

PROPOSAL FOR CREATION OF A NEW WORKING GROUP

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| <p>WG N° A2-40</p> | <p>Name of Convenor : Jelena Lukic (Serbia)</p> |
| <p>Title of the Group: Copper sulphide long-term mitigation and risk assessment</p> | |
| <p>Scope, deliverables and proposed time schedule of the Group :</p> <p>Background</p> <p>Problems encountered with copper sulphide in transformer insulation are still issues of concern in transformer industry. Nevertheless number of reported failed cases due to copper sulphide deposition in the windings is until today quite low, need to continue work in this field has been recognized, since thousands of transformers have been passivated in last few years and many units are in service with corrosive oils. Mechanisms of copper sulphide formation, influence of oxygen, magnetic and electrical fields and impact of materials other than oil are not fully understood so far. Several mitigation techniques for removal of corrosive sulphur from the oil have been reported and applied with apparent success. The addition of metal passivator is today the mitigation technique that has been used most widely. More field experience needs to be gathered to improve current knowledge in risk assessment and long-term effects of applied mitigation techniques.</p> <p>Scope</p> <p><i>State of the art, more precise risk assessment and long-term effects of mitigation techniques</i> are prioritised areas of concern for further research.</p> <p><u>Sources of sulphur other than oil</u> Possibility that materials other than oil, containing sulphur might be converted to reactive forms under specific operational conditions and transformer environment should be explored.</p> <p><u>Influential factors and mechanism</u> Role of oxygen on copper sulphide formation and deposition on paper insulation and other details of the copper sulphide formation mechanism should be further studied, like investigations of copper sulphide by-products and specific sulphur compounds. Influence of magnetic and electrical fields, impact of DC fields should be explored, since there are indications of correlations with amount and location of copper sulphide deposits in windings. Better mapping of influential factors is expected to contribute to improvement of risk assessment.</p> <p><u>Methods and tools in diagnostics</u> More statistics to be collected, including DGA history, detailed post-failure inspections, together with oil analysis of specific sulphur compounds and copper sulphide by-products is expected to put more insight with mechanisms involved and associated risks.</p> <p><u>Metal passivator stability and efficiency</u> Extended study on passivator stability, distribution in paper/oil insulation and its efficiency influenced by operating conditions, temperature, oil composition and performance is to be performed. Phenomena of rapid metal passivator consumption from the oil and possible correlations to stray gassing, oil oxidation stability and ageing products should be investigated. Protective function of passivator absorbed in the paper and its efficiency after copper sulphide has been already deposited in windings should also be explored. More studies on ways of passivator protective action in the paper would be valuable to highlight this subject.</p> <p><u>Efficiency of existing on-site oil treatment processes and new technologies</u> Development of new techniques for removal of corrosive sulphur from the oil should be attempted in order to minimize probability of failures. Possibilities that some oils may become more corrosive after oil reclaiming should be also investigated. Follow-up on passivated and reclaimed units, including the influence of operating conditions would enable better prediction on long-term efficiency of mitigation techniques.</p> | |

Deliverables:

- Report: More detailed risk assessment regarding copper sulphide in power transformer insulation
- Report: Study on long-term effects of mitigation techniques
- Brochure and tutorial

Time schedule: start: **May 2009****Final report: May 2012****Comments from Chairmen of SCs concerned:****Approval by Technical Committee Chairman :** Klaus Fröhlich**Date:** 9/4/2009