PRODUCT ENVIRONMENTAL PROFILE
Environmental Product Declaration

ABB FastLine Direct Incomer DK95/240/300

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Company contacts	EPD_ELSP@in.abb.com
Reference product	DK240/100 Direct incomer
Description of the product	DK240/100 Direct incomer suitable for connection to ABB FastLine busbars provide a robust and safe solution with uncompromised lifetime. The Direct incomer provides a number of significant benefits such as continuous operation, space saving and fast installation. These benefits are important for achieving low operating cost and high reliability in low voltage distribution systems.
Functional unit	Connect N clamping units between 2 or more wires for a rated cross-section Sn, with rated voltage U, rated current I_n, and a voltage drop DU, according to the appropriate use scenario, and for the reference service life of the product of 20 years.

Product Description	Rated voltage, U [V]	Rated current, In [A]
DK240/100	1000V	400
DK240/50	1000V	400
DK 300	1000V	800
DK 95	1000V	250

Other products covered	DK240/100, DK240/50, DK 300, DK 95
Reference lifetime	20 years
Product category	Electrical, Electronic and HVAC-R Products (Terminal Blocks)
Use Scenario	Direct Incomers have no significant power loss during use phase.
Geographical representativeness	Raw materials & Manufacturing: [Europe / Global] Assembly: [Romania] Distribution / Use: [Europe] specific sales mix EoL: [Global]
Technological representativeness	Materials and processes data are specific for the production of DK95/240/300
LCA Study	This study is based on the LCA study described in the LCA report 2CGC0150
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 (2023)
LCIA methodology	EN 15804:2012+A2:2019

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 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 Alingsas operates in Sweden. ABB Provides a complete low voltage distribution system consisting of cabinets, busbars, switching devices, connectors and wide range of accessories that support a great variety of customer applications.

- ABB products comply with following EC directive: "Low-Voltage Directives" (LVD) no. 2014/35/EU
- ISO 9001 for quality management
- ISO 14001 for environmental management
- ISO 45001 for the management of the health and safety of employees in the workplace
- ISO 50001 for energy management

Different products produced in ABB Alingsas are
- SLD & SLE Fuse Switch Disconnectors
- CDC Cabinets
- Connectors

Each brand are specific systems which is developed according to standards for different country distribution systems. The primary scope is to deliver a system with high level of safety, simplicity and reliability. Every installer and surrounding environments should be safe during the 40 years of the products lifetime. The products are critical parts of public infrastructure, and continuous operation needs to be secured.

Direct Incomer DK95/240/300 product cluster

DK240/100 is uninsulated connector suitable for connection to ABB FastLine busbars provide a robust and safe solution with uncompromised lifetime. The connector provides a number of significant benefits such as continuous operation, space saving and fast installation. These benefits are important for achieving low operating cost and high reliability in low voltage distribution systems.

The entire system, including busbars, connectors and switches are IP2X classified.

- **DK95/240/300**

Product Description	Rated voltage, U [V]	Rated current, In [A]
DK240/100	1000V	400
DK240/50	1000V	400
DK 300	1000V	800
DK 95	1000V	250

Table 1: Technical characteristics of DK240/100 Direct Incomer
(Refer Technical catalogue for complete details).

Constituent Materials

DK240/100

The representative product is DK240/100 Direct Incomer which weighs 4kg including its paper documentation and packaging.

DK240/100				
Materials	**Name**	**IEC 62474 MC**	**[g]**	**Weight %**
Metals	Cu and Cu Alloys	M-121	1363.5	33.6%
	Aluminium	M-120	412.0	10.2%
	Steel	M-119	276.3	6.8%
Plastics	Unsaturated Polyester	M-301	1421.5	35.0%
	Polycarbonate	M-254	356.9	8.8%
	Elastomer	M-320	0.2	<0.1%
	PolyVinylChloride	M-250	0.1	<0.1%
Other	Paper/Cardboard	M-341	227.2	5.6%
		Total	4057.7	100.0%

