

**Laboratory**

**Power Transformer Testing Laboratories, Transformers & Rectifiers (India) Ltd., Survey No.: 427P/3-4 & 431P/1-2, Sarkhej Bavla Highway, Post: Moraiya, Tal: Sanand, Dist. Ahmedabad, Gujarat**

**Location 1 - Survey No.: 427P/3-4 & 431P/1-2, Sarkhej Bavla Highway, Post: Moraiya, Tal: Sanand, Dist. Ahmedabad, Gujarat**

**Location 2 - Survey No.: 344/350, Sarkhej Bavla Highway No. 8, Changodar, Tal: Sanand, Dist. Ahmedabad, Gujarat**

**Accreditation Standard ISO/IEC 17025: 2005**

**Discipline Electrical Testing**

**Issue Date 11.02.2016**

**Certificate Number T-2837**

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S. No.	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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**LOCATION 1**

**I. TRANSFORMERS AND REACTORS**

<b>1. Single Phase Transformer Upto 500 MVA, 765 kV Class</b>  <b>Three Phase Transformer Upto 500 MVA, 400 kV Class</b>	Ratio & Polarity Check	IS 2026-1: 2011, IEC 60076-1: 2011	1 to 300
	Magnetic Balance & Magnetizing Current Measurement at Low Voltage	CBIP Publication 317: 2013	60 V to 600 V 1 mA to 250 A
	Vector Group Verification	IS 2026-1: 2011, CBIP Publication 317: 2013	60 V to 600 V
	Insulation Resistance & Polarization Index	IS 2026-1: 2011, IEC 60076-1: 2011, CBIP Publication 317: 2013	10 MΩ to 100 GΩ
	Winding Resistance	IS 2026-1: 2011, IEC 60076-1: 2011	100 μΩ to 100 Ω
	Capacitance & Tan Delta	IS 2026-1: 2011, IEC 60076-1: 2011, CBIP Publication 317: 2013	100 pF to 30 nF 0.05 % to 5 %
	Separate Source Voltage Withstand / Applied Voltage	IS 2026-3: 2009, IEC 60076-3: 2013	3 kV to 250 kV

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	<b>Single Phase Transformer Upto 500 MVA, 765 kV Class</b>	Induced Voltage Withstand	IS 2026-3: 2009, IEC 60076-3: 2013	10 kV to 700 kV
		No Load Loss & Current	IS 2026-1: 2011, IEC 60076-1: 2011	1 kW to 150 kW
	<b>Three Phase Transformer Upto 500 MVA, 400 kV Class</b>	Load Loss & Impedance Voltage	IS 2026-1: 2011, IEC 60076-1: 2011	2 kW to 1500 kW
		Check of Core & Frame Insulation For Liquid Immersed Transformer	IS 2026-1: 2011, IEC 60076-1: 2011, CBIP Publication 317: 2013	1 kV to 5 kV
		Harmonics of No Load Current	IS 2026-1: 2011	All 3 phases 3 <sup>rd</sup> , 5 <sup>th</sup> , 7 <sup>th</sup> , 9 <sup>th</sup> , 11 <sup>th</sup> , 13 <sup>th</sup> , 15 <sup>th</sup> , 17 <sup>th</sup> , 19 <sup>th</sup> , 21 <sup>st</sup> , 23 <sup>rd</sup> and 25 <sup>th</sup> order
		Partial Discharge Measurement	IS 2026-3: 2009, IEC 60076-3: 2013	10 pC to 1000 pC
		Sound Level	IS 2026-10: 2009, IEC 60076-10: 2005	40 dB to 114 dB
		Power Taken by Fans And Liquid Pump Motors	IS 2026-1: 2011, IEC 60076-1: 2011	0.2 kW to 50 kW

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	<b>Single Phase Transformer Upto 500 MVA, 765 kV Class</b>	Zero Sequence Impedance (Three Phase Transformers Only)	IS 2026-1: 2011, IEC 60076-1: 2011	200 V to 100 kV, 10 A to 1000 A
		Lightning Impulse	IS 2026-3: 2009, IEC 60076-3: 2013	30 kVp to 2800 kVp
	<b>Three Phase Transformer Upto 500 MVA, 400 kV Class</b>	Switching Impulse	IS 2026-3: 2009, IEC 60076-3: 2013	100 kVp to 2200 kVp
		Transient Voltage Transfer Characteristics	IEC 60076-3: 2013, CBIP Publication 317: 2013	10 Vp to 300 Vp, 10 kVp to 500 kVp
		Temperature Rise	IS 2026-2: 2010, IEC 60076-2: 2011	20 °C to 100 °C
		Over Excitation	PGCIL Specification C/FNGG/MODEL-SPEC/TRF Rev. 05	1 kW to 150 kW
		Frequency Response (FRA)	IEC 60076-18: 2012	Qualitative
		On-Load Tap Changer	IS 2026-1: 2011, IEC 60076-1: 2011	Qualitative
<b>II.</b>	<b>ELECTRICAL MATERIALS-LIQUID DIELECTRIC MATERIALS</b>			
<b>1.</b>	<b>Transformer Oil</b>	Electric Strength (Oil BDV)	IS 1866: 2000, IS 6792: 1992, IEC 156: 1995	20 kV to 100 kV

