Laboratory	**Central Power Research Institute, Prof. Sir C.V. Raman Road, Sadashivanagar P.O., Bangalore, Karnataka**		
Accreditation Standard	**ISO/IEC 17025: 2005**		
Discipline	**Mechanical Testing**	**Issue Date**	**10.06.2015**
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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
I.	**MECHANICAL PROPERTIES OF MATERIALS**			
1.	**Transmission Line Towers**	Prototype Tests	IS 802 (Part 3): 1978 (RA 2013) IEC 60652: 2002	Height: 70 m Base Width: 26 m × 26 m Overturning moment 245250 kN-m Stub Load: 6380 kN
2.	**Steel Poles**	Temporary deflection Permanent set Test Breaking load Test	IS 2713 (Part 1 to 3): 1980 (RA 2013)	Diameter: Upto 350 mm Height: Upto 25m Deflection: 1 mm to 500 mm Load: Upto 50 kN
3.	**Line Material**	Tensile	IS 5350 (Part 3): 1971 (RA 2009) IS 2544: 1973 (RA 2011) IS 731: 1971 (RA 2011) IEC 60168: 2001	Load: 600 kN Free Clamping Length: 1.6 m Load: 200 kN Free Clamping Length: 35 m
		Bending Test	IS 1445: 1977 (RA 2009) IS 5350 (Part 3): 1971 (RA 2009) IS 2544: 1973 (RA 2011) IS 731: 1971 (RA 2011) IEC 60168: 2001	Load: 600 kN Free Clamping Length: 1.6 m Load: 200 kN Max. Specimen height Upto 7 m
		Residual Strength (Tensile)	IEC 60797: 1984	Load: 600 kN Free Clamping Length: 1.6 m

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	Line Material	Slip Strength & Mechanical Strength Test (Tensile)	IS 2486 (Part 1): 1993 (RA 2013)	Load: 600 kN Free Clamping Length: 1.6 m Load: 200 kN Free Clamping Length: Upto 10 m
		Compression Test	IS 1445: 1977 (RA 2009) IS 5350 (Part 3): 1971 (RA 2009) IS 2544: 1973 (RA 2011) IEC 60168: 2001 IS 5300: 1969 (RA 2009)	Load: 600 kN Free Clamping Length: 1.6 m Load: 200 kN Free Clamping Length: Upto 10 m
		Mechanical Failing Load Test	IEC 60383-1: 1993 IS 731: 1971 (RA 2011)	Load: 600 kN Free Clamping Length: 1.6 m Load: 200 kN Free Clamping Length: Upto 20 m
		Axial & Radial Run Out Test/ Eccentricity Test	IEC 60383: 1993 IS 731: 1971 (RA 2011)	Range: 50 mm
4.	**Transmission Line Conductors Upto & Including 800 kV**	Breaking Load/ UTS Test	IS 398 (Part 1 to 5): 1996 1996, 1976, 1994 & 1992 respectively (RA 2007) 2007, 2009	Load: 1000 kN Free Clamping Length: 30 m
		Stress-strain Test	2009 & 2007 respectively	Load:500 kN Length:30 m
		Type Test on Individual wires (except RIV & Corona Tests)		Load: 50 kN Length: 1.0 m

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	Transmission Line Conductors Upto & Including 800 kV	Tensile Breaking Strength / RTS	IEC 62420: 2008 BS EN 50182: 2001 IEC 61089: 1997	Load: 200 kN Length: Upto 20 m
5.	**Compression Clamps**	Slip Strength/ Mechanical Strength etc.	IS 2486 (Part 1): 1993 (RA 2013) IEC 61238-1: 2003	Load: 600 kN Free Clamping Length: 30 m Load: 200 kN Length: Upto 10 m
6.	**Mid Span Joint**	Mechanical Failing Load	IS 2121 (Part 3): 1992 (RA 2007)	Load: 600 kN Free Clamping Length: 1.6 m Load: 200 kN Length: Upto 10 m
7.	**I & V Suspension Tension String Upto & Including 800 kV Rating**	Mechanical Failing Load	Power Grid specification/ Customers requirement	Load: 1000 kN Length: 20 m Load: 200 kN Length: Upto 20 m
8.	**Structural Steel**	Tensile Except R_p, R_t & A_{gt} Bend	IS 1608: 2005 (RA 2010)	Load: 600 kN
		Galvanizing Coating Thickness Measurement (Magnetic Method)	IS 3203: 1982 (RA 2010) IS 4759: 1996 (RA 2010) EN ISO 2178: 1995 BS EN ISO 1461: 2009	Conel Meter Range: 600 microns

