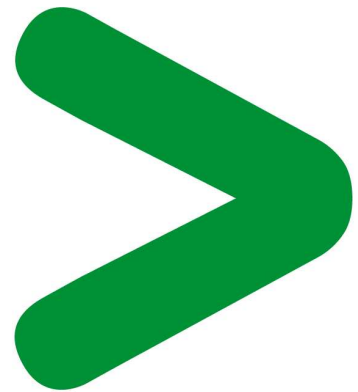


Product Environmental Profile

MINERA MP

Oil filled Medium Power Transformer (MPT)



Product Environmental Profile – PEP

Product overview

The main purpose of Minera MP transformers is to supply reliable and safe voltage amplitude transformation to distribution network from HV to MV, or MV to MV, or MV to LV (or vice versa for step up operation).

This range consists of mineral oil filled medium power transformers from 3.15MVA up to and including 100MVA power rating and 170kV maximum operating voltage, manufactured in Schneider Electric transformer plants*.

The representative product used for the analysis is mineral oil filled medium power transformer with ratings; 16MVA 45/11kV 50Hz 3-phase, no-load/load losses: 11.87/99kW, tank with radiator and oil expansion conservator.

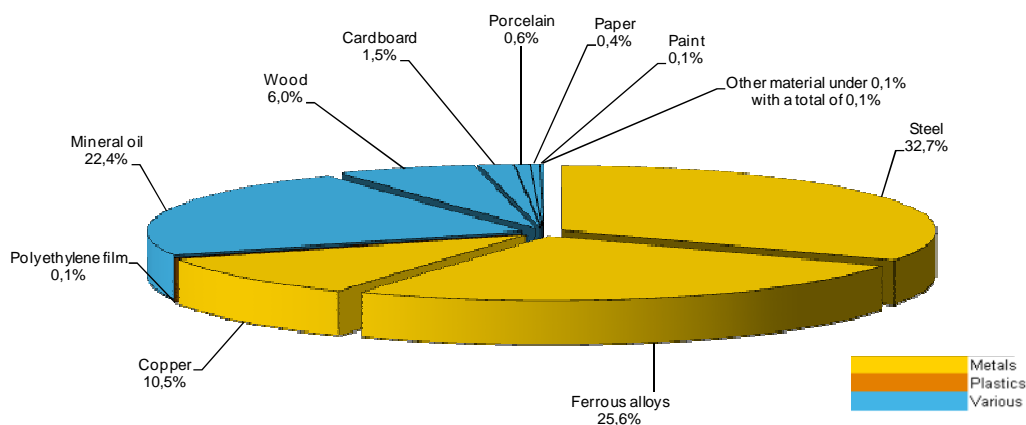
The environmental impacts of this reference product are representative for the other products of the range which are developed with a similar technology.

The environmental analysis was performed in conformity with ISO 14040.

* This PEP analysis does not yet include the Minera MP transformers manufactured in Schneider Electric India and Indonesia plants.

Constituent materials

The mass of the product range is from 10 tonnes up to 100 tonnes including packaging. For the reference 16MVA Minera MP transformer, the weight is 31 tonnes including packaging. The constituent materials are distributed as follows:



Substance assessment

Minera MP transformers are not included in scope of the RoHS according to sub-clause 2.4.e of European Directive.

Details of ROHS and REACH substances information are available on the Schneider-Electric [Green Premium website](http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page) . (<http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page>)

Manufacturing

Minera MP product range is manufactured at Schneider Electric plants on which an ISO14001 certified environmental management system has been established.

Distribution

The weight and volume of the packaging have been optimized, based on the European Union's packaging directive.

Minera MP packaging weight is from 10kg to 3000kg depending on product size and requested packaging method, and it consists of wood material and polyethylene film. For reference 16MVA product, the packaging weight is 1400kg.

Product Environmental Profile – PEP

Use

The products of Minera MP range do not generate environmental pollution (noise, emissions) requiring special precautionary measures in standard use.

