National Accreditation Board for Testing and Calibration Laboratories

SCOPE OF ACCREDITATION

Laboratory Name : POWER TRANSFORMER FACTORY - 2 TESTING LABORATORY, HITACHI ENERGY INDIA LIMITED, MANEJA WORKS, MANEJA, VADODARA, GUJARAT, INDIA

Accreditation Standard ISO/IEC 17025:2017

Certificate Number TC-13213 **Page No** 1 of 4

Validity 06/03/2026 to 05/03/2030 **Last Amended on** -

S.No	Discipline / Group	Materials or Products tested	Component, parameter or characteristic tested / Specific Test Performed / Tests or type of tests performed	Test Method Specification against which tests are performed and / or the techniques / equipment used
Permanent Testing				
1	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Applied Voltage Test (Separate Source AC High Voltage Withstand Test)	IEC 60076, (Part – 3) Clause 10:2013+AMD1:2018 and IS 2026 (Part – 3) clause 10
2	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Determination of transient voltage transfer characteristics	IEC 60076, Part – 3, Clause Annex B:2013+AMD1:2018 and IS 2026 Part – 3, Clause Annex B
3	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Induced Over Voltage Withstand Test	IEC 60076, Part – 3, Clause 11.1&11.2:2013+AMD1:2018 and IS 2026 Part – 3, Clause 11.1&11.2
4	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Induced voltage test with partial discharge measurement (IVPD)	IEC 60076, Part – 3, Clause 11.3:2013+AMD1:2018 and IS 2026 Part – 3, Clause 11.3: 2018
5	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Lightning / Chopped Impulse	IEC 60076, Part – 3, Clause 13:2013+AMD1:2018 and IS 2026 (Part 3) clause 13
6	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Line Terminal AC Voltage Withstand Test	IEC 60076, Part – 3, Clause 12:2013+AMD1 and IS 2026 Part - 3, Clause 12
7	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Magnetic Balance & Magnetizing Current Test	CBIP Manual (No. 317)
8	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Magnetic Balance & Magnetizing Current Test	CBIP Manual (No. 317)
9	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Acoustic Noise Level	IEC 60076 -10:2016 and NEMA TR1:2013 and IS 2026, Part – 1, Clause 10.1.3 (f):2011, IS 2026-10
10	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Auxiliary Losses	IS 2026, Part – 1, Clause 10.1.3(h) and IEC 60076 Part 1, Cl. 11.1.3.(d)
11	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Capacitance of Bushing	IEC 60137
12	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Capacitance of Winding	IS 2026 Part I Clause 10.1.3(b) IEC 60076, Part 1, Clause 11.1.2.2 (a)
13	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Frequency Response Analysis (SFRA)	IEC 60076-18
14	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Insulation Resistance	IS 2026, Part – 1, Clause – 10.1.3 (j) and IEC – 60076, Part – 1, Clause 11.1.2.2 (b)

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15	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Load Losses	IS 2026, Part -1, Clause 10.4, 2011 and IEC 60076, Part I Clause- 11.4
16	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of No load Current Harmonics	IS 2026, Part - 1, Clause 10.6
17	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Short Circuit Impedance in Percentage	IS 2026, Part -1, Clause 10.4 : 2011 and IEC 60076, Part I Clause- 11.4
18	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Tan delta of Bushing	IEC 60137
19	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Tan Delta of Winding	IS 2026 Part I Clause 10.1.3(j) IEC 60076, Part 1, Clause 11.1.2.2 (c)
20	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Voltage Ratio	IS 2026, Part – 1, Clause – 10.3 and IEC – 60076, Part – 1, Clause 11.3
21	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Winding Resistance	IS 2026, Part – 1, Clause – 10.2 and IEC – 60076, Part – 1, Clause 11.2
22	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Measurement of Zero Phase Sequence Impedance	IS 2026, Part -1, Clause 10.7: 2011 and IEC 60076, Part 1, Clause 11.6
23	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	No Load Excitation Current	IS 2026, Part -1, Clause 10.5 : 2011 and IEC 60076, Part -1,Clause 11.5 & 11.1.2.2 (e)
24	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	No Load Loss	IS 2026, Part -1, Clause 10.5 : 2011 and IEC 60076, Part -1,Clause 11.5 & 11.1.2.2 (e)
25	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Switching Impulse test	IEC 60076, Part – 3, Clause 14:2013+AMD1:2018 and IS 2026 Part – 3, Clause 14
26	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Temperature Rise test	IS 2026, Part 2 : 2010 and IEC 60076, Part 2
27	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Test On OLTC	IS 2026 Part I, Cl. 10.8 & IEC 60076 Part I, Cl. 11.7
28	ELECTRICAL- INDUCTORS & TRANSFORMERS	Power Transformers Up to 200 MVA, 220 kV Class	Vector Group Test	IS 2026, Part – 1, Clause – 10.3 and IEC – 60076, Part – 1, Clause 11.3
29	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer insulating oil	Appearance	IEC 60422:2024, IEC 60296:2020, IS 335:2018, IS 1866:2017, IEC 62770
30	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Breakdown Voltage	IS 6792:2017 & IEC 60156

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31	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer insulating oil	Density measurement	ISO 3675 (1998), IS 1448 (P:16)
32	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Acetylene (C2H2)	IEC 60567:2011 & IS 9434
33	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis- Ethane (C2H6)	IEC 60567:2011 & IS 9434
34	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Ethylene(C2H4)	IEC 60567:2011 & IS 9434
35	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Methane (CH4)	IEC 60567:2011 & IS 9434
36	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Carbon Dioxide (CO2)	IEC 60567:2011 & IS 9434
37	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Carbon Monoxide (CO)	IEC 60567:2011 & IS 9434
38	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Hydrogen (H2)	IEC 60567:2011 & IS 9434
39	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Nitrogen (N2)	IEC 60567:2011 & IS 9434
40	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Dissolved Gas Analysis-Oxygen (O2)	IEC 60567:2011 & IS 9434
41	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer insulating oil	Interfacial Tension	IEC 62961:2018, IS 6104
42	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Resistivity	IEC 60247:2004 & IS 16840
43	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Tan delta	IEC 60247:2004 & IS 16840
44	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Water content	IEC 60814:1997 & IS 13567

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45	ELECTRICAL- INSULATING MATERIALS & INSULATORS	Transformer Insulating Oil	Water content measurement of oil-impregnated paper and pressboard	IEC 60814:1997, IS 13567
46	ELECTRICAL- MAGNETIC MATERIALS	Magnetic Sheet Steel - CRGO	Specific Core Loss Measurement	IS 649