Table 2: Weight of materials DK240/100

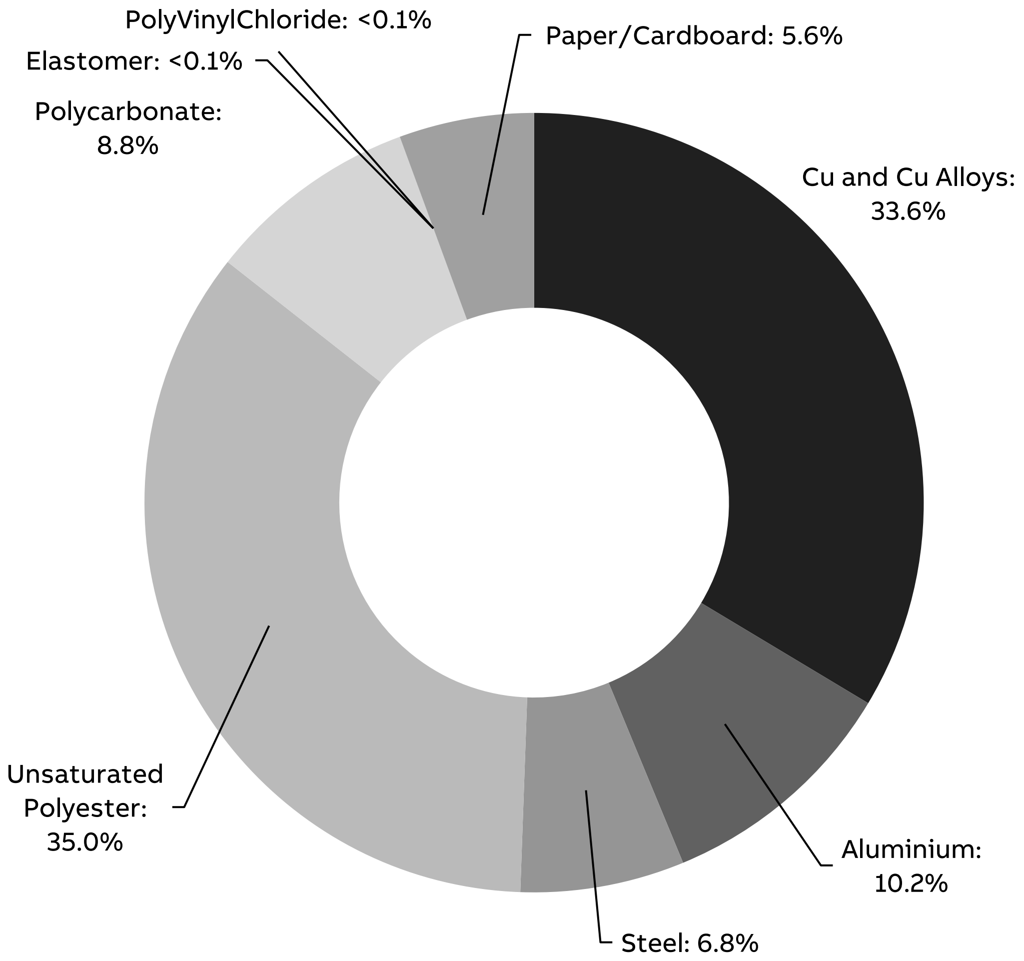

Figure 1: Composition of DK240/100

Packaging weighs 226.4 g, with the following substance composition:

Material	Unit	Total	%
Corrugated Cardboard	g	226.4	5.58%
Total	**g**	226.4	5.58%

Table 3: Weight of materials DK240/100 - Packaging

No cut-off criteria have been applied to the analysis of the product and its packaging. Additional packaging for semifinished products along the supply chain haven't been considered.

Official declarations LB-DT 17-21D [13] and LB-DT 18-21D [14] states compliance of ABB moulded case circuit breakers and air circuit breakers respectively to RoHS II and REACH regulations; annex 1SDL000571R0 [15] provides exemptions considered for RoHS II while annex 1SDL000572R0 [16] lists REACH substances present in a concentration above 0,1% adding reference to products where involved parts are mounted.

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.

Connect N clamping units between 2 or more wires for a rated cross-section Sn, with rated voltage U, rated current In, and a voltage drop DU, according to the appropriate use scenario, and for the reference service life of the product of 20 years.

