



Study Committee A2

Working Group Form

JWG N°: A2/C4.39	Name of convenor: Angélica Rocha / Brazil
Title of working group: Electrical Transient Interaction between Transformers and the Power System	
Context <p>The objective of the JWG is to assess and discuss the different types of electrical transient interaction between transformers and other components of the T&D power system, motivated by a general increase in transformer dielectric failures in the system, some of them with no specific causes. Technical articles have been written and recently IEEE and Cigre working groups have summarized the relevant findings. It has been agreed that fast transient overvoltages do exist and can cause damage on transformer windings. However, still a lot of unknowns remain regarding this issue, with reference to transformer design and testing – concerning in particular its insulation – to transformer protection, and to interactions between transformers and fast transient system ‘sources’, such as circuit breakers, capacitor banks, power electronics.</p> <p>In this context, the focus of the JWG is to pursue an improvement of the transformer reliability, based on recommendations regarding equipment specifications, design review, system planning and operation.</p> <p>It is worth mentioning that a significant activity on the subject is in progress in Brazil with the support of utilities, manufacturers and third parties like research institutes. The following results have been obtained.</p> <ul style="list-style-type: none">• Digital simulations show that voltage stresses across transformer terminals are usually restricted to frequencies in the range of 40 kHz-200 kHz. However, when these stresses are compared with the specified standardized waves, they may exceed the transformer withstand design.• Disconnectors switching in substations give rise, in most cases, to transients not well covered by the standard dielectric testes and may contribute to significant stress on the insulation and even transformer failure.• The results are markedly influenced by the assumed transformer models especially for frequencies above 500 kHz. <p>The aim of this JWG is to extend the scope of such a work and to open it a wider international context. This JWG will be conducted under the leadership of SC A2.</p>	
Scope and aim <ul style="list-style-type: none">• Survey on high frequency pulses originated by the system and stressing relevant insulation.• High frequency transformers modelling and testing• Protection and critical connection configurations• Survey of utility experiences regarding transformer failures and occurrences involving transients, including comparison and discussion of the relevant results.• Manufacturer experience concerning technical specifications dealing with transient voltage requisites.• Discussion on the possibility of pinpointing risk factors that may cause failures due to transients (case-by-case analysis, specification; operation/maintenance practices).• Development of a methodology for transient system studies aimed at evaluating a range of frequencies appearing during switching short-circuits in substations, and incoming lines of different voltage level and arrangements.	

Deliverables/time schedule

- July 2008: Starting of the Joint working group
- End of 2010 : Interim Report
- End of 2012 : Final Report

Papers issued: TB, Summary in Electra

Approved by TC chairman: [Klaus Fröhlich](#)
Date: [14/07/2008](#)