

Laboratory LCMTL, LAPP India Pvt. Ltd., Plot No. 98, J&K, Jigani Industrial Area, Phase-II, Bangalore South, Bangalore, Karnataka

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-6896

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Validity 07.02.2018 to 06.02.2020

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Sl.	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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ELECTRICAL TESTING

I.	CABLES AND ACCESSORIES			
1.	Polyvinyl Chloride Insulated Unsheathed and Sheathed Cables / Cord with Rigid and Flexible conductor for rated Voltages up to and including 1100V	Annealing (For Copper)	IS 694 IS 8130 IS 10810 (Part 1)	1 mm to 1000 mm 0.001 mm to 25 mm
		Tensile (for Aluminum)	IS 694 IS 8130 IS 10810 (Part 2)	1 N to 5000 N 1 mm to 1000 mm 100 N/mm ² to 170 N/mm ²
		Wrapping (for Aluminum)	IS 694 IS 8130 IS 10810 (Part 3)	Qualitative
		Conductor Resistance	IS 694 IS 8130 IS 10810 (Part 5)	1μΩ to 100 mΩ
		Overall dimension and thickness of insulation / sheath	IS 694 IS 10810 (Part 6)	0.01 mm to 150 mm 0.01 mm to 50 mm
		Physical Tests for Insulation		
		Tensile strength and Elongation at Break	IS 694 IS 5831 IS 10810 (Part 7)	1 N to 1000 N 0.01 mm to 50 mm Upto 20 N/mm ² 150% to 300%
		Loss of Mass	IS 694 IS 5831 IS 10810 (Part 10)	Ambient to 150°C 0.01 mm to 50 mm 1 g to 200 g
		Ageing in Air Oven	IS 694 IS 5831 IS 10810 (Part 11)	Ambient to 150°C Upto 20N/mm ² 150% to 300%
		Shrinkage	IS 694 IS 5831 IS 10810 (Part 12)	Ambient to 200°C

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Program Director

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		Heat Shock	IS 694 IS 5831 IS 10810 (Part 14)	Ambient to 200°C
		Hot Deformation	IS 694 IS 10810 (Part 15) IS 5831	1 mm to 50mm Ambient to 150°C 0.01 mm to 50 mm 1 g to 1.5 kg
		Thermal stability	IS 694 IS 10810 (Part 60) IS 5831	200°C
		Cold Bend /Cold Impact	IS 694 IS 10810 (Part 20) IS 10810 (Part 21) IS 5831	1 mm to 50mm (-)20°C 0.01 mm to 150 mm
		Flammability	IS 694, Cl.10.4 IS 10810 (Part 53)	Qualitative
		Oxygen Index	IS 694, Cl.10.5 IS 10810 (Part 58)	Qualitative
		Temperature Index	IS 694, Cl.10.7 IS 10810 (Part 64)	Qualitative
		Halogen acid gas evolution	IS 694, Cl.10.6 IS 10810 (Part 59)	Ambient to 800°C 1 g to 200 g
		Smoke Density Rating	IS 694, Cl.10.8 IS 13360-6-sec.9	0.1 kg/cm ² to 4 kg/cm ² Ambient to 100°C 0.1 V to 6 V
		Physical Tests for Sheath Removed from cable		
		Tensile strength and Elongation at Break	IS 694 IS 10810 (Part 7) IS 5831	1 N to 1000 N 0.01 mm to 50 mm Upto 20N/mm ² 150% to 300%
		Loss of Mass	IS 694 IS 10810 (Part 10) IS 5831	Ambient to 150°C 0.01 mm to 50 mm 1 g to 200 g

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		Ageing in Air Oven	IS 694 IS 10810 (Part 11) IS 5831	Ambient to 150°C Upto 20N/mm ² 150% to 300%
		Shrinkage	IS 694 IS 5831 IS 10810 (Part 12)	Ambient to 200°C
		Heat Shock	IS 694 IS 5831 IS 10810 (Part 14)	Ambient to 200°C
		Hot Deformation	IS 694 IS 10810 (Part 15) IS 5831	1 mm to 50 mm Ambient to 150°C 0.01 mm to 50 mm 1 g to 1.5 kg
		Thermal stability	IS 694 IS 10810 (Part 60) IS 5831	200°C
		Cold Bend / Cold Impact	IS 694 IS 10810 (Part 20) IS 10810 (Part 21) IS 5831	1 mm to 50 mm (-)20°C 0.01 mm to 150 mm
		Oxygen Index	IS 694, CI.10.5 IS 10810 (Part 58)	Qualitative
		Temperature Index	IS 694, CI.10.7 IS10810 (Part 64)	Qualitative
		Halogen acid gas evolution	IS 694, CI.10.6 IS 10810(Part 59)	Ambient to 800°C 1 g to 200 g
		Smoke Density Rating	IS 694, CI.10.8 IS 13360-6-Sec.9	0.1 kg/cm ² to 4 kg/cm ² Ambient to 100°C 0.1 V to 6 V
		Tests on Completed Cable		
		High Voltage (Water immersion)	IS 694, CI.10.1 IS 10810 (Part 45)	1 kV to 10 kV _{ac} 0.1 kV to 1.5kV _{dc} Ambient to 100°C
		Insulation Resistance	IS 694 IS 5831	Ambient to 100°C 100 V to 1000 V

