CASE HISTORY

RATP chooses Pauwels SLIM® transformers for Paris Métro and RER

Compact size and overload potential clinched the RATP deal

RATP, the Paris public transport authority, recently started installing about 100 Pauwels stationary traction transformers in and around the city to supply electric power to the underground (Métro) and suburban rail (RER) systems. The 3.3, 4.4 and 5.5 MVA units are based on Pauwels' innovative SLIM® design with DuPont™ NOMEX® thermal technology, which enables them to achieve the critical compact size and overload potential the RATP requires.

RATP replaces equipment at regular intervals to assure maximum reliability of the city's public transport system. But RATP's switch to the compact SLIM® transformers was more than just routine replacement policy.

Stationary traction transformers supply current to a section of line. When a train passes on that section – and even more so when two trains cross there – that transformer carries an extra-heavy current. The resulting internal temperature rise may degrade the cellulose paper insulation in conventional transformers, and degradation products may contaminate the dielectric. Repeated overloads can lead to insulation failure, i.e. transformer breakdown, with disastrous results for any public transport system.

According to Mr Daniel Vavasseur, the RATP engineer who led the negotiations with Pauwels, the increasing frequency of Métro and RER trains created higher and more frequent overloads, which were pushing some older units to their limits. Ageing equipment and the availability of new technology led them to seek a new solution.

Installing higher-rated – and, therefore, bulkier – conventional transformers would have solved this problem. But the available space for stationary traction transformers in Paris is limited and expensive, and the city imposes limits on the weight and dimensions that can be carried on roads.

The combined innovative design skills of Pauwels and DuPont™ NOMEX® thermal insulation technology allowed the use of SLIM® transformers that have smaller dimensions than conventional units of the same power. "The 5.5 MVA units, for example, are only 250 cm long, 190 cm wide and 230 cm high, but do not compromise on reliability and safety," says Mr François Landais, sales engineer with Pauwels France.

DuPont™
NOMEX®

"Cellulose paper starts to degrade at 105° C," explains Dr. ir. Jan Declercq, Technical Business Development Manager with Pauwels International. "Pauwels SLIM® transformers with NOMEX® paper can easily withstand such temperatures. NOMEX® can withstand up to 220° C without degradation; this means extra capacity to handle peak loads and other emergency situations."

"Safety is also a key factor in such installations. The inherent self-extinguishing characteristics of NOMEX® (classified M1 F1 according to NF F 16-101) enable these transformers to meet the RATP's stringent safety requirements. Moreover, the SLIM® transformers use silicone fluid dielectric instead of mineral oil, which has a flash point of about 150° C compared to 360° C for silicone fluid."

Apart from their compact dimension and greater reserve capacity, Pauwels SLIM® transformers offer another advantage. "The previously installed 5 MVA transformers needed ventilators to dissipate heat generated by overloads," Mr Vavasseur says. "Ventilators are noisy, need maintenance, consume energy and occasionally break down. Smaller transformers that don't need ventilators may still overheat. NOMEX® thermal technology solved both problems, allowing ventilators to be removed from the larger transformers and improving the safety of the smaller units."

The installation of Pauwels stationary traction transformers, which meet all the RATP's specifications for safety, reliability and life expectancy, began in 2003 and will continue over a period of four years.

Application:
Stationary traction transformers installed in rectifier stations in and around Paris.

Requirements:
- Overload potential
- Compact size
- High reliability and extended lifetime
- Safety in use
- Cost-effectiveness (initial and lifecycle costs)

Configuration:
SLIM® Distribution transformers rated at 3.3, 4.4 and 5.5 MVA, 20 kV/585 V or 1175 V with NOMEX® thermal technology and DC 561 silicone fluid dielectric.

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