



**SIEMENS**



**3AP1 FG 145 kV  
Circuit Breaker**

Environmental Product Declaration

[siemens.com/energy](https://www.siemens.com/energy)

# Environmental Mission Statement

## Design for Environment

Ecological design is nothing new at Siemens. The company published its in-house standard SN 36350 on environmentally compatible product design in 1993, and since then this standard has been an integral part of our product planning and development process.

Among other things, it calls for use of separate and distinct material fractions, ease of disassembly, a reduction in the number of components per product, durability, low energy requirements during manufacture and day-to-day use, and the avoidance of hazardous substances. It also lists minimum requirements regarding the parameters to be described in environmental declarations.

This standard and our system of environmental management enable us to take a holistic and all-encompassing approach to environmental protection spanning the entire product life cycle from product planning to end-of-life recycling and disposal. We also work with product-specific guidelines that refine the requirements outlined in SN 36350.

*“Our knowledge and our solutions are helping to create a better world. We have a responsibility to the wider community and we are committed to environmental protection.*

*In our global operations, featuring a great diversity of processes, products and services, our company is concerned with sustaining the natural resources essential to life.*

*We view the economy, environmental protection and social responsibility as three key factors carrying equal weight in a liberal world market. We support*

*the dissemination of knowledge needed for sustainable development through the transfer of knowledge in the fields of management and technology, wherever we operate as a company.*

*For us, sustainable development in environmental protection means careful use of natural resources, which is why we assess possible environmental impacts in the early stages of product and process development. It is our aim to avoid pollution altogether or to reduce it to a minimum, above and beyond statutory requirements.”*



# The Product

## Product Description

Circuit breakers are the central part of AIS and GIS switchgear. They have to meet high requirements in terms of:

- Reliable opening and closing
- Consistent quenching performance with rated and short-circuit currents even after many switching operations
- Maintenance-free operating mechanisms

Due to the consistent application of our modular design, the 3AP1 FG 145 kV circuit breaker is made using the same range of components as all Siemens circuit breakers, whether air- or gas-insulated, based on our well proven platform concept. One of these components is, for example, the interrupter unit with self-compression arc-quenching principle. Self-compression circuit breakers of the 3AP family ensure optimum use of the thermal energy of the arc. Siemens patented this method for arc quenching in 1973. Since that time, Siemens has continued to develop the technology of the self-compression interrupter unit, e.g. the arc energy is increasingly used to extinguish the arc. In short-circuit breaking operations, the actuating energy required is reduced to the energy needed for mechanical contact movement. That means that the operating energy is truly minimized.

## Manufacturing

The products of our 3AP circuit breaker family are manufactured according to the new Siemens Production System (SPS). Application of these new methods improves the whole production process, including sales and dispatch, and results in less lead time and work in process. It helps to avoid needlessly high stocks, overproduction, holding times, rejects and unnecessary transportation. Process optimizations concerning hazardous production material led to reduction of varnished surfaces to the minimum and use of powder- or water-based lacquer. Code of conduct for all Siemens suppliers world-wide – defines principles and Siemens demands on our suppliers of goods and services regarding their responsibility for human and environmental safety. This means that all suppliers are obliged to apply environmental management systems in accordance with ISO 14001 or comparable systems.

## Manufacturer

Siemens AG  
Energy Sector  
Power Transmission Division  
High Voltage Products  
Nonnendammallee 104  
13629 Berlin, Germany

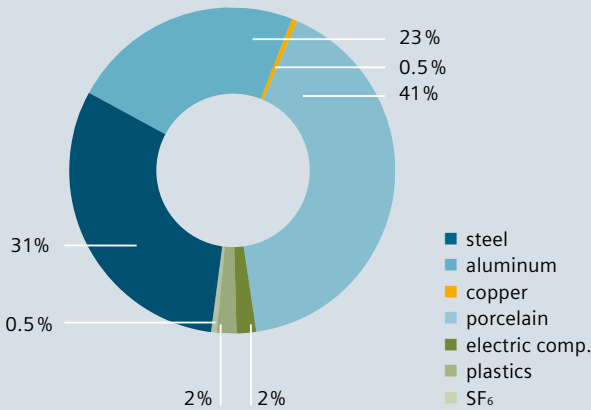
## Contact

[www.siemens.com/energy](http://www.siemens.com/energy)

