaging after installation of the product at the end of its life, a transport distance of 100 km (according to PSR [2]) was assumed.

The actual disposal site is unknown and is managed by the customer. The disposal scenario of the packaging was calculated based on the Eurostat data (2021), for non-European countries, 100% incineration has been considered.

Use

Use and maintenance are modelled according to the PCR [1].

Parameters		
RSL	[no. of years]	20
Time operating coefficient	[%]	30

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 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 (3) 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 Ecoinvent [6] 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] | market for | Cut-off, S).

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

End of life

The end-of-life stage is modelled according to IEC/TR 62635 [9]. The percentages for end-of-life treatments of materials are taken from IEC/TR 62635 [9].

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]).

Benefits (Module D)

Module D refers to the contribution from the life cycle of the product to the circular economy. The module is an optional one, but it can be registered in PEP Ecopassport on a voluntary basis. The assessment of benefits is carried according to the end-of-life scenarios and does NOT consider the waste and co-products resulting in Modules A1-A3.

The parameters and formula used to calculate module D results can be observed below:

Module D =∑ (+ R1i×Mi×EPMi −R2i×Mi×EPMi* −R3i×Mi×ESE)

R1i= Recycled content of the material from primary data

R2i= Recyclability potential of the material according to table 7 -PEP-PCR-ed4-EN-2021_09_06 [1]

R3i= Energy recovery potential of the material according to table 7 -PEP-PCR-ed4-EN-2021_09_06 [1]

Mi= mass of the material in the study from the constituent table

EPMi =environmental impact (loads) associated with the secondary material

EPMi*=environmental benefit of the recycling of material at the end of the product's life

ESE=environmental benefit of waste-to-energy

The LHV values to calculate the ESE is considered from Ecoinvent [6]. The scope of module D includes the modules from A4-C4. The point of substitution is considered after the EOL of the product i.e. after C3 and C4 modules according to PEP-PCR-ed4-EN-2021_09_06 [1].

Environmental impacts

The following table shows the environmental impact indicators of the life cycle of a XRG3-185/10-3P *# 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).

