PRODUCT ENVIRONMENTAL PROFILE

Environmental Product Declaration

ABB Softstarters PSE142….PSE170

Production site: Västerås, Sweden
April 2026

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DOCUMENT COMPLIES WITH ISO 14025: 2006 « ENVIRONMENTAL LABELS AND DECLARATIONS. TYPE III ENVIRONMENTAL DECLARATIONS »	

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Manufacturer name and address	ABB Electrification Sweden AB Motorgränd 20, Västerås, Sweden- 721 32
Company contacts	EPD_ELSP@in.abb.com
Reference product	PSE142-600-70 Softstarter
Description of the product	The softstarter PSE142-600-70 has a rated maximum operational current of 142 A with an operating voltage span from 208...600 V AC. The PSE has functions such as current limit, kickstart, analog output, EOL, underload, and locked rotor protection. Typical applications are, for example, pumps, fans, compressors, and conveyors.
Functional unit	Establish and cut off the supply of a downstream installation from an electrical control characterised a rated voltage of Ue = 600V, a rated current Ie = 142 A, a control circuit voltage Uc = 24V DC, with Np = 3 poles, in the Industrial application areas, according to load rate of 50% Ie and use rate of 50% RLT, and during the reference service life of the product of 20 years.
Other products covered	PSE170-600-70
Reference lifetime	20 years
Product category	Electrical, Electronic and HVAC-R Products (Contactor, remote control switch, combination or starter) [1]
Use Scenario	The use phase has been modelled based on the sales mix data (2024), and the corresponding low voltage electricity countries mix.
Geographical representativeness	Raw materials & Manufacturing: [Europe / Global] Assembly: [Sweden] Distribution / Installation/ Use: [Global] specific sales mix EoL: [Global]
Technological representativeness	Materials and processes data are specific to the production of PSE softstarter
LCA Study	This study is based on the LCA study described in the LCA report 1SFC132472D0201 [2]
EPD type	Products family declaration
EPD scope	“Cradle to grave”
Year of reported primary data	2024
Reference LCA standards	ISO 14040 [3], ISO 14044 [4]
LCA software	SimaPro desktop 10.3.0.1 (2025) [5]
LCI database	Ecoinvent v3.11 (2025) [6] and Carbon Minds V2.02 (2025) [7]
LCIA methodology	EN 15804:2019+A2; EF 3.1 [8]

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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 infra-structure, 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

The ABB facility located in Vasteras is for the Smart Power Division, the competence center for Softstarters, Contactors >100A and one of leading manufacturing sites. All the products are produced in an automated system with precision and accuracy. These are supplied to utilities, industrial, and tertiary sector customers.

ABB adopts and implements for its own activities an integrated Quality/ Environmental/ Health Management System in compliance with the following standards:

- ISO 9001: 2015 - Quality Management Systems- Requirements
- ISO 14001: 2015 - Environmental management systems - Requirements with guidance for use
- ISO 45001:2018 - Occupational Health and Safety Assessment Series
- ISO 50001: 2018 - Energy management systems

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PSE softstarter

The new generation PSE is a true general purpose softstarter. It is a perfect balance between high starting capacity and cost efficiency. They come in three different sizes Frame A (PSE18…PSE105), Frame B (PSE142…PSE170) and Frame C (PSE210…PSE370). Products declared in this LCA are listed in Table 1.

Table 1: Technical Specifications of PSE softstarter

Product	Frame	Rated Operating Voltage [Ue], V	Rated operating current [Ie], A	Number of poles Np	Control circuit voltage [Uc], V
PSE142-600-70	B	600	142	3	24V DC
PSE170-600-70			170		

Constituent Materials

The PSE142-600-70 softstarter is the representative model of the PSE142…PSE170 range and weighs 5.28 kg with its installed accessories and packaging.

