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Designing Approach on Accessories to Align Clamp-Core in Reactor

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Abstract: ***Proper condition monitoring of Reactor / Transformer is very essential for detecting the problem. Appropriate checklist should be follow in travelling span. It also observed that one and two test not detected the problem. Many tests, corrective method is require to find the problem. Temporary setup / Portable setup can be more helpful for such types of problems. Such type of problem may remove by consideration of conflict of transportation and advancement of accessories. Designing approach may take part to remove such conflict of transportation and inspection.***

Keywords: Design approach on accessories to align Core-Clamp

1. Introduction

Bhopal –Dhule Transmission Company Limited (BDTCL) elements are part of transmission scheme "System Strengthening in WEST REGION". This network will facilitate the transfer of upto 5000 MW of electricity from the coal belt in the east, to the energy-starved regions of Western and Northern India. This network is considered two on going 765/400 kV Substation at Bhopal –M.P and Dhule –M.H and 4 no of 765 S/C Transmission Line ,2 no 400 kv D/C Transmission Line . So we can understand the severity of this system to make available all time .Also it is provide energy stability to the industrial belts of Indore, Dewas, and Aurangabad.

2. Technical Parameter

S/N	Technical Parameter	Description
1	Rating	80 MVAR, 765 KV, 1PH, 50HZ
2	Cooling	ONAN
3	BIL (Peak)	1950KV (HV) ,550 KV (NEUTRAL)
4	Power freq. withstand(rms)	230KV(NEUTRAL)
5	Bushings	HV NEUTRAL
6	Type	OIP Condensertype
7	Rated voltage class(KV)	800 (HV), 145(NEUTRAL)
8	Rated current (A)	181.1
9	Creepage (mm/KV)	25 (HV) 25 (NEUTRAL)
10	Oil Capacity	Conservator : 4 KL , Tank : 44 KL
11	Winding Resistance	2.15 ohms
12	No. of turns in wdg	2377

3. Case

Core-Clamp Shorting in Reactor

An example extinguish the role of designing approaches on accessories to align Clamp-Core in Reactor. In construction phase of substation, A 80 MVAR, Single Phase Reactor observed CORE-CLAMP Insulation Resistance value ZERO before unloaded on plinth . Impact recorder also have some deflection. Nitrogen Pressure of Cylinder, System and Tank was positive above 20 psi. There was no any sign of physical damage on Reactor. Customer has informed to manufacturer regard this subject.

Manufactured proposed bellow remedial action to rectify on site :-

3.1 Vacuum and Filtration of Main Tank :- Assumption behind this approach was to remove shorting particle by vacuum and Filtration .

3.2 Internal Inspection :- When proposal one got fail . CORE-CLAMP value still was ZERO.
Internal inspection had been compulsory .An expert Team came on site and did the internal Inspection after drain Oil. But they could not be able to find right cause in this regard.

3.3 Energises of Shorted Path :- Over this period manufacturer came out with several proposals, tried several methods - that even included blowing out the shorted path with a high energy Spark - generated from charging & discharging of a Capacitor. All had failed. Insulation Resistance value of Core – Clamp is still ZERO (shorting).

4. Rectification of Reactor in Workshop

As material was imported , Manufacturer was not have own workshop in India. They took more time to arrange a workshop in India .After some time Manufacturer tied up with one transformer company for this particular job .

4.1 Line of action in workshop

Line of action has decided step by step with proper consideration and aspects . Following are the plan has

decided with mutually understanding between manufacturer and customer.