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9.	**Terminal Clamp**	Mechanical Failing Load Test (Tensile)	IS 5561: 1970 (RA 2007)	Load: 600 kN Free Clamping Length: 1.6 m Load: 50 kN Length: Upto 10 m
10.	**Insulator & Insulator Strings of Single/Twin/ Triple/ Quad-Tension or Suspension type Upto & including 800 kV Rating**	Twenty Four hours Mechanical Strength Test	IS 731: 1971 (RA 2011)	Load: 200 kN Length: Upto 20 m
		Mechanical Failing load Test	IS 731: 1971 (RA 2011)	Load: 1000 kN
		Fatigue/ Vibration Test	Power Grid Specification	Span: 80 m
		Mechanical Test/ Mechanical Performance Test	IEC 60383: 1993 IEC 60575: 1997	Load: 1000 kN Length: Upto 20 m
		Assembled core load time Test & Damage Limit Proof Test	IEC 61109: 2009	Load: 200 kN Length: Upto 20 m
11.	**Vibration Damper Upto & including 800 kV**	Dynamic Characteristics Test	IS 9708: 1993 (RA 2009)	Load: 445 N f: 0 to 100 Hz
		Damper Efficiency Test	IS 9708: 1993 (RA 2009)	
		Fatigue/ Vibration Test	IS 9708: 1993 (RA 2009)	
		Clamp bolt torque Test	IS 9708: 1993 (RA 2009)	Torque: 200 N-m
		Clamp Slip Test	IS 9708: 1993 (RA 2009)	Load: 20 kN
		Resonance frequency Test	IS 9708: 1993 (RA 2009)	Load: 445 N f: 0 to 100 Hz

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12.	**Spacer/ Spacer Damper Upto & including 800 kV**	Movement Test Clamp Slip Test Clamp Bolt Torque Test Assembly Torque Test Tensile Load Test Compression & Pull off / Tension Test Log Decrement Test Vibration Test Longitudinal Vibration Test Vertical vibration Test Sub-span Oscillation Test Aeloian Vibration Test	IS 10162: 1982 (RA 2007) IS 10162: 1982 (RA 2007) IS 10162: 1982 (RA 2007) IS 10162: 1982 (RA 2007) IS 10162: 1982 (RA 2007) IS 10162: 1982 (RA 2007) IS 10162: 1982 (RA 2007) IEC 61854: 1998 IS 10162: 1982 (RA 2007) IS 10162: 1982 (RA 2007) IEC 61854: 1998	Length: 1 m Load: 20 kN Torque: 200 N-m Load: 200 kN Length: Upto 3 m Span: 80 m f: 0 - 40 Hz Span: 80 m f: 0 - 40 Hz Span: 80 m f: 0 - 40 Hz
13.	**Hardware Items, Fasteners, Line Material, Cable Lugs, Cable Connectors, Cable Clamps etc**	Mechanical strength Tests/ failing load Tests (tensile, compression, bending, slip strength Test)	SOP No. MED/SOP-01	Load: 600 kN Free clamping length: 1.60 m Bending span: 1.15 m Load: 1000 kN Span: Upto 20 m Load: 200 kN Length: Upto 20 m
14.	**Substation Equipments/ Current Transformers/ Power Transformers/ CVTs/ Capacitors Bushings/ Polymer Insulators**	Cantilever Failing load-Mechanical bending Test, Cantilever Load WithstandTest, Cantilever Test, Cantilever strength Test, Mechanical bending Test, Mechanical load Test	IEC61952: 2008-05 IEC 60358: 2012-06 IEC 60044-1: 2003-02 IEC 60168: 2001-04 IEC 60137: 2008-07 IEC 61462: 2007-02 IEC61109: 2008-05 IEC62155: 2003-05 IS2099: 1986 (RA 2013) IEC60099-4:2014-06	Load: 50 kN Height: Upto 7 m Load: 20 kN Height: Upto 7 m

