

Laboratory GE T&D India Limited Test Lab, P.O. Naini, Allahabad, Uttar Pradesh

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6650

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Validity 18.12.2017 to 17.12.2019

Last Amended on 27.05.2019

Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
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ELECTRICAL TESTING

I.	TRANSFORMERS AND REACTORS			
1.	Transformer 50 MVA to 500 MVA, Auto Transformer 400 kV, 3 Phase 5 MVA to 370 MVA GT 400 kV Three Phase, 5 MVA to 333 MVA GT 400 kV Single Phase, Oil immersed	Voltage Ratio	IS 2026 (Part-1):2011 Cl.10.3 IEC 60076 (Part-1):2011 Cl.11.3	1 to 100
		Verification of vector group	IS 2026 (Part-1):2011 Cl.6 IEC 60076 (Part-1):2011 Cl.11.3	Qualitative
		Polarity	IS 2026 (Part-1):2011 Cl.6 IEC 60076 (Part-1):2011 Cl.11.3	Qualitative
		Winding Resistance	IS 2026 (Part-1):2011 Cl.10.2 IEC 60076 (Part-1):2011 Cl.11.2	0.5 mΩ to 10 Ω
		Insulation Resistance	IS 2026 (Part-1):2011 Cl.10.1.3 IEC 60076 (Part-1):2011 Cl.11.1.4	1 MΩ to 100 GΩ, 1kV to 10 kV
		Capacitance Tan Delta	IS 2026 (Part-1):2011 Cl.10.1.3 IEC 60076 (Part-1):2011 Cl.11.1.4	10 pF to 100 nF 0.01% to 100%
		No load loss	IS 2026 (Part-1):2011 Cl.10.5 IEC 60076 (Part-1):2011 Cl.11.5	5 kW to 250 kW
		Load loss	IS 2026 (Part-1):2011 Cl.10.4 IEC 60076 (Part-1):2011 Cl.11.4	20 kW to 1200 kW

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		Impedance	IS 2026 (Part-1):2011 Cl.10.4 IEC 60076 (Part-1):2011 Cl.11.4	0.5 to 66 kV 1 to 1500 A
		Induced over voltage	IS 2026 (Part-3):2009 Cl.12.2 IEC 60076 (Part-3):2013 Cl.11.2	11 kV to 570 kV @ 175Hz/200Hz
		Power frequency voltage withstand	IS 2026 (Part-3):2009 Cl.11 IEC 60076 (Part-3):2013 Cl.12	20 to 300 kV
		Partial discharge	IS 2026 (Part-3):2009 Cl.12.4 IEC 60076 (Part-3):2013 Cl.11.3.4	10 pC to 1000 pC
		Zero Phase Sequence Impedance	IS 2026 (Part-1):2011 Cl.10.7 IEC 60076 (Part-1):2011 Cl.11.6	1 % to 100 %
		Lightning impulse voltage withstand	IS 2026 (Part-3):2009 Cl.13 IEC 60076 (Part-3):2013 Cl.13.2	50 kVp to 3000 kVp
		Transfer of Surge Voltage	IS 2026 (Part-3):2009 Cl.13.3.3 IEC 60076 (Part-3):2013 Cl.13.2	50 kVp to 2000 kVp
		Lightning impulse test (Chopped wave)	IS 2026 (Part-3):2009 Cl.14 IEC 60076 (Part-3):2013 Cl.13.3	50 kVp to 3000 kVp
		Switching impulse voltage withstand	IS 2026 (Part-3):2009 Cl.15 IEC 60076 (Part-3):2013 Cl.14	250 kVp to 1500 kVp
		Temperature rise	IS 2026 (Part-2):2010 IEC 60076 (Part-2):2011	20 °C to 70 °C Above Ambient
		Magnetizing current	CBIP-328:2013 Cl.B.6	1 mA to 15 A
		Magnetic balance	CBIP-328:2013 Cl.B.7	200 V to 500 V