Table 2: Weight of materials PSE142-600-70

Material Type	Material Class	Material Code	[g]	Weight %
Plastics	Polyamide	M-208/M-258	1826.0	34.6%
	Polyethylene	M-201	247.3	4.7%
	PET	M-209/M-259	47.7	0.9%
	Other plastics	N/A	3.5	<0.1%
Metals	Al and Al Alloys	M-120	1058.5	20.1%
	Cu and Cu Alloys	M-121	650.5	12.3%
	Steel	M-119	316.8	6.0%
Others	Other devices	N/A	529.1	10.0%
	Cardboard	N/A	290.0	5.5%
	PCBA	N/A	284.0	5.4%
	Paper	M-341	13.9	0.3%
	Others	N/A	10.5	0.2%
Total			5277.8	100.0%

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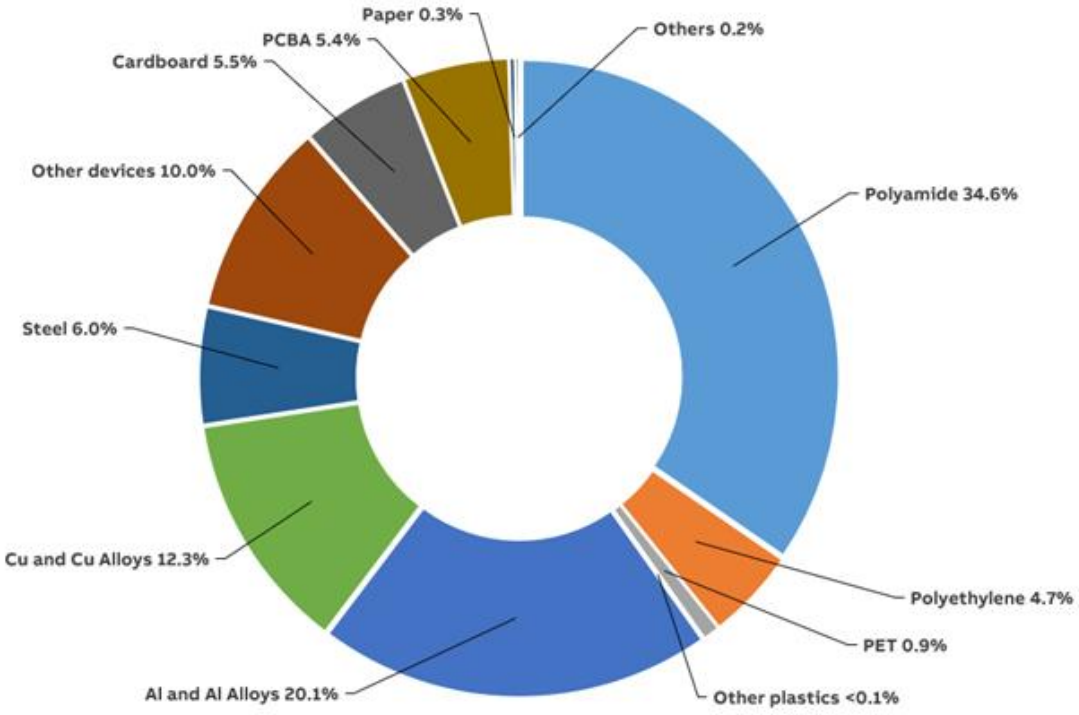

Figure 1: Composition of PSE142-600-70

Packaging weight for PSE142-600-70 and its composition is tabulated below.

Table 3: Weight of materials PSE142-600-70 Packaging

Material Type	Material Class	Material Code	[g]	Weight %
Others	Cardboard	N/A	290.0	56.8%
	Paper	M-341	0.6	0.1%
Plastics	Polyethylene	M-201	220.0	43.1%
Total			385.6	100.0%

No cut-off criteria have been applied to the analysis of the product and its packaging.

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.

