

Dual Function Circuit Interrupter (DFCI)

# PEP ecopassport®

## Product Environmental Profile



Registration number:	ABBG-00853-V01.01-EN	Drafting rules:	PCR-ed4-EN-2021 09 06
Contact information:	us-epd_nema_elsb@abb.com	Supplemented by:	PSR-0005-ed3.1-EN-2023 12 08
Verifier accreditation number:	VH44	Information and reference documents:	www.pep-ecopassport.org
Date of issue:	September-25	Validity period:	5 years
<b>Independent verification of the declaration and data in compliance with ISO 14025: 2006</b>			
Internal:	<input type="checkbox"/>	External:	<input checked="" type="checkbox"/>
The PCR review was conducted by a panel of experts chaired by Julie Orgelet (Ddemailn)			
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 content of this PEP cannot be compared with the content based on another program/database.

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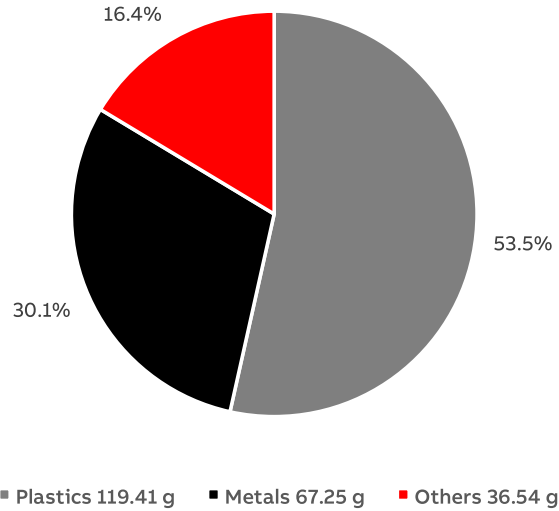


## General information

Reference product	Reference product: THQL1120DF Product ID: 1TQQ011020X7000 PSR product category: Differential Circuit-Breakers
Description of the product	Dual Function Circuit Interrupter (DFCI) combines both Ground Fault and Combination Arc Fault (GFCI & AFCI) protection. GFCI provides protection against overloads, short circuits, and ground faults preventing electrical shocks. AFCI is designed to eliminate Arc faults preventing damage or fires that can result from arcing and sparking that can arise from deteriorated wires, poor connections, and breaches in wire insulation.
Functional unit	Protect the installation against overloads and short circuits and protect people and premises at risk of fire or explosion against insulation defects in a circuit with rated voltage 120/240V, rated current 20A, with 1 pole, a rated breaking capacity 10kA, the tripping curve 1TQC143200E0003, the sensitivity 30mA Arc Fault, 5mA Ground Fault, and the differential protection type AC, and, if applicable, the specific specifications, in the Household application area, according to the appropriate use scenario, and during the reference service life of the product of 20 years.
Other products covered	THQL-DF, THQL-DFA, THQL-PDF, THHQL-DF, THHQL-DFA, THHQL-PDF, THQB-DF, THHQB-DF 1-Pole, rated current 15A-20A, 10kA (THQL, THQB) & 22kA (THHQL, THHQB), and trip time curve 1TQC143200E0003. In total, the DFCI series covered in this EPD contains 14 unique product catalog numbers.
Manufacturing address	Fenix Manufacturing Solutions FP26+PFJ, San Pedro de Macoris 21000, Dominican Republic <a href="https://global.abb/group/en/sustainability">https://global.abb/group/en/sustainability</a>



# Constituent Materials



Total weight of reference product and packaging

223.2

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%
<b>Polyester</b>	44.8	<b>Steel</b>	15.7	<b>Cardboard</b>	16.4
<b>Polyvinyl Chloride</b>	4.2	<b>Copper</b>	11.3		
<b>Polypropylene</b>	1.9	<b>Aluminum</b>	1.9		
<b>Phenolic (Thermoset Polymer)</b>	1.9	<b>Other</b>	1.3		
<b>Other</b>	0.7				

