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Transformer Life Expectancy

Isolation transformers comprise a primary winding and a secondary winding which must be physically and electrically separated from one another. Electrical separation is achieved by the use of an insulating medium, either air or sheet insulation material or a combination of both.

The dielectric strength of an insulating material reduces with increasing temperature. Continuous transformer operation at elevated temperatures therefore results in faster aging of the insulating material with a consequent reduction of the insulating properties of the material. Reduction or loss of the materials insulating properties results in the eventual failure of the transformer.

Many transformers are not operated continuously at full load; the load tends to be cyclic in nature. Since the primary factors in the determination of transformer life expectancy are temperature and time, this cyclic nature of the load makes accurate predictions of life expectancy extremely difficult.

While it is generally recognized that the life expectancy of a transformer is determined to a great extent by temperature and time, other factors can also have an influence, such as:

- Occurrence of overload conditions. Frequent or extended periods of overload can reduce life expectancy.
- Quality of power supply, i.e. frequent voltage surges may overstress insulation.

In conclusion, it may be stated that the life expectancy of a transformer is proportional to its average operating temperature. For a transformer operated well within the capabilities of its insulation system over its entire life and not subjected to any significant overvoltage conditions, it is not unreasonable to expect a useful life of between twenty and thirty years.