

<b>Laboratory</b>	<b>Switchgear Testing &amp; Development Station (STDS), Central Power Research Institute, Govindpura, Bhopal, Madhya Pradesh</b>		
<b>Accreditation Standard</b>	<b>ISO/IEC 17025:2005</b>		
<b>Discipline</b>	<b>Electrical Testing</b>	<b>Issue Date</b>	<b>10.06.2015</b>
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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
<b>I.</b>	<b>SWITCHGEAR EQUIPMENT</b>			
<b>1.</b>	<b>H.V. Circuit Breaker &amp; Switchgear Panel With Circuit Breaker</b>	Short Circuit Current Making and Breaking Test.		4 A to 100 kArms at 12 kV, 10 A to 11 kArms at 24 kV 10 A to 16.0 kArms at 36 kV
		Capacitive Current Switching Test.		1 A to 400 A, 3 $\phi$ at 12 kV, 1 A to 1200 A, 1 $\phi$ at 12 kV & 15 kV
		Cable/Line Charging Current Breaking Test.		0.1 A to 400 A, 3 $\phi$ at 12 kV, 0.1A to 1200 A, 1 $\phi$ at 12 kV & 15 kV.
		Short Time Withstand Current & Peak Withstand Current Test.		4 A to 200 kArms for 1.0 s with 565 kA peak
		Dielectric Tests (Wet/Dry).		Upto 132 kV class. Upto 325 kV
		Mechanical Operation Test at Ambient Air Temperature		Upto 10,000 operations
		Lightning Impulse Voltage Withstand Test		Upto 400 kV class, Upto 2100 kVp (both polarity)
		Switching Impulse Voltage Test(Dry)		Upto 400 kV class, Upto 1500 kVp (both polarity)

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	<b>H.V. Circuit Breaker &amp; Switchgear Panel With Circuit Breaker</b>	Temperature Rise Test		Upto 25,000 A 10 °C to 150 °C
		Measurement of The Resistance of The Main Circuit.		Upto 100 mV at 100A DC Upto 100 mΩ
		Out-Of-Phase Making & Breaking Capacity Test. #		10 A to 50 kArms at 12 kV, 10 A to 11 kArms at 24 kV, 10 A to 16.0 kArms at 36 kV
		Inductive Load Current Switching Test.		6.6 kV & 3.3 kV at 100 & 300 A
		Internal Arc Test.		10 A to 50 kArms at 12 kV, 10 A to 11 kArms at 24 kV, 10 A to 16 kArms at 36 kV.
		Test to Verify The Degrees of Protection of Enclosure		IP-1X to 6 x and IP-X1 to X6.
<b>2.</b>	<b>H.T. Switches/ Line Sectionalizer/ Capacitor Switch/ Load Break Switch</b>	Rated Short Circuit Making Capacity Test.	IS 9920-1: 2002 IEC 60265-1: 1998; IS 9920-2: 2001 IEC 60265-2: 1988 IEC 62271-104: 2009 IEC 62271-1: 2011 IEC 62271-103: 2011 IEC 62271-105: 2002	2 kA to 125 kA peak at 12 kV, 2 kA to 27.5 kA peak at 24 kV 2 kA to 40.0 kA peak at 36 kV

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	<b>H.T. Switches/ Line Sectionalizer/ Capacitor Switch/ Load Break Switch</b>	Rated Making and Breaking Capacity Test.	IS 9920-1: 2002/ IEC 60265-1: 1998; IS 9920-2: 2001/ IEC 60265-2: 1988 IEC 62271-104: 2009 IEC 62271-1: 2011	1 A to 630 A at 12 kV (3 $\phi$ ) 1 A to 800 A at 27.5 kV (1 $\phi$ )
		Short Time Withstand Current and Peak Withstand Current Test.	IEC 62271-103: 2011 IEC 62271-105: 2002	4 A to 200 kArms for 1 s with 565 kA peak
		Single Capacitor Bank Switching Test.		0.1 A to 400 A, 3 $\phi$ at 12 kV, 0.1 A to 1200 A, 1 $\phi$ at 12 kV & 15 kV
		Dielectric Tests (Wet & Dry)		Upto 132 kV class. (Upto 325 kV)
		Lightning Impulse Voltage Withstand Test		Upto 400 kV class Upto 2100 kVp (both polarity)
		Switching Impulse Voltage Test(Dry)		400 kV class Upto 1500 kVp (both polarity)
		Mechanical Endurance Test.		Upto 1,000 operations.
		Temperature Rise Test		Upto 10000 A 10 °C to 150 °C
		Measurement of The Resistance of The Main Circuit.		Upto 100 mV at 100A DC Upto 100 m $\Omega$

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3.	<b>Isolators and Earthing Switches</b>	Short Time Withstand Current and Peak Withstand Current.	IS 9921-1: 1981 (RA 2007) IS 9921-2: 1982 (RA 2007) IS 9921-3: 1982 (RA 2007) IS 9921-4: 1985 (RA 2007) IS 9921-5: 1985 (RA 2007) IS/IEC 62271 (Part 1): 2007 IS/IEC 62271 (Part 102): 2003 IEC 62271-102: 2013	4 A to 200 kArms for 1s with 565 kA peak 33 kV class; 1 kA to 80 kArms for 3 s with 200 kA peak for above 33 kV class.
Dielectric Tests (Wet & Dry)			Upto 132 kV class (Upto 325 kV rms)	
Mechanical Endurance Test			Upto 1,000 operations	
Temperature Rise Test			Upto 6300 A 10 °C to 150 °C	
Measurement of The Resistance of The Main Circuit			Upto 100 mV at 100 A DC Upto 100 mΩ	
Lightning Impulse Voltage Withstand Test		IS 9921-1: 1981 (RA 2007) IS 9921-2: 1982 (RA 2007) IS 9921-3: 1982 (RA 2007) IS 9921-4: 1985 (RA 2007)	Upto 400 kV class Upto 2100 kVp (both polarity)	
Switching Impulse Voltage Test(Dry)		IS 9921-5: 1985 (RA 2007) IS/IEC 62271 (Part 1): 2007 IS/IEC 62271 (Part 102): 2003 IEC 62271-102: 2013	Upto 400 kV class upto 1500 kVp (both polarity)	
Partial Discharge Test			Upto 100 kV, 50 Hz. 2 pC to 100 pC	

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4.	<b>Neutral Grounding Resistor Units</b>	Short Time Current Test# Temp Rise Test	CPRI document no. TOP-01	10 A to 200 kA for 1 s Upto 25 kA 10 °C to 150 °C
5.	<b>Autoreclosures</b>	Test to Prove Mechanical Operation Test Temperature Rise Test.  Operating Duty Test.  Short Time Current Test.	IS 7567: 1993 IS/IEC 62271 (Part 100): 2008 IS 12729: 2004/ IEC 60694: 2002 ANSI/IEEE C-37.60: 2003	Upto 36 kV Class.  Test Upto 400 A Temp from 10 °C to 150 °C  10 A to 50 kA rms at 12 kV, 10 A to 11 kA rms at 24 kV, 10 A to 16 kA rms at 36 kV  10A to 200 kA rms for 1.0 s with 565 kA peak.