RoHS and REACH compatibility and other information about the products materials (i.e. halogen free, recyclability)



## Additional Information

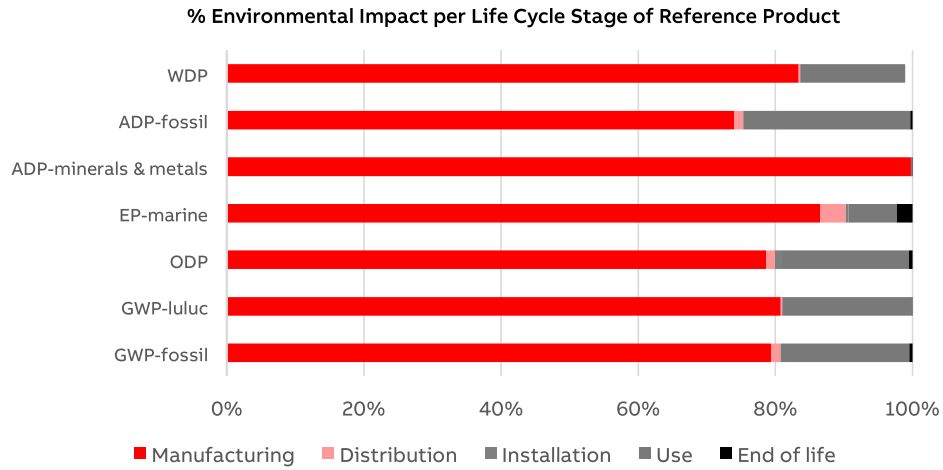
<b>Manufacturing</b>	This product line is manufactured in ABB's contract manufacturer plant, Fenix Manufacturing Solutions, in San Pedro de Macoris, Dominican Republic.
<b>Distribution</b>	Distribution scenario has been modelled considering ABB average market for the product. Q Line delivery scenario includes truck, train and ship transportation scenarios.
<b>Installation</b>	The installation of the breakers in the load centers is performed manually, therefore causing no negative environmental impacts aside from the disposal or recycling of product packaging.
<b>Use</b>	No consumables and maintenance.
<b>End of life</b>	Due to lack of data around customer disposal methodology, regional landfill disposal and recycling mix is the assumed standard scenario.
<b>Benefits and loads beyond the system boundaries</b>	Not considered or evaluated.



## Environmental Impacts

Reference lifetime	20 years
Product category	Differential Circuit-Breakers
Installation elements	No special installation elements required.
Use scenario	Load time: 15% of rated current Use time rate: 30% of reference lifetime
Geographical representativeness	Country Mix: United States of America, Canada, Mexico, Puerto Rico, El Salvador, Panama, Ecuador, Dominican Republic, Ecuador, Guatemala, Global
Technological representativeness	Represents the Dual Function Circuit Interrupter (DFCI) types THQL, THQB, THHQL and THHQB.
Software and database used	SimaPro 9.6 with ecoinvent database 3.11
<b>Energy model used</b>	
Manufacturing	Electricity, medium voltage {DO}
Installation	-
Use	Electricity, low voltage {Country Mix}
End of life	-

