

Transformer Life-time Management

Ensuring a long life for your transformer

ABB offers an extensive diagnostic and maintenance service to ensure a long transformer life and to avoid unplanned outages.

Transformer Life Management helps our customer's secure high reliability and gain in-depth knowledge of the condition of their equipment. We offer the complete portfolio of service products which can be implemented across the entire life cycle. It includes engineering support and technical expert advice, on-site and workshop repairs capabilities and field service. In order to select the right maintenance actions in an optimum way, ABB provides condition assessment surveys based on the results of advanced diagnostic tools, design reviews as well as output from on-line monitoring.

Benefits

ABB has developed a Life Assessment offering which is a design based assessment. This is accomplished by modelling the original transformer design to our latest advanced technologically designed programs. By using the original design data that we own, in combination with today's advanced design tools, we can re-evaluate the critical parameters of the transformer. In using this detailed designed approach, we then re-calculate the thermal, mechanical and electrical properties of the transformer. This design based approach greatly increases the accuracy of the continuing life of the transformer by determining the remaining insulation life and overall reliability of the transformer.

Diagnostic Techniques

The goal of a diagnostic testing programme is to define the necessary maintenance actions to improve the efficiency and reliability of your transformer assets, whilst keeping costs under control. The present operating conditions are driven by regulatory factors, the need for optimal system operations, and economic restraints. The diagnostic techniques used by ABB include:

1. Windings resistance
2. Capacitance and power factor/dielectric losses for windings
3. Capacitance and power factor/dielectric losses for bushings
4. OLTC static and dynamic resistance measurements
5. Transformer excitation currents and short circuit impedances
6. Thermography
7. Transformer turns/voltage ratio
8. Advanced dissolved gas analysis (ADGA) and oil tests
9. Frequency response analysis (FRA)
10. Dielectric frequency response (DFR, FDS) both for bushings and windings.
11. Partial discharge tests (PRPDA)



On-line monitoring

Advanced transformer on-line techniques provide information regarding incipient defects; remaining life expectancy and optimal control under extreme conditions. By using these techniques, optimal asset management, life expectancy control and availability monitoring allows the user to manage transformer life costs effectively, including remote management strategies. ABB's TEC Monitoring system includes:

- On-Line supervision with historical records
- DGA evolution
- Overload capability and ageing effects
- Remaining transformer life estimation
- Cooling control
- Alarms and operation control

As the largest transformer manufacturer in the world, our customers often ask for assistance with advanced diagnosing, assessing condition/remaining life and offering workable thermal performance upgrade approaches on their power transformers. We are able to accomplish this because of ABB's ownership and historical knowledge of the design databases for more than 30 OEM brand names: including ABB, ASEA, Ansaldo, Breda, BBC, CGE, Elektrisk Bureau, Elta, GE (> 40 MVA), Cademesa, Cenemesa, CONELEC, Diestre, Gould, IEL, ITE Indelve, Italtrafo, Lepper, MFO, Marelli, National Industri, Ocren, OEL, OTE, Richard Pfeiffer, Sécheron, Stromberg, TIBB, Thrige, Westinghouse. ormer Service Technical Flyer

Please see table at the back for full details on diagnostic activities and recommended intervals.

	1st year operation		1 month	+ 1 years	+ 5 years	+ 10 years	+ 20 years	Relocation
	1/4 year	1 year ^(*)						
1. General								
1.1 – Visual inspection (painting, corrosion...)				R				
1.2 – Oil temp (with max. recording)	R		R					
1.3 – Winding temp (with max. recording)	R		R					
1.4 – Currents HV, LV (with max. recording)	R		R					
1.5 – Voltages VH, LV (with max. recording)	R		R					
2. Oil								
2.1 – Water in oil evolution		R		R				R
2.2 – DGA ^(*) , physical-chemical	R			R				R
2.3 – Leakages, levels		R		R				R
2.4 – Filtering and degassing						R		R
2.5 – Drying and reconditioning/reclaiming							R	R
3. Active part assessment								
3.1 – Mechanical integrity						R		R
3.2 – Dielectric integrity						R		R
3.3 – Core integrity						R		R
3.4 – Internal inspection							R	
3.5 – Retightening							R	
4. Components								
4.1 – Core				R				R
4.2 – HV, LV bushings ^(*)				R				R
4.3 – O-rings, joints				R		R		R
4.4 – De-energized tap changer (DETC)								
4.4.1 – Visual inspection		R		R				R
4.4.2 – Internal verification					R		S	
4.5 – On load tap changer (OLTC) ^(*)								
4.5.1 – Visual inspection		R		R				R
4.5.2 – Internal verification ^(*)					R		S	
4.6 – OLTC drive								
4.6.1 – Visual inspection		R		R				
4.6.2 – Internal verification					R		S	R
4.7 – Oil Pumps				R			S	R
4.8 – Coolers/Heat Exchangers				R				R
4.9 – Ambient temp	R		R					R
5. Accessories								
5.1 – Gas Relay, overpressure		R		R			S	R
5.2 – Desiccant		R		R			S	R
5.3 – Thermometers		R		R			S	R
5.4 – Valves		R		R			S	R
5.5 – Control cubicle		R		R			S	R
5.6 – Expansion tank		R		R			S	R

(*) Intermediate inspection (6 months) on critical units (GSU, Industrial, reactors...)

(**) Depends on model and operating life

Notes

(1) On-line monitoring possibility

M = Maintenance & Diagnostic; R = Replacement

Mid-life Refurbishment / Factory / TrafoSiteRepair™

Off line - Disconnected

Off line - Connected

On line

Just call your local ABB Specialist

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