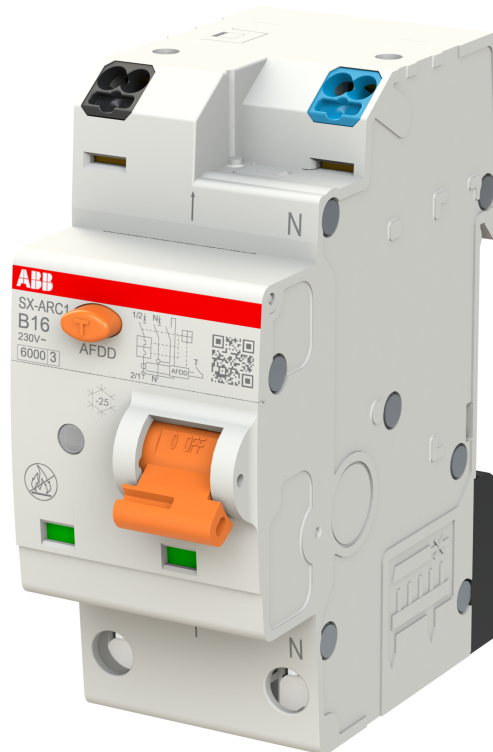


SX-ARC1, S-ARC1 ARC FAULT DETECTION DEVICE

PEP ecopassport®

Product Environmental Profile



Registration number:	ABBG-00215-V01.02-EN	Drafting rules:	PCR-ed4-EN-2021 09 06
Contact information:	EPD_ELSB@abb.com	Supplemented by:	PSR-0005-ed2-EN-2016 03 29
Verifier accreditation number:	VH42	Information and reference documents:	www.pep-ecopassport.org
Date of issue:	Aug-23	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 (Ddmain)			
PEPs are compliant with XP C08-100-1:2016 and EN 50693:2019 or NF E38-500 :2022 The components of the present PEP may not be compared with components from any other program.			
Document complies with ISO 14025:2006 "Environmental labels and declarations. Type III environmental declarations"			





ABB Purpose & Embedding Sustainability

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.

The context of this PEP cannot be compared with the content based on another program/database.

Scan QR code for more information

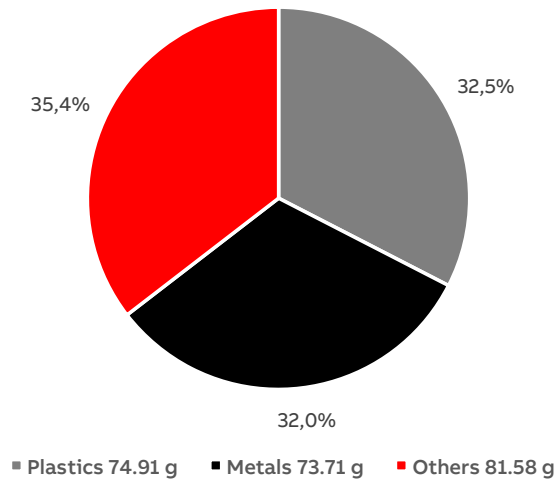


General information

Reference product	SX-ARC1 B16 6kA 1P+N - 2CSA255908R9165
Description of the product	The SX-ARC1 B16- 2CSA255908R9165 is an AFDD compliant to the product standard "IEC 62606 - General requirements for Arc Fault Detection Devices" intended to mitigate the effects of arcing faults by disconnecting the circuit when an arc fault is detected. Integrated with an MCB in 6kA and 10kA breaking capacity, S-ARC1 and S-ARC1 M offer protection against overcurrents and arc faults in only two modules width.
Functional unit	The functional unit is Circuit Breaker designed to protect for 20 years the installation against arc faults, overvoltage (higher than 275V), overloads and short-circuits with assigned voltage 230 V, and rated current 16 A. This protection is ensured in accordance with the following parameters: - Number of poles: 1P+N - Rated breaking capacity Icn: 6kA - Tripping curve type B
Other products covered	SX-ARC1, S-ARC1 & S-ARC1 M homogeneous family: Beaking capacity 6kA or 10kA 1+N Poles with 230V rated voltage B & C char from 6 up to 40 A
Manufacturing address	ABB S.p.A. – ELSB Viale dell'Industria, 18 20009 Vittuone (MI) - Italy www.new.abb.com



