

<b>Laboratory</b>	<b>KEI Industries Ltd. (Quality Assurance Laboratory), SP-919, 920, 922, RIICO Industrial Area, Bhiwadi, Alwar, Rajasthan</b> <b>Location 1: SP-919, 920, 922, RIICO Industrial Area, Bhiwadi, Alwar, Rajasthan</b> <b>Location 2: A-280 to 284, RIICO Industrial Area, Chopanki, Bhiwadi, Alwar, Rajasthan</b>		
<b>Accreditation Standard</b>	<b>ISO/IEC 17025: 2005</b>		
<b>Discipline</b>	<b>Electrical Testing</b>	<b>Issue Date</b>	<b>18.06.2015</b>
<b>Certificate Number</b>	<b>T-1616</b>	<b>Valid Until</b>	<b>17.06.2017</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>
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### LOCATION 1 & 2

#### I. CABLES AND ACCESSORIES

1.	All Types of Wires, Conductors and Cables - EHV, HT & LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto & including 220 kV)		IS 1554 (Part 1): 1988 IS 1554 (Part 2): 1988 IS 7098 (Part 1): 1988 IS 7098 (Part 2): 2011 IS 7098 (Part 3): 1993 IS 9968 (Part 1): 1988 IS 9968 (Part 2): 2002 IS 14494: 1998 IEC 60502 (Part 1) (Edition 2.1): 2009-11 IEC 60502 (Part 2) (Edition 3.0): 2014-02 IEC 6084 (Edition 4.0): 2011-11 IEC 62067 (Edition 2.0): 2011-11 BS 5467: 1997+Amd. 3: 2008 BS 6346: 1997 BSEN 50288-7: 2005 BS 6387: 2013 IS 14255: 1995 IS 694: 2010 IEC 60092-350 (Edition 4.0): 2014-08 IEC 60092-351: 2004-04 IEC 60092-352: 2005-09 IEC 60092-353: 2011-08 IEC-60092-354: 2014-08 IEC 60092-375: 1977-01	
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	<b>All Types of Wires, Conductors and Cables - EHV, HT &amp; LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto &amp; including 220 kV)</b>		IEC 60092-376: 2003-05 BS 7846: 2009 BS 6724: 1997+Amd. 3: 2008	
		Annealing Test (Copper)	IS 10810 (Part 1): 1984 (RA 2006) IEC 60228: 2004-11	Upto 2500 N Upto 1000 mm
		Tensile Test (Aluminium)	IS 10810 (Part 2): 1984 (RA 2007) IEC 60228: 2004-11	Upto 2500 N
		Wrapping Test (Aluminium)	IS 10810 (Part 3): 1984 (RA 2006) IEC 60228: 2004-11	Qualitative
		Conductor Resistance (Drain Wire, Armour, Metal Screen, Sheath Resistance)	IS 10810 (Part 5): 1984 (RA 2007) IEC 60228: 2004-11	0.1 mΩ to 1999 Ω
		Armour Resistance (Resistivity)	IS 10810 (Part 42): 1984 (RA 2006)	0.1 mΩ to 1999 Ω
		<b>Tests on Armour</b>		
	Dimension of Armour	IS 10810 (Part 36): 1984 (RA 2006) IEC 60502 (Part 1): 2009-11 IEC 60502 (Part 2): 2014-02	0.001 mm to 25 mm 0.01 mm to 150 mm	

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	<b>All Types of Wires, Conductors and Cables - EHV, HT &amp; LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto &amp; including 220 kV)</b>	Tensile Test (Elongation)	IS 10810 (Part 37): 1984 (RA 2006)	Upto 2500 N Upto 1000 mm
		Winding Test on Strip / Wrapping	IS 10810 (Part 39): 1984 (RA 2006) BS 7846: 2009 BS 6724: 1997+Amd. 3: 2008 BS EN 50288-7: 2005	Qualitative (Mandrel dia – 12 mm & 21 mm )
		Adhesion	IS 3975: 1999	Qualitative
		Torsion Test on Wire	IS 10810 (Part 38): 1984 (RA 2006)	Upto 999 Turns
		Uniformity of Zinc Coating	IS 10810 (Part 40): 1984 (RA 2006)	Qualitative
		Mass of Zinc Coating	IS 10810 (Part 41): 1984 (RA 2001) BS 7846: 2009 BS 6724: 1997+Amd. 3: 2008 BS EN 50288-7: 2005	0.0001 g to 220 g
		Thickness of Insulation & Sheath	IS 10810 (Part 6): 1984 (RA 2007)	0.01 mm to 300 mm
		Measurement of Overall diameter & Metallic Sheath	IS 10810 (Part 36): 1984 (RA 2006) IEC 60811-201 (Edition 1.0): 2012-03 IEC 60811-202 (Edition 1.0): 2012-03 IEC 60811-203 (Edition 1.0): 2012-03	

