The state of transformer oil and cellulose insulation is one of the key parameters influencing equipment life expectancy and reliability. ABB’s Oil Reclamation service is an economical and environmentally friendly process that restores the properties of the transformer oil close to the values of new oil. By removing acids, sludge and other oxidation products, the aging rate of the oil and its effect on insulating materials is mitigated.

The aging rate of insulating materials depends on different parameters such as:
- Original insulation material quality
- Oil temperature
- Moisture content
- Oxygen content
- Acids from oil degradation

Oxidation is the main reason for oil aging. The aging rate of oil is influenced by temperature, as well as metals like copper and iron. Moisture, acids and sludge are the oxidation products that cause the most concern. Reclamation of transformer oil is a measure to restore the oil’s properties close to the values of new oil. It is important to point out that oil reclamation is not a drying process. If the transformer insulation is very wet, drying of the transformer should be considered in combination with reclamation. Degassing and filtering are not a reclamation process either.

When to undertake the oil reclamation process
When the oil shows unacceptable values for neutralization number, interfacial tension and dissipation factor then reclaiming should be considered. Since the aging of insulation is an irreversible process, it is important to reclaim before the degradation has gone too far.

ABB’s oil reclamation method
The total oil volume of a transformer is circulated several times (8-12) over the absorption columns that are filled with bauxite (Aluminum oxide). During the process, the bauxite is automatically reactivated. With conventional techniques, the material would have to be changed and disposed of. The reactivation method makes it economically possible to use the bauxite over and over again.

As shown in the graph below, when less absorbent measures are used the long-term effect is not satisfactory. In general, it is always less costly to change the oil for small transformers, less than 2 MVA, than to reclaim it. For transformers larger than 10 MVA, it will be approximately 30% more expensive to replace the oil.
Aging of transformer oil after reclamation and oil change.

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