Constituent Materials



Total weight of reference product and packaging

230,2

g

Plastics as % of weight		Metals as % of weight		Others as % of weight	
Name and CAS number	Weight%	Name and CAS number	Weight%	Name and CAS number	Weight%
PA	22,2	STEEL	19,9	WOOD	18,1
GF	8,0	COPPER	7,7	CARDBOARD	5,2
PPS	1,0	BRASS	3,0	PAPER	2,6
PC	1,0	ALUMINIUM	0,9	PCB	9,4
PE	0,3	OTHER METALS	0,6	Other	0,2

Total weight of the reference product is 170,6 and its packaging is 59,6g



Additional Information

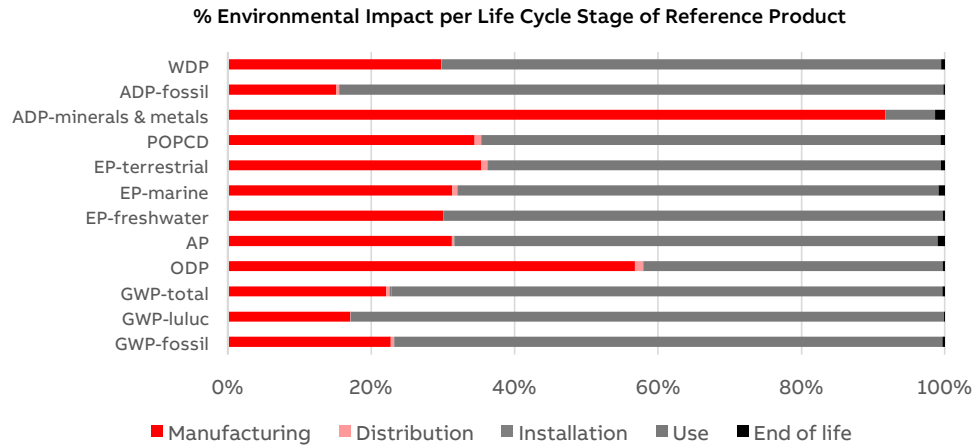
Manufacturing	Includes the environmental impacts associated with extraction and processing of the raw materials used to produce and assembly the product and its packaging, distribution to the manufacturer's last logistic platform.
Distribution	Includes the transportation in its packaging from the manufacturer's last logistic platform to the distributor.
Installation	Installation stage includes the installation of the products made manually and waste treatment of discarded materials.
Use	Energy consumption is calculated by following the PSR. The energy models used in this phase are the specific energy mixes based on ABB distribution. No maintenance is necessary.
End of life	Includes its removal, dismantling and transportation of the dismantled product to the treatment site and the treatment process. A value of 1000 km transport by lorry is used for the transportation.
Benefits and loads beyond the system boundaries	N/A



Environmental Impacts

Reference lifetime	20 years
Product category	Circuit Breaker
Installation elements	Installation carried out manually. End of life of packaging.
Use scenario	Load time: 50% of rated current in continuous operation (In). Use time rate: 30% of reference lifetime (RLT).
Geographical representativeness	Europe
Technological representativeness	Materials and processes data are specific for the production of SX-ARC1 B16 6kA 1P+N - 2CSA255908R9165 and its family
Software and database used	Simapro 9.4.0.2 and Ecoinvent v3.8
Energy model used	
Manufacturing	Electricity, medium voltage {IT} market for Cut-off, System_GO energy mix_ei 3.8 System
Installation	Manually done. Europe
Use	Electricity, low voltage {RER} market group for Cut-off, S
End of life	The energy-related processes used for the inputs of the end-of-life stage are those included in the ecoinvent datasets selected for the analysis

