

CIGRE Study committee A2
PROPOSAL FOR THE CREATION OF A NEW WORKING GROUP

WG A2.75

NAME OF THE CONVENOR

MTETWA Sidwell (SOUTH AFRICA)

TITLE

Tap Changer Specification, Condition Assessment, Testing and Maintenance Guidelines

THE WG APPLIES TO DISTRIBUTION NETWORKS: YES

ENERGY TRANSITION

4 / Sustainability and Climate Change
8 / Sector Integration

POTENTIAL BENEFIT OF WG WORK

5 / Guide or survey on techniques, or updates on past work or brochures

STRATEGIC DIRECTION

2 / Making the best use of the existing systems

SUSTAINABLE DEVELOPMENT GOAL

9 / Industry, innovation and infrastructure

BACKGROUND :

On-load tap-changers (OLTCs) are one of the most critical components used in power transformers.

The most common application is the OLTC used in step-up /step-down transformers, but they are also used in shunt reactors, phase-shifting transformers, arc-furnace and HVDC applications. Each application needs special attention with respect to the OLTC. Performance requirements and test methods as well as principal design aspects and standard applications are well described in the relevant tap-changer standards. However, detailed descriptions of specification and selection of tap-changers to meet the special challenges of those applications are not explained in detail by the standards already existing or under revision, because they cannot be comprehensive in dealing with every detail. Today this information is available at the tap-changer manufacturers and can be asked for.

In IEC 60214-2 a list of information to be provided by the transformer manufacturer at the enquiry or order stage for on-load tap-changers is given. However, an explanation on the correct determination of the required values is not given in every case. The specification sheets of the tap-changer manufacturers are based on this required information and might be similar for standard transformer applications but differs from manufacturer to manufacturer when considering special applications. Additionally, also for standard transformers some special situations or duties may arise, which could be missed during specifying the OLTC.

OLTCs have to be maintained regularly. The tap-changer manufacturer documentation usually describes actions to be taken for maintenance on their devices, which is common practice since many years. Today, more and more OLTC shall be refurbished or replaced. Both actions are new challenges, because often it is not only the exchange of a device but also a change to a new technology.

DGA analysis of tap-changers became more and more important within the last decade. CIGRÉ, IEC and IEEE took this task already into their working programs.

The following documents are/will be available:

- IEC 60214-1: 2014 “Tap-changers - Part 1: Performance requirements and test methods”
- IEC 60214-2: 2019 “Tap-changers - Part 2: Application guidelines”
- IEEE C57.139 – 2015 “IEEE Guide for Dissolved Gas Analysis in Transformer Load Tap Changers”
- IEEE C57.152 (under revision) “IEEE Guide for Diagnostic Field Testing of Fluid-Filled Power Transformers, Regulators, and Reactors”
- CIGRE TB445 Guide for Transformer Maintenance (2024 edition)

PURPOSE / OBJECTIVE / BENEFIT OF THIS WORK :

The purpose of this working group is to give guidance to tap changer manufacturers and end users on specification, condition assessment, testing and maintenance.

SCOPE :

The scope of this working group is to provide information on open topics related to the recommended practice of using OLTCs in power transformers and address new input for related standards and guides.

In particular, the following topics shall be covered:

- Special applications of OLTCs not covered completely by existing standards (OLTCs applied to e.g., shunt reactors, phase-shifting transformers, HVDC transformers, arc furnace transformers). Additionally, paralleling of regulated transformers is an issue to be considered.
- Guidelines for the proper selection of OLTCs
 - Transformer design consideration
 - Life cycle cost consideration
 - Specification and design review
- Guidelines on operation, testing and maintenance
 - Commissioning
 - Failure modes and root causes
 - Field testing
 - Dynamic Resistance Measurement
 - Vibro-Acoustic Measurement
 - Dissolved Gas Analysis
 - Fluid quality
 - Temperature/Thermography
 - Condition Assessment
 - Maintenance (scope of work, quality of work...)
- Guidelines on end of life decision making
 - Overhaul/Refurbishment/Modifications/Upgrades
 - Retrofit/Replacement

DELIVERABLES AND EVENTS

Deliverables Types

Annual progress and activity report to Study Committee
Electra report
Technical Brochure and Executive Summary in Electra
Tutorial
Webinar

Time schedule

- | | | |
|----|------|---|
| Q4 | 2024 | Recruit members (National Committees, WiE, NGN) |
| Q1 | 2025 | Develop final work plan |
| Q4 | 2026 | Draft Technical Brochure for Study Committee review |
| Q2 | 2027 | Final draft Technical Brochure |
| Q4 | 2027 | Tutorial |
| Q2 | 2028 | Webinar |

APPROVAL BY TECHNICAL COUNCIL CHAIRMAN:

Rannveig S. J. Løken
November 12th, 2024