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6.	<b>LV Switchgear and Control Gear</b>	Making & Breaking Capacity	IS/IEC 60947-1: 2004 IS/IEC 60947-2: 2003 IS/IEC 60947-3: 1999 IS/IEC 60947-4-1: 2000 IS/IEC 60947-4-2: 1999 IS/IEC 60947-5-1: 2003	4 A to 100 kA 2.555 % at 50 kA 5 V to 726 V 2.4801 % at 252 V 0.4 s to 5 s 0.6801 at 1.0 s
		Short Circuit Making Capacity	IEC 60947-1: 2007, Amd. 1: 2010, Amd. 2: 2014 IEC 60947-2: 2006 Amd. 1: 2009, Amd. 2: 2013 IEC 60947-3: 2008, Amd. 1: 2012 IEC 60947-4-1: 2009, Amd.1: 2012 IEC 60947-4-2: 2011 IEC 60947-5-1: 2003, Amd. 1: 2009	Upto 200 kA for 1 sec. with 565 kA <sub>pk</sub> at 1.1 kV and Upto 80 kA <sub>dc</sub> at 1.55 kV <sub>dc</sub>
		Short Time Withstand Current	IEC 60947-6-1: 2005, Amd. 1: 2013 IEC 60947-7-1: 2009 IS/IEC 60898-1: 2002 IS/IEC 60898-2: 2003  IEC 60898-1: 2002, Amd. 1: 2002, Amd. 2: 2003 IEC 60898-2 2000, Amd. 1: 2003,  IS 12640 (Part 1): 2008 IS 12640 (Part 2): 2008  IEC 61008-1: 2010 , Amd. 1: 2012 , Amd. 2: 2013 IEC 61008-2-1: 1990-12 IEC 61008-2-2: 1990-12	

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	<b>LV Switchgear and Control Gear</b>		IEC 61009-1: 2010, Amd. 1: 2012 , Amd. 2: 2013 IEC 61009-2-1: 1991 IEC 61009-2-2: 1991 IS 3427: 1997/ IEC 298: 1990, IS 10027: 2000, IEC 60755: 2008 IS 13032: 1991, IEC 60695-2-10: 2013 IS 14659: 1999	
		Fuse Protected Short Circuit Withstand		Upto 200 kA for 1 sec. with 565 kApk at 1.1 kV and Upto 80 kAdc at 1.55 kVdc
		Fuse Protected Short Circuit Making		
		Rated Service Short Circuit Breaking Capacity		
		Rated Ultimate Short Circuit Breaking Capacity		
		Rated Short Time Withstand Current		
		Short Circuit Breaking Capacity at Maximum Short Time Withstand Current		
		Short Circuit at Selectivity Limit Current.		

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	<b>LV Switchgear and Control Gear</b>	Short Circuit at 1.1 Times Protective Current		
		Short Circuit At		
		Ultimate Short Circuit Breaking Capacity		
		Short Time Withstand Current		
		Fuse Protected Short Circuit Withstand		
		Fuse Protected Short Circuit Making		
		Rated Service Short Circuit Breaking Capacity		
		Rated Ultimate Short Circuit Breaking Capacity		
		Rated Short Time Withstand Current		Upto 200 kA for 1 sec. with 565 kA <sub>pk</sub> at 1.1 kV and Upto 80 kA <sub>dc</sub> at 1.55 kV <sub>dc</sub>
		Short Circuit Breaking Capacity at Maximum Short Time Withstand Current		



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	<b>LV Switchgear and Control Gear</b>	Short Circuit at Selectivity Limit Current.		
		Short Circuit at 1.1 Times Protective Current		
		Short Circuit At Ultimate Short Circuit Breaking Capacity		
		Verification of Rated Making and Breaking Capacity		
		Verification of The Rated Residual Making and Breaking Capacity		
		Verification of The Coordination at The Rated Making and Breaking Capacity		
		Verification of The Coordination at Rated Conditional Residual Short Circuit Current		Upto 200 kA for 1 sec. with 565 kA <sub>pk</sub> at 1.1 kV and Upto 80 kA <sub>dc</sub> at 1.55 kV <sub>dc</sub>
		Verification of The Coordination at Rated Conditional Residual Short Circuit Current		

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	<b>LV Switchgear and Control Gear</b>	Short Circuit Performance at 1500 A		
		Service Short Circuit Capacity		
		Performance at Rated Short Circuit Capacity		
		Circuit Fault Current Test		
		Rated Earth Fault Breaking Current Test		
		Flexible Cord Test		
		Temperature Rise Verification		Upto 25 kA, 3 ph
		Dielectric Properties	IS/IEC 60947-1: 2004 IS/IEC 60947-2 : 2003	1kV to 5kV
		Leakage Current	IS/IEC 60947-3: 1999 IS/IEC 60947-4-1: 2000	1000V, 0 to 10 A.
		Strength of Actuator Mechanism	IS/IEC 60947-5-1: 2001 IEC 60947-1 (2007-06)	18 gm to 13.38 kgm.
		Operational Performance	IEC 60947-2 (2009-05) IEC 60947-2- Amd. 1 (2009-01)	Upto 630 A, 415V
		Tripping Limits and Characteristics	IEC 60947-3 (2008-08) IEC 60947-4-1 (2009-09)	Upto 100kA.
		Mechanical Operation and Operational Performance Capability	IEC 60947-4-2 Amd. 1+Amd. 2 (2007) IEC 60947-5-1 (2003-11) Amd. 1	Up to 1Lakh operations
	Overload Performance	IEC 60947-6-1: 1998	Upto 100kA.	

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	<b>LV Switchgear and Control Gear</b>	Verification of Overload Releases		Upto MCB rating of 125A.
		Marking Dimensions, Visual Examination, General		Upto MCB rating of 125A.
		Mechanism/Trip Free Mechanism		Upto MCB rating of 125A.
		Indelibility of Marking		Upto MCB rating of 125A.
		Clearances and Creepage Distances		10-120cNm, 1-6Nm, 2.5-11Nm
		Non Interchangeability		50N-100N 10-120cNm, 1-6Nm 2.5-11 Nm
		Reliability of Screws, Current Carrying Parts and Connectors		
		Reliability of Terminals For External Conductors	IS/IEC 60947-1: 2004 IS/IEC 60947-2 : 2003	Upto MCB rating of 125A.
		Protection Against Electric Shock	IS/IEC 60947-3: 1999 IS/IEC 60947-4-1: 2000 IS/IEC 60947-5-1: 2001	Upto MCB rating of 125A.
		Resistance to Heat	IEC 60947-1 (2007-06) IEC 60947-2 (2009-05)	Upto MCB rating of 125A
	Resistance to Abnormal Heat and to Fire	IEC 60947-2- Amd. 1 (2009-01) IEC 60947-3 (2008-08)	Upto MCB rating of 125A	
	Resistance to Rusting	IEC 60947-4-1 (2009-09) IEC 60947-4-2	Upto MCB rating of 125A	