Impact category	Unit	Total	Manufacturing	Distribution	Installation	Use	End of Life	Benefits
GWP-total	kg CO2 eq	1.47E+03	1.27E+02	4.71E+00	2.13E-01	1.33E+03	1.13E+01	-5.53E+01
GWP-fossil	kg CO2 eq	1.35E+03	1.26E+02	4.71E+00	1.06E-02	1.21E+03	1.13E+01	-5.52E+01
GWP-biogenic	kg CO2 eq	1.11E+02	6.09E-01	2.22E-03	2.03E-01	1.10E+02	4.77E-02	-3.94E-02
GWP-luluc	kg CO2 eq	2.67E+00	1.50E-01	1.46E-03	4.23E-06	2.51E+00	9.37E-03	-4.75E-02
ODP	kg CFC11-eq	2.06E-05	2.73E-06	9.25E-08	1.94E-10	1.77E-05	1.14E-07	-1.47E-06
AP	mol H+ eq	9.08E+00	5.04E+00	1.89E-02	6.06E-05	3.97E+00	4.73E-02	-1.74E+00
EP-freshwater	kg P eq	1.83E-01	2.53E-02	3.35E-05	1.08E-07	1.57E-01	3.51E-04	-8.26E-03
EP-marine	kg N eq	9.35E-01	3.03E-01	7.08E-03	9.09E-05	6.15E-01	9.97E-03	-1.13E-01
EP-terrestrial	mol N eq	1.15E+01	4.04E+00	7.77E-02	2.27E-04	7.23E+00	1.08E-01	-1.41E+00
POCP	kg NMVOC eq	3.56E+00	1.18E+00	2.94E-02	1.03E-04	2.32E+00	3.65E-02	-4.16E-01
ADP-m&m	kg Sb eq	8.80E-02	7.23E-02	1.14E-05	2.56E-08	1.56E-02	1.50E-05	-2.10E-02
ADP-fossil	MJ	2.18E+04	1.81E+03	6.78E+01	1.41E-01	1.98E+04	1.43E+02	-7.52E+02
WDP	m3 of equiv. depriv.	2.54E+02	1.04E+02	2.98E-01	-7.38E-03	1.49E+02	8.53E-01	-4.45E+01
PENRE	MJ	2.17E+04	1.70E+03	6.78E+01	1.41E-01	1.98E+04	1.43E+02	-7.52E+02
PENRM	MJ	1.09E+02	1.09E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	2.18E+04	1.81E+03	6.78E+01	1.41E-01	1.98E+04	1.43E+02	-7.52E+02
PERE	MJ	7.14E+03	3.46E+02	9.56E-01	3.01E-03	6.78E+03	1.12E+01	-9.13E+01
PERM	MJ	8.66E+00	8.66E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.15E+03	3.55E+02	9.56E-01	3.01E-03	6.78E+03	1.12E+01	-9.13E+01
SM	kg	2.34E+00	2.34E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-8.09E-02
RSF	MJ	0.00E+00	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	0.00E+00
PET	MJ	2.89E+04	2.16E+03	6.88E+01	1.44E-01	2.65E+04	1.54E+02	-8.43E+02
FW	m3	1.68E+01	2.65E+00	9.40E-03	-1.43E-04	1.41E+01	3.72E-02	-1.10E+00
HWD	kg	7.57E-02	1.50E-02	4.48E-04	9.76E-07	5.98E-02	4.61E-04	-2.48E-03
N-HWD	kg	1.34E+02	2.07E+01	5.17E+00	6.21E-01	9.33E+01	1.46E+01	-5.83E+00
RWD	kg	9.55E-02	3.76E-03	1.87E-05	5.58E-08	9.15E-02	2.14E-04	-9.62E-04
CfR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MfR	kg	1.45E+01	4.33E+00	0.00E+00	5.51E-01	0.00E+00	9.66E+00	0.00E+00
MfER	kg	2.11E-01	0.00E+00	0.00E+00	5.89E-02	0.00E+00	1.52E-01	0.00E+00
EN	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
PM	disease inc.	3.19E-05	1.40E-05	4.25E-07	1.02E-09	1.69E-05	6.06E-07	-5.33E-06
IRP	kBq U-235 eq	9.70E+01	5.43E+00	2.75E-02	8.37E-05	9.12E+01	3.34E-01	-1.51E+00
ETP-fw	CTUe	1.25E+04	7.01E+03	1.48E+01	2.72E+00	5.39E+03	3.47E+01	-2.23E+03

HTP-c	CTUh	4.77E-06	2.05E-06	2.63E-08	7.23E-11	2.67E-06	2.05E-06	-1.08E-06
HTP-nc	CTUh	6.81E-05	5.04E-05	4.47E-08	6.16E-10	1.76E-05	7.31E-08	-1.69E-05
SQP	Pt	7.74E+03	1.92E+03	6.13E+01	1.46E-01	5.71E+03	4.59E+01	-5.71E+02

Table 7: Impact indicators for XRG3-185/10-3P*#

@- Negative value due to the treatment of waste in sanitary landfills:*
**a Ecoinvent dataset: Waste polyethylene {RoW}| treatment of waste polyethylene, sanitary landfill | Cut-off, S*
**b Ecoinvent data set: Waste plastic, mixture {RoW}| treatment of waste plastic, mixture, sanitary landfill | Cut-off, S*
Waste graphical paper {RoW}| treatment of waste graphical paper, sanitary landfill | Cut-off, S
Municipal solid waste {RoW}| treatment of municipal solid waste, sanitary landfill | Cut-off, S

Impact category	Unit	XRG3-185/10-3P*#
Biogenic Carbon content of the product	kg	1.04E-03
Biogenic Carbon content of the associated packaging	kg	1.33E-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