The functional unit to this study is “Establish and cut off the supply of a downstream installation from an electrical control characterised a rated voltage of Ue, a rated current Ie, a control circuit voltage Uc, with Np poles, in the Industrial application areas, according to the appropriate use scenario load, and during the reference service life of the product of 20 years”(Refer Table 1: Technical Specifications of PSE softstarter)

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The Reference Flow of the study is a single softstarter (including its packaging and accessories) with mass described in Table 2 & Table 3.

System boundaries and life cycle stages

The life cycle of the softstarter, 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 [9] for the evaluation of electronic and electrical products and systems.

Table 4: Phases for the evaluation of construction products according to EN50693:2019 [9]

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

The "point of substitution" principle is applied in the end-of-life allocation, in accordance with the EN 50693:2019 [9] standard.

Temporal and geographical boundaries

The ABB component suppliers are sourced all over the world. All primary data collected is from 2024, which is a representative production year for production technology of PSE softstarter at ABB Electrification Sweden AB facility. The geographical representativeness for the other life stages is global. The technological representativeness for the secondary data is ecoinvent [6].

The selected ecoinvent [6] and Carbon Mind [7] 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.

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Boundaries in the life cycle

As indicated in the PCR [1] 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 is not available, generic data originating from the Ecoinvent [6] and/or Carbon Minds [7] dataset, are used.

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 [1] and EN 50693 [9] 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 [9] 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 occupancy area. Based on this criterion, only a portion of the factory's total water, waste, thermal energy and electricity energy consumption for the year 2024 is designated for PSE softstarter.

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 [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 have been considered in the LCA model. Default scraps for metal working, plastic and packaging processes are included as per PSR [10].

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.

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Energy Models

Table 5: Energy models used in each LCA stage

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	Based on materials and supplier's locations
		Electricity, {RER}| market group for | Cut-off	
Manufacturing	A3	Electricity, low voltage {SE}| market for electricity, low voltage | Cut-off, S	-
Installation (Packaging EoL)	A5	Electricity, {GLO}| market group for | Cut-off	-
Use Stage	B1-B7	Electricity, [country]x | market for | Cut-off	Low voltage, based on 2024 country sales mix
EoL	C1-C4	Electricity, {GLO}| market group for | Cut-off	-

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 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 (Searates).

All primary data collected from ABB Electrification Sweden plant are from 2024. In cases where primary data was not available, secondary data sources such as Ecoinvent [6] and Carbon Mind [7] were utilized.

Manufacturing stage

The softstarters are composed of a multitude of components, all of which are made from 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 product before shipping them. An average raw material packaging content of 5% of the reference equipment has been considered as per PSR [10].

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 manufacturing facility have been calculated.

The electric energy (hydroelectric) and district heating used for production are modelled as per actual supplier data. Waste generated during the manufacturing stage is also included.

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Distribution

The transport distances from ABB manufacturing plant to the distribution centers (regional distribution centers / local sales organizations) have been calculated considering the specific 2024 sales mix data for PSE softstarter (SAP ERP sales data as a source).

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]).

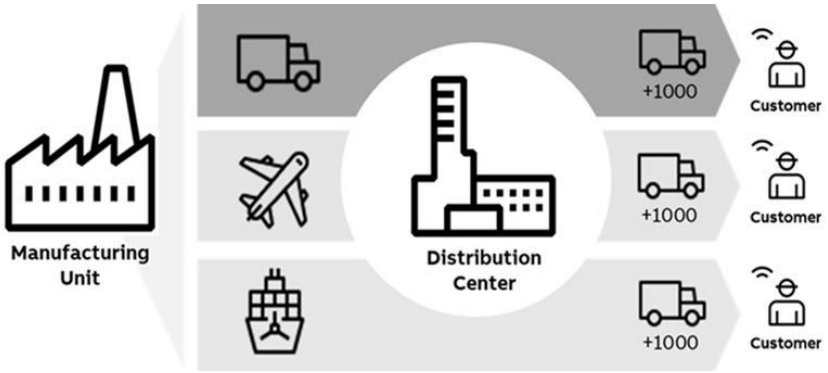

Figure 2: Distribution methodology

Installation

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

All the components needed to install the product are part of the BOM and included in the analysis. For the disposal of the packaging after installation of the softstarter at the end of its life, a transport distance of 100 km (according to PSR [10]) was assumed.

