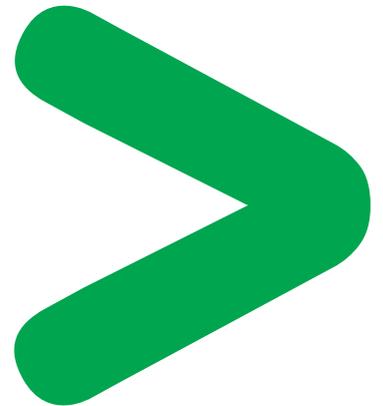
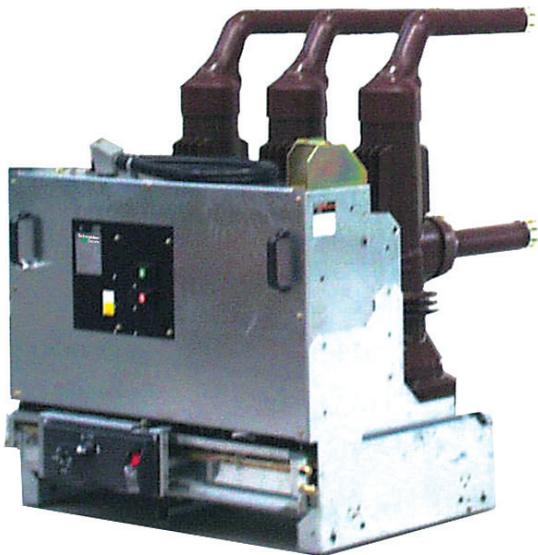


# Product Environmental Profile

SF RANGE



# Product Environmental Profile - PEP

## Product Overview

The main function of the SF Range product range is to protect operators and equipments in Medium Voltage power distribution systems.

This range consists of fixed and withdrawable circuit breakers with frontal operating mechanism and accessories associated with these products.

The representative product used for the analysis is SF F400 Withdrawable Circuit Breaker (SF F400 36 kV 31.5 kA 1250 A 250 mm) fitted with withdrawable accessories (arms, clips, drive device), a motor drive, a shunt closing release and a shunt opening release.

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.

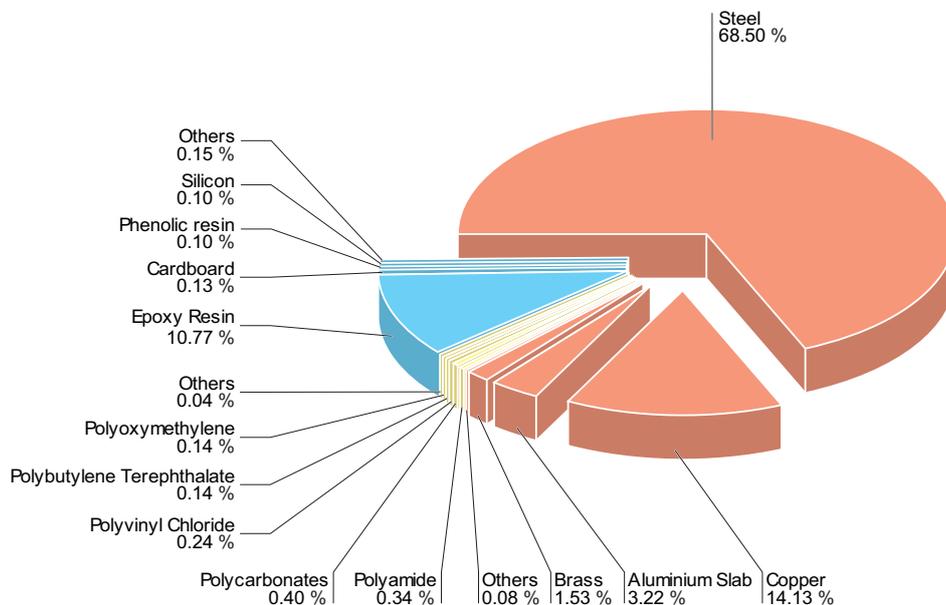
The extrapolation rules are described in the following chapters.