Common base of mandatory indicators



Environmental impact indicators

Indicator		Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
GWP	Total	kg CO2 eq.	3,62E+01	8,00E+00	1,58E-01	1,20E-01	2,78E+01	1,25E-01	NA
	Fossil	kg CO2 eq.	3,52E+01	7,99E+00	1,58E-01	1,25E-02	2,69E+01	1,21E-01	NA
	Biogenic	kg CO2 eq.	9,72E-01	-6,59E-03	1,46E-04	1,08E-01	8,67E-01	3,56E-03	NA
	Luluc	kg CO2 eq.	7,68E-02	1,31E-02	6,17E-05	5,06E-06	6,35E-02	1,01E-04	NA
ODP		kg CFC-11 eq.	3,26E-06	1,85E-06	3,71E-08	2,48E-09	1,36E-06	1,04E-08	NA
AP		H+ eq.	2,27E-01	7,09E-02	8,01E-04	6,47E-05	1,53E-01	2,32E-03	NA
EP	Freshwater	kg P eq.	3,89E-02	1,17E-02	1,02E-05	1,13E-06	2,71E-02	1,19E-04	NA
	Marine	kg N eq.	3,80E-02	1,19E-02	2,76E-04	3,08E-05	2,55E-02	3,41E-04	NA
	Terrestrial	mol N eq.	3,56E-01	1,26E-01	3,01E-03	2,46E-04	2,25E-01	2,00E-03	NA
POPCD		kg NMVOC eq.	9,65E-02	3,32E-02	8,66E-04	7,16E-05	6,18E-02	5,94E-04	NA
ADP	Minerals & metals	kg SB eq.	3,67E-03	3,37E-03	5,24E-07	4,35E-08	2,53E-04	5,02E-05	NA
	Fossil	MJ	6,80E+02	1,03E+02	2,42E+00	1,73E-01	5,73E+02	1,29E+00	NA
WDP		m³ eq. depr.	9,43E+00	2,80E+00	7,47E-03	6,99E-04	6,57E+00	4,75E-02	NA

Resource use indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
PERE	MJ	1,31E+02	1,32E+01	3,36E-02	2,89E-03	1,18E+02	1,66E-01	NA
PERM	MJ	9,35E-01	9,35E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA
PERT	MJ	1,32E+02	1,41E+01	3,36E-02	2,89E-03	1,18E+02	1,66E-01	NA
PENRE	MJ	6,78E+02	1,01E+02	2,42E+00	1,73E-01	5,73E+02	1,29E+00	NA
PENRM	MJ	2,59E+00	2,59E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA
PENRT	MJ	6,80E+02	1,03E+02	2,42E+00	1,73E-01	5,73E+02	1,29E+00	NA

Common base of mandatory indicators

Use of secondary materials, water, and energy resources

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
SM	kg	1,11E-05	1,11E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA
FW	m ³	5,97E-01	9,68E-02	2,73E-04	3,56E-05	4,98E-01	1,45E-03	NA

Waste category indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
HWD	kg	1,02E-03	5,68E-04	6,25E-06	4,48E-07	4,36E-04	7,63E-06	NA
N-HWD	kg	3,09E+00	7,86E-01	1,41E-01	2,53E-02	2,00E+00	1,41E-01	NA
RWD	kg	4,53E-03	2,97E-04	1,64E-05	1,12E-06	4,21E-03	7,44E-06	NA

Output flow indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
CfRu	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA
MfR	kg	1,67E-01	6,88E-02	0,00E+00	2,75E-02	0,00E+00	7,02E-02	NA
MfER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA
EE	MJ	2,28E-01	4,97E-02	0,00E+00	8,09E-02	0,00E+00	9,78E-02	NA

Other indicators

Indicator		Unit	Total
Biogenic Carbon	Product	kg of C	0,00E+00
	Packaging	kg of C	2,51E-02
Environmental Cost		€	0,00E+00

