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Evaluation of an efficient transformer core design

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Abstract

Distribution transformers have inherently high efficiencies of up to 99%, however they are in continuous operation and have a long lifespan, hence their power loss cost is still significant. A small efficiency improvement can lead to a considerable amount of energy savings over the lifetime of the transformer.

Symmetric core design has the potential to improve transformer efficiency. The aim of this dissertation is to evaluate a relatively new symmetrical triangular core transformer for use in the Eskom Distribution network in South Africa. The transformer is called the hexa-transformer.

A three phase 100 kVA hexa-transformer unit has been purchased from Hexaformer AB in Sweden. The unit has been routinely tested. A 50% no-load loss reduction has been achieved. The transformer was also opened and examined. The results indicated sound manufacturing quality. The economic analysis indicated a life cycle saving of R 2 727.41 per a transformer over a 25 year period when compared to a conventional E-core transformer of the same rating. It is recommended that Eskom consider these units for future implementation in their Distribution network.