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			IS 10810 (Part 43)	1 MΩ to 1 TΩ 0.01 mm to 50 mm
		High Voltage	IS 694, Cl.10.2 IS 10810 (Part 45)	1 kV to 10 kV
		Flammability	IS 694, Cl.10.4 IS 10810 (Part 53)	Qualitative
		Additional Ageing (OU Cables Only)	IS 694, Cl.10.9 IS 10810 (Part 53) IS 10810 (Part 45) IS 10810 (Part 20 & 21): 1984	Qualitative (1 kV to 10 kV) (-20°C)
2.	PVC insulated (Heavy Duty) Electric cables for working voltages up to and including 1100V	Annealing (For Copper)	IS 1554(Part 1), Cl.15.1 IS 8130 IS 10810 (Part 1)	1 mm to 1000 mm 0.001 mm to 25 mm
		Tensile (for Aluminum)	IS 1554(Part 1), Cl.15.1 IS 8130 IS 10810 (Part 2)	1 N to 5000 N 1 mm to 1000 mm 100 N/mm ² to 170N/mm ²
		Wrapping (for Aluminum)	IS 1554(Part 1), Cl.15.1 IS 8130 IS 10810 (Part 3)	Qualitative
		Conductor Resistance	IS 1554(Part 1), Cl.15.1 IS 8130 IS 10810 (Part 5)	1μΩ to 100 mΩ
		Tests for Armour wires / Strips		
		Dimension (Armour)	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 36)	0.001 mm to 25 mm
		Tensile Strength	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 37)	1 N to 5000 N 250 N/mm ² to 580N/mm ²
		Elongation at Break	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 37)	1 mm to 1000 mm 6% to 12 %
		Torsion for round wire	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 38)	Qualitative
		Winding for formed wire	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 39)	Qualitative

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Sl.	Product / Material of Test	Specific Test Performed	Test Method Specification against which tests are performed	Range of Testing / Limits of Detection
		Uniformity of Zinc Coating	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 40)	Qualitative
		Mass of Zinc Coating	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 41)	1 g to 200 g 90 g/m ² to 210 g/m ²
		Resistivity	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 42)	1μΩ to 100 mΩ Up to 14.5 X10 ⁻⁵ Ωcm
		Thickness of insulation and sheath	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 6)	0.01 mm to 150 mm 0.01 mm to 50 mm
		Physical Tests for insulation and sheath		
		Tensile strength and Elongation at Break	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 7) IS 5831	1 N to 1000 N 0.01 mm to 50 mm Upto 20 N/mm ² 150% to 300%
		Loss of Mass	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 10) IS 5831	Ambient to 150°C 0.01 mm to 50 mm 1 g to 200 g
		Ageing in Air Oven Unit of measurement	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 11) IS 5831	Ambient to 150°C Upto 20 N/mm ² 150% to 300%
		Shrinkage	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 12) IS 5831	Ambient to 200°C
		Heat Shock	IS 1554(Part 1), Cl.15.1 IS 5831 IS 10810 (Part 14) IS 10810 (Part 10)	Ambient to 200°C (Qualitative)
		Hot Deformation	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 15) IS 5831	1 mm to 50mm Ambient to 150°C 0.01 mm to 50 mm 1 g to 1.5 kg
		Thermal stability	IS 1554(Part 1), Cl.15.1 IS 5831 IS 10810 (Part 60)	200°C
		Insulation Resistance	IS 1554(Part 1), Cl.15.1 IS 5831	Ambient to 100°C 100 V to 1000 V

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			IS 10810 (Part 43)	1 MΩ to 1 TΩ 0.01 mm to 50 mm
		High Voltage (Water immersion)	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 45)	1 kV to 10 kV _{ac} 0.1 kV to 1.5kV _{dc} Ambient to 100°C
		High Voltage	IS 1554 (Part 1), Cl.15.1 IS 10810 (Part 45)	1 kV to 10 kV
		Flammability	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 53)	Qualitative
		Oxygen Index	IS 1554(Part 1), Cl.15.1 IS 10810 (Part 58)	Qualitative
		Flame retardance (Single Cable)	IS 1554(Part 1), Cl.15.1,Cl.16.6 IS 10810 (Part 61)	Qualitative
		Flame retardance (Bunched Cable)	IS 1554(Part 1), Cl.15.1, Cl.16.7 IS 10810 (Part 62)	Qualitative
		Temperature Index	IS 1554(Part 1), Cl.15.1, Cl.16.10 IS 10810 (Part 64)	Qualitative
		Smoke Density	IS 1554(Part 1), Cl.15.1, Cl.16.11 IS 10810 (Part 63)	0.1 kg/cm ² to 4 kg/cm ² Ambient to 100°C 0.1 V to 6 V
		Halogen acid gas evolution	IS 1554(Part 1), Cl.15.1, Cl.16.9 IS 10810 (Part 59)	Ambient to 800°C 1 g to 200 g
3.	Cross linked polyethylene insulated PVC Sheathed Cables for working voltages up to and including 1100V	Annealing (For Copper)	IS 7098 (Part 1), Cl.15.1 IS 8130 IS 10810 (Part 1)	1 mm to 1000 mm 0.001 mm to 25 mm
		Tensile (for Aluminum)	IS 7098 (Part 1), Cl.15.1 IS 8130 IS 10810 (Part 2)	1 N to 5000 N 1 mm to 1000 mm 100 N/mm ² to 170 N/mm ²
		Wrapping (for Aluminum)	IS 7098 (Part 1), Cl.15.1 IS 8130 IS 10810 (Part 3)	Qualitative

