

Laboratory	CG Transformer Division Laboratories, Crompton Greaves Ltd., Kanjurmarg (East), Mumbai, Maharashtra		
Accreditation Standard	ISO/IEC 17025: 2005		
Discipline	Electrical Testing	Issue Date	24.02.2014
Certificate Number	T-1620	Valid Until	23.02.2016
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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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I. ELECTRICAL MATERIALS

1. Magnetic Materials

a. Electrical Steel	i) Surface Insulation Resistivity	ASTM 717- (1995), IEC 60404-11(1996) IS 649-(1997)	500 mV, 0 to 0.999A
	ii) Specific core loss	IEC 60404-2 (1996), ASTM A343(1997), IS 649-(1997)	0.001T to 2 T, 3 Hz to150 Hz
	iii) A. C. Magnetization	IEC 60404-2(1996), ASTM A343(1997), IS 649-(1997)	1 A/m to 30000 A/m
	iv) Ageing	IS 649 (1997)	0 to 250 °C
	v) Stacking Factor	IS 649 (1997)	0 to 1500 psi, 0 to 50 mm

2. Liquid Dielectric Materials

a. Insulating Oil	i) Density	ISO 3675-(1998) ASTM D1298 (2005) BS 148 (7.2): (1998) IS 1448 (P: 16) : (1976)	0.80 gm/ml to1.00 gm/ml
	ii) Break Down Voltage	ASTM D 877: (2007) BS 148 : (1998) (7.11) IEC 60156-07(1995), IS 6792 (1998)	0 to 100 kV AC/DC

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		iii) Tan Delta	ASTM D 924: (2004) BS 148 : (1998) (7.12) IEC 60247-02 (2004), IS 6262 (1996)	0 to 1
		iv) Specific Resistivity	IS 6103 – (1996)	1x10 ⁹ to 10 ¹⁵ Ω-cm
		v) Water Content	ASTM D 1533: (2005) BS 148 : (1998) (7.8) IEC 60814-1-(1997) IS 13567 : (1992)	0.1 µg to 10 mg
		vi) Neutralisation Value	ASTM D 974: (2007) BS 148 : (1998) (7.6) IEC 62021-12(2001) IS 1448 -2 (1967)	0 to 100mg KOH/gm
		vii) Inter Facial Tension	ASTM D 971: (2004) IS 6104 : (1971) ISO 6295 : (1983)	0.01mN/m to 100 mN/m
		viii) Kinematic Viscosity	ASTM D 445: (2006) BS 148 : (1998) (7.3) IEC 60814-1(1997) IS 1448 -25 (1976)	0 to 100 cSt

II. TRANSFORMERS & REACTORS

1. Transformer 500 MVA, 400 kV, 3 Phase 350 MVA, 500kV, 1 Phase 27MVA, 420 kV 1 Phase, GT	i) Voltage ratio measurement & polarity check	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	1 to 1000
	ii) Verification of Vector Group	IS2026-1(2011) IEC60076-1(2011),	-

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		iii) Check of Polarity	IEEE Std. C57(2010) IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	-
		iv) Magnetic Balance Test	As per Industry Standard Practice	-
		v) Winding resistance measurement	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	1 mΩ to 199.99Ω
		vi) Insulation resistance measurement	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	0 to 1TΩ, Upto 10kV
		vii) Capacitance & Tan delta measurement	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	Capacitance 1 pF to 100μF & tan delta 0.1% to 10%
		viii) Measurement of No-Load Loss & Excitation Current	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	Upto 1200 kW , 1mA to 300A , Upto 76 kV
		ix) Measurement of Harmonics of No-Load current	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	Upto 100%
		x) Measurement of Load Loss	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	Upto 1200 kW , 1mA to 200A , Upto 76 kV

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		xi) Measurement of impedance voltage	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	1mA to 200A 0.1 kV to 76 kV & Upto 10000 Ω for reactors
		xii) Tests on OLTC	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	-
		xiii) Measurement of zero phase sequence impedance on three phase transformers & reactors	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	Upto 2000 A , Upto 76 kV
		xiv) Temperature rise test	IS2026-1(2011) IEC60076-1(2011), IEEE Std. C57(2010)	Upto 1200 kW , 1mA to 200A , Upto 76 kV & Upto 200°C
		xv) Separate source voltage withstand test	IS2026-3(2009) IEC60076-3(2011), IEEE C57(2010)	1 kV to 395kV
		Applied Voltage Test(AV)	IEC60076-3-(2013)	
		xvi) Induced overvoltage test	IS2026-3(2009) IEC60076-3(2011), IEEE C57(2010)	1 kV to 680kV
		Induced Voltage Withstand Test (IVW)	IEC60076-3-(2013)	