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	<b>LV Switchgear and Control Gear</b>	28-Day Testing	Amd. 1+Amd. 2 (2007) IEC 60947-5-1 (2003-11) Amd. 1	Upto MCB rating of 125A
		Mechanical and Electrical Endurance Test	IEC 60947-6-1: 1998 IEC 60947-7: 1989 IEC 60947-7-1: 2002,	Upto MCB rating of 125A
		Trip and Non Trip Test	IS/IEC 60898-1: 2002 IS/IEC 60898-2: 2003	Upto MCB rating of 125A
		Resistance to Mechanical Shock and Impact	IEC 60898-1 Amd. 1 + Amd. 2 (2003-07) IEC 60898-2	Qualitative
		Voltage Drop/Effective Earthing Environment Test	Amd. 1 (2003-07) IS 12640 (Part 1): 2008 IS 12640 (Part 2): 2008	0-100A, 50 V -10°C to 100°C, 20% to 98% RH
		Moisture and Humidity Test	IEC 61008-1 (Edition 3.0) (2010-02) IEC 61008-2-1 (Edition 1.0) (1990-12) IEC 61008-2-2 (Edition 1.0) (1990-12)	-10°C to 100°C, 20% to 98% RH
		Verification of Operation and Operating Limits	IEC 61009-1 (Edition 3.0) (2010-02)	Upto 1000 V class. Upto 10,000 A
		Verification of Ability to Withstand Overload Currents	IEC 61009-2-1 (Edition 1.0) (1991-09) IEC 61009-2-2 (Edition 1.0) (1991-09)	
		Verification of Mechanical Properties of Terminals	IS 2959: 1985, IS 3427: 1997/ IEC 298: 1990,	Upto 1000 V
		Time Current Characteristics	IS 10027: 2000, IEC 60755: 1983, Amd.1: 1988, Amd. 2: 1992,	Upto MCB rating of 125 A
		Insulation Resistance	IS 13032: 1991, IEC 60695-2-1/0: 1994 IS 14659: 1999 IEC 60466: 1987	100 Ω to 10 GΩ 250 V to 5 kV

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	<b>LV Switchgear and Control Gear</b>	Transformer (Current)	Amd.1994	0 to 100 A, 50 V
		Balance Test	IS 9000 (Part 8): 1981 IEC/TR61641: 2008	
		Test for Determination of Test Device Ampere Turns		0 to 30 A
		Test for Sensitivity		100 A, 300 mA
		Shock Test		100 A, 300 mA
		Verification of Performance of Test Device		100 A, 300 mA
		Degree of Protection		IP 1X to 6X & IP X1 to X6
		Lightning Impulse		35 kV peak
		HV Test		5 kV
		Over Current Device Calibration Test		Upto 100 A, 300 mA
		Operation of The Test Device at The Limits of Rated Voltage		Upto 100 A, 300 mA
		Behaviour of The RCCB In Case of Failure of The Line Voltage		Upto 100 A, 300 mA
		Limiting Values of The Non Operating Currents Under Overcurrent Conditions		Upto 100 A, 300 mA
	Resistance Against Unwanted Tripping Due to Current Surges		Upto 100 A, 300 mA	

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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>LV Switchgear and Control Gear</b>	Resistance of The Insulation Against Impulse Voltage	IS/IEC 60947-1: 2004 IS/IEC 60947-2: 2003 IS/IEC 60947-3: 1999	Upto 100 A, 300 mA
		Behaviour of RCCB In Case of Earth Fault Current Comprising A D.C. Component	IS/IEC 60947-4-1: 2000 IS/IEC 60947-5-1: 2003 IEC 60947-1: 2007, Amd. 1: 2010, Amd. 2: 2014 IEC 60947-2: 2006	Upto 100 A, 300 mA
		Reliability	Amd. 1: 2009, Amd. 2: 2013 IEC 60947-3: 2008,	Upto 100 A, 300 mA
		Ageing of Electronic Component	Amd. 1: 2012 IEC 60947-4-1: 2009 Amd. 1: 2012	Upto 100 A, 300 mA
		Controls, Sequence and Limits of Operation	IEC 60947-4-2: 2011 IEC 60947-5-1: 2003, Amd. 1: 2009	Upto 100 A, 300 mA
		Residual Operating Characteristics	IEC 60947-6-1: 2005, Amd. 1: 2013	Upto 100A, 300 mA
		Testing Under Condition of Arcing Due to Internal Fault	IEC 60947-7-1: 2009 IS/IEC 60898-1: 2002 IS/IEC 60898-2: 2003 IEC 60898-1: 2002, Amd. 1: 2002, Amd. 2: 2003 IEC 60898-2: 2000, Amd. 1: 2003, IS 12640 (Part 1): 2008 IS 12640 (Part 2): 2008 IEC 61008-1: 2010 Amd. 1: 2012 Amd. 2: 2013 IEC 61008-2-1: 1990-12 IEC 61008-2-2: 1990-12 IEC 61009-1: 2010, Amd. 1: 2012 Amd. 2: 2013 IEC 61009-2-1: 1991 IEC 61009-2-2: 1991 IS 3427: 1997/IEC 298: 1990	Upto 200 kA for 1 s with 565 kA pk at 1.1 kV

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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
7.	LV Fuses, Fuse Holders/Base, Rewirable Type Fuses, Fuses (Cutouts) Auxilliary Terminal Blocks & Interconnecting Units, Cartridge Fuses, D Type (AC/DC) Fuses, Semiconductor Fuses, Fuses With Enclosure	<p>Breaking Capacity Tests</p> <p>Performance Under Short Circuit Conditions</p> <p>Cut-Off Current Characteristics</p> <p>I<sup>2</sup>t Characteristics and Over Current Discrimination</p> <p>Mechanical Strength of Fuse Holder</p> <p>Verification of Resistance to Heat</p> <p>Non-Deterioration of Insulating Parts of Fuse Links, Fuse Base and Contacts</p>	<p>IS 13703 (Part 1): 1993 IS 13703 (Part 2/Sec I): 1993 IS 13703 (Part 2/Sec II): 1993 IS 13703 (Part 4): 1993 IS 8187: 1976 Amd. 1: 1980 IS 2086: 1993 Amd. 1: 1997 IS 10027: 2000 IEC 60269-1: 2006 Amd. 1: 2009 Amd. 2: 2014 IEC 60269-2: 2013 IEC 60269-3: 2010 + Amd. 1: 2013 IEC 60269-4: 2009 + Amd. 1: 2012 BSEN 60269-1: 2007+ Amd. 2: 2014/ BS 88-1: 2007 + Amd. 2: 2014 BSHD 60269-2: 2010/ BS 88-2: 2010 BSHD 60269-3: 2010 + Amd.1: 2013/ BS 88-3: 2010 BSHD 60269-4: 2009 + Amd. 1: 2012, BS 88-4: 2009 + Amd. 1 2012 BS 7657: 2010 BS 1361: 1971 IS 9926: 1981</p>	<p>4 A to 200 kA rms at 5 V to 1.1 kV and Upto 80 kA DC at 1.55 kV DC</p> <p>4 A to 100 kArms for 5 V to 550 V. 4 A to 80 kA for 5 V to 726 V 0 to 20 s for I1, I2&amp; I3 0 to 60 min for I4 and I5</p> <p>Upto 1250 A, 1000 V</p> <p>Upto 1250 A, 1000 V</p> <p>Upto 1250 A, 1000 V</p> <p>Upto 1250 A, 1000 V</p>