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		Conductor Resistance	IS 7098 (Part 1), Cl.15.1 IS 8130 IS 10810 (Part 5)	1 $\mu\Omega$ to 100 m Ω
		Tests for Armour wires / Strips		
		Dimension (Armour)	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 36)	0.001 mm to 25 mm
		Tensile Strength	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 37)	1 N to 5000 N 250 N/mm ² to 580N/mm ²
		Elongation at Break	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 37)	1 mm to 1000 mm 6% to 12 %
		Torsion for round wire	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 38)	Qualitative
		Winding for formed wire	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 39)	Qualitative
		Uniformity of Zinc Coating	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 40)	Qualitative
		Mass of Zinc Coating	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 41)	1 g to 200 g 90 g/m ² to 210 g/m ²
		Resistivity	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 42)	1 $\mu\Omega$ to 100 m Ω Up to 14.5 X10 ⁻⁵ Ω cm
		Physical Tests for Insulation		
		Tensile strength and Elongation at Break	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 7)	1 N to 1000 N 0.01 mm to 50 mm 12.5 N/mm ² to 20 N/mm ² 200% to 600%
		Ageing in Air Oven	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 11)	Ambient to 150°C 12.5 N/mm ² to 20 N/mm ² 200% to 600%
		Hot Set	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 30)	200°C
		Shrinkage	IS 7098 (Part 1), Cl.15.1	Ambient to 200°C

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			IS 10810 (Part 12)	
		Water Absorption (Gravimetric)	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 33)	Ambient to 100°C 1 g to 200 g Ambient to 200°C
		Physical Tests for Outer Sheath		
		Tensile strength and Elongation at Break	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 7) IS 5831	1 N to 1000 N 0.01 mm to 50 mm 10 N/mm ² to 20 N/mm ² 150% to 300%
		Ageing in Air Oven	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 11) IS 5831	Ambient to 150°C 10 N/mm ² to 20 N/mm ² 150% to 300%
		Loss of Mass in air Oven	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 10) IS 5831	Ambient to 150°C 0.01 mm to 50 mm 1 g to 200 g
		Shrinkage	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 12) IS 5831	Ambient to 200°C
		Hot Deformation	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 15) IS 5831	1 mm to 50mm Ambient to 150°C 0.01 mm to 50 mm 1 g to 1.5 kg
		Heat Shock	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 14) IS 5831	Qualitative (Ambient to 200°C)
		Thermal stability	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 60) IS 5831	200°C
		Insulation Resistance	IS 7098 (Part 1), Cl.15.1 IS 10810 (Part 43)	Ambient to 100°C 100 V to 1000 V 1 MΩ to 1 TΩ 0.01 mm to 50 mm
		High Voltage	IS 7098 (Part 1), Cl.15.1,	1 kV to 10 kV

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			Cl.16.2 IS 10810 (Part 45)	
		Flammability	IS 7098 (Part 1), Cl.15.1, Cl.16.3 IS 10810 (Part 53)	Qualitative
		Oxygen Index	IS 7098 (Part 1), Cl.15.1, Cl.16.9 IS 10810 (Part 58)	Qualitative
		Flame retardance (Single Cable)	IS 7098 (Part 1), Cl.15.1, Cl.16.10 IS 10810 (Part 61)	Qualitative
		Flame retardance Bunched Cable	IS 7098 (Part 1), Cl.15.1, Cl.16.11 IS 10810 (Part 62)-2014	Qualitative
		Temperature Index	IS 7098 (Part 1), Cl.15.1, Cl.16.4 IS 10810 (Part 64)	Qualitative
		Smoke Density	IS 7098 (Part 1), Cl.15.1, Cl.16.15 IS 10810 (Part 63)	0.1 kg/cm ² to 4 kg/cm ² Ambient to 100°C 0.1 V to 6 V
		Halogen acid gas evolution	IS 7098 (Part 1), Cl.15.1, Cl.16.13 IS 10810 (Part 59)	Ambient to 800°C 1 g to 200 g

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