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		Ageing in Air Oven / Additional Ageing / Compatibility	IS 10810 (Part 11): 1984 (RA 2006) IEC 60811-401 (Edition 1.0): 2012-03	80 °C 100 °C 135 °C
		Loss of Mass	IS 10810 (Part 10): 1984 (RA 2006) IEC-60811-409 (Edition 1.0): 2012-03	80 °C 100 °C 0.01m g to 180 g
		Hot Deformation Pressure Test	IS 10810 (Part 15): 1984 (RA 2006) IEC-60811-508 (Edition 1.0): 2012-03	80 °C 95 °C
		Heat Shock	IS 10810 (Part 14): 1984 (RA 2006) IEC 60811-509 (Edition 1.0): 2012-03	150 °C
	Shrinkage	IS 10810 (Part 12): 1984 (RA 2006) IEC 60811-502 (Edition 1.0): 2012-03 IEC 60811-503 (Edition 1.0): 2012-03	130 °C 150 °C	

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	<b>All Types of Wires, Conductors and Cables - EHV, HT &amp; LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto &amp; including 220 kV)</b>	Thermal Stability	IS 10810 (Part 60): 1984 (RA 2005) IEC 60811-405 (Edition 1.0): 2012-03	200 °C
		Insulation Resistance (Volume Resistivity)	IS 10810 (Part 43): 1984 (RA 2007) IEC 60502 (Part 1): 2009-11 IEC 60502 (Part 2): 2014-02	1.0 MΩ to 10 <sup>6</sup> MΩ at 300 V DC to 500 V DC
		High Voltage Test at room Temperature	IS 10810 (Part 45): 1984 (RA 2007) IEC 60502 (Part 1): 2009-11 IEC 60502 (Part 2): 2005 IS 7098 (Part 3): 1993 (RA 2014) IEC 60840 (Edition 4.0): 2011-11 IEC 62067 (Edition 2.0): 2011-11	Upto 375 kV
		Water Immersion Test (High Voltage)	IS 1554 (Part 1): 1988 Clause 16.3 IEC 60502 (Part 1): 2009-11	6 kV AC 1.2 kV DC
		Flammability Test	IS 10810 (Part 53): 1984 (RA 2001) IEC 60332-1: 2004-07	Upto 1000 mm
		Cold Bend Test	IS 10810 (Part 20): 1984 (RA 2007) IEC 60811-504 (Edition 1.0): 2012-03	Qualitative

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	<b>All Types of Wires, Conductors and Cables - EHV, HT &amp; LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto &amp; including 220 kV)</b>	Cold Impact Test	IS 10810 (Part 21): 1984 (RA 2006) IEC 60811-506 (Edition 1.0): 2012-03	Qualitative
		Hot set Test for XLPE, EPR , HEPR , Elastomeric Sheath	IS 10810 (Part 30):1984 (RA 2006) IEC 60811-507 (Edition 1.0): 2012-03	200°C 250 °C 0.01 mm to 150mm
		Water absorption Test on XLPE (Gravimetric) , EPR	IS 10810 (Part 33): 1984 (RA 2006) IEC 60811-402 (Edition 1.0): 2012-03	70 °C to 85 °C 0.00001 g to 180 g
		Partial Discharge Test	IS 10810 (Part 46): 1984 (RA 2006) IEC 60502 (Part 2): 2014-02 IS 1554 (Part 2): 1988 IS 7098 (Part 3): 1993 RA 2014 IEC 60840 (Edition 4.0): 2011-11 IEC 62067 (Edition 2.0): 2011-11	Upto 500 pC