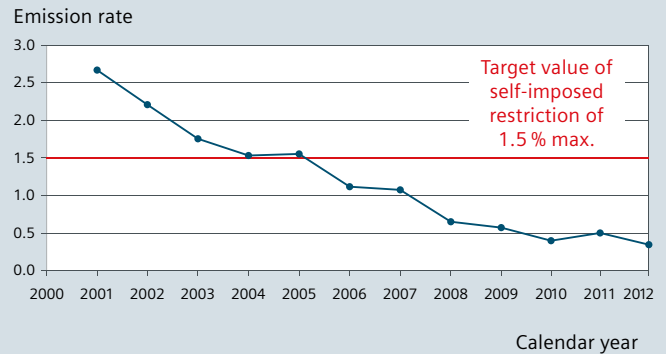


# The Product Life-Cycle

Material composition of the 3AP1 FG 145 kV



SF<sub>6</sub> reduction as a contribution to green manufacturing



SF<sub>6</sub> emission rates for E T H Berlin

## Materials

Procurement of materials as well as the improvement of our 3AP circuit breakers requires not only consideration of functional and cost-optimizing questions, but also ever-growing environmental efforts. This can be achieved either by reducing materials and material variety, or by usage of environmentally friendly substances. Therefore 95% of the material used is recyclable, based on the current state of disposal engineering. Nonrecyclable composites and coatings are largely avoided. Total weight of the 3AP1 FG circuit breaker has been constantly reduced at currently 1336 kg, and it does not contain any operating fluids. Our high quality standards lead to exceptional high longevity of more than 50 years; first maintenance is due after 25 years. Likewise remarkable the particularly low SF<sub>6</sub> leakage rate of less than 0.1% p.a. (0.016 kg) and the rate of 4303 years meantime between major failures. All circuit breaker documentation such as brochures or operating instructions is printed on elementary chlorine-free bleached paper. Also, disposal of the packaging materials is ecologically responsive as we use minimized quantities of steel and wood, which are entirely recyclable.

## SF<sub>6</sub>

Thanks to its outstanding dielectric properties sulfur hexafluoride (SF<sub>6</sub>) has been in use since 1968 as an insulating and arc-extinguishing gas in high-voltage technology. Even though SF<sub>6</sub> is non-toxic and does not damage the ozone, it is still a potent greenhouse gas. That is why in 2005, German manufacturers (incl. Siemens), in collaboration with users and the SF<sub>6</sub>-producer Solvay, agreed to comply with a self-imposed requirement to decrease emissions beyond what existing laws and regulations stipulated. When it went into effect the emission rate at the Berlin plant had reached the target value of 1.5% (emitted from the total amount used for development, production and filling of products). Since then, the use of modern systems and proper handling have made it possible to reduce that figure to 0.6%.



### **Environmental and Quality Management**

All our circuit breakers are fully type-tested in accordance with the latest IEC 62271 and ANSI standards.

The test laboratories that we work together with are accredited to EN 45001 and are part of the European network of independent testing organizations (PEHLA / KEMA / CESI).

Our comprehensive quality system is certified according to DIN EN ISO 9001 and was implemented in 1989. It covers development, manufacturing, sales, commissioning and after-sales service.

The Siemens high-voltage business unit has been certified according to DIN EN ISO 14001 since 1995.

Consistent implementation of environmental and quality management processes at all times, as well as periodic internal and external process audits, enable us to offer our 3AP1 FG circuit breakers as one of the industry's best concerning state-of-the-art manufacturing quality as well as environmentally friendly design.

### **Proper Disposal at the End of Product Life-Cycle**

The 3AP1 FG is an environmentally compatible product. In disposal after no less than 50 years, priority must be given to reuse of the materials. Environmentally acceptable disposal is possible in line with current legislation. It can be recycled as mixed scrap, or, if it is dismantled as far as possible, in a more environmentally acceptable way as sorted scrap with a mixed-scrap residual portion.

In accordance with the latest IEC 62271-4 the insulating and quenching medium SF<sub>6</sub> must be drained off/evacuated and, after reconditioning, made available for reuse. In the opened gas compartments, there may be solid decomposition products resulting from switching operations. The gaseous products are absorbed by the built-in filters. When switching devices containing SF<sub>6</sub> are disposed of (with particular regard to filter material and solid decomposition products), the necessary safety measures must be complied with.

Detailed information concerning disposal can be obtained from the circuit breaker's operating instructions or at any time from our local customer support offices.

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