LCA Phase: Manufacturing

Product	GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater	EP-marine	EP-terrestrial	POCP	ADP-minerals & metals	ADP-fossil	WDP
XRG3 185/10 3P*#	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
XRG3 185/10 4P*#	1.13	1.13	1.14	1.14	1.07	1.15	1.15	1.14	1.15	1.14	1.16	1.12	1.12
XRG3 185/10 DC*#	0.79	0.79	0.76	0.74	0.90	0.69	0.69	0.72	0.71	0.72	0.68	0.81	0.75
XRG3 185/10 3P MOT*#	1.05	1.05	1.05	1.04	1.03	1.01	1.02	1.03	1.03	1.03	1.03	1.05	1.02
XRG3 185/10 4P MOT*#	1.17	1.17	1.19	1.18	1.10	1.16	1.17	1.17	1.17	1.17	1.18	1.17	1.14
XRG3 185/10 3P EFM*#	1.03	1.03	1.01	1.03	1.03	1.01	1.01	1.02	1.01	1.02	1.01	1.03	1.02
XRG3 185/10 4P EFM*#	1.15	1.15	1.15	1.17	1.10	1.16	1.16	1.15	1.16	1.16	1.16	1.15	1.14
XRG3 185/10 DC EFM*#	0.82	0.82	0.78	0.78	0.92	0.70	0.70	0.75	0.73	0.74	0.71	0.84	0.77
XRG3 185/10 3P ITS2.1/ITS2.D*#	1.26	1.26	1.08	1.31	1.24	1.19	1.24	1.23	1.23	1.22	1.30	1.25	1.17
XRG3 185/10 4P ITS2.1/ITS2.D*#	1.39	1.39	1.23	1.45	1.31	1.33	1.39	1.37	1.37	1.37	1.45	1.37	1.29
XRG3 185/10 3P MOT EFM*#	1.08	1.08	1.06	1.07	1.05	1.02	1.03	1.04	1.04	1.04	1.04	1.08	1.04
XRG3 185/10 4P MOT EFM*#	1.20	1.20	1.20	1.21	1.13	1.17	1.18	1.18	1.18	1.19	1.19	1.20	1.16
XRG3 185/10 3P MOT ITS2.1/ITS2.D*#	1.31	1.31	1.13	1.36	1.27	1.20	1.26	1.26	1.25	1.25	1.33	1.30	1.19

XRG3 185/10 4P MOT ITS2.1/ITS2.D*#	1.43	1.44	1.28	1.50	1.34	1.35	1.41	1.40	1.40	1.40	1.48	1.42	1.31

Table 9: Extrapolation factors for Slimline XRG3 manufacturing stage

LCA Phase: Distribution

Product	All environmental impact indicators
XRG3 185/10 3P*#	1.00
XRG3 185/10 4P*#	1.16
XRG3 185/10 DC*#	0.84
XRG3 185/10 3P MOT*#	1.04
XRG3 185/10 4P MOT*#	1.20
XRG3 185/10 3P EFM*#	1.13
XRG3 185/10 4P EFM*#	1.18
XRG3 185/10 DC EFM*#	0.86
XRG3 185/10 3P ITS2.1/ITS2.D*#	1.09
XRG3 185/10 4P ITS2.1/ITS2.D*#	1.25
XRG3 185/10 3P MOT EFM*#	1.06
XRG3 185/10 4P MOT EFM*#	1.23
XRG3 185/10 3P MOT ITS2.1/ITS2.D*#	1.15
XRG3 185/10 4P MOT ITS2.1/ITS2.D*#	1.31

Table 10: Extrapolation factors for Slimline XRG3 distribution stage

LCA Phase: Installation

Installation phase impacts are common across all variants of the product.

LCA Phase: Use

Product	All environmental impact indicators
XRG3 185/10 3P*#	1.00
XRG3 185/10 4P*#	1.00
XRG3 185/10 DC*#	0.67
XRG3 185/10 3P MOT*#	1.00
XRG3 185/10 4P MOT*#	1.00
XRG3 185/10 3P EFM*#	1.02
XRG3 185/10 4P EFM*#	1.02
XRG3 185/10 DC EFM*#	0.69

XRG3 185/10 3P ITS2.1/ITS2.D*#	1.02
XRG3 185/10 4P ITS2.1/ITS2.D*#	1.02
XRG3 185/10 3P MOT EFM*#	1.03
XRG3 185/10 4P MOT EFM*#	1.03
XRG3 185/10 3P MOT ITS2.1/ITS2.D*#	1.02
XRG3 185/10 4P MOT ITS2.1/ITS2.D*#	1.02