The Reference Flow of the study is a Direct Incomers (including its packaging and accessories) with mass described in page 6 table 1.

System boundaries and life cycle stages

The life cycle of the Direct Incomer, 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, 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	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. Secondary data are also representative for this year, as provided by ecoinvent [6].

The selected ecoinvent [6] 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 [6] 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 [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.

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 [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-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

Allocation coefficients are based on the DK240/100 line’s occupancy area for electricity and methane consumption as well as the total amount of waste generated by the production line.

The total number of operators was considered for water consumption. All these flows have been allocated and divided by the total number of DK95/240/300 Direct Incomers produced in 2023.

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 the 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.

Application of grease lubricant on the circuit breakers operating mechanism has been excluded since it is negligible. Surface treatments like galvanizing, tin and silver plating as well as their related transport processes (back and forth from the finishing suppliers) have been considered in the LCA model. Specific phosphate surface treatment, Stearate coating have been excluded by operational choice (mass of the components involved < 0.9% of the final product, thus negligible). Scraps for metal working and plastic processes are included when already defined in ecoinvent[6].

Printed circuit boards (PCB) have been modelled with a representative cluster dataset including: every single component, the unpopulated board as well as the surface mounting technology (SMD) process. For some components with no equivalent on ecoinvent database[6], the dataset "Electronic component, passive, unspecified {GLO}| market for | Cut-off, S" was used.

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 suppliers locations
Manufacturing	A3	Electricity, high voltage {SE}| market for | Cut-off, U - ABB Mix Sweden	Standard Energy model for Romania manufacturing plant
Installation (Packaging EoL)	A5	Electricity, {GLO}| market group for | Cut-off	
EoL	C1-C4	Electricity, {GLO}| market group for | Cut-off	

Table 5: Energy models used in each LCA stage

** Please refer the use phase page 14 for further description

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 software were used. They are a list of all the components and assemblies that constitute the finished product, organized by level. Each item is matched with its code, quantity, weight and supplier. The BOMs were then processed, adding material, surface area and other weight data, taken from technical drawings. 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 (Sea rates).

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

Due to the large amounts of components in the Direct Incomer, raw material inputs have been modelled with data from ecoinvent[6] representing either a European [RER] or Global [RoW] market coverage based on the supplier's location. These datasets are assumed to be representative.

Manufacturing stage

The FastLine Direct Incomers are 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.
All the Direct Incomer 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.

The entire supplier's network has been modelled with the calculation of each transportation stage, from the first manufacturing supplier to the next.

The energy mix used for the production phase is representative for ABB production site and includes renewable energy only (Wind).

The complete energy mix has been modeled considering the Energy Certificate from the supplier.

Distribution

The transport distances from ABB manufacturing plant to the distribution centers (regional distribution centers / local sales organizations) have been calculated considering the specific reference products sales mix data from 2023 (SAP ERP sales data as a source).
Reference product distribution is representative of the entire size and equivalent to distribution of other products listed in the extrapolation tables.

The other parameter affecting the environmental impact for this LCA stage is the total mass of the product (including its packaging). Different mass values for each specific configuration covered by this study have been considered in the model.

An additional 1000 kms distance by road has been considered to cover the last distribution stage to the end customer (usage location).

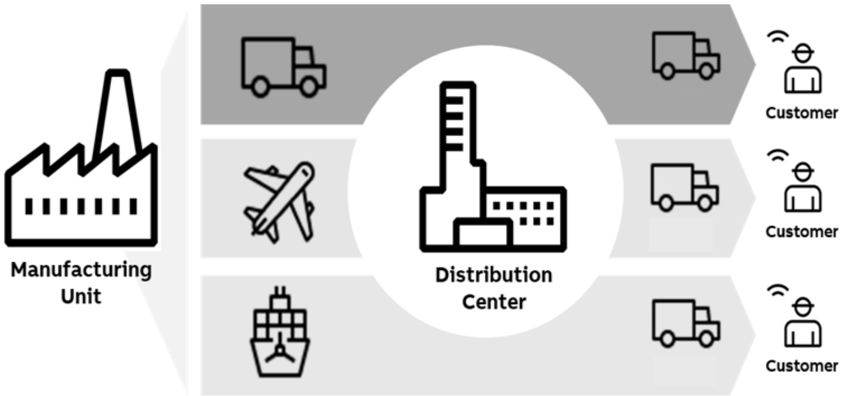

Figure 2: Distribution methodology.