The environmental analysis was performed in conformity with ISO 14040.

This analysis takes the stages of the life cycle of the product into account.

## Constituent materials

The mass of the product range is from 103 kg to 350 kg no including packaging. It is 313 kg for the analysed SF F400 withdrawable circuit breaker. 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, polybromodiphenylthethers PBDE) as mentioned in the Directive.

## Manufacturing

The SF product range 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 SF packaging weight is 6 kg. It consists of wood and cardboard. The product distribution flows have been optimised by setting up local distribution centres close to the market areas.

# Product Environmental Profile - PEP

## Utilization

The products of the SF range 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 8 W and 51 W for the SF product range.

This thermal dissipation represents less than 4E-6 % of the power which passes through the product.

## End of life

At end of life, the products in the SF 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 and information have been achieved so as components are able to enter the usual end of life treatment processes as appropriate: depollution if recommended, reuse and/or dismantling if recommended so as to increase the recycling performances and shredding for separating the rest of materials.

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: 84 %.

## Environmental impacts

The environmental impacts were analysed for the Manufacturing (M) phases, the Distribution (D) and the Utilization (U) phases.

This product range is included in the category 1, Energy passing product (assumed lifetime service is 30 years and using scenario: 20 years, loading rate is 30 % and uptime percentage is 100 %).

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 SF F400 withdrawable circuit breaker (SF F400 36 kV 31.5 kA 1250 A 250 mm).

The electrical power model used is Europe.

### Presentation of the environmental impacts

Environmental indicators	Unit	Range SF F400			
		S = M + D + U	M	D	U
Raw Material Depletion	Y-1	5.43 10 <sup>-12</sup>	5.41 10 <sup>-12</sup>	1.95 10 <sup>-15</sup>	1.60 10 <sup>-14</sup>
Energy Depletion	MJ	4.08 10 <sup>4</sup>	2.51 10 <sup>4</sup>	1.43 10 <sup>3</sup>	1.43 10 <sup>4</sup>
Water depletion	dm <sup>3</sup>	1.68 10 <sup>4</sup>	1.45 10 <sup>4</sup>	1.36 10 <sup>2</sup>	2.21 10 <sup>3</sup>
Global Warming	g≈CO <sub>2</sub>	2.28 10 <sup>6</sup>	1.43 10 <sup>6</sup>	1.13 10 <sup>5</sup>	7.30 10 <sup>5</sup>
Ozone Depletion	g≈CFC-11	4.78 10 <sup>-1</sup>	3.35 10 <sup>-1</sup>	8.03 10 <sup>-2</sup>	6.29 10 <sup>-2</sup>
Air Toxicity	m3	6.62 10 <sup>8</sup>	5.00 10 <sup>8</sup>	2.14 10 <sup>7</sup>	1.40 10 <sup>8</sup>
Photochemical Ozone Creation	g≈C <sub>2</sub> H <sub>4</sub>	8.19 10 <sup>2</sup>	4.68 10 <sup>2</sup>	97.06	2.53 10 <sup>2</sup>
Air acidification	g≈H <sup>+</sup>	5.44 10 <sup>2</sup>	4.14 10 <sup>2</sup>	14.48	1.15 10 <sup>2</sup>
Water Toxicity	dm <sup>3</sup>	6.37 10 <sup>5</sup>	4.45 10 <sup>5</sup>	1.41 10 <sup>4</sup>	1.77 10 <sup>5</sup>
Water Eutrophication	g ≈PO <sub>4</sub>	87.26	83.29	189	2.09
Hazardous waste production	kg	15.43	3.74	4.22 10 <sup>2</sup>	11.65

The life cycle analysis shows that the M phase is the life cycle phase which has the greatest impact on the majority of environmental indicators.

The product benefits from mass and volume reduction as opposed to former product range (Fluarc) which allows reducing its impact on environment.

# Product Environmental Profile - PEP

## 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<sup>3</sup>.

### 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<sub>2</sub>.

### 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<sub>2</sub>H<sub>4</sub>).

### 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<sup>+</sup>.

### 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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