Optional indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life	Benefits
Tot PE	MJ	8,12E+02	1,17E+02	2,45E+00	1,76E-01	6,91E+02	1,45E+00	NA
Efp	Dise inc	9,50E-07	4,37E-07	1,49E-08	1,08E-09	4,88E-07	9,48E-09	NA
IrHH	kBq U-235 eq	1,67E+01	9,56E-01	1,24E-02	8,79E-04	1,57E+01	1,62E-02	NA
ETX FW	CTUe	1,21E+03	8,38E+02	1,89E+00	1,67E-01	3,62E+02	1,25E+01	NA
HTX CE	CTUh	2,44E-08	1,13E-08	5,97E-11	9,76E-12	1,12E-08	1,82E-09	NA
HTX N-CE	CTUh	9,24E-07	5,19E-07	1,99E-09	1,66E-10	3,56E-07	4,72E-08	NA
IrLS	Pt	1,54E+02	4,78E+01	1,85E+00	1,20E-01	1,03E+02	1,26E+00	NA

Extrapolation Factors

For other products than the Reference product covered by this PEP, the environmental impacts for each phase of the lifecycle are obtained by a linear correlation with respect to weight for the production, distribution, and end-of-life phase and with respect to average power loss for the use phase. Each environmental indicator value shall be calculated using the following formulas.

For the **manufacturing stage, distribution stage and end-of-life stage:**

$$y = \tilde{a}_n x_1 + b_n$$

where **y** is the considered impact at a specific stage and **x1** is the **weight of the product**.

For the **use stage:**

$$y = a_n x_2 + b_n$$

Where **y** is the considered impact at a specific stage and **x2** is the average **power loss** of the product.

The next tables report the linear coefficients a_n & b_n for each life cycle stage.

Note: The calculation of the coefficient a_3 & b_3 for the Installation Stage was not performed because the selected parameters do not affect the values for this stage.

IMPACT CATEGORY	MANUFACTURING		DISTRIBUTION		INST.		USE		END OF LIFE	
	a_1	b_1	a_2	b_2	a_3	b_3	a_4	b_4	a_5	b_5
Climate change	4.71E-02	8.48E-02	6.98E-04	4.10E-02	1.0E+00	0.0E+00	4.04E-01	6.46E-04	7.42E-04	2.18E-05
Climate change - Fossil	4.67E-02	1.37E-01	6.97E-04	4.10E-02	1.0E+00	0.0E+00	3.90E-01	6.24E-04	7.20E-04	2.12E-05
Climate change - Biogenic	2.74E-04	-5.27E-02	6.46E-07	3.79E-05	1.0E+00	0.0E+00	1.26E-02	2.01E-05	2.12E-05	6.24E-07
Climate change - Land use and LU change	7.64E-05	2.34E-04	2.72E-07	1.60E-05	1.0E+00	0.0E+00	9.22E-04	1.48E-06	5.98E-07	1.76E-08
Ozone depletion	1.10E-08	1.48E-08	1.63E-10	9.60E-09	1.0E+00	0.0E+00	1.97E-08	3.15E-11	6.19E-11	1.82E-12
Acidification	4.19E-04	5.29E-04	3.53E-06	2.08E-04	1.0E+00	0.0E+00	2.22E-03	3.55E-06	1.38E-05	4.07E-07
Eutrophication, freshwater	6.96E-05	3.25E-05	4.50E-08	2.65E-06	1.0E+00	0.0E+00	3.93E-04	6.29E-07	7.08E-07	2.09E-08
Eutrophication, marine	6.95E-05	2.22E-04	1.22E-06	7.14E-05	1.0E+00	0.0E+00	3.70E-04	5.92E-07	2.03E-06	5.98E-08
Eutrophication, terrestrial	7.39E-04	1.64E-03	1.33E-05	7.81E-04	1.0E+00	0.0E+00	3.26E-03	5.22E-06	1.19E-05	3.51E-07
Photochemical ozone formation	1.94E-04	6.19E-04	3.82E-06	2.25E-04	1.0E+00	0.0E+00	8.96E-04	1.43E-06	3.53E-06	1.04E-07
Resource use, minerals and metals	2.01E-05	1.68E-06	2.31E-09	1.36E-07	1.0E+00	0.0E+00	3.67E-06	5.87E-09	2.99E-07	8.80E-09
Resource use, fossils	6.02E-01	2.26E+00	1.07E-02	6.27E-01	1.0E+00	0.0E+00	8.31E+00	1.33E-02	7.67E-03	2.26E-04
Water use (AWARE)	1.44E-02	3.85E-01	3.29E-05	1.94E-03	1.0E+00	0.0E+00	9.54E-02	1.53E-04	2.83E-04	8.33E-06
Total use of primary energy during the life cycle	6.65E-01	5.67E+00	1.08E-02	6.36E-01	1.0E+00	0.0E+00	1.00E+01	1.60E-02	8.66E-03	2.55E-04
Use of renewable primary energy, excluding renewable primary energy resources used as raw materials	6.36E-02	2.48E+00	1.48E-04	8.70E-03	1.0E+00	0.0E+00	1.71E+00	2.74E-03	9.88E-04	2.91E-05
Use of renewable primary energy resources used as raw materials	0.0E+00	9.35E-01	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total use <u>renew.</u> primary energy res.	6.36E-02	3.41E+00	1.48E-04	8.70E-03	1.0E+00	0.0E+00	1.71E+00	2.74E-03	9.88E-04	2.91E-05
Use of non-renewable primary energy, excluding non-renewable primary energy resources used as raw materials	6.02E-01	-3.36E-01	1.07E-02	6.27E-01	1.0E+00	0.0E+00	8.31E+00	1.33E-02	7.67E-03	2.26E-04
Use of non-renewable primary energy resources used as raw materials	0.0E+00	2.59E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Total use non-renew. primary energy res.	6.02E-01	2.26E+00	1.07E-02	6.27E-01	1.0E+00	0.0E+00	8.31E+00	1.33E-02	7.67E-03	2.26E-04
Use of secondary material	6.60E-08	1.94E-09	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Use of renewable secondary fuels	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Use of non-renewable secondary fuels	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Net use of fresh water	5.21E-04	9.22E-03	1.20E-06	7.07E-05	1.0E+00	0.0E+00	7.22E-03	1.16E-05	8.66E-06	2.55E-07
Hazardous waste disposed	3.34E-06	6.37E-06	2.75E-08	1.62E-06	1.0E+00	0.0E+00	6.32E-06	1.01E-08	4.54E-08	1.34E-09
Non-hazardous waste disposed	4.43E-03	4.13E-02	6.23E-04	3.66E-02	1.0E+00	0.0E+00	2.90E-02	4.65E-05	8.36E-04	2.46E-05
Radioactive waste disposed	1.74E-06	4.91E-06	7.22E-08	4.24E-06	1.0E+00	0.0E+00	6.11E-05	9.78E-08	4.43E-08	1.30E-09