The dissipated power depends on the product size as well as the conditions under which the product is implemented and used. This dissipated power is between 25kW and 320kW for Minera MP product range. It is 110,87kW at 100% load for the reference 16MVA transformer.

This thermal dissipation represents around 1% of the product's power rating.

Maintenance operations for Minera MP transformers should be undertaken during the product's service life, according to Schneider Electric IOM (Installation & Operation & Maintenance) manual. It should be noted that installation and maintenance activities of Minera MP transformers have negligible global impact.

End of life

At end of life, the products in Minera MP range have been optimized to decrease the amount of waste and allow recovery of the product components and materials.

This product range contains mineral oil and cellulosic paper & cardboard that should be separated from the stream of waste so as to optimize end-of-life treatment by special treatments. The location of these components and other recommendations are given in the End of Life Instruction document which is available for this product range on the Schneider-Electric [Green Premium website](http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page) (<http://www2.schneider-electric.com/sites/corporate/en/products-services/green-premium/green-premium.page>).

The recyclability potential of the products has been evaluated using the "ECO DEEE recyclability and recoverability calculation method" (version V1, 20 Sep. 2008 presented to the French Agency for Environment and Energy Management: ADEME).

According to this method, the potential recyclability ratio without packaging is: 68%.

As described in the recyclability calculation method this ratio includes only metals which have proven industrial recycling processes.

Environmental impacts

Life cycle assessment has been performed on the following life cycle phases: Materials and Manufacturing (M), Distribution (D), Installation (I), Use (U), and End of life (E).

Modelling hypothesis and method:

- The calculation was performed on 16MVA 45/11kV 50Hz 3-phase, load/no-load losses: 11.87/99kW, tank with radiator and oil expansion conservator.
- Product packaging is included.
- Installation components: no special components included.
- Scenario for the Use phase: This product range is included in the category 1 (Energy Passing Product). Assumed service lifetime is 30 years and use scenario is; power dissipation is 17,572kW at 24% load, average loading rate during life time is 24% and service uptime percentage is 100%.
- The geographical representative area for the assessment is Europe and the electrical power model used for calculation is Europe model.
- End of life impacts are based on a worst case transport distance to the recycling plant (1000km)

Product Environmental Profile – PEP

Presentation of the product environmental impacts

Environmental indicators	Unit	For MINERA MP 16MVA 45/11kV 50Hz 3-phase Po/Pk: 11.87/99kW					
		S = M + D + I + U + E	M	D	I	U	E
Air Acidification (AA)	kg H+ eq	5,88E+02	2,12E+01	1,53E+00	0*	5,65E+02	2,96E-01
Air toxicity (AT)	m ³	7,07E+11	4,91E+10	2,28E+09	0*	6,55E+11	4,40E+08
Energy Depletion (ED)	MJ	5,56E+07	1,45E+06	1,16E+05	0*	5,41E+07	2,24E+04
Global Warming Potential (GWP)	kg CO ₂ eq.	2,78E+06	9,92E+04	8,23E+03	0*	2,67E+06	1,59E+03
Hazardous Waste Production (HWP)	kg	3,64E+03	3,19E+03	9,46E-03	0*	4,50E+02	1,89E-03
Ozone Depletion Potential (ODP)	kg CFC-11 eq.	6,19E-01	1,02E-02	1,56E-05	0*	6,09E-01	3,02E-06
Photochemical Ozone Creation Potential (POCP)	kg C ₂ H ₄ eq.	2,12E+02	4,34E+01	1,84E+00	0*	1,65E+02	3,55E-01
Raw Material Depletion (RMD)	Y-1	1,48E-10	1,11E-10	1,68E-13	0*	3,61E-11	3,25E-14
Water Depletion (WD)	dm ³	8,17E+06	1,20E+06	8,56E+02	0*	6,97E+06	1,65E+02
Water Eutrophication (WE)	kg PO ₄ ³⁻ eq.	2,83E+01	2,97E+00	1,53E-02	0*	2,53E+01	2,96E-03
Water Toxicity (WT)	m ³	1,21E+06	1,93E+04	3,52E+03	0*	1,19E+06	6,81E+02

*0 means less than 0.01% of impact on the life cycle

Life cycle assessment has been performed with the EIME software (Environmental Impact and Management Explorer), version 5.3 and with its database version 2014-04.