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	Substation Equipments/ Current Transformers/ Power Transformers/ CVTs/ Capacitors Bushings/ Polymer Insulators	Mechanical Test (Tensile/ Torsion/ Bending)	IS 3070 (Part 3): 1993 (RA 2009) IS 5350 (Part 1): 1970 (RA 2009) IS 5561: 1970 (RA 2007) IS 9348: 1998 (RA2008) IS 9431: 1979 (RA 2009) IS 2705 (Part 1): 1992 (RA 2007) IEC 61869 -1: 2007	Load: 50 kN Length: Upto 20 m
15.	**Preformed Armour Rod**	Resilience Test Slip Strength Test Tensile Test	IS 2121 (Part 1): 1981 (RA 2007)	Load: 600 kN Length: Upto 10 m Load: 50 kN Length: Upto 1.6 m
II.	**NOISE & VIBRATION**			
1.	**All types of Electrical, Electronic Instruments, Equipment, Components, PCB's, MCB's, ACB's Rack Mounted Equipment, Instrument/ Equipment panels and other Articles**	Sine Vibration Test	IEC 60068-2-6: 2007 IS 9000 (Part 8): 1981 MIL-STD-810G: 2008, Method 514.6 MIL-STD-883F: 2004, Method 2007.3 MIL-STD-202G: 2002, Method 201A JSS 55555: 2012, Test No. 28 JSS 50101: 1996, Revsion 1, Test No. 23	Shaker Force Rating: 25 kN Frequency range: 5 Hz to 3000 Hz Displacement: 50 mm (pk-pk) Velocity: 1800 mm/s

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	All types of Electrical, Electronic Instruments, Equipment, Components, PCB's, MCB's, ACB's Rack Mounted Equipment, Instrument/ Equipment panels and other Articles	Random Vibration Test	IEC 60068-2-64: 2008 MIL-STD-810G: 2008, Method 514.6 MIL-STD-883F: 2004, Method 2026 MIL-STD-202G: 2002, Method 214A JSS 55555: 2012, Test No. 28 JSS 50101: 1996, Revsion 1, Test No. 24	Acceleration: Bare table- 830 m/s^2 vertical axis 130 m/s^2 Horzontal axis
		Mechnanical Shock Test & Bump Test	IEC 60068-2-27: 2008 IS 9000 (Part 7/Sec I): 2006 IS 9000 (Part 7/Sec II): 1979 MIL-STD-810G: 2008, 516.6 MIL-STD-883F: 2004, Method 2002.4 MIL-STD-202G: 2002, Method 213B JSS 55555: 2012, Test No. 5 JSS 50101: 1996, Revsion1, Test No. 12	
2.	**All Types of Energy Meters, Watthour meters, Trivector meters, Panel Meters (1 phase, 3 phase)**	Sine Vibration Test & Mechnanical Shock Test	IEC 62052-11: 2003 IEC 62053-11: 2003 IEC 62053-21: 2003 IEC 62053-22: 2003 IS 13010: 2002 IS 13779: 1999 IS 14697: 1999 CBIP TR 88	Shaker Force Rating: 25 kN Frequency range: 5 Hz to 3000 Hz Displacement: 50 mm (pk-pk) Velocity: 1800 mm/s Acceleration: Bare table- 830 m/s^2 vertical axis 130 m/s^2 Horzontal axis

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3.	**All Types of Measuring Relays and Protection Equipment**	Sine Vibration Test Mechnanical Shock Test & Bump Test	IEC 60255-21-1: 1988 IEC 60255-21-2: 1988	Shaker Force Rating: 25 kN Frequency range: 5 Hz to 3000 Hz Displacement : 50 mm (pk-pk) Velocity: 1800 mm/s Acceleration: Bare table- 830 m/s^2 vertical axis, 130 m/s^2 Horzontal axis
4.	**Rolling Stock Equipment for Railway Applications**	Random Vibration Test & Mechnanical Shock Test	IEC 61373: 2010	Shaker Force Rating: 25 kN Frequency range: 5 Hz to 3000 Hz Displacement : 50 mm (pk-pk) Velocity: 1800 mm/s Acceleration: Bare table- 830 m/s^2 vertical axis, 130 m/s^2 Horzontal axis