Extrapolation Factors

IMPACT CATEGORY	MANUFACTURING		DISTRIBUTION		INST.		USE		END OF LIFE	
	a ₁	b ₁	a ₂	b ₂	a ₃	b ₃	a ₄	b ₄	a ₅	b ₅
Particulate matter	2.56E-09	7.49E-09	6.56E-11	3.86E-09	1.0E+00	0.0E+00	7.08E-09	1.13E-11	5.64E-11	1.66E-12
Ionising radiation	5.63E-03	9.61E-03	5.47E-05	3.22E-03	1.0E+00	0.0E+00	2.28E-01	3.64E-04	9.63E-05	2.84E-06
Ecotoxicity: freshwater	4.97E+00	2.07E+00	8.33E-03	4.90E-01	1.0E+00	0.0E+00	5.26E+00	8.41E-03	7.43E-02	2.19E-03
Human toxicity: cancer	6.63E-11	1.51E-10	2.63E-13	1.55E-11	1.0E+00	0.0E+00	1.62E-10	2.59E-13	1.08E-11	3.19E-13
Human toxicity: non-cancer	3.08E-09	1.69E-09	8.79E-12	5.17E-10	1.0E+00	0.0E+00	5.16E-09	8.26E-12	2.81E-10	8.26E-12
Land use	2.39E-01	7.57E+00	8.14E-03	4.78E-01	1.0E+00	0.0E+00	1.50E+00	2.40E-03	7.47E-03	2.20E-04
Component for reuse	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Materials for recycling	8.44E-05	5.46E-02	8.44E-05	5.46E-02	1.0E+00	0.0E+00	0.0E+00	0.0E+00	4.18E-04	1.23E-05
Materials for energy recovery	0.0E+00	0.0E+00	0.0E+00	0.0E+00	1.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Exported energy	0.0E+00	4.97E-02	0.0E+00	4.97E-02	1.0E+00	0.0E+00	0.0E+00	0.0E+00	5.82E-04	1.71E-05

Extrapolation Factors

For the weight and average power loss data of the variants, please refer to table below.

