Product Environmental Profile

iK60N circuit breaker

PEP ecoPASSPORT®

Schneider Electric

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Product Overview

The main function of iK60N circuit breaker is to ensure protection of low voltage electrical installations.
This range consists of circuit breakers rated 1 A to 63 A:

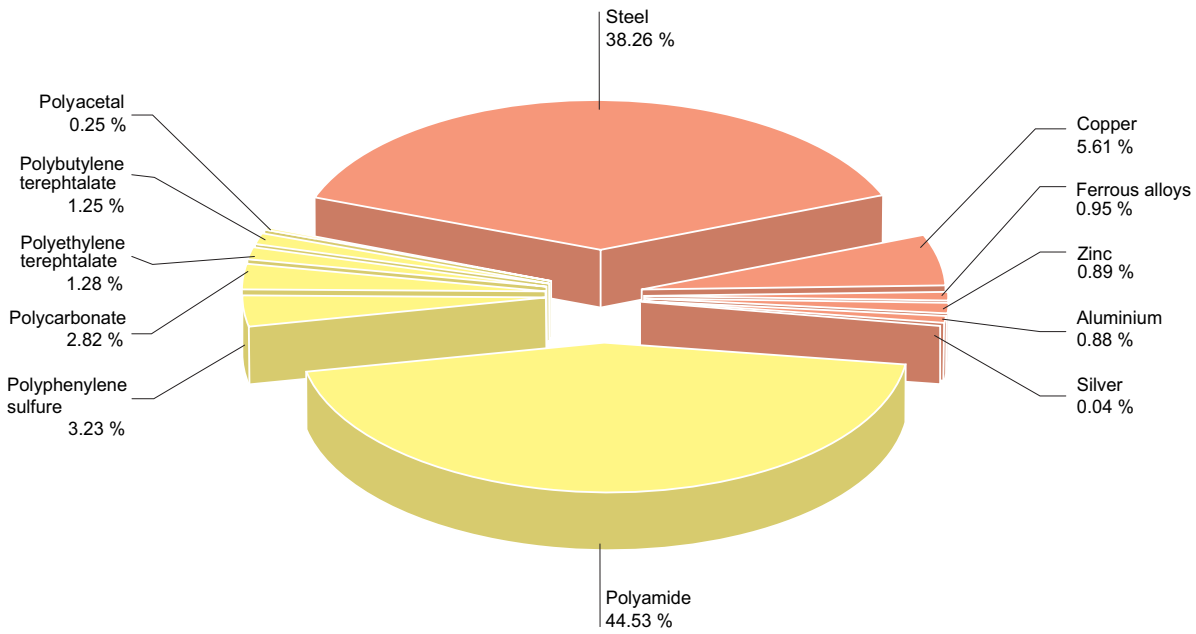
- complying with IEC/EN 60898-1.
- with instantaneous tripping curves type B or C
- with 1P, 1P+N, 2P, 3P or 4P.

The representative product used for the analysis is iK60N 2P 16 A C, reference A9K24216.
The environmental impacts of this referenced product are representative of the impacts of the other products of the range which are developed with the similar technology.
The extrapolation rules are described in the following chapters.

The environmental analysis was performed in conformity with ISO14040.
This analysis takes the stages of the life cycle of the product into account.

Constituent materials

The mass of the product range is from 117 g and 498 g no including packaging. It is 210 g for the iK60N 2P 16 A C.
The constituent materials are distributed as follows:



Substance assessment

Products of this range are designed in conformity with the requirements of the RoHS directive (European Directive 2002/95/EC of 27 January 2003) and do not contain, or in the authorised proportions, lead, mercury, cadmium, chromium hexavalent, flame retardant (polybromobiphenyles PBB, polybromodiphenylthers PBDE) as mentioned in the Directive.

Manufacturing

The iK60 circuit breaker is manufactured at a Schneider Electric production site on which an ISO 14001 certified environmental management system has been established.

Distribution

The weight and volume of the packaging have been reduced, in compliance with the European Union's packaging directive.
The iK60 circuit breaker packaging weight is 9.3 g. It consists of 100 % cardboard and paper.
The weight of recycled materials used is 96 % of total packaging mass.

The product distribution flows have been optimised by setting up local distribution centres close to the market areas.

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Use

The products of the iK60 circuit breaker do not generate environmental pollution requiring special precautionary measures (noise, emissions, and so on) in using phase.

The dissipated power depends on the conditions under which the product is implemented and used.
This dissipated power spreads out between 1.7 W and 14 W for the iK60 circuit breaker product range. It is 5.2 W for iK60N 2P 16 A C.

This thermal dissipation represents less than 0.08 % of the power which passes through the product.

End of life

At end of life, the iK60 circuit breaker have been optimized to decrease the amount of waste and valorise the components and materials of the product in the usual end of life treatment process.

The design has been achieved so as components are able to enter the usual end of life treatment. The product doesn't need any specific depollution process.
The potential of recyclability of the products has been evaluated using the Codde "recyclability and recoverability calculation method" (version V1, 20 Sep. 2008) and published by ADEME (French Agency for Environment and Energy Management).

