Varplus² Capacitor

Product Environmental Profile

Schneider Electric

Product overview

The main purpose of the Varplus² range of capacitors is to compensate for reactive power losses on an electrical network.

This range consists of fifteen products ranging from 7.5 kvar to 20 kvar.

The representative product used for the analysis is a set of Varplus^2 50 kvar capacitors.

The environmental impacts of this referenced product are representative of the impacts of the other products in the range for which the same technology is used.

The environmental analysis was performed in conformity with ISO 14040 "Environmental management: Life cycle assessment – Principle and framework".
This analysis takes the stages in the life cycle of the product into account.

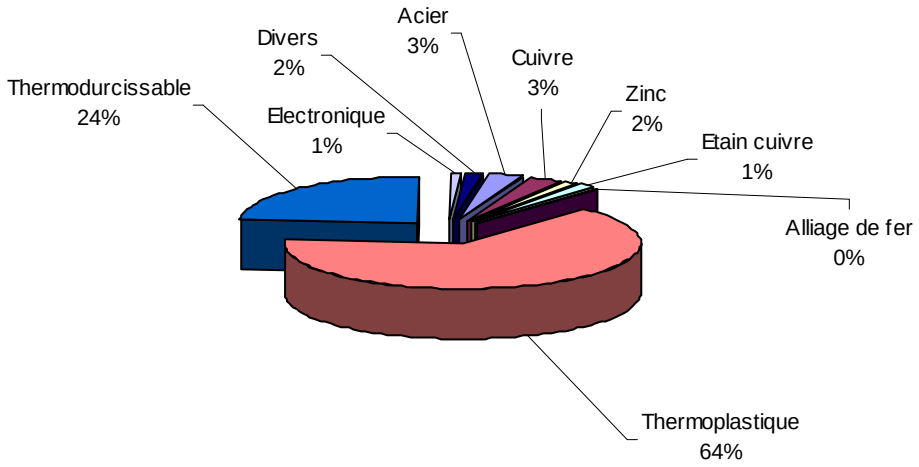
Constituent materials

The mass of the products in the range is from 1700 g to 12800 g. It is 5998 g, not including the packaging, for the 50 kvar product analysed.

The constituent materials are distributed as follows:

Categories	Materials	Mass (g)	%
Metals	Steel	180	3.0%
	Copper	185	3.1%
	Zinc	90	1.5%
	Tin/copper	72	1.2%
	Iron alloy	18	0.3%
Plastics	Thermoplastics	3866	64.6%
	Thermosetting materials	1430	23.9%
Others	Electronics	63	1.1%
	Miscellaneous	94	1.6%
	Total	**5998**	**100.00%**

The "Others" category includes various elements present in small quantities (less than 1% of the product mass, such as silica for the fuses, adhesive for the core plugs, etc.).



LEGENDES	
Thermosetting materials	**24%**
Miscellaneous	**2%**
Electronics	**1%**
Steel	**3%**
Copper	**3%**
Zinc	**2%**
Tin/copper	**1%**
Iron alloy	**0%**
Thermoplastics	**64%**

All necessary steps have been taken with our services, suppliers and subcontractors to ensure that the materials used in the composition of the Varplus² capacitor range do not contain any substances prohibited by the legislation that was in force* when it was put on the market.

Particular attention has been paid to the choice of materials. The plastic materials used in the product are non-flame retardant.

*** according to the list available on request.**

Manufacturing

The Varplus² range of capacitors is manufactured on the Rectiphase SAS production site. Rectiphase is a Schneider Electric subsidiary which has established an ISO 14001 certified environmental management system.

Distribution

The weight and volume of the packaging have been reduced in compliance with the European Union's packaging directive.

The weight of the packaging of the Varplus² set of 50 kvar capacitors is 894 g. It consists of the following materials:

Material	Mass (g)	%
cardboard	867	97
paper	27	3
Total	**894**	**100**

The packaging weighs 33% less than a product of the same capacity from the old range.

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

Utilisation

The products in the Varplus² capacitor range do not generate any environmental pollution requiring special precautionary measures (noise, emissions, etc.).

The dissipated power depends on the conditions under which the product is implemented and used.
The power consumption of the "Varplus²" range is between 3.6 W and 11.6 W. It is 11.6 W in active mode for all the 50 kvar Varplus² capacitors referenced.

End of life

At end of life, the products in the Varplus² range can either be dismantled or crushed to facilitate the recovery of the various constituent materials. More than 50% of the product can be recycled.

The end of life data appears on the product end-of-life sheet.

Environmental impacts

The EIME (Environmental Impact and Management Explorer) software, version 1.6 was used for the Life Cycle Assessment (LCA).

The assumed service life of the product is 15 years if the utilisation rate of the facility is 50%.

The analysis focused on a set of Varplus² 50 kvar capacitors.

The environmental impacts were analysed for the Manufacturing (M) phase, including the processing of raw materials, and for the Distribution (D) and Utilisation (U) phases.

The environmental impact assessment compared the impacts of a set of Varplus² 50 kvar capacitors with a set of Varplus 50 kvar capacitors.

It gives the following results:

EIME criterion	Unit	S=M+D+U	M	D	U
Raw Material Depletion (RMD)	Y-1	1.39E-13	1.20E-13	1.32E-16	1.96E-14
Energy Depletion (ED)	MJ	2.05E+04	6.23E+02	9.07E+01	1.98E+04
Water Depletion (WD)	dm3	3.28E+03	3.36E+02	2.89E+01	2.92E+03
Global Warming Potential (GWP)	g~CO2	1.13E+06	3.05E+04	5.66E+03	1.09E+06
Ozone Depletion (OD)	g~CFC-11	1.17E-01	1.59E-03	3.41E-03	1.12E-01
Photochemical Ozone Creation (POC)	g~C2H4	3.92E+02	1.13E+01	6.47E+00	3.75E+02
Air Acidification (AA)	g~H+	1.75E+02	6.35E+00	1.29E+00	1.68E+02
Hazardous Waste Production (HWP)	kg	1.51E+01	2.27E-01	2.70E-03	1.49E+01

The life cycle analysis showed that the Manufacturing phase has the greatest impact on most of the environmental indicators and the environmental parameters of this phase were optimised at the design stage. For example, the product has the following advantages:

- **a 50% reduction in mass (manufacturing gain)**
- **components can be replaced with other technologies.**
- **etc.**

These various changes make it possible to reduce the environmental impacts of the product significantly.

System approach

N.B.: the environmental impact data given above is only valid within the specified context and cannot be used directly in the environmental report on the installation.

Document creation date: 12/2005

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 this 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.

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 Potential (GWP)
The global warming of the planet is the result of the increase in the greenhouse effect, a natural phenomenon due to the sunlight reflected by the earth's surface being absorbed by certain gases known as "greenhouse-effect" gases.
This 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.
This 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 the rain. A high level of acidity in rain can cause damage to forests.
The contribution of acidification is calculated using the acidification potentials of the substances concerned and is expressed in mole 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, including energy production during this phase).
For example, special industrial waste in the manufacturing phase, waste associated with the production of electrical power, etc. It is expressed in kg.

This document is based on ISO 14020 relative to the general principles of environmental declarations and the ISO TR 14025 technical report relative to type III environmental declarations.