ABB Code of the specific product	Name	Weight of the product [g]	AVRG. POWER LOSS [W] @50@ In
2CSA255901R9064	S-ARC1 C6	203	0.83
2CSA255901R9065	S-ARC1 B6	203	0.83
2CSA255901R9104	S-ARC1 C10	203	0.75
2CSA255901R9105	S-ARC1 B10	203	0.75
2CSA255901R9134	S-ARC1 C13	203	0.80
2CSA255901R9135	S-ARC1 B13	203	0.80
2CSA255901R9164	S-ARC1 C16	203	0.95
2CSA255901R9165	S-ARC1 B16	203	0.95
2CSA255901R9204	S-ARC1 C20	203	1.15
2CSA255901R9205	S-ARC1 B20	203	1.15
2CSA255901R9254	S-ARC1 C25	203	1.13
2CSA255901R9255	S-ARC1 B25	203	1.13
2CSA255901R9324	S-ARC1 C32	203	1.45
2CSA255901R9325	S-ARC1 B32	203	1.45
2CSA255901R9404	S-ARC1 C40	203	1.80
2CSA255901R9405	S-ARC1 B40	203	1.80
2CSA255908R9064	SX-ARC1 C6	168	0.78
2CSA255908R9065	SX-ARC1 B6	168	0.78
2CSA255908R9104	SX-ARC1 C10	168	0.81
2CSA255908R9105	SX-ARC1 B10	168	0.81
2CSA255908R9134	SX-ARC1 C13	168	0.81

ABB Code of the specific product	Name	Weight of the product [g]	AVRG. POWER LOSS [W] @50@ In
2CSA255908R9135	SX-ARC1 B13	168	0.81
2CSA255908R9164	SX-ARC1 C16	168	1.31
2CSA255908R9165	SX-ARC1 B16	168	1.31
2CSA255908R9204	SX-ARC1 C20	168	1.48
2CSA255908R9205	SX-ARC1 B20	168	1.48
2CSA275901R9064	S-ARC1 M C6	207	0.83
2CSA275901R9065	S-ARC1 M B6	207	0.83
2CSA275901R9104	S-ARC1 M C10	207	0.75
2CSA275901R9105	S-ARC1 M B10	207	0.75
2CSA275901R9134	S-ARC1 M C13	207	0.80
2CSA275901R9135	S-ARC1 M B13	207	0.80
2CSA275901R9164	S-ARC1 M C16	207	0.95
2CSA275901R9165	S-ARC1 M B16	207	0.95
2CSA275901R9204	S-ARC1 M C20	207	1.15
2CSA275901R9205	S-ARC1 M B20	207	1.15
2CSA275901R9254	S-ARC1 M C25	207	1.13
2CSA275901R9255	S-ARC1 M B25	207	1.13
2CSA275901R9324	S-ARC1 M C32	207	1.45
2CSA275901R9325	S-ARC1 M B32	207	1.45
2CSA275901R9404	S-ARC1 M C40	207	1.80
2CSA275901R9405	S-ARC1 M B40	207	1.80

Glossary

Environmental impact indicators			
GWP-total	Global Warming Potential total (Climate hange)		
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 reachin 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 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)		
Secondary materials, water and energy resources		Waste category indicators	
SM	Use of secondary materials	HWD	Hazardous waste disposed
RSF	Use of renewable secondary fuels	N-HWD	Non-hazardous waste disposed
NRSF	Use of non-renewable secondary fuels	RWD	Radioactive waste disposed
FW	Net use of fresh water		
Output flow indicators		Optional indicators	
CfRu	Components for re-use	Tot PE	Total use of primary energy during the life cycle
MfR	Materials for recycling		
MfER	Materials for energy recovery	Efp	Emissions of Fine particles
EE	Exported Energy	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

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