The Use phase is the life cycle phase which has the greatest impact on the majority of environmental indicators.

Global Impacts of Different Rating and Losses

The environmental impacts are subject to change based on transformer rating and loss levels. For different power ratings and/or loss levels, the global impacts variation can be seen in below table as percentage for indicative purposes.

POWER RATING Total Loss @ 100% load	5MVA 40kW	16MVA 78,1kW	16MVA 110,87kW (reference)	16MVA 147,1kW	31,5MVA 200,5kW	60MVA 264kW
Air Acidification (AA)	2,94E+02	4,12E+02	5,88E+02	7,64E+02	1,00E+03	1,62E+03
Air toxicity (AT)	3,54E+11	4,95E+11	7,07E+11	9,19E+11	1,20E+12	1,94E+12
Energy Depletion (ED)	2,78E+07	3,89E+07	5,56E+07	7,23E+07	9,45E+07	1,53E+08
Global Warming Potential (GWP)	1,39E+06	1,95E+06	2,78E+06	3,61E+06	4,73E+06	7,65E+06
Hazardous Waste Production (HWP)	2,00E+03	4,00E+03	3,64E+03	3,28E+03	6,19E+03	1,20E+04
Ozone Depletion Potential (ODP)	3,10E-01	4,33E-01	6,19E-01	8,05E-01	1,05E+00	1,70E+00
Photochemical Ozone Creation Potential (POCP)	7,42E+01	1,91E+02	2,12E+02	2,54E+02	3,82E+02	5,83E+02
Raw Material Depletion (RMD)	5,18E-11	1,78E-10	1,48E-10	1,33E-10	2,66E-10	4,59E-10
Water Depletion (WD)	4,09E+06	5,72E+06	8,17E+06	1,06E+07	1,39E+07	2,25E+07
Water Eutrophication (WE)	1,42E+01	1,98E+01	2,83E+01	3,68E+01	4,81E+01	7,78E+01
Water Toxicity (WT)	6,05E+05	8,47E+05	1,21E+06	1,57E+06	2,06E+06	3,33E+06

Glossary

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 ⁺ .
Air Toxicity (AT)	This indicator represents the air toxicity in a human environment. It takes into account the usually accepted concentrations for several gases in the air and the quantity of gas released over the life cycle. The indication given corresponds to the air volume needed to dilute these gases down to acceptable concentrations.
Energy Depletion (ED)	This indicator gives the quantity of energy consumed, whether it is from fossil, hydroelectric, nuclear or other sources. It takes into account the energy from the material produced during combustion. It is expressed in MJ.
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 .
Hazardous Waste Production (HWP)	This indicator quantifies 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.
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 ₂ H ₄).
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.
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 .
Water Eutrophication (WE)	Eutrophication is a natural process defined as the enrichment in mineral salts of marine or lake waters or a process accelerated by human intervention, defined as the enrichment in nutritive elements (phosphorous compounds, nitrogen compounds and organic matter). This indicator represents the water eutrophication of lakes and marine waters by the release of specific substances in the effluents. It is expressed in grams equivalency of PO ₄ ³⁻ (phosphate).
Water Toxicity (WT)	This indicator represents the water toxicity. It takes into account the usually accepted concentrations for several substances in water and the quantity of substances released over the life cycle. The indication given corresponds to the water volume needed to dilute these substances down to acceptable concentrations.

PEP achieved with Schneider-Electric TT01 V10 and TT02 V19 procedures in compliance with ISO14040 series standards

PEP in line with PEPecopassport PCR : PEP-PCR-ed 2.1-EN-2012 12 11

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