ESSENTIAL TIPS TO REDUCE FAILURE OF DISTRIBUTION TRANSFORMERS
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Distribution Transformer is the costliest equipment in the Distribution Network.

In M.S.E.D.C.L., our distribution network comprises of around 2,25,000 nos. of distribution transformers of various capacities varying from 25KVA to 650KVA with installed capacity around 25000MVA.

Rate of failure of Distribution Transformer is around 16 to 18% p.a. which if converted into number comes out to 36000! & 3600 MVA capacity affected/lost per year.

Considering the cost of transformers to be Rs. 10 Lakhs/MVA, there is great set back on the economics of M.S.E.D.C.L.

It has become the most important K.K.P.I. to reduce the rate of failure of Distribution T/F.

There are a few essential steps & tips to follow to reduce the rate of failure of DTC.

The essential steps to be taken are required to be taken at the Section Office level. They are:

1. Collecting the information of capacity wise No. of T/Fs. in the jurisdiction (This information is generally available with every Section In-charge)
2. Allotting the DTC to “Janmitras” for regular monitoring of condition (This practice is also adopted by Section Officers)
3. Collection of information regarding Peak Hr. Load Quarterly from the responsible “Jan Mitras” This step is required to be taken as an immediate step towards reduction of failure of DTCs.
   This will clear the picture about the number of transformers full loaded & Those overloaded.
4. Collection of information regarding the conditions of T/Fs such as:
   a) Oil Level in the T/F.
   b) Availability of L.A.s on the T/F D.P.
   c) Availability of breather & if available, the condition of breather.
   d) Condition of H.V. & L.V. bushings, connection jumpers etc.
   e) Condition of the Distribution Box such as kit-kats,I.C.main switch,cable condition, door & lock condition etc.
   f) Over all condition of earthing of DTC neutral, body,L.A.,& Dist.box etc.
g) Condition & correctness of protection fuses on H.V. & L.V. side of T/fs. After collecting the above information the following tips can be adopted to reduce the rate of failure.

QUARTERLY MAINTENANCE:
Shut down is to be planned during load shedding period to avoid additional interruption.

a) Check the condition of L.A.s for proper earthing tightness. Always keep an additional L.A.set available while carrying out maintenance of DTC because most of the times, L.A. is either failed & disconnected or missing from the structure owing to previous failure. **This situation I have observed many times while moving on road.**

b) Check H.V.& L.V. connections for tightness of nuts & bolts & clamps .Use proper tightness & firm contact connectors on H.V. side & use lugs of proper size on L.V.cable. This not only helps in avoiding overheating of bushings but also helps in improvement of voltage. (**Voltage on L.V. side in our area was improved from 185v to 230v simply by providing proper lugs on L.V. cable.**) 

c) Check bushings for cracks, chippings, oil leakages if any, over heating marks, flashover marks, looseness of nuts, & tightness of oil seal caps. Proper tightness of nuts on connectors will help in reduction of overheating of the rods which in turn will reduce the chances of damage to oil seal.

d) Check oil level in the conservator tank by using some gauge, & top up oil (If level is less) using good quality oil (Minimum30K.V.B.D.V.)

e) Check the correctness of H.V. fuses & provide correct sized H.V.fuses.

f) Check the condition of Distribution box for
   i) L.V. cable & bus connection. Use lugs for proper connections. This will avoid loose connection & which in turn will avoid Burn out of cable as well as voltage drop to consumers.
   ii) Check condition of Main switch for proper & firm closing of contacts and proper opening of contacts. Apply a thin coat of White petroleum jelly to male & female contacts of the switch for smoothness of operations. Check the fuse links (Bridges) for correct rated fuse size & firmness of contacts.
   iii) Check earthing connections of main switch body, Distr.Box as well as neutral connection for safety of working.
iv) Check the cable entry gland plate. Seal the extra holes if any to avoid entry of any vermin in the box. **Snakes entered in the Distribution box may lead to failure of T/f in some events.**

**g)** Check silica gel in the breather. Replace it if found blackish or turned in powered form. Pink silica gel can be re activated by heating. But in case of availability of blue coloured silica gel, replace it with blue coloured one.

**h)** Check circuit fuses on L.v. outlets. They should be replaced to correctness according to the loads on the ckt.

**i)** Check the chances of L.T. line short ckt. due to loose spans, grown up tree branches into L.T., tilted poles, overloaded & high sagged Conductor.

**j)** **Load balancing of L.T. Phases.**: It is most essential for the satisfactory working of transformer that the single phase loads should be equally distributed on all the three phases. Unbalanced loading not only result into frequent blowing of fuses but also results into heavy neutral currents & increasing the chances of failure of T/Fs.

**k)** Frequent short ckt. On L.V.side of transformers & non operating the protections, on L.V. side, results into failure of H.V. windings of the transformers.

**l)** **T/F oil quality**: Oil samples should be checked for BDV tests at least once in a year, preferably in Pre-Monsoon maintenance i.e. in m/o May.

**m)** Attend oil leakages during the shut down. Oil leakage from top plate can be attended by tightening nuts & bolts diagonally.

**n)** Avoid overloading of the transformers.

**ANNUAL/PRE-MONSOON MAINTENANCE**

a) Test oil sample for BDV. Filter T/f if BDV is not within permissible limits & Colour of oil has become dark.

b) Replace silica Gel in the breather.

c) Balance loads on the phases.

d) Check availability of L.A. Provide L.A. if not available.

e) Check earthing connection of neutral of T/F.

f) Attend oil leakages invariably. Top up oil level wherever necessary.

g) Check I.R.values by 1K.V. Megger. I.R. should be above 100MΩ H.V.to E. & above 60MΩ for L.V. to E with neutral disconnected.

To conclude, **maintenance as above if carried out regularly, failure rate can certainly be brought down substantially**