The disposal scenario of the packaging was calculated based on actual sales mix. For European countries Eurostat data (2023) and for non-European countries default scenario from PSR [10] is used.

Use

During the use phase, PSE softstarter dissipate some electricity due to power losses. The respective energy for each specific configuration of the entire product family has been calculated following the PCR [1] & PSR [10] rules:

Table 6: Use phase calculation parameters

Parameters		
Load rate	[%]	50
h/year	[h]	8760
RSL	[years]	20
Use rate, α	[%]	50

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The formula for the calculation of the electricity consumed is shown below and it is described as follows, where Puse is the power consumed 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 was built based on the 2024 actual sales mix data for the entire product range (SAP ERP sales data as a source). This approach has been taken since this list of countries is the most representative.

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]x | market for | 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

For Europe, end-of-life stage is modelled according to Table 7 of PCR [1] and for rest of the world 100% Landfill as per PCR-PEP-FAQ-ed1.3-EN-2025 12 08 - Technical FAQ to precise the PCR ed4.

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]).

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Environmental impacts

The following table shows the environmental impact indicators of the life cycle of a PSE142-600-70, as indicated by PCR [1] and EN 50693:2019 [9]. The indicators are divided into the contribution of the processes to the different stages (manufacturing, distribution, installation, use and end-of-life).

Table 7: Impact indicators for PSE142-600-70

Impact category	Unit	Total	Manufacturing	Distribution	Installation	Use	End of Life
GWP-total	kg CO2 eq	4.51E+02	1.10E+02	2.54E+01	1.00E+00	3.14E+02	1.60E+00
GWP-fossil	kg CO2 eq	4.45E+02	1.09E+02	2.54E+01	5.07E-01	3.09E+02	1.58E+00
GWP-biogenic	kg CO2 eq	4.69E+00	2.82E-01	4.50E-03	4.96E-01	3.89E+00	2.02E-02
GWP-luluc	kg CO2 eq	1.24E+00	2.04E-01	2.31E-03	7.27E-05	1.03E+00	4.76E-04
ODP	kg CFC11-eq	4.42E-06	1.82E-06	3.82E-07	2.35E-09	2.21E-06	1.31E-08
AP	mol H+ eq	3.24E+00	1.56E+00	1.07E-01	3.29E-04	1.57E+00	3.37E-03
EP-freshwater	kg P eq	3.05E-01	1.35E-01	4.51E-04	1.77E-05	1.69E-01	1.60E-04
EP-marine	kg N eq	5.17E-01	1.62E-01	4.29E-02	1.66E-04	3.06E-01	6.14E-03
EP-terrestrial	mol N eq	5.36E+00	1.83E+00	4.68E-01	1.24E-03	3.06E+00	1.18E-02
POCP	kg NMVOC eq	1.68E+00	6.14E-01	1.52E-01	3.35E-04	9.06E-01	4.25E-03
ADP-m&m	kg Sb eq	3.34E-02	3.14E-02	7.55E-06	1.43E-07	2.02E-03	1.80E-05
ADP-fossil	MJ	5.92E+03	1.47E+03	3.37E+02	1.08E+00	4.10E+03	1.13E+01
WDP	m3 of equiv. depriv.	8.40E+01	2.95E+01	5.05E-01	4.73E-02	5.37E+01	2.02E-01
PENRE	MJ	5.86E+03	1.41E+03	3.37E+02	1.08E+00	4.10E+03	1.13E+01
PENRM	MJ	5.66E+01	5.66E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	5.92E+03	1.47E+03	3.37E+02	1.08E+00	4.10E+03	1.13E+01
PERE	MJ	9.31E+02	1.53E+02	1.32E+00	9.84E-02	7.75E+02	4.64E-01
PERM	MJ	3.93E+00	3.93E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	9.35E+02	1.57E+02	1.32E+00	9.84E-02	7.75E+02	4.64E-01
SM	kg	1.76E-01	1.76E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	9.50E-01	9.50E-01	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	6.85E+03	1.63E+03	3.38E+02	1.18E+00	4.88E+03	1.18E+01
FW	m3	3.24E+00	9.32E-01	1.67E-02	1.63E-03	2.30E+00	-8.27E-03**
HWD	kg	2.48E-02	9.31E-03	2.34E-03	5.92E-06	1.21E-02	1.05E-03
N-HWD	kg	2.80E+01	8.36E+00	1.20E+00	9.97E-02	1.37E+01	4.56E+00
RWD	kg	1.19E-02	2.23E-03	2.44E-05	2.38E-06	9.60E-03	9.48E-06
CfR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MfR	kg	9.57E-01	6.05E-01	0.00E+00	6.91E-02	0.00E+00	2.82E-01
MfER	kg	4.62E-01	1.72E-01	0.00E+00	2.01E-02	0.00E+00	2.71E-01
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.	2.32E-05	8.78E-06	3.16E-07	2.45E-09	1.40E-05	6.76E-08
IRP	kBq U-235 eq	4.96E+01	8.97E+00	1.00E-01	9.28E-03	4.05E+01	3.77E-02
ETP-fw	CTUe	3.42E+03	2.49E+03	1.55E+01	1.50E+00	8.44E+02	6.68E+01
HTP-c	CTUh	1.64E-07	1.11E-07	1.65E-09	6.66E-11	5.14E-08	6.40E-10
HTP-nc	CTUh	1.12E-05	7.85E-06	2.55E-07	2.47E-09	3.09E-06	2.28E-08
SQP	Pt	1.55E+03	6.85E+02	3.26E+01	3.08E-01	8.20E+02	1.09E+01