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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>LV Fuses, Fuse Holders/Base, Rewirable Type Fuses, Fuses (Cutouts) Auxilliary Terminal Blocks &amp; Interconnecting Units, Cartridge Fuses, D Type (AC/DC) Fuses, Semiconductor Fuses, Fuses With Enclosure</b>	Protection Against Electric Shock		Upto 25kA, 3 ph. with driving voltage of 40V. Temp from 10 °C to 150 °C
		Temperature Rise Test		
		Degree of Protection		IP 1X to 6X & IP X1 to X6
		Time Current Characteristics		Upto 1250 A, 1000 V Rating
		Conventional Time and Current		100 kA rms at 550 V and Upto 80 kArms at 726 V
		Visual Examination		Upto 100 A, 500 V
		Test for Dimensions		Upto 100 A, 500 V
		Mechanical Endurance		Upto 100 A, 500 V
		Mechanical Strength		Upto 100 A, 500 V
		Withdrawal Force		Upto 100 A, 500 V
		Insulation Resistance		Upto 2000 MΩ, 500 V
		Dielectric Test		Upto 5 kV
		Electrical Endurance		NA



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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>LV Fuses, Fuse Holders/Base, Rewirable Type</b>	Test for Water Absorption (Non Ceramic)		Upto 100 A, 415 V.
	<b>Fuses, Fuses (Cutouts) Auxilliary Terminal Blocks &amp; Interconnecting Units, Cartridge Fuses, D Type (AC/DC) Fuses, Semiconductor Fuses, Fuses With Enclosure</b>	Test for Water Absorption on Ceramic Material		Upto 100 A, 415 V
		Temperature Cycle Test		Upto 100 A, 415 V.
<b>8.</b>	<b>Bus Ducts, Panels. MCB Boards. Distribution Pillars, Distribution Fuse Boards and Cut Out</b>	Verification of The Short Circuit Withstand Strength	IS 8623 (Part 1): 1993 IS 8623 (Part 2): 1993 Amd. 1 IS 8623 (Part 3): 1993 Amd. 1 IEC 61439-1: 2011 IEC 61439-2: 2011 IEC 61439-3: 2012 IEC 61439-4: 2012 IEC 61439-5: 2014 IEC 61439-6: 2012 IS/IEC60947-1: 2004 IEC60947-1: 2007 + Amd. 1: 2010 + Amd. 2: 2014	4 A to 200 kA rms for 1.0 s with 565 kA peak
		Short Time Current Test	IEC 61439-6: 2012 IS/IEC60947-1: 2004 IEC60947-1: 2007 + Amd. 1: 2010 + Amd. 2: 2014	4 A to 200 kA rms for 1.0 s with 565 kA peak
		High Voltage Power Frequency Test	IS 13032 : 1991 IS 8084: 1976 (RA 2007) IS 5039: 1983 Amd. 1: 1997	Upto 132 kV class.
		Temperature Rise Test	IS 2675: 1983, IS/IEC 60529: 2001 IEC 60529: 1989 Amd. 1: 1999 Amd. 2: 2013 IEEE C37.23: 2003	Upto 25 kA, 3 phase 40 V 10 °C to 150 °C IP IX to 6X & IP X1 to X6.

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	<b>Bus Ducts, Panels. MCB Boards. Distribution Pillars, Distribution Fuse Boards and Cut Out</b>	Degree of Protection		Upto 132 kV class.
		Lightning Impulse Test		Upto 132 kV class.
		Verification of Clearances and Creepage Distance		50 operations.
		Verification of Mechanical Operation		100 kArms for 3 s with 250 kApk.
		Verification of The Continuity of The Protective Circuit		Qualitative
<b>II.</b>	<b>TRANSFORMERS AND REACTORS</b>			
<b>1.</b>	<b>Power Transformers, Traction Transformers, Auto Transformer and Inductors Upto 220 kV Rating</b>	Measurement of Winding Resistance.	IS 2026 (Part 1): 2011 IS 2026 (Part 2): 2010 IS 2026 (Part 3): 2009 IS 2026 (Part 5): 2011 IS 1180 (Part 1): 1989 IS 1180 (Part 2): 1989 IS 1180 (Part 1): 2014 IS 11171: 1985 (RA 2006) IS 3151: 1982 IEC 60076-1: 2011 IEC 60076-2: 2011 IEC 60076-3: 2013 IEC 60076-4: 2002 IEC 60076-5: 2006 IEC 60076-6: 2007 IEC 60076-8: 1997 IEC 60076-10: 2001 IEC 60076-10-1: 2005 IEC 60076-11: 2004 IEC 60310: 2004 IEEE C 57.12.00: 2010 IEEE C57.12.90: 2010 IEEE C57.15: 2009 IEEE C57.20: 2011	0.01 mΩ to 2000 Ω

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2.	<b>Distribution &amp; Dry Type Transformers Upto 33 kV Rating</b>	Measurement of Voltage Ratio and Check of Voltage Vector Relationship	IS 1866: 2000 IS 335: 1993 all Vector Groups as per Annexure D of IEC 60076-1: 2011	Ratio 0.5 to 2000
Measurement of Impedance Voltage/Short Circuit Impedance (Principal Tapping) and Load Loss.			200 VA to 40 MVA, 110 V to 220 kV class (10 W to 300 kW)	
Measurement of No-Load Loss and Current.			200 VA to 40 MVA, 110 V to 220 kV class (1 W to 100 kW)	
Measurement of Insulation Resistance.			100 $\Omega$ to 10 G $\Omega$ at 250V to 5 kV	
Dielectric Tests.			Upto 20 MVA, 66 kV Class 1 kV to 350 kV	
Lightning Impulse Voltage Withstand Test.			Upto 220 kV class Upto 2100 kVp (both polarity)	
Chopped Lightning Impulse Test			Upto 220 kV class Upto 2100 kVp (both polarity)	
Temperature Rise Test.			Upto 25 MVA, 66 kV class 10 °C to 150 °C	

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	<b>Distribution &amp; Dry Type Transformers Upto 33 kV Rating</b>	Short Circuit Withstand Tests.		200 VA to 60 MVA, 110 V to 220 kV class subject to impedance of Transformer and Upto SC Plant Capacity of 1250 MVA, 12 kV
		Induced Over Voltage Test		220 V to 66 kV, 100 Hz to 200 Hz,
		Partial Discharge Measurement		Upto 100 kV, 50 Hz. 2 pC to 100 pC
		Pressure Test		2500 kVA
		Vacuum Test		2500 kVA
		Oil Leakage Test		(Qualitative) Upto 2500 kVA
		Paint Adhesion Test		(Qualitative) Upto 2500 kVA
		BDV & Moisture Content of Oil In The Transformer		2500 kVA
		Permissible Flux Density & Overfluxing		2500 kVA
		Measurement of Acoustic Noise Level/Sound Level Determination		20 dB to 140 dB 200 VA to 40 MVA at 110 V to 220 kV class

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3.	<b>Current Transformer</b>	Short Time Current Test.	IS 2705 (Part 1): 1992 (RA 2002) IS 2705 (Part 2 to 4): 1992 (RA 2007) IS/IEC 60044-1: 2003 IEC 61869-1: 2007	4 A to 200 kArms for 1 s with 565 kA peak subject to impedance of current Transformer
		Transient Response Test.	IEC 61869-2: 2012 IEC 61869-4: 2013	1 kV to 400 kV class.
		Temperature Rise Test.	IEEE C57.13: 2008 IEEE C57.13.5: 2009	Test Upto 25,000 A Temp from 10 °C to 150 °C
		Lightning Impulse Voltage Withstand Test.		Test Upto 400 kV class Test voltage Upto 2100 kVp (both polarity)
		Chopped Lightning Impulse Test on Primary Winding.		(Test Upto 400 kV class) Upto 2100 kVp (both polarity)
		Switching Impulse Voltage Withstand on Primary Winding (Dry)		(Test Upto 400 kV class) Test voltage Upto 1500 kVp (both polarity)
		High Voltage Power Frequency Test (Dry and Wet)		Upto 132 kV class. Upto 325 kV
		Determination of Errors and Other Characteristics		0.05 % Upto 10,000 A/1 A and 5 A

