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Dmytro Honcharenko¹, Yuliya Sobol²

¹student of group E-426a National University “Zaporizhzhia Polytechnic”

²PhD (Philology), assistant professor National University “Zaporizhzhia Polytechnic”

SULFUR HEXAFLUORIDE GAS BENEFITS IN RELATION TO OIL AND CELLULOSE INSULATION IN VOLTAGE TRANSFORMERS

Insulation is used in most areas of voltage transformers designing, beginning from transformer winding insulation and ending with sulfur hexafluoride (SF₆) gas, transformer oil, and cellulose insulation for dry transformers.

The insulation that separates the current-carrying parts from each other and from the grounded parts in power transformers is performed in the form of structures made of solid and liquid dielectrics [3].

In SF₆ gas voltage transformers, sulfur hexafluoride is used as insulation and refrigerant, which makes it possible to abandon the fire extinguishing system since sulfur hexafluoride is not combustible, and it also removes the need for oil collectors and gutters around the transformer [1].

In case of internal malfunctions, the pressure in the tank is very small in comparison to the strength characteristics of the tank, which ensures that the tank does not explode and the equipment around it does not suffer [1].

Since neither an expansion tank, nor a pressure relief device, which are important components of an oil transformer, are needed, it becomes possible to significantly reduce the height of the substation [1].

A significant decline in the cost of substation building or a room for a transformer is achieved by increasing the compactness of the transformer [1].

It is also worth noting that, unlike oil-insulated transformers, the total cost of the transformer decreases with a decrease in size and the absence of an expansion tank and an oil pan, as well as additional costs for building the premises.

The main and indisputable advantage of dry type transformers with cellulose insulation is an operational safety [2].

In areas with increased safety requirements (educational, medical institutions, park recreation areas, etc.), the use of dry transformers is more than justified [2].

Since dry type transformers meet all fire safety requirements, they can be installed directly in production rooms or in a special room near a residential building.

Due to the design features, namely the absence of flammable liquids in the design, unlike oil, dry transformers have a significantly lower probability of catching on fire during a short circuit or from any external mechanical impact, but are still inferior to SF₆ gas transformers in terms of fire safety [2].

In conclusion we can briefly highlight the advantages of sulfur hexafluoride over other types of insulation, namely fire safety, explosion safety, compact design of the transformers, lack of need for additional pressure and oil control units.

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