

Laboratory Ramelex Testing and Research Institute (RTRI), Dangat Industrial Estate, S.No. 81/4A, NDA Road, Shivane, Pune, Maharashtra

Accreditation Standard ISO/IEC 17025: 2005

Certificate Number TC-5715

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Validity 15.02.2018 to 14.02.2020

Last Amended on 20.02.2018

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### ELECTRICAL TESTING

<b>1.</b>	<b>TRANSMISSION LINE EQUIPMENTS &amp; ACCESSORIES</b>			
<b>1.</b>	<b>Metal Fittings of Insulators for Overhead Power Lines with Nominal Voltage Greater than 1000 V</b>			
	<b>Bolted Type Clamps, Compression Type Clamps &amp; Suspension Clamp</b>	Electrical Resistance for Tension Joints and Anchor Clamps	IS 2486 (Part 1) Cl. 12.1.1(a) IEC 61284, Cl. 13.4.5.1	40 $\mu\Omega$ to 10 m $\Omega$
		Heating Cycle	IS 2486 (Part 1) Cl. 12.1.1(b), Cl. 12.1.2 IEC 61284 Cl. 13.5.2 for class A	5 °C to 199 °C
		Magnetic Power Loss	IEC 61284, Cl. 12	0.04 W to 12 W
	<b>Stockbridge Vibration Damper for Overhead Power Line</b>	Magnetic Power Loss	IS 9708, Cl. 7.12	0.04 W to 12 W
	<b>Electrical power Connectors</b>	Electrical Resistance	IS 5561 Cl. 11 IEC 61284, Cl. 13.4.5.1	40 $\mu\Omega$ to 10 m $\Omega$
		Temperature rise	IS 5561, Cl. 12	5 °C to 199 °C
<b>2.</b>	<b>Conductor and Earth Wire Accessories for Overhead Power Lines</b>			
	<b>Armour Rod, Mid-Span Joints &amp; Repair Sleeve &amp; Accessories for Earth wire</b>	Electrical Resistance	IS 2121(Part 1), Cl. 7.5 IS 2121(Part 2), Cl. 6.5 IS 2121(Part 3), Cl. 5.3	40 $\mu\Omega$ to 10 m $\Omega$
		Heat Cycle for Midspan Compression Joint	IS 2121(Part-2), Cl. 6.6	5 °C to 199°C
<b>3.</b>	<b>Aluminum Conductors for Overhead Transmission Purposes</b>			
	<b>Conductor of Types AAC, AAAC, ACSR</b>	Electrical Resistance	IS 398 (Part 1) IS 398 (Part 2) IS 398 (Part 4) IS 398 (Part 5)	40 $\mu\Omega$ to 10m $\Omega$

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**MECHANICAL TESTING**

I.	<b>MECHANICAL PROPERTIES OF METALS</b>			
1.	<b>Aluminum Materials, Alloys &amp; Products</b>	Visual Examination	IS 2486 (Part 1), Cl. 5 IEC-61284, Cl. 7	Qualitative
		<b>Dimensions</b>	IS 2486 (Part 1), Cl. 8 IEC 61284, Cl. 8	1 mm to 100 mm
	Diameter	10 mm to 1000 mm		
	<b>Ferrous Materials, Alloys &amp; Products</b>	Length	IS 2486 (Part 1), Cl. 11.2	2 kN to 200kN
		Mechanical Strength		5 kN to 500 kN
	<b>Metallic coatings Product - Transmission line equipment and Accessories Metal fittings – Insulator Fittings, Suspension clamps, Tension clamps both –Bolted &amp; Crimping &amp; Non Tension clamps &amp; Joints</b>	Damage & Failure Load	IEC 61284 Cl. 11.3, Cl. 11.4.1, Method B	5 kN to 500 kN
		Slip Strength (Suspension Clamp)	IS 2486 (Part 1), Cl. 11.1.1 IEC 61284, Cl. 11.4.2	5 kN to 500 kN
Slip strength (Bolted & Compression type Clamp)		IS 2486 (Part 1), Cl. 11.1.2, Cl. 3 IEC 61284, Cl. 11.5	5 kN to 500 kN	
2.	<b>Aluminum materials, alloys &amp; products</b>	Visual Examination	IS 2121 (Part 1), Cl. 7.2 IS 2121 (Part 2), Cl. 6.2 IS 2121 (Part 3), Cl. 5.2 IEC 61284, Cl. 7	Qualitative
		<b>Ferrous Materials, Alloys &amp; Products</b>	Dimensions	IS 2121 (Part 1), Cl. 7.3 IS 2121 (Part 2), Cl. 6.3
	Diameter		10 mm to 1000 mm	
	Length		IS 2121 (Part 3), Cl. 5.2	10 mm to 5000 mm
	Length		IEC 61284, Cl. 8	10 mm to 5000 mm

