

In ELECTRA No. 202 – June 2002, the CIGRÉ TASK FORCE 15.01.09 published  
“DIELECTRIC RESPONSE METHODS FOR DIAGNOSTICS OF POWER TRANSFORMERS”.

At the end of this publication the following **CONCLUSIONS AND GUIDELINES** can be found:

*“The results of work of TF 15.01.09 presented in this report confirm that the dielectric response measurements provide valuable information on the state of oil-paper insulation in power transformers, in particular the moisture content. All the dielectric response methods compared (RVM, FDS, PDC) reflect the same fundamental polarisation and conduction phenomena in transformer insulation, the special feature of which is a combination of oil gaps and solid insulation.*

*The dielectric measurements described here confirm that due to the influence of oil gaps, the condition of the oil, specifically its conductivity, has a significant impact on dielectric response, and this must be taken into account when attempting to estimate moisture contents in the solid insulation from the results of all three methods.*

*Regarding the influence of geometry, it has an influence on the response but not as significant as the effect of the oil conductivity. For the tested sizes of oil gaps, which are typical for the transformer insulation, it is first of all the existence of the gaps rather than their detail dimensions which has the main impact on the results of the measurements.*

*For the RVM technique, the old interpretation based only on simple relationship between the dominant time constant of the polarisation spectrum and the water content in cellulose is not correct. An improved interpretation requires taking into account the complete measured curve. An alternative qualitative interpretation has been proposed which resolves some previous anomalous conclusions.*

*Mathematical modelling provides a link between the measured responses of the applied three methods and shows how responses are affected by oil conductivity (resistivity), moisture content and object geometry. Knowledge of the dielectric properties of insulation components is needed for this purpose. Such modelling is recommended today for interpretation of the results of all methods.*

*Before operational decisions concerning life management of transformers can be made with confidence from the indications of the dielectric response techniques, further validation is required. There is a particular need to verify the estimates of water content determined by the dielectric response techniques by comparison with basic chemical measurements. The influences of different types of pressboard/paper and ageing products (beyond the effects of oil conductivity and moisture) on dielectric response have yet to be determined conclusively.*

*Since all three methods use different measurements, they could in principle and appear to have in practice, their own strengths and weaknesses. These need to be assessed further before any one can be recommended over the others.”*