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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>Current Transformer</b>	Terminal Marking and Polarity.		Upto 400 kV class.
		Over Voltage Interturn Test.		Upto 400 kV class.
		Composite Error Measurement Test.		Upto 400 kV class.
		Turn Ratio Measurement Test.		Upto 400 kV class.
		Secondary Winding Resistance Measurement Test		Upto 400 kV class.
		Knee Point Voltage and Excitation Current Measurement Test.		Upto 400 kV class.
		Instrument Security Current Test		Upto 400 kV class
		Measurement of Partial Discharge		Upto 100 kV 2 pC to 100 pC
<b>4.</b>	<b>Voltage Transformers &amp; CVT</b>	Short Circuit Withstand Capability Test.	IS 3156 (Part 1): 1992 (RA 2007) IS 3156 (Part 2 to 4): 1992 (RA 2007)	1 kV to 132 kV class.
		Voltage Error and Phase Displacement Measurement Test	IEC 61869-1: 2007 IEC 61869-3: 2012 IEC 61869-4: 2013	Upto 1 $\phi$ , 132/ $\sqrt{3}$ kV, 3 $\phi$ , 33 kV.
		Terminal Marking & Polarity Test.	IEC 61869-5: 2011 IEEE C57.13: 2008 IEEE C57.13.5: 2009	Upto 132 kV class by physical verification
		Chopped Lightning Impulse Voltage Test On Primary Winding		Upto 400 kV class Test voltage Upto 2100 kVp (both polarity)

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	<b>Voltage Transformers &amp; CVT</b>	Switching Impulse Voltage Withstand on Primary Winding(Dry)		Upto 400 kV class voltage Upto 1500 kVp (both polarity)
		Lightning Impulse Voltage Test on Capacitive Voltage Transformer		Upto 400 kV class 2100 kVp (both polarity)
		High Voltage Power Frequency Test (Dry and Wet)		Upto 132 kV class . Upto 325 kV rms
		Temperature Rise Test		Upto 33 kV, 3-phase 10 °C to 150 °C
		Induced Voltage Withstand Test		Upto 1000 V 200 Hz
		Measurement of Partial Discharge		Upto 100 kV. 2 pC to 100 pC
<b>5.</b>	<b>Reactors</b>	Measurement of Winding Resistance	IS 5553-2: 1990 (RA 2003) IS 5553-3: 1990 (RA 2007) IS 5553-4: 1989 (RA 2004)	100 mΩ to 300 Ω
		Measurement of Impedance Voltage/Short Circuit Impedance.	IS 5553-6: 1990 (RA 2006) IS 5553- 8: 1990 (RA 2004)	1 kV Ar to 2 MV Ar, 11 kV
		Measurement of Insulation Resistance	IEC 60076-6: 2007 IS 5553- 5: 1989 (RA 2004)	100 Ω to 10 GΩ at 250 V to 5 kV.
		Dielectric Tests		Upto 132 kV Class PF Upto 325 kV
		Short Time Withstand Current Test.		10 A to 200 kArms for 1 s with 565 kA peak subject to impedance of reactors

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	<b>Reactors</b>	Lightning Impulse Voltage Withstand Test		Upto 220 kV class Upto 2100 kVp (both polarity)
		Temperature Rise Test		10 °C to 150 °C (100 A)
<b>III. TRANSMISSION LINE EQUIPMENT AND ACCESSORIES</b>				
<b>1.</b>	<b>Surge Arrestors</b>	Short Circuit Tests.	IS 3070-3: 1993 (RA 2004) IS 15086-1: 2011 IEC 60099-4: 2014 IEC 60099-5: 2013 IEEE C62.11: 2005	10 A to 50 kArms at 12kV, 10 A to 11 kArms at 24kV, 10 A to 16 kArms at 36kV. for high Current test & also associated low Current test.
<b>2.</b>	<b>Surge Arrester for Alternating Current Systems Upto 400 kV Rating</b>	Lightning Impulse Voltage Test on Arrester Housing (Dry) Switching Impulse Voltage Test on Arrester Housing (Dry)	IEC 60099-4: 2009 IS 3070 (Part 3): 1993	Upto 2100 kV peak  Upto 1500 kV peak
<b>3.</b>	<b>H.T. Fuses/ Distribution Fuse Boards and Cut Outs</b>	Short Circuit Breaking Capacity Test.	IS 9385-1: 1979 (RA 2007) IS 9385-2: 1980 (RA 2007) IS 9385-3: 1980 (RA 2007) IS 9385-4: 1983 (RA 2007) IEC 60282-1: 2009 IEC 60282-2: 2008 IS 2675: 1983 IS 13947 (Part 1): 1993 IEC 60947-1: 2011 IS 12063: 1987 IEC 60529: 2001 IEEE C37.40: 2003 IEEE C37.41: 2008 IEEE C37.42: 2009	10 A to 50 kArms at 12 kV, 10 A to 11 kArms at 24 kV, 10 A to 16 kArms at 36 kV.



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	<b>H.T. Fuses/ Distribution Fuse Boards and Cut Outs</b>	Dielectric Test.		(Upto 132 kV class) Upto 325 kVrms
		Temperature Rise Test.		Upto 630 A 10 °C to 150 °C
		Test for Time Current Characteristics		1 A to 100 kA.
		Power Dissipation Test		0.1 mW to 500 W
		Creepage and Clearance Test		Upto 33 kV.by measuring ver.
		Test to Verify The Degrees of Protection		IP-1X to 6X and IP-X1 to X6
<b>4.</b>	<b>Line Traps</b>	Short Time Current Test. #	IS 8792: 1995 (RA 2008) IS 8793: 1995 (RA 2008) IEC 60353: 1989 Amd-1: 2002	12 kV, 1 kA to 50 kA for 0.2 s (depending on line trap impedance)
<b>5.</b>	<b>Motor Terminal Box</b>	Through Fault Current Test	CPRI Document No. TOP-01.	10 A to 200 kArms for 1 s
		Internal Fault Current Test.		10 A to 50 kA rms for 0.2 s at 12 kV, 10 A to 11 kArms for 0.2 s at 24 kV, 10 A to 16 kArms for 0.2 s at 36 kV
<b>6.</b>	<b>Spacers for Bundle Conductor.</b>	Fault Current Test. #	IS 10162: 1982 (RA 2007) CPRI Document No. TOP-01	10 A to 50 kArms for 0.1 s

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7.	<b>HT Contactor</b>	Rated Making and Breaking Capacity Test.  Dielectric Tests.  Mechanical Endurance Test  Temperature Rise Test.  Dimensional Check.  Visual Examination.  Short Time Current Test.	IS/IEC 60470: 2000 IS 5561: 1970 (RA 2007) IEC 62271-1: 2011 IEC 62271-106: 2011	10 A to 4 kA rms at 12 kV  (Test Upto 132 kV Class). Upto 325 kV  Upto 12 kV Class.  Test Upto 25000 A with driving voltage of 40 V Temp from 10 °C to 150 °C  Upto 12 kV Class.  Upto 12 kV Class.  10 A to 200 kA rms for 1 s with 565 kA pk.

