

SIEMENS

Ingenuity for life

Safety first in oil & gas

Ester converters with ATEX certification

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

The challenge

Transformers for industrial applications often are located close to employees' work areas. Converters for the oil & gas-industry may even be operated at sea.

Although oil leakage in a transformer is very unlikely, a risk of oil spilling remains. But it is not only environmental protection that needs to be considered. The health and safety of the staff are also of utmost importance. That is why our customer in the UAE asked for a converter with synthetic ester insulation for his application.

The solution

The customer approached Siemens Transformers, a pioneer in alternative fluids and experienced in adjusting transformer design to the special characteristics of ester.

The decision was to go with MIDEL 7131, a synthetic ester fluid that is approved up to 433 kV. As a high-performance liquid insulation medium, it is fire safe and at the same time robust and biodegradable.

The transformers were designed and manufactured by Siemens Transformers in Dresden, Germany. They have a rating of 16/4 x 4 MVA at a voltage level of 33 kV/4x 2.0 kV \pm 5% and are equipped with a no-load tap changer.

The units have a core with an intermediate yoke and four low-voltage systems in a double tier for feeding a 24-pulse converter, and received an ATEX-certification for Ex-zone 2 IIA/IIB T3.

To meet the customer's safety requirement for explosion prevention, they are equipped with a Sergi transformer explosion prevention system.



Converter transformer for an oil and gas application in Abu Dhabi, UAE

Highest performance meets superior environmental and safety standards.

Converter transformers

Converter transformers need to supply the input for variable speed drives: for example in large-scale industry drives, pump stations, rolling stock applications, and blast furnaces. Multi-pulse rectifier operation (up to 36 pulses) must also be possible.

When operating large drives there is no standard voltage, which results in specific voltage and insulation levels, depending on the industrial application. The operating conditions, however, are just as tough as in other industry applications: harmonics need to be reduced and short-circuit currents limited. The output frequency needs to be flexible, as should the transformer's ability to cope with different load cycles. In short: A transformer needs to ensure flexible voltage adaptation to meet the drive input voltage.

Technical features

The converter transformer for this project is built according to IEC 61378. The use of synthetic ester insulation results in increased fire safety as well as environmental protection.

Esters provide a higher flash and fire point than mineral insulation liquids. This makes the operation safe and protects valuable assets. In addition, the lower gas conversion factor of synthetic ester fluids reduces the risk of tank rupture. Overall, ester insulation fluids add to the zero-harm policy that is a core value for most companies in the industrial sector.

Additionally, synthetic ester is also extremely moisture tolerant. This means that the cellulose insulation is also expected to have a longer lifespan and provide higher oxidation stability and better cold temperature performance than natural ester.

Transformer operators also benefit from the ability to safely increase transformer loading or reduce transformer size when deciding in favor of synthetic ester insulation.

Benefits of ester for industrial transformer operators

While ester use in transformers was pioneered primarily by grid operators, industrial companies may now benefit from the R&D and the experiences gained since the very beginning.

Ester provides technical as well as safety advantages, and can ultimately even be less expensive. The advantages at a glance:

- High flash and fire point for increased safety
- Readily biodegradable liquid for extended environmental protection
- High moisture tolerance for a long lifespan
- Option of increasing transformer loading
- Synthetic ester: low pour point (-56°C) allows operation in cold climates
- Lower costs thanks to decreased risk of fire and long outages due to hazardous failures

If you are interested in learning more about the advantages of ester in your application, talk to us!



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Siemens AG
Energy Management Division
Freyeslebenstrasse 1
91058 Erlangen, Germany

Siemens Transformers
Katzwangerstrasse 150
90461 Nuernberg, Germany