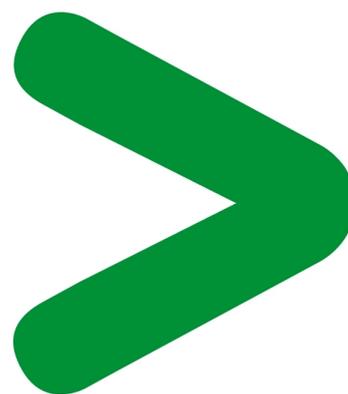


Product Environmental Profile

GMA
Gas Insulated Switchgear



Schneider
Electric

Product Environmental Profile - PEP

Product overview

The main purpose of the GMA switchgear units with ratings up to 24 kV, 2500 A and 31.5 kA/3s is to cover all usual functions required in middle voltage (MV) switchboards.

GMA is primarily a gas insulated single busbar systems for application in:

- Public utilities: MV-substations
- Industries: Mining, oil gas, metallurgy
- Infrastructures: Airports, subways, road tunnels, buildings, hospitals, wind power plants
- Transport: Marine and offshore plants

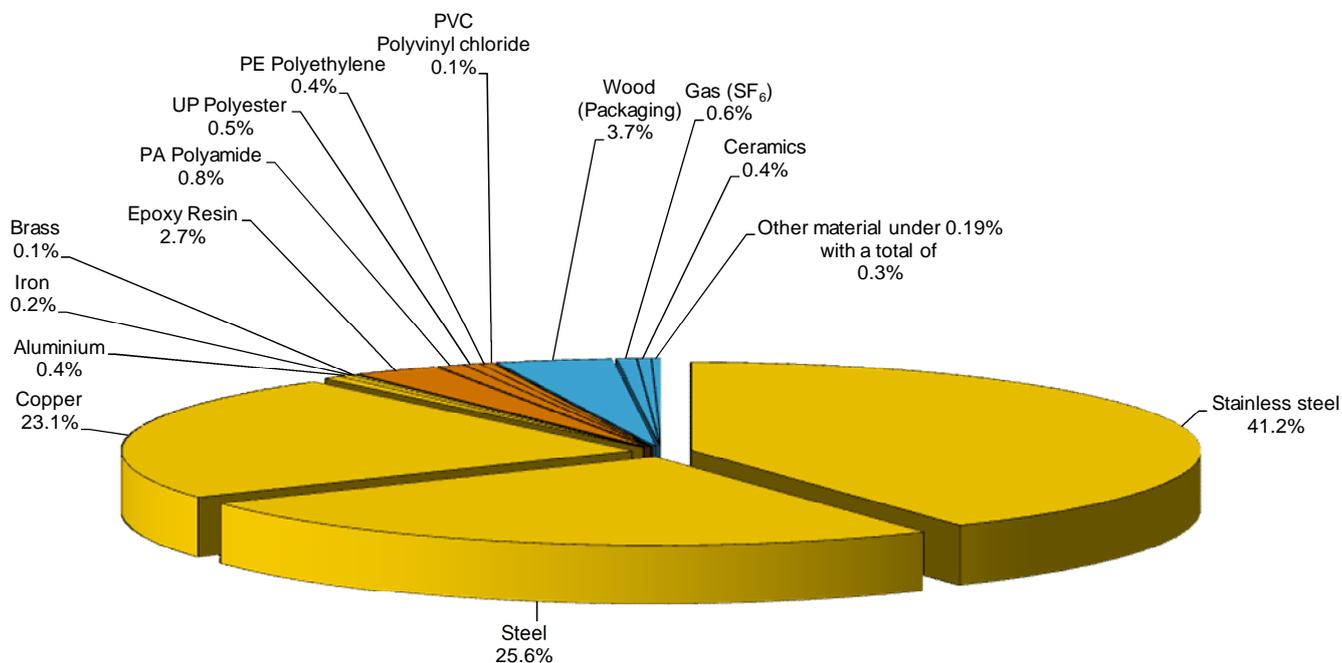
The representative product used for the analysis is GMA 17-25-06, which is a single busbar panel with rated voltage 17.5 kV, rated short time current 25 kA/3s, and outgoing feeder rated current is 1250 A (without voltage transformer). Low voltage cabinets are designed individually according to customer request. Therefore the components of low voltage cabinets are not included in this analysis.

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

The environmental analysis was performed in conformity with ISO 14040.

Constituent materials

The mass of the product range is from 385 kg and 955 kg including packaging. It is 545 kg for the representative product GMA 17-25-06. The constituent materials are distributed as follows:



Substance assessment

This product contains: lead (0.01 %) and trace amount of hexavalent chromium. These percentages are relative to the total mass of the restricted substances in homogeneous material according to the definition Article 3.19 and Annex II of the European RoHS Directive 2011/65/EU.

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>)

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Manufacturing

The GMA product range is manufactured at a Schneider Electric production site 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. The optimization has been done according to means of transportation. For deliveries by means of truck transportation the packaging weight is 25 kg for the representative product. It consists of wooden pallet (20 kg), metal sheets and screws (3kg), and Polyethylene film (2kg).