## Common base of mandatory indicators



### Environmental impact indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
GWP	Total	kg CO2 eq. 7.01E+00	5.51E+00	9.12E-02	7.08E-02	1.30E+00	3.47E-02
	Fossil	kg CO2 eq. 6.88E+00	5.46E+00	9.11E-02	4.77E-03	1.29E+00	3.23E-02
	Biogenic	kg CO2 eq. 1.12E-01	3.79E-02	-1.38E-05	6.60E-02	6.07E-03	2.45E-03
	Luluc	kg CO2 eq. 2.24E-02	1.81E-02	4.38E-05	2.35E-06	4.25E-03	1.15E-05
ODP	kg CFC-11 eq.	7.01E+00	5.51E+00	9.12E-02	7.08E-02	1.30E+00	3.47E-02
AP	H+ eq.	7.16E-02	6.46E-02	1.74E-03	2.59E-05	5.17E-03	9.96E-05
EP	Freshwater	kg P eq. 1.46E-02	1.38E-02	4.81E-06	4.66E-07	7.58E-04	2.08E-06
	Marine	kg N eq. 1.26E-02	1.09E-02	4.58E-04	5.59E-05	8.87E-04	2.88E-04
	Terrestrial	mol N eq. 1.40E-01	1.26E-01	5.08E-03	8.74E-05	8.31E-03	3.96E-04
POPCD	kg NMVOC eq.	4.96E-06	4.95E-06	1.34E-09	7.48E-11	1.08E-08	3.66E-10
ADP	Minerals & metals	kg SB eq. 4.61E-03	4.60E-03	1.53E-07	1.22E-08	1.10E-05	6.08E-08
	Fossil	MJ 9.42E+01	6.97E+01	1.20E+00	7.07E-02	2.29E+01	3.39E-01
WDP	m³ eq. depr.	2.17E+00	1.85E+00	4.33E-03	-5.63E-03	3.40E-01	-1.77E-02

### Resource use indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
PERE	MJ	1.37E+01	9.00E+00	1.27E-02	1.29E-03	4.69E+00	4.61E-03
PERM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	1.37E+01	9.00E+00	1.27E-02	1.29E-03	4.69E+00	4.61E-03
PENRE	MJ	1.00E+02	7.44E+01	1.27E+00	7.52E-02	2.42E+01	3.60E-01
PENRM	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.00E+02	7.44E+01	1.27E+00	7.52E-02	2.42E+01	3.60E-01

## Common base of mandatory indicators

### Use of secondary materials, water, and energy resources

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
SM	kg	3.65E-02	3.65E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	5.00E-02	5.00E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m <sup>3</sup>	2.95E-06	2.95E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00

### Waste category indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
N-HWD	kg	1.56E-01	0.00E+00	0.00E+00	3.65E-02	0.00E+00	1.19E-01
RWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

### Output flow indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
CfRu	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MfR	kg	1.20E-01	1.61E-02	0.00E+00	3.65E-02	0.00E+00	6.73E-02
MfER	kg	1.19E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.19E-01
EE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

### Other indicators

Indicator	Unit	Total
Biogenic Carbon	Product	kg of C 0.00E+00
	Packaging	kg of C 3.43E-02

### Optional indicators

Indicator	Unit	Total	Manufacturing	Distribution	Installation	Use	End of life
Tot PE	MJ	1.14E+02	8.34E+01	1.28E+00	7.65E-02	2.89E+01	3.65E-01
Efp	Dise inc	4.74E-07	4.38E-07	5.47E-09	4.95E-10	2.81E-08	2.41E-09
IrHH	kBq U-235 eq	9.86E-01	5.12E-01	8.11E-04	9.39E-05	4.73E-01	3.08E-04
ETX FW	CTUe	1.46E-02	1.38E-02	4.81E-06	4.66E-07	7.58E-04	2.08E-06
HTX CE	CTUh	3.37E-08	3.08E-08	4.36E-10	2.36E-11	2.30E-09	1.20E-10
HTX N-CE	CTUh	5.16E-07	5.01E-07	4.95E-10	2.51E-10	1.34E-08	4.79E-10
IrLS	Pt	5.44E+01	4.94E+01	5.73E-01	7.98E-02	3.93E+00	3.82E-01



## Glossary

### 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
POPCD	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
		IrLS	Impact related to Land use / soil quality

## References

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- [2] PSR “PSR-0005-ed3.1-EN-2023 12 08” - SPECIFIC RULES FOR Electrical switchgear and control gear Solutions (Circuit breakers)
- [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
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- [12] LB-DT 18-21D - REACH (MCCBs and ACBs)
- [13] 1SDL000571R0 Ver 01 - RoHS Exemptions (MCCBs and ACBs)
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