Installation

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

For the disposal of the packaging after application of Direct Incomer 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 latest Eurostat data (EU-27) available (2021).

Use

Direct Incomers have no significant power loss during use phase.

End of life

The end-of-life stage is modelled according to PCR [1] and 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]).

Environmental impacts

The following table show the environmental impact indicators of the life cycle of a single DK240/100 Direct Incomer, 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).

DK240/100

Impact category	Unit	Total	Manufacturing	Distribution	Installation	Use	End of Life
GWP-total	kg CO2 eq	4.37E+01	3.39E+01	1.49E-01	8.20E-02	8.16E+00	1.41E+00
GWP-fossil	kg CO2 eq	4.30E+01	3.36E+01	1.49E-01	3.53E-03	7.84E+00	1.39E+00
GWP-biogenic	kg CO2 eq	5.60E-01	1.97E-01	1.26E-04	7.84E-02	2.69E-01	1.53E-02
GWP-luluc	kg CO2 eq	1.01E-01	4.86E-02	6.93E-05	1.89E-06	5.15E-02	1.03E-03
ODP	kg CFC11-eq	1.67E-06	1.43E-06	3.19E-09	8.39E-11	2.26E-07	1.21E-08
AP	mol H+ eq	1.06E+00	9.73E-01	6.03E-04	2.01E-05	8.22E-02	5.99E-03
EP-freshwater	kg P eq	8.79E-02	8.06E-02	1.04E-05	3.65E-07	7.06E-03	2.72E-04
EP-marine	kg N eq	7.84E-02	6.54E-02	2.29E-04	4.43E-05	8.48E-03	4.22E-03
EP-terrestrial	mol N eq	9.34E-01	8.18E-01	2.44E-03	7.40E-05	9.97E-02	1.39E-02
POCP	kg NMVOC eq	2.83E-01	2.48E-01	9.16E-04	3.55E-05	2.94E-02	4.70E-03
ADP-m&m	kg Sb eq	1.41E-02	1.33E-02	3.94E-07	9.01E-09	8.61E-04	1.30E-06
ADP-fossil	MJ	6.50E+02	4.85E+02	2.14E+00	4.64E-02	1.49E+02	1.31E+01
WDP	m3 of equiv. depriv.	2.95E+01	2.20E+01	1.02E-02	1.08E-03	7.37E+00	1.21E-01
PENRE	MJ	6.13E+02	4.48E+02	2.14E+00	4.64E-02	1.49E+02	1.31E+01
PENRM	MJ	3.70E+01	3.70E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	6.50E+02	4.85E+02	2.14E+00	4.64E-02	1.49E+02	1.31E+01
PERE	MJ	9.97E+02	7.52E+01	3.13E-02	1.11E-03	9.21E+02	1.04E+00
PERM	MJ	3.90E+00	3.90E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.00E+03	7.91E+01	3.13E-02	1.11E-03	9.21E+02	1.04E+00
SM	kg	1.11E+00	1.11E+00	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	1.65E+03	5.64E+02	2.17E+00	4.75E-02	1.07E+03	1.41E+01
FW	m3	7.13E+00	6.19E-01	3.36E-04	3.48E-05	6.51E+00	4.45E-03
HWD	kg	3.63E-03	3.27E-03	1.33E-05	2.65E-07	2.94E-04	4.72E-05
N-HWD	kg	1.72E+01	8.48E+00	1.87E-01	2.41E-02	6.50E+00	2.02E+00
RWD	kg	2.80E-03	1.41E-03	6.52E-07	2.10E-08	1.38E-03	1.47E-05
CfR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MfR	kg	3.94E+00	1.47E+00	0.00E+00	1.87E-01	0.00E+00	2.29E+00
MfER	kg	2.34E-01	1.40E-01	0.00E+00	1.90E-02	0.00E+00	7.47E-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.	3.87E-06	3.20E-06	1.50E-08	3.34E-10	5.52E-07	1.04E-07
IRP	kBq U-235 eq	1.15E+01	5.08E+00	2.70E-03	8.63E-05	6.35E+00	5.96E-02
ETP-fw	CTUe	9.60E+02	8.62E+02	1.12E+00	1.43E-01	9.17E+01	5.22E+00
HTP-c	CTUh	1.79E-07	1.57E-07	6.33E-11	3.07E-12	1.99E-08	1.94E-09
HTP-nc	CTUh	1.33E-05	1.22E-05	1.99E-09	1.80E-10	9.36E-07	1.21E-07
SQP	Pt	4.78E+02	3.96E+02	2.17E+00	4.86E-02	7.08E+01	9.70E+00

