Transformer with low-maintenance cooling

Use Case: Water-cooling without oil-pumps

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The challenge
With an ever increasing need for reliable and efficient energy, substations are moving closer to the consumer.

Our customer IBC, a public utility in Switzerland, needed to construct a new substation in Chur to replace an outdated one. Due to a lack of space, the chosen location was underground – right underneath a playground.

As the transformer is operated in a cavern, transformer cooling was essential for the customer. In addition, the transformers had to adhere to Swiss regulation on the maximum threshold for electromagnetic radiation (NISV).

The solution
Siemens designed two 52.6 / 10.3 kV power transformers with a rating of 16 MVA for this project. The weight of each unit is 40.4 tons.

The transformer units were designed and manufactured at the Siemens transformer plant in Linz, Austria. Due to the underground location of the substation, Siemens designed a tailor-made cooling system without a mechanical oil pump.

By choosing Siemens, IBC was provided with the technical expertise not only to design these transformer units but also to complete the installation process which, due to the underground location, also presented certain challenges.

„Thank you very much for the good pleasant collaboration. “
Guido Giovanoli, Head of Planning & Projects, IBC, Chur, Switzerland

IBC Energie Wasser Chur

Established in 1896, IBC is a long-standing energy company based in Chur, Switzerland. The company is the key power and water supplier in the canton of Graubünden, Switzerland.

Increasing reliability and efficiency at low maintenance – improved sustainability

Technical features

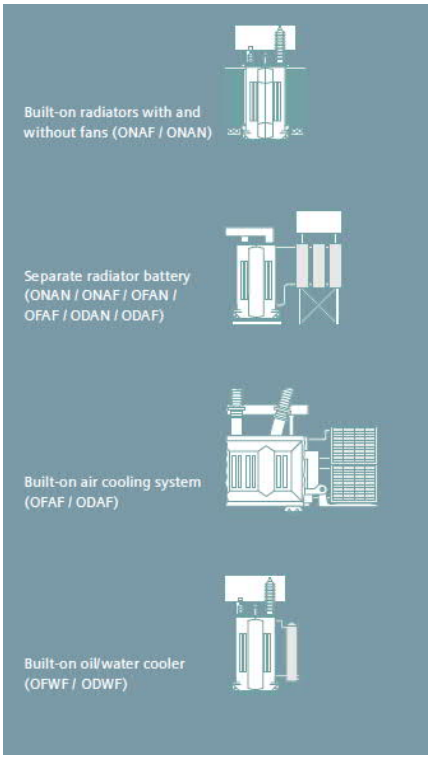
1. Energy-saving cooling system
Two main criteria determined the selection of the cooling system: The transformer operation in a closed cavern and low maintenance requirements. Therefore a thermosyphon cooling system was developed, where natural convection circulates the insulating oil without the need for a pump. This provides cooling while saving energy and lowering maintenance costs. This is the first time that Siemens has supplied a thermosyphon cooling system to a customer in Europe.

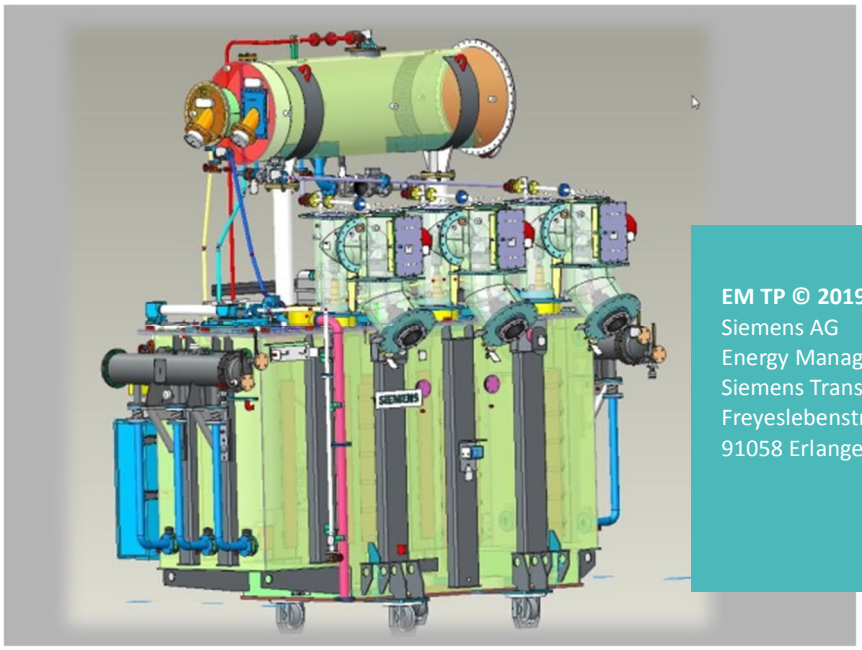
2. Low magnetic field
These transformer units comply with Swiss NISV regulation regarding the maximum threshold for electro-magnetic radiation. The units have been specially isolated to prevent electromagnetic radiation from being emitted into the surrounding area.

3. Plug and play connections
For ease of installation and commissioning – and also in case of maintenance – the transformers are connected to the grid via plug and play cables and connections. This reduces installation time and effort and makes installation inside the cavern easier than dealing with nuts and bolts to install a conventional power transformer bushing.

4. Compact design suitable for limited space installation and operation
The space available in cities – and especially inside a cavern – is very limited. Optimization of insulation distances and designing the transformer to fit exactly in the designated spot is crucial. Therefore, the transformer had to be optimized regarding its dimensions.

Different cooling types in conventional transformers:





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