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8.	<b>Bushing, Power Connectors, Insulators</b>	Short Time Current Test	IS 2099: 1986 Amd: 1989, Amd. 2: 1993 IS 7421: 1988 IS 5561: 1970 IS 5621: 1980, Amd: 1983, Amd. 2: 1987, IS 2544: 1973 with four Amendments, IS 731: 1971 with seven Amendments, IEC 60273: 1990.	Test Upto 100 kA rms for 3 s with 250 kA pk.  200 kArms for 1 s with 565 kA pk.  Upto 132 kV class.  Upto 220 kV class.  Upto 25 kA, 3 ph. with driving voltage of 40 V, Upto 132 kV class. Upto 132 kV class. Upto 132 kV class. Upto 325 kV Upto 132kV class. 10 °C to 150 °C
		HV Power Frequency Test (Dry & Wet) Lightning Impulse Test & Switching Impulse Test Temperature Rise Test Visual Inspection Electrical Routine Test		
		Verification of Dimensions		
		Puncture Test		

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<b>9.</b>	<b>ON Load Tap Changer</b>	High Voltage Test	IS 8468,1977 RA 2006 Amendment-I/1980	Upto 132 kV class Upto 325 kV
		Temperature Rise Test	IEC 60214-1: 2014 IEC 60214-2: 2004, IEC 60214: 2003 IEC 60947-1: 2007	Upto 25 kA, 3 ph. withdriving voltage of40 V 10 °C to 150 °C
		Short Circuit Tests	Amd. 1: 2010 Amd. 2: 2014 IS/IEC 60947-1: 2004 IS/IEC 60529:2001 IEC 60529: 1989 Amd. 1: 1999	- 4 A Upto 120 kA rms, 0.4 s to 3 s 4 V to 1.1 kV.
		Switching Test	Amd. 2: 2013	Upto 12.5 kV, 1000 A, Continuous , 2000 A intermittent
		Transition Impedance Test		
		Mechanical Test		Upto 220 kV class
		Insulation Test		100 Ω to 10 GΩ 250 V to 5 kV
		Lightning Impulse Test		Upto 220 kV class Upto 2100 kVp
		Mechanical Endurance		Upto 132 kV class.
		Degree of Protection		IP 1X to 6X & IP X1 to X6

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<b>IV. ELECTRICAL MATERIALS - SOLID INSULATING MATERIAL</b>				
1.	<b>Insulator Strings</b>	Power Arc Tests.	CPRI Document No. TOP-01. IEC 60168: 2001 IEC 60383-1: 1993 IEC 60383-2: 1993 IEC 1109: 1992 Amd. 1: 1995 IEC 60433: 1998 IS 2544: 1973 (RA 2002) Amd. 1997 IS 731: 1993 IS 1445: 1977 & Amd. 3	10 A to 50 kArms at 12 kV 10 A to 11 kArms at 24 kV 10 A to 16 kArms at 36 kV
2.	<b>Porcelain Insulators for Over Head Power Lines With Nominal Voltage Greater Than 1000 V, Insulator String, Post Insulators, Solid Core Insulator, Composite Insulators, Pin Insulator, Polycrrete Housings Upto 400 kV Rating</b>	Lightning Impulse Test and 50 % Impulse Voltage Flashover Test		Upto 2100 kV peak (both polarity) for withstand test and flashover voltage the generator voltage remains the same.
3.	<b>Bushing Upto 220 kV</b>	Switching Impulse Voltage Test (Dry)		Upto 1500 kV peak
4.	<b>Hollow Insulator, Post Insulator (Indoor/Outdoor) Upto 400 kV Rating</b>		IEC 60137: 2008 IS 2099: 1986 (RA 2006) IEEE C57.19.01: 2000	

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<b>V. CABLES AND ACCESSORIES</b>				
<b>1.</b>	<b>Cables, Joints and Terminations Of Polymeric Cables</b>	Dynamic & Thermal Short Circuit Test	IS 13573 (Part 1): 1992 IS 1554 (Part 1): 1988 Amd. 1+Amd. 2+Amd. 3+Amd. 4	Test 4 A to 200 kA rms for 1.0 s with 565 kA peak
		Lightning Impulse Test	IS 1554 (Part 2): 1988 Amd. 1+Amd. 2 +Amd. 3 IS 5819: 1970 IS 7098 (Part 1): 1988,	Upto 400 kV class, Upto 2100 kVp (both polarity)
		Dielectric Test	Amd. 1 ,Amd. 2 ,Amd. 3 IS 7098 (Part 2): 2011 IS 7098 (Part 3): 1993+	132 kV class. Upto 325 kV
		Conductor Resistance Test	Amd. 1 ,Amd. 2 ,Amd. 3 ,Amd. 4 & CPRI Document	Upto 300 Ω.
		Insulation Resistance Measurement	No.TOP-02 IS 13573 (Part 1): 2011 IS 13573 (Part 2): 2011 IS 13573 (Part 3): 2011	100 Ω to 10 GΩ 250 V to 5 kV
<b>VI. MEASURING INSTRUMENTS - ELECTRICAL AND ELECTRONIC (STATIC) ENERGY METERS</b>				
<b>1.</b>	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Impulse Voltage Test	IS 13779: 1999 Clause. 12.7.6.2 Amd. 1 to 4, IEC 62052-11: 2003 Clause. 7.3.2 IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.7.6.1 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.4.6.2 IS 15884: 2010 Clause. 5.4.6.2	10 kV peak,

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	AC Voltage Test	IS 13779: 1999 Clause. 12.7.6.3 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 7.3.3 IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.7.6.3 Amd. 1 to 4, CBIP Manual 304: 2008 Clause. 5.4.6.3 IS 15884: 2010 Clause. 5.4.6.3	5 kV
		Insulation Test	IS 13779: 1999 Clause. 12.7.6.4 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.7.6.4 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.4.6.4 IS 15884: 2010 Clause. 5.4.6.1	2000 MΩ

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Test on Limits of Errors	IS 13779: 1999 Clause. 11.11 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 11.1 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.6.8 IS 15884: 2010 Clause. 4.6.1	120 A Direct, 200 A Multi-turn , Voltage: 40 V to 480 V, 45 Hz to 65 Hz
		Interpretation of Test Results	IS 13779: 1999 Clause. 12.16 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.15 Amd. 1 to 4. CBIP Manual 304: 2008, IS 15884: 2010	120 A Direct, 200 A Multi-turn , Voltage: 40 V to 480 V, 45 Hz to 65 Hz
		Test of Meter Constant	IS 13779: 1999 Clause. 12.15 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.14 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.6 IS 15884: 2010 Clause. 5.6.5	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz



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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Test of Starting Condition, Initial Start Up of The Meter	IS 13779: 1999 Clause. 12.14 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.13 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.5 IS 15884: 2010 Clause. 5.6.4	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz 0 to 1 hr
		Test of No Load Condition	IS 13779: 1999 Clause. 12.13 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, Clause. 8.3 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.12 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.4 IS 15884: 2010 Clause. 5.6.3	40 V to 480 V, 45 Hz to 65 Hz
		Ambient Temp. Influence	IS 13779: 1999 Clause. 12.12 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.11 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.3	120 A Direct, 200 A Multi-turn , : 40 V to 480 V, 45 Hz to 65 Hz

