



Partial discharge Testing of Mineral Oil/Paper Insulated Instrument Transformers

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Areva performs routine partial discharge testing (PD testing) on all units type OSKF, OTEF and KOTEF. The objective of the test is to ensure quality in workmanship of the high voltage insulation. The test is described by most industry standards and the most stringent test limits are set by IEC. Areva Waynesboro adopted these values in 1995:

Voltage	Maximum allowed Partial discharge
Maximum System Voltage (Maximum Line-Line Voltage) Example for 230 kV System; this voltage is 245 kV	10 pC
120% Maximum Line-Ground Voltage Example for 230 kV System; this voltage is 170 kV	5 pC (virtually no discharge from the High Voltage insulation, the limit is set as the achievable background noise)

A partial discharge is an electric discharge, which only partially bridges the insulation between conductors. The current of this discharge is converted through integration into an electrical charge and is displayed as a function of the unit and test set-up parameters (apparent discharge). 1 pC equals One Ampere x 1 second x 10^{-12} .

Partial discharge free high voltage insulation systems are necessary for long-term service.

To achieve a partial discharge free high voltage insulation system, not only design, materials and workmanship have to meet stringent requirements, but also processing plays an important role. The partial discharge test is highly sensitive and picks up voids or unevenness in the insulation. Despite rigorous controls, the processing is influenced by many parameters and might vary from batch to batch (e.g. ambient temperature or humidity). As a result, it might take several test sequences to find the point in time when the unit is fully processed (e.g. all micro-pores are fully impregnated with oil). The Areva designs type OSKF, OTEF and KOTEF are unique in their dense, machine applied kraft paper

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insulation. Even for a unit which has undergone several rounds of partial discharge testing, a successful find result is evidence that the unit has attained the high quality insulation system demanded of Ritz units.

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