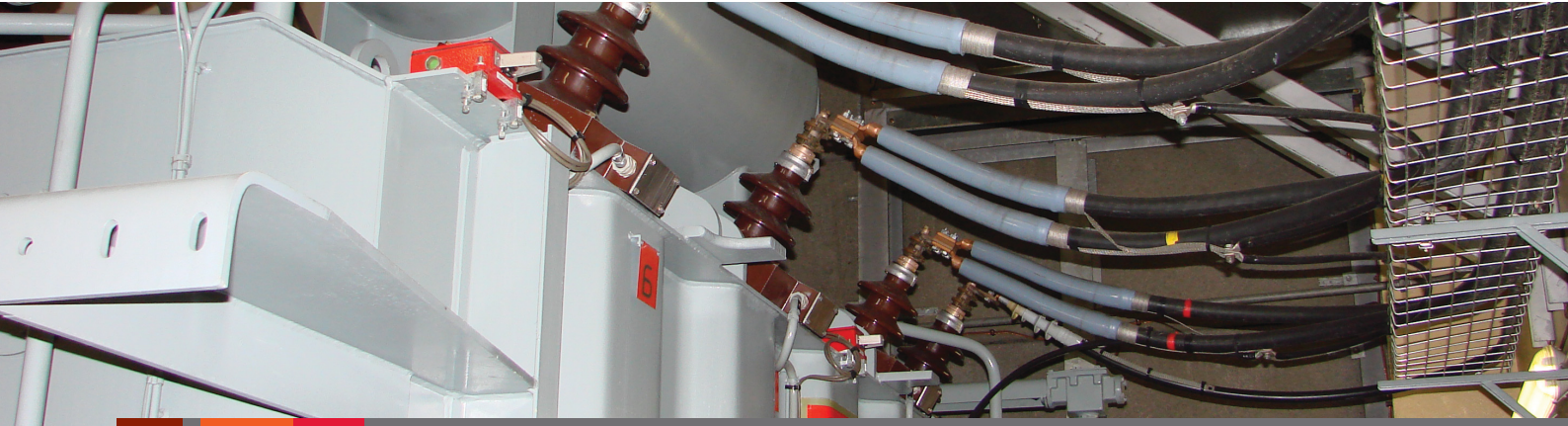


Hybrid transformer scores a European first at GEG

High rating, limited size and low noise emissions were the requirements of Gaz Electricité de Grenoble for this transformer

"Transformers to be located in densely populated urban areas must meet all the usual technical requirements such as size, weight, overload capacity, safety and reliability. In addition, noise is a major constraint," explains Jean-Paul Giraud, CEO of Gaz Electricité de Grenoble. Transformers with forced ventilation systems generate noise that is unacceptable in residential districts. Sound traps and possible modifications to the substation to suppress such noise add considerably to the overall cost.

This was the situation facing Gaz Electricité de Grenoble (GEG), the power utility of Grenoble (pop. 160 000) in south-eastern France, when an aging 10 MVA (63 kV/5kV) transformer in the city needed to be replaced. After considering several options, GEG chose a Pauwels 36 MVA (63kV/21kV) with natural cooling. The fluid-filled transformer uses a hybrid insulation system based on DuPont™ Nomex® thermal technology which meets the recent IEC 60076-14 technical guide.

Roger Joubert, head of the Electricity Operations Department, submitted the specifications that GEG laid down for this transformer to Mr Bresson Lavigne from KWI, an engineering company in charge of the project. The installation is in the centre of Grenoble, with residents living all around the site, so low noise emissions during operation were important. The replacement unit had to have a much higher rating than the previous transformer, but it also had to fit in the existing substation, so the dimensions were strictly limited.

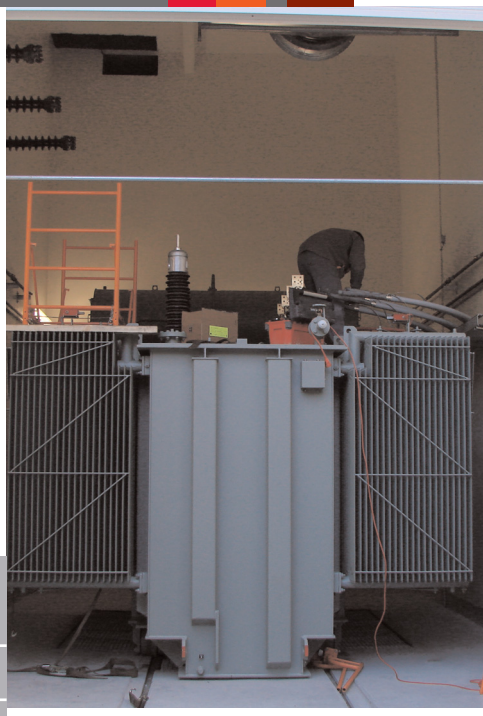
"We considered various designs using different cooling methods like, ONAN, ONAF, ODAF, keeping in mind the additional cost of sound traps and other peripheral equipment to reduce the noise made by a forced ventilation system," says Roger Joubert. "Finally, we gave preference to a transformer from Pauwels International N.V. with natural air ventilation as a very good all-round solution. We examined the question of safety and reliability with special care, as the transformer has to operate at full load with only the existing air-entry points in the substation."

Night view of the densely populated urban areas of Grenoble. (photo GEG)

DUPONT®

Nomex®

With this 36 MVA transformer, GEG marked a 'first' in Europe. Hybrid technology has been used in power transformers for quite some time including in transformers for power substations, however this is the first time that the technology will be applied in a power substation in Europe by an electricity utility.
Established more than 100 years ago, GEG has a well-deserved reputation for seeking innovative solutions to the problems that face power utilities.
Transformers insulated with tried-and-tested DuPont™ Nomex® thermal technology are smaller and lighter for a given power rating than most conventionally insulated units, take load variations and overloads in their stride, operate safely and reliably with winding temperature rises of more than 65 K.



Installation, in the densely populated urban areas of Grenoble, of Pauwels fluid-filled 36 MVA transformer, using a hybrid insulation system based on DuPont™ Nomex® thermal technology.

Technical Description

Power	36 MVA
Voltage	HV=63kV, LV=21kV, three phase
Vector group	YN yn0
No-load losses	19 kW
Load losses in nominal tap	140 kW
Dimensions	
Length/width/height	5400/3560/3950 mm
Cooling	ONAN Mineral-oil filled, meets IEC 60296

Application
36 MVA liquid-filled transformer installed in urban substation in a densely populated district

Requirements
Low noise emissions during operation, power capacity increase for similar footprint, safety in use, reliability, extended lifetime

Configuration
Step-down power transformer with hybrid insulation (DuPont™ Nomex® brand paper on conductors and NOMEX® brand pressboard for spacers) which meets IEC 60076-14.

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