Table 11: Extrapolation factors for Slimline XRG3 use stage

LCA Phase: End of Life

Product	GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater	EP-marine	EP-terrestrial	POCP	ADP-minerals & metals	ADP-fossil	WDP
XRG3 185/10 3P*#	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
XRG3 185/10 4P*#	1.14	1.14	1.15	1.14	1.14	1.14	1.15	1.09	1.14	1.14	1.13	1.14	1.21
XRG3 185/10 DC*#	0.75	0.75	0.72	0.73	0.74	0.74	0.72	0.83	0.75	0.75	0.82	0.74	0.61
XRG3 185/10 3P MOT*#	1.04	1.03	4.29	1.03	1.03	1.03	1.03	1.02	1.03	1.03	1.06	1.03	1.04
XRG3 185/10 4P MOT*#	1.18	1.16	4.44	1.17	1.17	1.17	1.17	1.12	1.17	1.17	1.18	1.17	1.24
XRG3 185/10 3P EFM*#	1.02	1.02	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.01	1.02	1.01	1.01
XRG3 185/10 4P EFM*#	1.15	1.15	1.15	1.16	1.15	1.15	1.16	1.10	1.15	1.15	1.14	1.15	1.22
XRG3 185/10 DC EFM*#	0.76	0.76	0.72	0.74	0.75	0.75	0.73	0.84	0.76	0.76	0.84	0.74	0.62
XRG3 185/10 3P ITS2.1/ITS2.D*#	1.16	1.16	1.13	1.12	1.13	1.12	1.13	1.09	1.13	1.12	1.07	1.13	1.18
XRG3 185/10 4P ITS2.1/ITS2.D*#	1.29	1.29	1.28	1.27	1.27	1.27	1.27	1.18	1.26	1.26	1.19	1.27	1.38
XRG3 185/10 3P MOT EFM*#	1.06	1.04	4.30	1.04	1.04	1.04	1.04	1.03	1.04	1.04	1.07	1.04	1.05
XRG3 185/10 4P MOT EFM*#	1.19	1.18	4.45	1.18	1.18	1.18	1.18	1.13	1.18	1.18	1.20	1.18	1.25
XRG3 185/10 3P MOT ITS2.1/ITS2.D*#	1.20	1.19	4.42	1.15	1.15	1.15	1.15	1.11	1.16	1.15	1.12	1.15	1.21
XRG3 185/10 4P MOT ITS2.1/ITS2.D*#	1.34	1.32	4.57	1.29	1.29	1.29	1.30	1.21	1.29	1.29	1.25	1.29	1.42

Table 12: Extrapolation factors for Slimline XRG3 EOL stage

Additional environmental information

According to the waste treatment scenario calculation in Simapro [7], based on the recycling rate in the technical report IEC/TR 62635 Edition 1.0 [9] Table D.6, the following recyclability potentials were calculated. The recyclability potential is calculated based on the product weight (excluding packaging).

	XRG3-185/10-3P*#
Recyclability potential	**80.1%**

Table 13: Recyclability potential of XRG3-185/10-3P*#

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

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

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

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

[6] ecoinvent v3.10(2024). ecoinvent database version 3.10 - (https://ecoinvent.org/)

[7] SimaPro Software version 9.6.0.1 (2024) - PRé Sustainability

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

[9] 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

[10] https://www.ecosystemspa.com/

[11] 1SDH002542A1006_SlimLine_BOM_Process

[12] 1SDH002542A1007_SlimLine_Data

[13] 1SDL000282R1377 - RoHS II (MCCBs and ACBs)

[14] 1SDL000282R1378 - REACH (MCCBs and ACBs)

[15] 1SDL000571R0 Ver 01 - RoHS Exemptions (MCCBs and ACBs)

[16] 1SDL000572R0 Ver 01 - SVHC present in excess of 0.1% (MCCBs and ACBs)