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Test of Repeatability of Error	IS 13779: 1999 Clause. 12.17 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.16 Amd. 1 to 4 CBIP Manual 304: 2008, Clause. 5.6.9 IS 15884: 2010 Clause. 5.6.7	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz
		Limits of Error Due to Influence Quantities	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003 Clause. 8.2 IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.10, Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.2 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Voltage Variation	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4, IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003 Clause. 8.2, IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.10 Amd. 1 to 4 CBIP Manual 304: 2008, Clause. 5.6.2 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Frequency Variation	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003, Clause. 8.2 IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.10 Amd. 1 to 4 CBIP Manual 304: 2008, Clause. 5.6.2 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz
		Reversed Phase Sequence	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003 Clause. 8.2 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.10 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.2 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz
		Voltage Unbalance	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003, IEC 62053-22: 2003 Clause. 8.2 IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.10 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.2 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz

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		Waveform 10% of 3rd Harmonic In The Current	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4 IS 14697: 1999 Clause. 12.10 Amd. 1 to 4 , CBIP Manual 304: 2008, IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz, Upto 40 <sup>th</sup> harmonic
		Harmonic Component In Current and Voltage	IEC 62052-11: 2003 Clause. 8.2 IEC 62053-21: 2003, IEC 62053-22: 2003, CBIP Manual 304: 2008 Clause. 4.6.7	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz, Upto 40 <sup>th</sup> harmonic
		Sub Harmonic In Ac Current Circuit	IEC 62052-11: 2003 Clause. 8.2 IEC 62053-21: 2003, IEC 62053-22: 2003, CBIP Manual 304: 2008 Clause. 4.6.7	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz, Upto 40 <sup>th</sup> harmonic

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Odd Harmonics In Ac Current Circuit	IEC 62052-11: 2003 Clause. 8.2 IEC 62053-21: 2003, IEC 62053-22: 2003, CBIP Manual 304: 2008 Clause. 4.6.7	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz, 40 <sup>th</sup> harmonic
		Continuous Magnetic Induction of External Origin	IEC 62052-11: 2003 Clause. 8.2.4, IEC 62053-21: 2003, IEC 62053-22: 2003, IEC 62053-23: 2003	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz,
		Magnetic Induction of External Origin (0.5mt)	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003 IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.10, Amd. 1 to 4, IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Stray D.C.Magnetic Induction of External Origin 67mt	IS 13779: 1999 Clause. 4.6.2 12.11 Amd. 1 to 4 CBIP report No.88 (Revised July: 1996), Amd. 1999 (2000, 2002, 2005) IS 14697: 1999 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.2.1 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn ,  40 V to 480 V, 45 Hz to 65 Hz

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Stray A.C.Magnetic Induction of External Origin 0.5mt	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4, CBIP report No.88 (Revised July: 1996), Amd. 1999 (2000, 2002, 2005) IS 14697: 1999 Clause. 12.10 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.2.2 IS 15884: 2010 Clause. 6.2	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Abnormal A.C.Magnetic Induction of External Origin (10 Mtesla)	CBIP report No.88 (Revised July: 1996), Amd: 1999 (2000, 2002, 2005) CBIP Manual 304: 2008 Clause. 5.6.2.4	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Abnormal A.C.Magnetic Induction of External Origin (200 Mtesla)	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4, CBIP report No.88 (Revised July: 1996), Amd: 1999 (2000, 2002, 2005) IS 14697: 1999 Clause. 12.10 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.6.2.5 IS15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz

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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Continuous Abnormal Dc.Magnetic Induction of External Origin (200/270 Mtesla)	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4 CBIP report No.88 (Revised July: 1996), Amd: 1999 (2000,2002,2005) IS 14697: 1999 Clause. 12.10 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.6.2.3 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Influence of Supply Voltage	IS 13779: 1999 Clause. 12.7.2 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 7.1.2, IEC 62053-21: 2003 IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.7.2 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.4.2 , IS 15884: 2010 Clause. 4.4.2 & 5.4.2	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Short Time Over Current Test	IS 13779: 1999 Clause.12.7.3 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003 Clause. 7.2 IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999, Clause. 12.7.3 Amd. 1 to 4 CBIP Manual 304: 2008, Clause. 5.4.3 IS 15884: 2010 Clause. 4.3	100 kA for 3 s

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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Influence of Self Heating	IS 13779: 1999 Clause. 12.7.4 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003 Clause. 7.3 IEC 62053-22: 2003, IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.7.4 Amd. 1 to 4, CBIP Manual 304: 2008 Clause. 5.4.4 IS 15884: 2010 Clause. 5.4.4	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Influence of Heating	IS 13779: 1999 Clause. 12.7.5 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 7.2 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.7.5 Amd. 1 to 4, CBIP Manual 304: 2008, Clause. 5.4.5 IS 15884: 2010 Clause. 4.5	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Test of Immunity to Earth/Phase Fault	IS 13779: 1999 Clause. 12.8 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 7.4 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.17 Amd. 1 to 4, CBIP Manual 304: 2008,	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz



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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Dry Heat Test	IS 13779: 1999 Clause. 12.6.1 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 6.3.1 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.6.1 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.3.1 IS 15884: 2010 Clause. 5.31	80 °C
		Cold Test	IS 13779: 1999 Clause. 12.6.2 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 6.3.2 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.6.2 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.3.2 IS 15884: 2010	(-)25 °C
		Damp Heat Cyclic Test	IS 13779: 1999 Clause. 12.6.3 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 6.3.3 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.6.3 Amd. 1 to 4 CBIP Manual 304: 2008 IS 15884: 2010 Clause. 5.3.3	RH 30 % to 98 % 40 °C to 55 °C

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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Spring Hammer Test/ Mechanical Test of Meter Case	IS 13779: 1999 Clause. 12.3.3 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 5.2.2.1 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.3.3 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.2.1 IS 15884: 2010 Clause. 5.2.1	(±)0.22 Nm
		Protection Against Penetration of Dust and Water	IS 13779: 1999 Clause. 12.5 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 5.9 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.5 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.2.5 IS 15884: 2010 Clause. 5.2.5	5x – Dust x1, x2, x3,x4 -Water
		Test of Resistance to Heat & Fire	IS 13779: 1999 Clause. 12.4 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 6.3.2 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.4 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.2.4 IS 15884: 2010 Clause. 5.2.4	0 to 960 °C

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Fast Transient Burst Test	IS 13779: 1999 Clause. 12.9.4 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 7.5.4 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.8.4 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.5.3 IS 15884: 2010 Clause. 5.5.4	250 V to 4.4 kV
		Electrostatic Discharge Test	IS 13779: 1999 Clause. 12.9.2 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 7.5.2 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.8.2 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.5.2 IS 15884: 2010 Clause. 5.5.2	Contact : 8.0 kV Air discharge: 15 kV
		Radio Interference Measurement	IS 13779: 1999 Clause. 12.9 Amd. 1 to 4 IEC 62052-11: 2003 Clause. 7.5.5 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.8.5 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 5.5.8 IS 15884: 2010 Clause. 5.5.5	9.0 kHz to 2 GHz