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		xvii) ACSD/ACLD voltage withstand test with PD measurement	IS2026-3(2009) IEC60076-3(2011), IEEE C57(2010)	Upto 680kV, 1pC to100000 pC
		Induced voltage test with partial Discharge measurement (IVPD)	IEC60076-3-(2013)	
		Line terminal AC Withstand Test (LTAC)	IEC60076-3-(2013)	
		xviii) Lightning impulse test	IS2026-3(2009) IEC60076-3(2011), IEEE C57(2010)	Upto 2000kV
		Lightning impulse test (LI, LIC, LIN, LIMT)	IEC60076-3-(2013)	
		xix) Switching impulse test	IS2026-3(2009) IEC60076-3(2011), IEEE C57(2010)	Upto 1700 kV
		Switching impulse test(SI)	IEC60076-3-(2013)	
		xx) Measurement of Noise level	IS2026-1(2010) IEC60076-10(2001), IEEE C57 (2010)	100 dB max.
		xxi) Measurement of power taken by fan & pump(Cooler loss)	IS2026-1(2011) IEC60076-1(2011), IEEE C57 (2010)	Max. 1200kW

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		xxii) CT ratio measurement	IEC60044-1 Amend-1	Upto 3000 Amp.
		xxiii) SFRA	IEC60076-18/Ed-1	20Hz to 2 MHz
2.	Reactor 125 MV_{ar} 420 kV, 3 Phase 50 MV_{ar}, 500 kV, 1 Phase, Neutral Grounding Reactor	i) Winding resistance measurement	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	1 mΩ to 199.99Ω
		ii) Insulation resistance measurement	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	0 to 1TΩ , Upto 10kV
		iii) Capacitance & Tan delta measurement	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	Capacitance 1 pF to 100μF & tan delta 0.1% to 100%
		iv) Measurement of Harmonics of No-Load current	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	Upto 100%
		v) Measurement of Load Loss & Impedance	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	300 kW, Current Upto 1200A & Voltage Upto 300kV per phase for reactor
		vi) Knee Point Voltage measurement	IEC60076-6(2007)	Voltage Range from 0.7 Ur to 1.1 Ur

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		vii) Measurement of zero phase sequence impedance on three phase reactors	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	1mA to 1200A , Upto 300 kV
		viii) Temperature rise test	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	Upto 300 kW, Upto 1200 A, Upto 300 kV, Upto 200°C
		ix) Separate source voltage withstand test	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	1kV to 395kV
		x) Applied Voltage test (AV)	IEC60076-3(2007)	
		xi) Induced overvoltage test	IS 5553 :1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	1kV to 680kV
		Induced Voltage Withstand test (IVW)	IEC60076-3(2007)	
		xii) ACSD/ACLD voltage withstand test with PD measurement	IS 5553:1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	1kV to 680kV

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		Induced voltage test with partial Discharge measurement (IVPD)	IEC60076-3-(2013)	
		Line terminal AC Withstand Test (LTAC)	IEC60076-3-(2013)	
	xiii)	Lightning impulse test	IS 5553:1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	Upto 2000kV
		Lightning impulse test (LI, LIC, LIN, LIMT)	IEC60076-3-(2013)	
	xiv)	Switching impulse test	IS 5553:1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	Upto 1700kV
		Switching impulse test(SI)	IEC60076-3-(2013)	
	xv)	Measurement of Noise level	IS 5553:1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	100 dB max.
	xvi)	Measurement of power taken by fan & pump(Cooler loss)	IS 5553:1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	Max 200 kW

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		xvii) Measurement of vibration	IS 5553:1990, IEC60076-6(2007), IEEE Std. C57.21.90-2010, IEEE Std. C57.12.00-2010	Max. 3000 microns
		xviii) CT ratio measurement	IEC60044-1 Amend-1	Upto 3000 A
		xix) SFRA	IEC60076-18/ED-1	20 Hz to 2 MHz

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