According this method, the potential recyclability ratio is: 43.5 %.

Environmental impacts

The environmental impacts were analysed for the Manufacturing (M) phases, the Distribution (D) and the Utilisation (U) phases.
This product range is included in the category 1 (assumed lifetime service is 20 years and using scenario: 1.1 Loading rate is 30% and uptime percentage is 30 %).

The EIME (Environmental Impact and Management Explorer) software, version 4.0, and its database, version 10.0 were used for the life cycle assessment (LCA).

The calculation has been done on iK60N 2P 16 A C.
The electrical power model used is European.

Presentation of the environmental impacts

Environmental indicators	Unit	iK60N circuit breaker			
		S = M + D + U	M	D	U
Raw Material Depletion	Y-1	**$5.41\ 10^{-15}$**	$5.13\ 10^{-15}$	$1.18\ 10^{-18}$	$2.80\ 10^{-16}$
Energy Depletion	MJ	**$2.71\ 10^{2}$**	19.87	$8.67\ 10^{-1}$	$2.51\ 10^{2}$
Water depletion	dm^3	**47.91**	9.09	$8.23\ 10^{-2}$	38.74
Global Warming	$g \approx CO_2$	**$1.42\ 10^{4}$**	$1.30\ 10^{3}$	71.43	$1.28\ 10^{4}$
Ozone Depletion	g≈CFC-11	**$1.35\ 10^{-3}$**	$2.02\ 10^{-4}$	$4.85\ 10^{-5}$	$1.10\ 10^{-3}$
Air Toxicity	m^3	**$2.89\ 10^{6}$**	$4.04\ 10^{5}$	$1.64\ 10^{4}$	$2.47\ 10^{6}$
Photochemical Ozone Creation	$g \approx C_2H_4$	**5.01**	$5.10\ 10^{-1}$	$5.87\ 10^{-2}$	4.44
Air acidification	$g \approx H^+$	**2.29**	$2.56\ 10^{-1}$	$1.15\ 10^{-2}$	2.03
Water Toxicity	dm^3	**$4.30\ 10^{3}$**	$1.18\ 10^{3}$	8.58	$3.11\ 10^{3}$
Water Eutrophication	$g \approx PO_4$	**$1.51\ 10^{-1}$**	$1.13\ 10^{-1}$	$1.14\ 10^{-3}$	$3.66\ 10^{-2}$
Hazardous waste production	kg	**$2.26\ 10^{-1}$**	$2.18\ 10^{-2}$	$2.56\ 10^{-5}$	$2.04\ 10^{-1}$

The life cycle analysis shows that the U phase is the life cycle phase which has the greatest impact on the majority of environmental indicators. The environmental parameters of this phase have been optimized at the design stage.

Extrapolation rules for product range: depending on the impact analysis, the environmental indicators (except RMD) of other products in this family may be proportional extrapolated by power dissipation of the product.

The RMD impact of the other products of the family may be proportional extrapolated by product mass.

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System approach

As the product of the range are designed in accordance with the RoHS Directive (European Directive 2002/95/EC of 27 January 2003), they can be incorporated without any restriction within an assembly or an installation submitted to this Directive.

N.B.: please note that the environmental impacts of the product depend on the use and installation conditions of the product.
Impacts values given above are only valid within the context specified and cannot be directly used to draw up the environmental assessment of the installation.

Glossary

Raw Material Depletion (RMD)

This indicator quantifies the consumption of raw materials during the life cycle of the product. It is expressed as the fraction of natural resources that disappear each year, with respect to all the annual reserves of the material.

Energy Depletion (ED)

This indicator gives the quantity of energy consumed, whether it be from fossil, hydroelectric, nuclear or other sources.
This indicator takes into account the energy from the material produced during combustion. It is expressed in MJ.

Water Depletion (WD)

This indicator calculates the volume of water consumed, including drinking water and water from industrial sources. It is expressed in dm^3.

Global Warming (GW)

The global warming of the planet is the result of the increase in the greenhouse effect due to the sunlight reflected by the earth's surface being absorbed by certain gases known as "greenhouse-effect" gases. The effect is quantified in gram equivalent of CO_2.

Ozone Depletion (OD)

This indicator defines the contribution to the phenomenon of the disappearance of the stratospheric ozone layer due to the emission of certain specific gases. The effect is expressed in gram equivalent of CFC-11.

Photochemical Ozone Creation (POC)

This indicator quantifies the contribution to the "smog" phenomenon (the photochemical oxidation of certain gases which generates ozone) and is expressed in gram equivalent of ethylene (C_2H_4).

Air Acidification (AA)

The acid substances present in the atmosphere are carried by rain.
A high level of acidity in the rain can cause damage to forests.
The contribution of acidification is calculated using the acidification potentials of the substances concerned and is expressed in mode equivalent of H^+.

Hazardous Waste Production (HWP)

This indicator calculates the quantity of specially treated waste created during all the life cycle phases (manufacturing, distribution and utilization). For example, special industrial waste in the manufacturing phase, waste associated with the production of electrical power, etc.
It is expressed in kg.

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