Plan-A

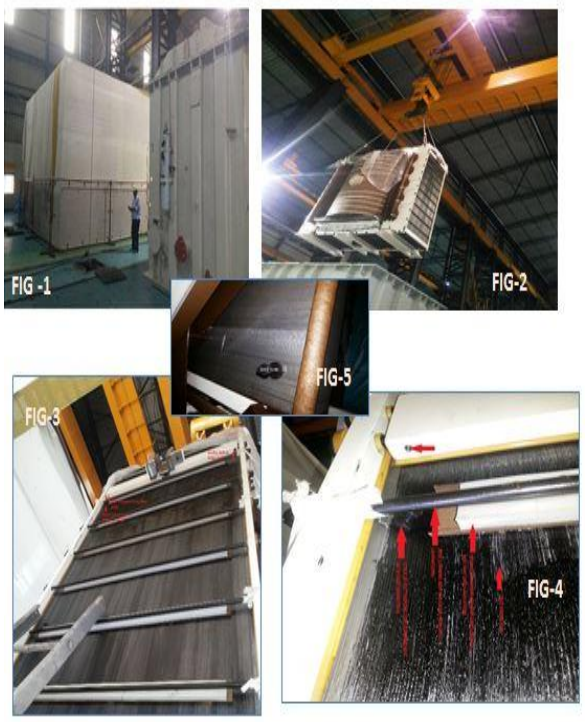
A. Physical verifying work environment, humidity, temperature of work Area.
B. Physical verifying dust-free chamber made for repairing of the Reactor with SPM meter.
C. Carry out ASP Test as suggested by manufacturer.
D. Dry air with require specifications, dew point, hot air circulation with specification of Dust proof Chamber.
E. Verifying the necessary tools and lifting facility require to lift the reactor from tank.
F. Releasing of N2 from Reactor tank and use Dry Air in tank.
G. Opening of the top plate of Reactor.
H. Carry out IR Test of Core –Clamp-Earth.
I. Physical verification from top of the tank to find out the problem.

Plan –B

A. If problem not identified / solved, the Core will be taken out from tank and keep immediately (i.e. with in around Half an hour) in dust proof chamber prepared for the same with spread Dry Air through two way upon Core (Fig-1).
B. Fault finding and rectification of fault within 12 hour packing of Core inside the Tank. (Fig-2,3)
C. Application of N2 cycle after the vacuum (1 Tour) and oil filtration cycle continuous 72 hours each .
D. Measurement of IR value of Core –Clamp-Earth.

5. Fault Diagnosed by Plan -B

Ultimately the culprit was identified to be a small bolt that dropped off and shorted across a Core Clamping Bolt and the CRGO Lamination (Fig- 3,4,5). As I understand - a few threads of the bolt had sheared off (Fig-5).



Insulation Resistance been checked between Core & Clamp leads (twice using different Meggers for confirmation) - recorded 1G-ohm / 2G-ohm - So ALL OK. Rector keep on vacuum after completed of troubleshooting activity and maintain 72 hour vacuum continuous after 1 tour . Then Oil circulation stared and persist 72 hour continuous and Tank maintain with positive Nitrogen pressure shake of transport concern after Oil drained from tank and.

6. Objective

This study aim to understand the importance of design aspects on used accessories between Core and Clamp in Transformer/Reactor. Also emphasize the role of inspection chamber in top side of Tank. The availability of Manufacturer's service centre in same country is very important aspects for future orientation.

7. Innovativeness & Usefulness

Non availability of manufacturer's workshop in India, was the big concern with respect of equipment reliability. Compatible machinery and surrounding condition was most concern in term of customer .The Reactor is the first its kind, To rectify the problem in India of this high rating Reactor .Best innovation was to make surrounding condition preferable as per mark . After introduced many innovations and tactic, Factory may compatible as per mark . Some aspects are benefits offered by the factory:
High economical
Availability of equipment
Rectify the Reactor problem

8. Conclusion

Proper condition monitoring of Reactor / Transformer is very essential for detecting the problem. Appropriate checklist should be follow in travelling span. It also observed that one and two test not detected the problem. Many tests, corrective method is require to find the problem. Temporary setup / Portable setup can be more helpful for such types of problems. Such type of problem may remove by consideration of conflict of transportation and advancement of accessories. Designing approach may take part to remove such conflict of transportation and inspection.

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