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**LOCATION 2**

**I. TRANSFORMERS AND REACTORS**

<b>1. Three Phase transformer Upto 100 MVA, 220 kV Class</b>	Ratio & Polarity Check	IS 2026-1:2011, IEC 60076-1:2011	2 to 300
	Magnetic Balance & Magnetizing current Measurement at low voltage	CBIP Publication 317: 2013	1 V to 600 V 1mA to 1 A
<b>Single Phase Transformer Upto 35 MVA, 220 kV Class</b>	Vector Group Verification	IS 2026-1:2011, CBIP Publication 317: 2013	1V to 600 V
<b>Three Phase Special Transformer Upto 70 MVA, 33 kV Class</b>	Insulation Resistance & Polarization Index	IS 2026-1:2011, IEC 60076-1:2011, CBIP Publication 317: 2013	1 MΩ to 100 GΩ
	Winding Resistance	IS 2026-1:2011, IEC 60076-1:2011	100 μΩ to 100 Ω
	Capacitance & Tan delta	CBIP Publication 317:2013	100 pF to 8nF 0.01 % to 3 %
	Separate Source Voltage Withstand/ Applied voltage	IS 2026-3:2009, IEC 60076-3:2013	3 kV to 350 kV
	Induced Voltage Withstand	IS 2026-3:2009, IEC 60076-3:2013	400V to 300 kV

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	<b>Three Phase transformer Upto 100 MVA, 220 kV Class</b>	No load loss & current	IS 2026-1:2011, IEC 60076-1:2011	0.5 to 100 kW
		Load loss & Impedance Voltage	IS 2026-1:2011, IEC 60076-1:2011	1 to 500 kW
	<b>Single Phase Transformer Upto 35 MVA, 220 kV Class</b>	Check of core & frame insulation for liquid immersed transformer	IS 2026-1:2011, CBIP Publication 317: 2013	0.5 kV to 5 kV
	<b>Three Phase Special Transformer Upto 70 MVA, 33 kV Class</b>	Partial Discharge Measurement	IS 2026-3:2009, IEC 60076-3:2013	5 to 500 pC
		Harmonics of No load Current	IS 2026-1:2011	3 <sup>rd</sup> , 5 <sup>th</sup> , 7 <sup>th</sup> , 9 <sup>th</sup> , 11 <sup>th</sup> , 13 <sup>th</sup> , 15 <sup>th</sup> , 17 <sup>th</sup> , 19 <sup>th</sup> , 21 <sup>st</sup> , 23 <sup>rd</sup> and 25 <sup>th</sup> Harmonics
		Sound Level	IS 2026-10:2009, IEC 60076-10:2005	46.7 to 114 dB
		Power taken by Fans and Liquid pump Motors	IS 2026-1:2011, IEC 60076-1:2011	0.2 to 20 kW
		Zero sequence Impedance (Three phase transformers only)	IS 2026-1:2011, IEC 60076-1:2011	5V to 30 kV, 3A to 1000 A
		Lightning Impulse	IS 2026-3:2009, IEC 60076-3:2013	1200 kVp
		Switching Impulse	IS 2026-3:2009, IEC 60076-3:2013	850 kVp

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	<b>Three Phase transformer Upto 100 MVA, 220 kV Class</b>	Transient Voltage Transfer Characteristics	IE C 60076-3:2013, CBIP Publication 317: 2013	1V to 150 V
		Temperature rise	IS 2026-2:2010, IEC 60076-2:2011	5° C to 100 ° C
	<b>Single Phase Transformer Upto 35 MVA, 220 kV Class</b>	Measurement of frequency response (FRA)	IEC 60076-18:2012	Qualitative
		On-load Tap Changer	IS 2026-1:2011, IEC 60076-1:2011	Qualitative
	<b>Three Phase Special Transformer Upto 70 MVA, 33 kV Class</b>			
<b>II. ELECTRICAL MATERIALS-LIQUID DIELECTRIC MATERIALS</b>				
<b>1.</b>	<b>Transformer Oil</b>	Electric Strength (Oil BDV)	IS 1866: 2000, IS 6792: 1992, IEC 156: 1995	10kV to 100 kV

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