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5.	**All types of Electrical, Electronic Instruments, Equipment, components, PCB's, MCB's, ACB's Rack Mounted Equipment, Instrument/ Equipment Panels, Relays and other Articles**	Cold (Low Temeperature) Test	IEC 60068-2-1: 2007 IS 9000 (Part 2/Sec I to IV): 1977 IEC 60571: 2012	Temperature range: (-)70 ^{o}C to (+)150 ^{o}C
		Dry Heat (High Temperature) Test	IEC 60068-2-2: 2007 IS 9000 (Part 3/Sec I to V): 1977 IEC 60571: 2012	Ramp Rate: 10 ^{o}C/minute from (-)20 ^{o}C to (+)150 ^{o}C & 5 ^{o}C/minute from (-)20 ^{o}C to (-)70 ^{o}C
		Temperature Cycling Test	IEC 60068-2-14: 2009 IS 9000 (Part 6):1978	
		Composite Temperature & Humidity Test	IEC 60068-2-30: 2005 IS 9000 (Part 5/Sec I & II): 1981 IEC 60068-2-78: 2012 IS 9000 (Part 4): 2008 IEC 60571: 2012	Humidity range: 30 % to 95 % RH from 25 ^{o}C to 55 ^{o}C Maximum specimen size 1 m^3 and weight 100 kg
6.	**All types of Electrical, Electronic Instruments, Equipment, Control and Relay Panels, Mechanical Components, Structures and other Articles**	Sine Vibration Test, Seismic Qualification Test (Tri-axial)	IEEE 344: 2013 IEC 60980: 1989 IEC 60068-3-3: 1991	Frequency range: 0.1 Hz to 50 Hz Displacement : Horizontal axes- 300 mm (pk-pk) Vertical axis- 200 mm (pk-pk) Velocity: 1 m/s (pk) Acceleration: 10 m/s^2 (pk) Maximum payload: 10,000 kg

S. No.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
7.	**All types of Substation Equipment and Structures**	Sine Vibration Test, Seismic Qualification Test (Tri-axial)	IEEE 693: 2005 IEC TR 62271-300: 2006 IEC TS 62271-210: 2013 IEC 62271-207: 2012 IEC TS 61463: 2000 IEC 60068-3-3: 1991 IS1893 (Part 1): 2002 ICC-ES AC 156: 2010	Frequency range: 0.1 Hz to 50 Hz Displacement : Horizontal axes- 300 mm (pk-pk) Vertical axis- 200 mm (pk-pk) Velocity: 1 m/s (pk) Acceleration: 10 m/s^2 (pk) Maximum payload: 10,000 kg
8.	**All types of Electrical, Electronic Instruments, Equipment, Relays, Relay Panels, Mechanical Components, Structures and other Articles**	Sine Vibration Test, Seismic Qualification Test (Uni-axial)	IEEE 344: 2013 IEC 60980: 1989 IEC 60068-3-3: 1991 IEC 60255-21-3: 1993	Frequency range: 1 Hz to 250 Hz Displacement: 100 mm (pk-pk) Velocity:0.8 m/s (pk) Acceleration: 60 m/s^2 (pk) 10 Hz to 100 Hz 30 m/s^2 (pk) 100 Hz to 150 Hz 10 m/s^2 (pk) at 250 Hz Payload: 1000 kg Acceleration: 60 m/s^2 , Duration: 30 ms

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9.	**All types of Electrical, Electronic Instruments, Equipment, Components, PCB's, MCB's, ACB's Rack Mounted Equipment, Instrument/ Equipment Panels, Rolling Stock Equipment for Railway Applications and other Articles**	Sine Vibration Test	IEC 60068-2-6: 2007 JSS 55555: 2012, Test No. 28 IS 9000 (Part 8): 1981	Frequency range: 1 Hz to 250 Hz Displacement: 100 mm (pk-pk)
		Random Vibration Test	IEC 60068-2-64: 2008 IEC 61373: 2010	Velocity:0.8 m/s (pk) Acceleration: 60 m/s^2 (pk) 10 Hz to 100 Hz
		Mechnanical Shock Test & Bump Test	IEC 60068-2-27: 2008 IS 9000 (Part 7/Sec I): 2006 IS 9000 (Part 7/Sec II): 1979 IEC 61373: 2010	30 m/s^2 (pk) 100 Hz to 150 Hz 10 m/s^2 (pk) at 250 Hz Payload: 1000 kg Acceleration: 60 m/s^2 , Duration: 30 ms

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