** The freshwater indicator FW shows negative values for the following waste treatment datasets used in this assessment: Waste graphical paper {CH}, Waste aluminium {CH}, Waste plastic, mixture {CH} (sanitary landfill treatments in Switzerland), and Waste paperboard {Europe

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without Switzerland}, Waste graphical paper {Europe without Switzerland}, and Waste wood, untreated {Europe without Switzerland} (market group disposal mixes in Europe).

Table 8: Inventory flow other indicators

Impact category	Unit	PSE142-600-70
Biogenic C of Product	kg	3.12E-03
Biogenic C of Packaging	kg	1.24E-01

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 re-sources 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

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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 [5] model has been fully parametrized to fulfil each different configuration.

For products other 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

Same as the reference product PSE142-600-70.

LCA Phase: Distribution

Same as the reference product PSE142-600-70.

LCA Phase: Installation

Same as the reference product PSE142-600-70.

LCA Phase: Use

Table 9: Use phase extrapolation factors ref. product PSE142-600-70

Product	Factor
PSE142-600-70	1.00
PSE170-600-70	1.25

LCA Phase: End of life

Same as the reference product PSE142-600-70.

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Additional environmental information

The recyclability potential of the product (excluding packaging) was calculated based on values reported in Tables D.5 and D.6 of IEC/TR 62635 Edition 1.0 [11]. A conservative approach was adopted: materials not included in the technical report and purchased components lacking detailed material composition data have been assigned a recyclability potential of 0%.

Table 10: Recyclability potential

Product>	PSE142-600-70
Recyclability potential	42%

Note- These percentages are based on generic example data from IEC/TR 62635 and assume specific regional recycling practices. They may differ significantly depending on actual recycling facility capabilities, regional practices, and evolving industry standards. Therefore, these percentages have not been used in the calculation of the environmental impact indicators.

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