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	<b>Copper Materials, Alloys &amp; Products</b> <b>Metallic Coatings Products</b> <b>Conductor and Earth Wire</b> <b>Accessories for Overhead Power Lines</b> <b>Mid-span Joints and Sleeves for Conductors</b> <b>Armour Rod &amp; Earth wire</b> <b>(Suspension Clamp, Tension Clamp, Mid-span Joints, Copper Earth Bonds)</b>	Failing load	IS 2121(Part 2), Cl. 6.4 IEC 61284, Cl. 11.5	5 kN to 500 kN
		Tensile Strength	IS 2121 (Part 1), Cl. 7.4.1	70 N/mm <sup>2</sup> to 1000 N/mm <sup>2</sup>
		Slip Strength	IS 2121(Part 1) Cl. 7.7 IS 2121(Part 3), Cl. 5.4 IEC 61284, Cl. 11.5	5 kN to 500 kN
		Mechanical Strength	IS 2121 (Part 3), Cl. 5.5	2 kN to 200 kN
		Bend	IS 2121 (Part 1), Cl. 7.10	Qualitative (Diameter : 1270 mm, 2540 mm)
		Resilience (for Armour Rods only )	IS 2121 (Part-1), Cl. 7.11	Qualitative
3.	<b>Aluminum materials, alloys &amp; products</b> <b>Ferrous materials, alloys &amp; products</b> <b>Copper materials, alloys &amp; products</b> <b>Non-Tension Joints &amp; Power Connectors</b>	Visual Examination	IS 2121(Part 4) Cl. 6.2	Qualitative
		<b>Dimensions</b> Diameter	IS 2121(Part 4) Cl. 6.3 IS 5561, Cl. 14	1 mm to 100 mm
		Length		10 mm to 1000 mm

Amit Kumar Sinha  
Convenor

N. Venkateswaran  
Program Director

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4.	Aluminum Materials, Alloys & Products  Ferrous Materials, Alloys & Products  Copper Materials, Alloys & Products	Tensile strength	IS 1608	70 N/mm <sup>2</sup> to 2500 N/mm <sup>2</sup>
		Yield strength		55 N/mm <sup>2</sup> to 2000 N/mm <sup>2</sup>
		Elongation		4 % to 80 %
		Reduction of area		4 % to 90 %
5.	Aluminum Materials, Alloys & Products  Ferrous Materials, Alloys & Products	Brinell Hardness	IS 1500 (Part 1), Cl. 7 IS 1586, Cl. 7	95 HBW to 450 HBW (10/3000)
		Rockwell Hardness		60 HBW to 109 HBW (10/500)
				20 HRC to 70 HRC 20 HRBW to 100 HRBW
6.	Metal and Alloy-Metallic Coatings	Galvanizing (Uniformity of Zinc Coating)	IS 2633, Cl. 4	Qualitative
7.	Aluminum Materials, Alloys & Products  Ferrous Materials, Alloys & Products Product  Aluminum Conductors for Overhead Transmission Purpose  Conductor of type AAC, AAAC, ACSR	Visual Examination (Freedom from defect)	IS 398 (Part 1), Cl. 6 IS 398 (Part 2), Cl. 7 IS 398 (Part 5), Cl. 13.2	Qualitative
		Diameter of Individual Aluminum and steel wires	IS 398 (Part 1), Cl. 12.2 IS 398 (Part 2), Cl. 13.2 IS 398 (Part 5), Cl. 13.3	1 mm to 50 mm
		Lay ratio of Each Layer	IS 398 (Part 1), Cl. 12.6 IS 398 (Part 2), Cl. 13.7 IS 398 (Part 5), Cl. 13.4	5 to 35 (1 to 300 mm)
		Wrapping	IS 398 (Part 1), Cl. 12.4 IS 398 (Part 2), Cl. 13.5 IS 398 (Part 5)	Qualitative (Mandrel Diameter: 6 mm, 6.28 mm, 7.84 mm, 8.44 mm, 9.20 mm, 10.16 mm, 10.36mm, 12.00 mm, 12.72 mm, 13.40 mm, 14.12 mm, 16.36 mm)

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		Surface Condition	IS 398 (Part 2) Cl. 13.9 IS 398 (Part 5)	12 mm to 100 mm
		Breaking Load- Steel Strand	IS 398 (Part 2) Cl. 13.3 IS 398 (Part 5) Cl. 13.5.2	2 kN to 200 kN
		Elongation Steel Strands	IS 398 (Part 2) Cl. 13.4.2 IS 398 (Part 5) Cl. 13.6.2	3 % to 80 %
<b>II.</b>	<b>NOISE AND VIBRATION</b>			
<b>1.</b>	<b>Vibration Record on Transmission Line, Vibration Damper</b>	Visual examination	IS 9708, Cl. 7.2 IEC 61897, Cl. 7.1	Qualitative
		<b>Dimension</b> Diameter	IS 9708, Cl. 7.3 IEC 61897, Cl. 7.2	1 mm to 100 mm
			Length	
		Clamp Bolt Torque	IS 9708, Cl. 7.10 IEC61897, Cl. 7.7	Qualitative
		Resonance Frequency	IS 9708, Cl. 7.4	5 Hz to 60.0 Hz
		Mass Pull Off	IS 9708, Cl. 7.6 IEC 61897, Cl. 7.8	2 kN to 200 kN
		Fatigue	IS 9708, Cl. 7.5	Qualitative
		Dynamic characteristics	IS 9708, Cl. 7.7	Qualitative
	Galvanizing (Uniformity of Zinc Coating)	IS 9708, Cl. 7.7	Qualitative	