

Possibilities of condition assessment of on-load tap-changer (OLTCs) in converter transformers

OLTCs with vacuum switching technology are in most cases maintenance free up to 300.000 switching operations. In many applications this is equivalent to maintenance free over the lifetime. Nevertheless, in some cases it can be desired or required by the end customer to perform some regular checks. Reasons could be

- **regulatory requirements** (such as ISO 55000) in order to undertake e.g., a risk assessment or report the required KPIs from the management
- **insurance policies** if a confirmation of the current condition / status quo of the on-load tap-changer is needed or to verify an appropriate asset management policy
- internal **service processes** on customer site, (e.g. regular transformer service incl. OLTC service for very critical applications like HVDC)

The above given bullets are for sure not exhaustive, but it can be concluded that in any case measures to assess the condition of OLTCs (as part of the transformer) for an energized and de-energized transformer must be available.

The content of this document refers only to possibilities of condition assessment of OLTCs in transformers. Condition assessment of the transformer itself or other parts is not covered. All instructions of the official technical documentation of the respective product/transformer component have to be followed. The measures below describe additional measures which do not replace the activities described in the official technical documentation.

It should be pointed out that ensuring a very good quality process is of great importance as well as appropriate handling and transportation through the whole process chain.

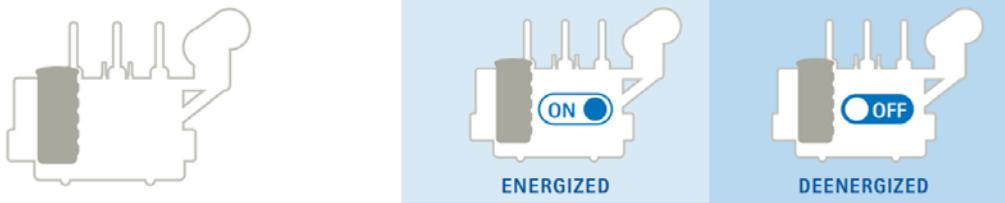
Already during the initial **commissioning** the following activities should be conducted:

- Visual inspection of diverter switch (includes measuring resistance value, operate diverter switch insert, check for irregularities, e.g. particles, rust, ...)
- Fingerprint of vibroacoustic measurement (VAM) and dynamic resistance measurement (DRM)
- Dissolved gas analysis (DGA) sample
- Oil analysis: water, break down voltage (BDV), corrosivity
- After energizing:
 - complete run of OLTC through the regulating range at no load condition
 - repeat DGA sample

During **Maintenance/Condition Assessment** the following activities should be conducted:

- On-line testing: Vibroacoustic measurement, oil analysis like DGA, water content and dielectric strength.
- Off-line testing: Vibroacoustic measurement combined with dynamic resistance measurement, oil analysis like DGA, water content and dielectric strength, visual inspection of diverter switch insert, Vacuum interrupter test

Commissioning and Maintenance should be performed by technically qualified staff.



	ENERGIZED	DEENERGIZED
vibroacoustic measurement	■	■
Oil analysis (DGA, water content, dielectric strength)	■	■
visual inspection of accessible parts	■	■
visual inspection of DSI		■
Test of vacuum interrupter		■
Dynamic resistance measurement		optional
Resistance measurement (selector condition)		optional

Figure 1: Overview of measures for condition assessment of OLTC for energized and deenergized transformer