

Furan analysis on power transformers in Malaysia: a field investigation

Abstract

The insulating materials (oil and cellulose paper) of power transformers undergo ageing during service. Thus condition monitoring of power transformers in service is very important. An established chemical test carried out on the transformer oil to determine the level of paper insulation deterioration in power transformers is the Furan Analysis. Numerous studies have been carried out to investigate transformer ageing in the laboratory, however, field investigations on full-scale or commercial power transformers using Furan Analysis are lacking. This paper reports an investigation on the concentration of 2-Furfuraldehyde in oil samples collected from 414 power transformers of Tenaga Nasional Berhad (Malaysia national power company) transmission and distribution system. Statistical analysis of the Furfural data showed a trend in the furfural concentrations (FC) of the power transformers. Temporal variation showed older transformers had higher FC. Further analysis on case by case basis on six transformers revealed that FC correlated well with the level of transformer insulation deterioration and operating conditions. Frequency Dielectric Spectroscopy test carried out on some of the power transformers corroborated the above findings.