Table 6: Impact indicators for DK240/100

Impact category	Unit	Total
Biogenic Carbon content of the product	kg	4.04E-04
Biogenic Carbon content of the associated packaging	kg	1.04E-01

Table 7: Impact indicators for DK240/100

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
WDP	Water deprivation potential.

Resource use indicators

PENRE	Use of non-renewable primary energy excluding renewable primary energy resources used as raw material
PENRM	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)
PERE	Use of renewable primary energy excluding non-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)
PET	Total use of primary energy during the life cycle

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

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

Other indicators

Efp	Emissions of Fine particles
IrHH	Ionizing radiation, human health
ETX FW	Ecotoxicity, freshwater
HTX CE	Human toxicity, carcinogenic effects
HTX N-CE	Human toxicity, non-carcinogenic effects
IrLS	Impact related to Land use / soil quality

Extrapolation for Homogeneous environmental family

As a result, the impacts of the different life cycle stages can be extrapolated to other products of the same homogeneous environmental family by applying a rule of proportionality to the parameters in the following tables, divided by different life cycle stages.

For products other than the reference product, covered in this PEP, the environmental impacts for each phase of the lifecycles are obtained by multiplying the impacts of the reference product by the factors listed in the tables below.

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
DK240/100	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
DK240/50	0.72	0.72	0.64	0.76	0.47	0.72	0.73	0.72	0.71	0.71	0.71	0.68	0.67
DK 300	1.27	1.27	2.37	1.27	0.90	1.75	1.75	1.59	1.65	1.60	1.88	1.22	1.44
DK 95	0.41	0.42	-0.22	0.29	0.22	0.23	0.26	0.31	0.26	0.28	0.22	0.43	0.38

Table 8a: Extrapolation factors for DK95/240/300 Direct Incomer

Reference product: DK240/100 – Manufacturing

Distribution

Product	GWP-total
DK240/100	1.00
DK240/50	0.57
DK 300	1.25
DK 95	0.28

Table 8b: Extrapolation factors for DK95/240/300 Direct Incomer

Reference product: DK240/100 – Distribution

Installation

The impacts are same for all the variants.

Use

Product	GWP-total
DK240/100	1.00
DK240/50	0.43
DK 300	0.99
DK 95	0.35

Table 8d: Extrapolation factors for DK95/240/300 Direct Incomer
Reference product: DK240/100 – Use 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
DK240/100	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
DK240/50	0.56	0.56	0.71	0.71	0.63	0.70	0.71	0.35	0.67	0.66	0.61	0.69	0.61
DK 300	1.46	1.45	2.02	1.91	1.64	1.87	1.92	0.78	1.77	1.74	1.53	1.83	1.59
DK 95	0.15	0.15	0.22	0.20	0.19	0.20	0.20	0.05	0.19	0.19	0.19	0.20	0.16

Table 8e: Extrapolation factors for DK95/240/300 Direct Incomer

Reference product: DK240/100 –End of Life

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).

	DK240/100
Recyclability potential	59.65%

Table 9: Recyclability potential of DK240/100

References

[1] PCR “PEP-PCR-ed4-EN-2021_09_06” - Product Category Rules for Electrical, Electronic and HVAC-R Products.

[2] PSR “PSR-0005-ed3.1-EN-2023 12 08” - SPECIFIC RULES FOR TERMINAL BLOCKS

[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 v3.9 (2023). ecoinvent database version 3.9 - (https://ecoinvent.org/)

[7] SimaPro Software version 9.5.0.1 - 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