

Transformer Safety: The Ultimate Health Check Guide for EHV Substations

This guide provides a structured method for assessing transformer health in EHV substations. It includes stepwise monitoring, a checklist, and reference tables.

Table 1: Summary of Transformer Health Checks

Step	Check Focus	Action if Faulty
1. Load Monitoring	Load > 90%	Reduce load / Upgrade transformer
2. Oil Condition	Dielectric strength < 30 kV	Filter or replace oil
3. Temperature Check	Temperature above safe limit	Check cooling system & ventilation
4. Insulation Testing	IR < 1 MΩ	Repair / Replace insulation
5. Bushing Inspection	Cracks, oil leakage, discoloration	Repair / Replace bushing
6. Vibration Analysis	Abnormal vibration patterns	Repair mechanical faults

Transformer Health Check Checklist

- Verify load < 90% of rated capacity
- Oil dielectric strength > 30 kV, moisture low
- Winding temperature within OEM limits
- Insulation resistance > 1 MΩ
- Bushings: No cracks, leaks, or discoloration
- No abnormal vibration patterns
- Perform Dissolved Gas Analysis (DGA)
- SCADA continuous load and temperature monitoring
- Moisture control with dehydrators and breathers
- Check for unusual noise or loose windings
- Evaluate cooling needs in hot climates
- Perform partial discharge testing
- Follow PPE and safety during testing
- Maintain OLTC: inspect, clean, replace oil
- Use predictive maintenance tools
- Thermal imaging for hotspots
- Avoid repeated transformer overloading
- Plan upgrades for bushings and OLTC at mid-life

Diagram: Transformer Health Check Flow (Load → Oil → Temperature → Insulation → Bushing → Vibration).