CIGRE Study Committee A2

PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP[1]

WG A2.62	**Name of Convenor: Stefan Tenbohlen** (GERMANY) **E-mail address**: stefan.tenbohlen@ieh.uni-stuttgart.de
Strategic Directions #[2]: 2	**Technical Issues #[3]: 8**
The WG applies to distribution networks[4]: Yes	
Potential Benefit of WG work #[6]: 5	
Title of the Group: Analysis of AC Transformer Reliability	

Scope, deliverables and proposed time schedule of the Group:

Background:

Accurate information about service experience of high voltage equipment is of significant value for both electric utilities and for manufacturers of such equipment. Consequently, in 2008, Working Group A2.37 Transformer Reliability was formed to collect and analyse failure data of power transformers by means of a standardized survey. A uniform way of collecting, compiling and presenting AC transformer failure data was proposed. The WG conducted a successful survey of failure data containing 964 major failures which occurred in the period 1996 to 2010, within a total population of 167,459 transformer-years, contributed by 56 utilities from 21 countries. The results of the survey were presented in terms of the investigated population, calculated failure rates and failures classification into location, cause, mode and effects of the failures.
Detailed information about the age distribution of the transformer population was not collected. Thus the calculation of hazard curves was not possible.
After almost 10 years an update in reliability performance of transformers and reactors is proposed with a broad scope

Scope:

1. Update of questionnaire regarding new experiences,
2. Conduction of a new survey about major failures and replacement for the period 2010 to 2019 for AC power transformers of 100 kV and above.
3. Analysis of failure data in terms of failure rate, location, mode and cause,
4. Analysis of failures due to high loading regimes,
5. Individual analysis of failures of transformers connected to GIS, wind farm transformers, transformers filled with new liquids, transformer subjected to overloads, shunt reactors,
6. Determination of the hazard curve of failure and replacement for different transformer populations.

Deliverables:

☒ Technical Brochure and Executive summary in Electra

☒ Electra report

☒ Tutorial[5]

Time Schedule: start: June 2019 **Final Report**: October 2022

Approval by Technical Committee Chairman:

Date: November 12th, 2018

Notes: [1] or Joint Working Group (JWG), [2] See attached Table 2, [3]See attached Table 1, [4] Delete as appropriate, [5] Presentation of the work done by the WG, [6] See attached table 3

Table 1: Technical Issues of the TC project "Network of the Future" (cf. Electra 256 June 2011)

1	Active Distribution Networks resulting in bidirectional flows
2	The application of advanced metering and resulting massive need for exchange of information.
3	The growth in the application of HVDC and power electronics at all voltage levels and its impact on power quality, system control, and system security, and standardisation.
4	The need for the development and massive installation of energy storage systems, and the impact this can have on the power system development and operation.
5	New concepts for system operation and control to take account of active customer interactions and different generation types.
6	New concepts for protection to respond to the developing grid and different characteristics of generation.
7	New concepts in planning to take into account increasing environmental constraints, and new technology solutions for active and reactive power flow control.
8	New tools for system technical performance assessment, because of new Customer, Generator and Network characteristics.
9	Increase of right of way capacity and use of overhead, underground and subsea infrastructure, and its consequence on the technical performance and reliability of the network.
10	An increasing need for keeping Stakeholders aware of the technical and commercial consequences and keeping them engaged during the development of the network of the future.

Table 2: Strategic directions of the TC (ref. Electra 249 April 2010)

1	The electrical power system of the future
2	Making the best use of the existing system
3	Focus on the environment and sustainability
4	Preparation of material readable for non-technical audience

Table 3: Potential benefit of work

1	Commercial, business or economic benefit for industry or the community can be identified as a direct result of this work
2	Existing or future high interest in the work from a wide range of stakeholders
3	Work is likely to contribute to new or revised industry standards or with other long term interest for the Electric Power Industry
4	State-of-the-art or innovative solutions or new technical direction
5	Guide or survey related to existing techniques. Or an update on past work or previous Technical Brochures
6	Work likely to have a safety or environmental benefit