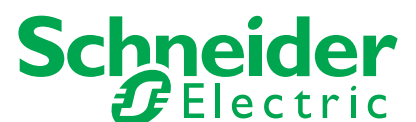
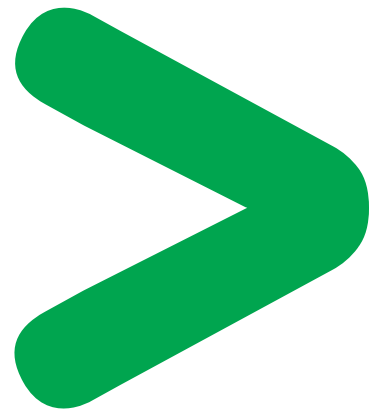
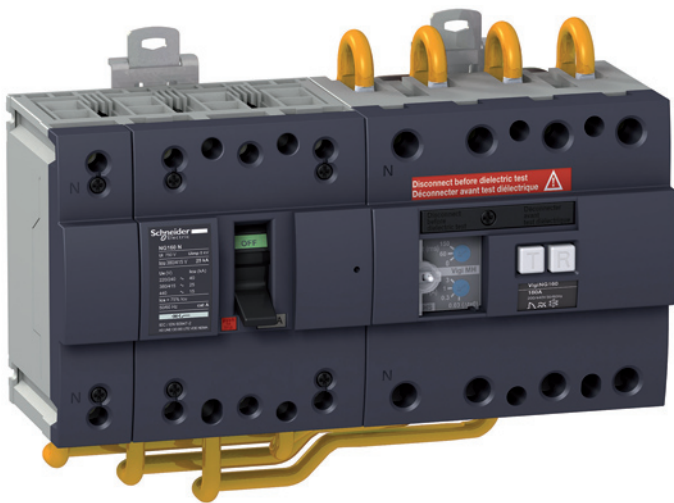


Product Environmental Profile

Compact NG160
with Vigi module



Product Environmental Profile - PEP

Product Overview

The Compact NG160 circuit breaker + Vigi module product range is designed to ensure the protection of low-voltage electrical applications from 16 A to 160 A.

The Product Environmental Profile (PEP) covers the entire range:

- Compact NG160 3-pole or 4-pole circuit breaker with a rating of 16 A to 160 A
- fitted with a thermal magnetic trip unit
- fitted with a Vigi earth leakage protection device.

The representative product used for the analysis was the Compact NG160 TM160 Vigi MH four-pole (4P) circuit breaker.

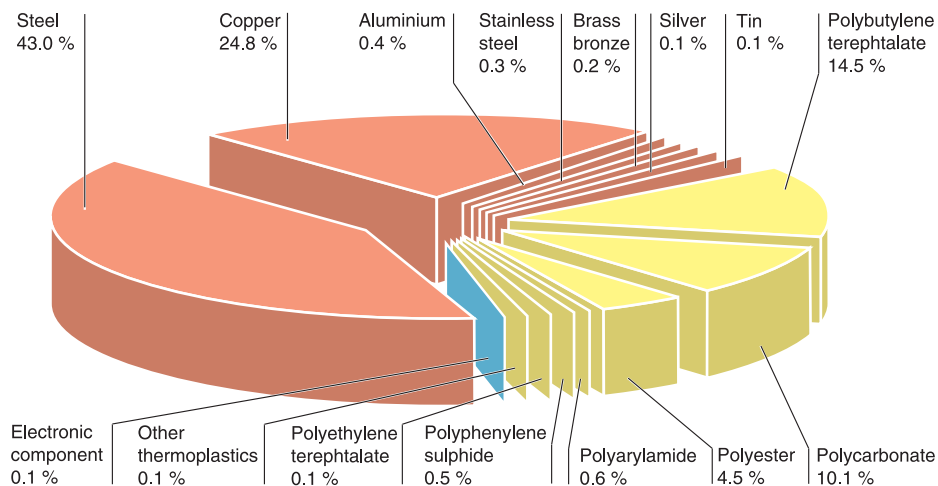
The environmental impacts of this referenced product are representative of the impacts of the other products in the range for which the same technology is used.

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 design and size of the products in this range are identical. The mass of the Compact NG160 TM160 Vigi MH 4P circuit breaker is 3212 g, not including the packaging. The constituent materials are distributed as follows:



The Other thermoplastics category includes various polymers that make up less than 0.05 % of the product mass such as Polyethylene (PE), Teflon (PTFE), Polypropylene (PP).

