

PROCEDURE OF DRY OUT BY N₂ / Associated Heating Method

For effective and faster removal of moisture from Transformer/Reactor, method of dry out by N₂ filling / vacuuming and if required heating is adopted. The detail procedure is as mentioned under.

First Cycle

- Blank all the openings on Transformer/Reactor tank. Transformer /Reactor tank is then subjected to vacuum upto 1.00 torr (1mm Hg) to be pulled and maintained for 48 -72 hrs duration during first dry out cycle. Leakages if any observed to be attended and rectified in this cycle.
- After vacuum cycle Dry Nitrogen of Dew point more than -50°C Dew point or Nitrogen of UHP grade (purity 99.9999%) to be pushed under vacuum till pressure of 2.0 Psi is achieved in Transformer tank and to be maintained for 24 Hrs.
- At the end of Nitrogen pressure cycle for 24 hrs, measure dew point values and record these values as dry out values of First Dry out cycle. Moistened Nitrogen inside Transformer tank will be removed during second dry out vacuuming cycle.

Second Cycle:

- Again start vacuuming of transformer tank upto 1.00 Torr i.e. (1mm Hg) and vacuum is to be maintained for 48 hrs in second dry out cycle.
- Dry Nitrogen of Dew point more than -50°C Dew point or Nitrogen of UHP grade (purity 99.9999%) is again to be pushed under vacuum till pressure of 2.0 Psi is achieved in Transformer tank and to be maintained for 24 Hrs.
- Measure dew point after 24 hrs in second Nitrogen cycle and record these dew point values as dew point values of second dry out cycle and compare these second cycle dry out dew point values as per BHEL standard values in consideration with quality of Nitrogen gas used for dry out.
- If the dew point values of second cycle is in line with the BHEL Standard values of Dew point considering the dew point of the gas used for dry out, the transformer is cleared for further vacuuming followed by oil filling and subsequently for HOC.
- In case desired dew point is not achieved then Transformer tank is to be again subjected for vacuum pulling for 24 hrs, followed by N₂ filling for duration of 24 hrs in each dry out cycle and subsequent measurement of Nitrogen gas dew point.

NOTE

If the dew point values were not achieved in 5 dry out cycle and values of dew point as measured is higher on positive dew point side then the N₂ pressurized tank to be heated externally to raise the temperature of transformer upto 55-65°C, followed by dew point measurement. This process is repeated till the proper dew point were achieved.

HOT OIL CIRCULATION

If the dew point is achieved then transformer is to be further cleared for vacuuming, oil filling and subsequently HOC to meet oil parameters.

Effective dry out process in most case will give the best results in 3 cycles, as per BHEL standard norm's minimum 2 dry out cycle has to be carried out at site before oil filling .

- Once dew point is achieved, new processed/filtered oil in separate oil storage tank having BDV more than 70 KV and moisture content less than 5 ppm shall be filled in from bottom of Transformer tank under vacuum. Hot oil circulation shall be carried out under vacuum and at a temperature of 50- 55 deg. C. to achieve BDV > 70kV and water content < 5 PPM.

IR values of different windings and combinations will be tested and thus the improved value will reveal effective dryness of the transformer and complete insulation system inside the transformer.

Aniruddh Vyas
Manager –TXX
Transformer Services Deptt.
BHEL Bhopal