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Thermal Behaviour of Electrical Distribution Transformers Immersed in Natural Ester Fluids

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Abstract

Since the early 1990s, natural ester fluids have been developed as an alternative to the growing energy and environmental crisis that face the planet. Its main advantages in comparison with mineral oil are: they are biodegradable, they come from a renewable resource, and their safe operation due to their high flash point. However, their cost of acquisition, the few studies reported, that can support their long-term operational characteristics and short application times, are barriers that limit their massive implementation.

This study presents a finite element method (FEM) analysis of the thermal behavior of an electrical distribution transformer using a natural ester fluid as dielectric liquid in a distribution transformer. Additionally, the study will be carried out in the same equipment using mineral oil and natural ester in order to compare results.

Keywords: natural ester fluids, finite element method (FEM), thermal behavior, distribution transformers.