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		Acoustic Noise Level	IS 13964:2014 IEC 60076 (Part-10):2016	55 dB to 120 dB @50Hz
		Harmonics of No Load Current	IS 2026 (Part-1):2011 Cl.10.6 IS 60076 (Part-1):2011 Cl.11.1.3	Fundamental to 24 th
		Power taken by the fans and oil pumps	IS 2026 (Part-1):2011 Cl.10.1.3 IEC 60076 (Part-1):2011 Cl.11.1.3	1 kW to 50 kW
		Sweep Frequency Response	IEC 60076 (Part-18):2012	20 Hz to 2 MHz
		Magnetic circuit (Isolation)	CBIP-328:2013 Cl.B.8	0.5 kV to 10 kV
2.	Shunt Reactor 1.5 to 125 MVar 420 kV, 3 Phase, Oil Immersed	Winding resistance	IS 5553 (Part-2):1990 IEC 60076 (Part-1):2011 Cl.11.2	1 mΩ to 100Ω
		Insulation resistance	IS 5553 (Part-2):1990 IEC 60076 (Part-1):2011 Cl.11.1.4	1 MΩ to 100 GΩ, Voltage up to 10 kV
		Capacitance Tan Delta	IS 5553 (Part-2):1990 IEC 60076 (Part-1):2011 Cl.11.1.4	10 pF to 100nF, 0.01 % to 100%
		Loss by Bridge method	IS 5553 (Part-2):1990 IEC 60076 (Part-6):2007 Cl.7.8.6	1 kW to 500 kW,
		Power frequency voltage withstand	IS 5553 (Part-2):1990 IEC 60076 (Part-3):2013 Cl.12	1 to 300 kV
		Partial discharge	IS 5553 (Part-2):1990 IEC 60076 (Part-3):2013 Cl.11.3.4	10 pC to 1000 pC
		Zero Phase Sequence Impedance/ Reactance	IS 5553 (Part-2):1990 IEC 60076 (Part-6):2007 Cl.7.8.8	1 % to 100 %

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		Lightning impulse voltage withstand	IS 5553 (Part-2):1990 IEC 60076 (Part-3):2013 Cl.13.2	170 kVp to 3000 kVp
		Lightning impulse (Chopped wave)	IS 5553 (Part-2):1990 IEC 60076 (Part-3):2013 Cl.13.3	170 kVp to 3000 kVp
		Switching impulse voltage withstand	IS 5553 (Part-2):1990 IEC 60076 (Part-3):2013 Cl.14	750 kVp to 1500 kVp
		Temperature rise	IS 5553 (Part-2):1990 IEC 60076 (Part-6):2007 Cl.7.8.14	20 °C to 70 °C Above Ambient
		Magnetizing current	IS 5553 (Part-2):1990 CBIP-328:2013 Cl.B.6	0 to 15 A
		Stress Measurement on Tank	IS 5553 (Part-2):1990 IEC 60076 (Part-6):2007 Cl.7.8.13	1960 kN/m ² to 49030 kN/m ²
		Vibration	IS 5553 (Part-2):1990 IEC 60076 (Part-6):2007 Cl.7.8.13	1 µm to 200 µm (peak to peak)
		Sweep Frequency Response	IEC 60076 (Part-18):2012	20 Hz to 2 MHz
		Magnetic circuit (Isolation)	CBIP-328:2013 Cl.B.8	0.5 kV to 10 kV
II.	ELECTRICAL MATERIALS - LIQUID DIELECTRIC MATERIALS			
1.	Transformer Oil	Break Down Voltage (BDV)	IS 6792:2003 IEC 60156:1995	10 kV to 100 kV
		Water Content	IS 13567:2003	1 mg/kg 1000 mg/kg
		Inter Facial Tension	IS 6104:2001	1 mN/m to 72 mN/m
		Dissolved Gas Analysis Hydrogen (H ₂)	IS 10593:2006	0.2 mg/l to 1000 mg/l
		Methane (CH ₄)	IEC 60567:2011	0.2 mg/l to 1000 mg/l
		Ethylene (C ₂ H ₄)		0.2 mg/l to 1000 mg/l

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		Ethane (C ₂ H ₆)		0.2 mg/l to 1000 mg/l
		Acetylene (C ₂ H ₂)		0.2 mg/l to 1000 mg/l
		Carbon Dioxide (CO ₂)		0.2 mg/l to 2500 mg/l
		Carbon Monoxide (CO)		0.2 mg/l to 1000 mg/l
		Oxygen (O ₂)		0.2 mg/l to 10000 mg/l
		Nitrogen (N ₂)		0.2 mg/l to 88000 mg/l