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Test of Immunity to Electromagnetic HF Fields.	IS 13779: 1999 Clause. 12.9.3 Amd. 1 to 4, IS 14697: 1999 Clause. 12.8.3 Amd. 1 to 4 IS 15884: 2010 Clause. 5.5.3	10 kHz to 2 GHz
		Test of Immunity to Conducted Disturbances Induced By Radio Frequency Field.	IEC 62052-11: 2003 Clause. 7.5.5 IEC 62053-21: 2003 IEC 62053-22: 2003, IEC 62053-23: 2003, CBIP Manual 304 Clause. 5.5.5 IS 15884: 2010	150 kHz to 250 MHz
		Surge Immunity Test	IEC 62052-11: 2003 Clause. 7.5.6 IEC 62053-21: 2003 IEC 62053-22: 2003, IEC 62053-23: 2003, CBIP Manual 304 Clause. 5.5.7 Clause. 5.5.6 IS 15884: 2010	200 V to 6.0 kV
		Damped Oscillatory Wave Immunity Test.	IEC 62052-11: 2003 Clause. 7.5.7 IEC 62053-21: 2003 IEC 62053-22: 2003, IEC 62053-23: 2003, CBIP Manual 304 Clause. 5.5.6 IS 15884: 2010	200 V to 4.0 kV

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	General and Constructional Requirements ( HDT to Be Subcontracted) General, Meter Case, Window,Terminals, Terminal Block and Protective Earth Terminal, Terminal Cover, Clearances and Creepage Distances, Insulating Encased Meter,Display of Measured Values, Output Device	IS 13779: 1999 Clause. 6.0 Amd. 1 to 4 IEC 62052-11: 2003 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 Clause. 6.0 IS 14697: 1999 Amd. 1 to 3, CBIP Manual 304: 2008 Clause. 4.2.2 IS 15884: 2010 Clause. 4.1	0 to 200 mm
		Marking of Meters 7.1 – Name Plate 7.2 – Connection Diagrams and Terminal Marking	IS 13779: 1999 Clause. 7.0 Amd. 1 to 4 IEC 62052-11: 2003 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 7.0 Amd. 1 to 3 CBIP Manual 304: 2008 Clause. 4.2.2.11 IS 15884: 2010 Clause. 4.2	
		Auxiliary Voltage ± 15%	IS 13779: 1999 Clause. 12.10 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003 IS 14697: 1999 Clause. 12.10 Amd. 1 to 3, CBIP Manual 304: 2008 Clause. 4.2.2.10 IS 15884: 2010 Clause. 4.2.2.10	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz

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	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Phase of Auxiliary Supply Changed By 120°	IS 13779: 1999 Clause. 12.10 Amd. 1 to 4 IEC 62052-11: 2003, IEC 62053-21: 2003 IEC 62053-22: 2003, IEC 62053-23: 2003 Clause. 12.10 IS 14697: 1999 Amd. 1 to 4 CBIP Manual 304: 2008, IS 15884: 2010	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Vibration Test	IS 13779: 1999 Clause. 12.3.2 Amd. 1 to 4 IS 12346: 1999 IEC 62052-11: 2003 Clause. 5.2.2.3 IEC 62053-21: 2003, IEC 62053-22: 2003 IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.3.2 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.2.3 IS 15884: 2010 Clause. 5.2.3	Sine and Random 0.1 Hz to 3.5 kHz
		Shock Test	IS 13779: 1999 Clause. 12.3.1 Amd. 1 to 4 IS 12346: 1999 IEC 62052-11: 2003 Clause. 5.2.2.2 IEC 62053-21: 2003, IEC 62053-22: 2003 IEC 62053-23: 2003, IS 14697: 1999 Clause. 12.3.1 Amd. 1 to 4 CBIP Manual 304: 2008, Clause. 5.2.2 IS 15884: 2010 Clause. 5.2.2	Half sine, 18 ms, Upto 40g

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<b>S.No.</b>	<b>Product / Material of Test</b>	<b>Specific Test Performed</b>	<b>Test Method Specification against which tests are performed</b>	<b>Range of Testing / Limits of Detection</b>
	<b>AC Static Watt hour Meter Class 1 and 2; AC Static Transformer Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2</b>	Operation of An Accessories	IS 13779: 1999 Clause. 12.11 Amd. 1 to 4 IS 12346: 1999 IEC 62052-11: 2003 IEC 62053-21: 2003 IEC 62053-22: 2003 IEC 62053-23: 2003, IS 14697: 1999 Clause. 11.2 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 4.6.2 IS 15884: 2010 Clause. 4.6.2	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Power Consumption	IS 13779: 1999 Clause. 12.7.1 Amd. 1 to 4 IS 12346: 1999 IEC 62052-11: 2003 Clause. 7.1 IEC 62053-21: 2003 Clause. 7.1 IEC 62053-22: 2003 Clause. 7.1 IEC 62053-23: 2003 Clause. 7.1 IS14697: 1999 Clause. 12.7.1 Amd. 1 to 4 CBIP Manual 304: 2008 Clause. 5.4.1 IS 15884: 2010 Clause. 5.4.1	2.4 kW to 2.4 kVA
		Verification of Anti-Tamper Features	CPRI document No. TOP-04 CBIP Manual 304: 2008 IS 14697: 1999 with all Amendments.	120 A Direct, 200 A Multi-turn , 40 V to 480 V, 45 Hz to 65 Hz
		Load Switching Capacity	IS 15884: 2010 Clause. G1	1 mA to 120 A 40 V to 480 V, 45 Hz to 65 Hz

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	AC Static Watt hour Meter Class 1 and 2; AC Static Transformer	Test on Consumption Based Charging Functions	IS 15884: 2010 Clause. 5.9	1 mA to 120 A 40 V to 480 V, 45 Hz to 65 Hz
	Operated Watthour and VAR- Hour Meters, Class 0.2 and 0.5; AC Direct Connected Static Prepayment Meters for Active Energy Class 1 and 2	Functional Requirements	IS 15884: 2010 Clause. 6.0	1 mA to 120 A 40 V to 480 V, 45 Hz to 65 Hz
		Accuracy Requirement (Under Reference Condition)	IS 15707: 2006	1 mA to 120 A 40 V to 480 V, 45 Hz to 65 Hz
		Normal Operation	IS 15884: 2010 Clause. G2	1 mA to 120 A 40 V to 480 V, 45 Hz to 65 Hz
		Electrical Endurance	IS 15884: 2010 Clause. G3	1 mA to 120 A 40 V to 480 V, 45 Hz to 65 Hz
		Line to Load Voltage Surge Withstand	IS 15884: 2010 Clause. G4	12 kV peak,
		Fault Current Making Capacity	IS 15884: 2010 Clause. G5	Upto 726 V, Upto 100 kA PF: 0 to UPF
		Short Circuit Current Carrying Capacity	IS 15884: 2010 Clause. G6	Upto 726 V, Upto 100 kA PF: 0 to UPF
		Minimum Switched Current	IS 15884: 2010 Clause. G7	1 mA to 120 A 40 V to 480 V, 45 Hz to 65 Hz
		Dielectric Strength	IS 15884: 2010 Clause. G8	12 kV peak, A.C. 5 kV

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**Dheeraj Chawla**  
Convenor

**N. Venkateswaran**  
Program Manager