For deliveries by means of airplane and ship transportation the wooden boxes are used as packaging. The weight of packaging is 100 kg and it consists of wooden box (80 kg), metal sheets and screws (5 kg), desiccant mineral (5kg), aluminium foil (5 kg) and Polyethylene bubble wrap (5 kg).

Use

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

The dissipated power depends on the conditions under which the product is implemented and used. This dissipated power is between 215 W and 904 W at 100 % load for the GMA product range. It is 394 W for the representative product GMA 17,5 kV, 25 kA/3s, 1250 A.

This thermal dissipation represents less than 0.0018 % of the power which passes through the product.

The product range does not require special maintenance operations.

End of life

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

This product range contains SF₆ as insulating gas (according to Kyoto Protocol), circuit breakers and loaded springs, which 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 [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 which serves as background calculation method for the IEC/TR 62635 ed1.0).

According to this method, the potential recyclability ratio is: 90 % based on weight.

As described in the recyclability calculation method this ratio includes only metals and plastics 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), Use (U), and End of life (E).

Modeling hypothesis and method:

- the calculation was performed on the GMA 17-25-06, which is a single busbar panel with rated voltage 17.5 kV, rated short time current 25 kA/3s, and the feeder outgoing rated current 1250 A. The reference GMA does not include the voltage transformer and low voltage cabinet.
- product packaging: is included
- installation components: no special components included.
- scenario for the Use phase: this product range is included in the category of "Energy passing product". Assumed service life is 40 years and use scenario is: Energy dissipation is 394 W at 100 % load, loading rate is 80 % and service uptime percentage is 100 %.
- the geographical representative area for the assessment is Europe and the electrical power model used for calculation is European 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 GMA Gas Insulated Switchgear				
		S = M + D + U + E	M	D	U	E
Air Acidification (AA)	kg H ⁺ eq.	1.1697 x 10 ¹	6.6738 x 10 ⁻¹	2.7124 x 10 ⁻²	1.0996 x 10 ¹	6.9808 x 10 ⁻³
Air toxicity (AT)	m ³	1.4474 x 10 ¹⁰	1.6605 x 10 ⁹	4.0156 x 10 ⁷	1.2763 x 10 ¹⁰	1.0396 x 10 ⁷
Energy Depletion (ED)	MJ	1.08558 x 10 ⁶	3.0137 x 10 ⁴	2.5984 x 10 ³	1.0525 x 10 ⁶	5.0118 x 10 ²
Global Warming Potential (GWP)	kg CO ₂ eq.	5.7131 x 10 ⁴	1.9613 x 10 ³	2.0503 x 10 ²	5.4929 x 10 ⁴	3.5576 x 10 ¹
Hazardous Waste Production (HWP)	kg	8.6437 x 10 ¹	7.7318 x 10 ¹	7.6480 x 10 ⁻²	9.0425	4.4020 x 10 ⁻⁵
Ozone Depletion Potential (ODP)	kg CFC-11 eq.	1.2415 x 10 ⁻²	4.0746 x 10 ⁻⁴	1.4542 x 10 ⁻⁴	1.1862 x 10 ⁻²	6.7388 x 10 ⁻⁸
Photochemical Ozone Creation Potential (POCP)	kg C ₂ H ₄ eq.	4.0930	7.0185 x 10 ⁻¹	1.7831 x 10 ⁻¹	3.2040	8.8548 x 10 ⁻³
Raw Material Depletion (RMD)	Y-1	5.6616 x 10 ⁻¹²	4.9549 x 10 ⁻¹²	3.5418 x 10 ⁻¹⁵	7.0241 x 10 ⁻¹³	7.2681 x 10 ⁻¹⁶
Water Depletion (WD)	dm ³	1.7191 x 10 ⁵	3.6017 x 10 ⁴	2.4656 x 10 ²	1.3565 x 10 ⁵	3.6927
Water Eutrophication (WE)	kg PO ₄ ³⁻ eq.	6.0189 x 10 ⁻¹	1.0647 x 10 ⁻¹	3.4188 x 10 ⁻³	4.9193 x 10 ⁻¹	6.6081 x 10 ⁻⁵
Water Toxicity (WT)	m ³	2.3754 x 10 ⁴	6.2708 x 10 ²	2.8635 x 10 ¹	2.3083 x 10 ⁴	1.5202 x 10 ¹

Life cycle assessment has been performed with the EIME software, version 5 and with its database version 2013-02

Except for the hazardous waste production (HWP) and raw material depletion (RMD) indicators, the use phase is the life cycle phase which has the greatest impact on the majority of environmental indicators. For HWP and RMD the manufacturing phase is the most impacting life cycle phase.

Extension rules (& system approach)

According to this environmental analysis, proportionality rules may be used to evaluate the impacts of other products of this range: Depending on the impact analysis, the environmental indicators (without HWP and RMD) of other products in this family may be proportional extrapolated by energy consumption values. For RMD and HWP, impact may be proportional extrapolated by mass of the product.

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.
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.
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).
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 ⁺ .
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.
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.

PEP achieved with Schneider-Electric TT01 V9 and TT02 V16 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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