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 products in the Compact NG160 + Vigi module range are manufactured at Schneider Electric production sites which have established an ISO 14001 certified environmental management system.

Distribution

The packaging conforms to the European Union packaging directive. The packaging was designed to optimise both its weight and volume. The weight of the packaging of the Compact NG160 TM160 Vigi MH 4P circuit breaker is 513.1 g. The packaging consists of a cardboard box and a polyethylene foam (496 g). The weight includes the instructions for the device (17.1 g). 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 in the Compact NG160 + Vigi module range do not generate any environmental pollution requiring special precautionary measures (noise, emissions, etc.). The dissipated power (loss of wattage due to the Joule effect) depends on the conditions under which the product is implemented and used. For the products in the Compact NG160 + Vigi module range, this dissipated power is between 12.1 W for the Compact NG160 16 A Vigi MH 3P circuit breaker and 66.4 W for the Compact NG160 160 A Vigi MH 4P circuit breaker referenced.

The heat dissipation accounts for less than 0.03 % of the power passing through the product.

The annual power consumption of a Compact NG160 TM160 Vigi MH 4P circuit breaker is 232.7 kWh, assuming that it is operating at 80 % of the load for 14 hours and 20 % of the load for 10 hours.

End of life

The potential for recycling products in the Compact NG160 TM160 Vigi MH 4P range is greater than 96.6 %.

At end of life, the products in the Compact NG160 + Vigi module range can either be dismantled or crushed to facilitate the recovery of the various constituent materials.

The percentage includes ferrous and non-ferrous materials as well as marked plastics that do not contain halogenated flame retardants. Less than 0.5 % of the total product mass requires special recycling treatment.

The Vigi earth leakage protection device used in the products in the Compact NG160 + Vigi module range contains an easily removable 26.5 cm² electronic card that must be sent to specialised treatment systems. The removal procedure appears on the product end-of-life recovery sheet.

Environmental impacts

The EIME (Environmental Impact and Management Explorer) software, version 1.6, and its database, version 5.4 were used for the Life Cycle Assessment (LCA). The assumed service life of the product is 20 years and the European electrical power model is used.

The life cycle assessment relates to the Compact NG160 TM160 4P circuit breaker and includes:

- the circuit breaker disconnecting box
- the thermal magnetic trip unit
- the Vigi earth leakage protection device.

This analysis takes the product consumptions and emissions into account in all the life cycle phases: Manufacturing "M" including the processing of raw materials, Distribution "D" and Utilisation "U".

Presentation of product environmental impacts

Data calculated for product utilisation of 20 years.

Environmental indicators	Unit	For a Compact NG160 TM160 Vigi MH 4P			
		S = M + D + U	M	D	U
Raw Material Depletion	Y-1	4.90 10 ⁻¹³	4.46 10 ⁻¹³	3.19 10 ⁻¹⁷	4.33 10 ⁻¹⁴
Energy consumption	MJ	4.88 10 ⁴	2.67 10 ²	24.2	4.85 10 ⁴
Water Depletion	dm ³	6.46 10 ³	1.54 10 ²	4.54 10 ⁻¹	6.31 10 ³
Global Warming	g≈CO ₂	3.06 10 ⁶	1.62 10 ⁴	1.84 10 ³	3.04 10 ⁶
Ozone Depletion	g≈CFC-11	3.81 10 ⁻¹	5.15 10 ⁻³	2.14 10 ⁻⁴	3.76 10 ⁻¹
Photochemical Ozone Creation	g≈C ₂ H ₄	1.08 10 ³	7.39	1.63	1.07 10 ³
Air Acidification	g≈H ⁺	5.21 10 ²	5.10	3.40 10 ⁻¹	5.16 10 ²
Hazardous Waste Production	kg	43.6	1.05 10 ⁻¹	1.22 10 ⁻⁴	43.5

The utilisation phase (phase U) has the greatest impact on all the life cycle phases of the product. It corresponds to the impacts associated with electricity production during this phase. Schneider Electric takes all the necessary measures required to optimise this parameter.

Due to an innovative design, the environmental impacts of the new Compact NG160 circuit breaker + Vigi module are greatly reduced for most indicators.

For example, compared with the old Compact NSA160 + Vigi module product range, the Compact NG160 TM160 Vigi MH 4P product has the advantage of reducing the dissipated power by 23.8 %, which represents a reduction in impacts by a similar proportion for seven of the indicators ⁽¹⁾.

(1) Comparison available on request.

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 dm³.

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 CO₂.

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 (C₂H₄).

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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