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	<b>All Types of Wires, Conductors and Cables - EHV, HT &amp; LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto &amp; including 220 kV)</b>	Bending Test	IS 10810 (Part 50): 1984 (RA 2006) IEC 60502 (Part 2): 2014-02 IS 1554 (Part 2): 1988 IS 7098 (Part 3): 1993 (RA 2014) IEC 60840 (Edition 4.0): 2011-11 IEC 62067 (Edition 2.0): 2011-11	Qualitative
		Dielectric Power Factor Capacitance Measurement	IS 10810 (Part 48): 1984 (RA 2006) IEC 60502 (Part 2): 2014-02 IS 1554 (Part 2): 1988 IS 7098 (Part 3): 1993 (RA 2014) IEC 60840 (Edition 4.0): 2011-11 IEC-62067 (Edition 2.0): 2011-11	Upto $1 \times 10^{-6}$ 10 nF to 1000 pF at 400 kV
		Heating Cycle Voltage Test Load Cycle Test	IS 10810 (Part 49): 1984 (RA 2006) IEC 60502 (Part 2): 2014-02 IS 1554 (Part 2): 1988/ IS 7098 (Part 3): 1993 (RA 2014) IEC 60840 (Edition 4.0): 2011-11 IEC 62067 (Edition 2.0):	Upto 450 kV Upto 110 °C

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		Tear Resistance	IS 10810 (Part 17): 1984 (RA 2006)	Upto 2500 N
		Water Absorption (Electrical)	IS 10810 (Part 28): 1984 (RA 2006) IEC 60811-402 (Edition 1.0): 2012-03	Upto 12 kV Upto 100 °C
		Flammability (Flame retardant Test)	IS 10810 (Part 61):1984 (RA 2005) SS 424 1475: 1988 Clause. F3	Upto1000 mm 0.01 mm to 300 mm
		Oxygen Index Temperature Index	ASTM D 2863 : 2009 IS 10810 (Part 58 ): 1998 (RA 2003) IS 10810 (Part 64): 2003 (RA 2008)	Upto100 % (Oxygen Index) Upto100 °C
		Smoke Density	ASTM D 2843: 2010	Upto100 %



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		Per Sulphate Test / Metal Coating for tin Copper	IS 10810 (Part 4): 1984 (RA 2006)	0.1 ml to 50 ml 1 ml to 100 ml
		Flammability Test (Ladder Test)	IEEE 383: 2003	Upto 815 °C
		Test for anti Rodent and Anti termite Test	ZPPL/SP/E12 Rev 0 (Lanco): 2006	Qualitative (by presence of lead)
		Spark Testing	IS 10810 (Part 44): 1984 (RA 2007) BS 7846: 2009 BS 6724: 2008 BS 5099: 2004	Upto 30 kV AC
		pH Conductivity	IEC60754-2: 2011-11 BS EN 50267-2-1: 1999	1 to 14 Upto 99.9 µS/cm
		Melt Flow Index	IS 14255: 1988 IEC 60811-511: 2012 EN 60811-4-1: 2004	Upto 200 °C
		Strippability	BS 6622: 2007 IS 7098 (Part 2): 2011 IEC 60502-2: 2014	Upto 2500 N

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	All Types of Wires, Conductors and Cables - EHV, HT & LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto & including 220 kV)	Carbon black content	IS 10810 (Part 32): 1984 (RA 2006)	Upto 1000 °C
		Water penetration	IS 7098 (Part 3): 1993 (RA 2014) IEC 60840 (Edition 4.0): 2011-11 IEC 62067 (Edition 2.0): 2011-11	90 + 5 °C to 10 °C
		Resistivity of semiconducting screen	IS 7098(Part 3): 1993 (RA 2014) IEC 60840 (Edition 4.0): 2011-11 IEC 62067 (Edition 2.0): 2011-11	1 μΩ to 19.99 kΩ

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### LOCATION 1

#### I. CABLES AND ACCESSORIES

1.	<b>All Types of Wires, Conductors and Cables - EHV, HT &amp; LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto &amp; including 220 kV)</b>	Electrostatic Noise Rejection Ratio	IEEE Vol. IGA-3, No.2	1 $\mu$ v to 500 V AC
		Cross Talk	KEI/WKI/TP/156 Rev 00 Issue date 26.11.2014	Upto 100 dB Upto 620 kHz
		Attenuation	KEI/WKI/TP/153 Rev 00 Issue date 26.11.2014	Upto 100 dB Upto 620 kHz
		Characteristic Impedance	KEI/WKI/TP/154 Rev 00 Issue date 26.11.2014	Upto 19.99 k $\Omega$
		Toxicity	NES 713 Issue 3 March 1985	0.0001 g to 220 g Upto 1200 $^{\circ}$ C
		Mud Drilling Fluid	NEK 606: 2009 IEC 60092-350: 2014	Upto 2500 N Upto 1000 mm
		Coverage Density of the Braid	IEC 60092-350: 2014 IS 14494: 1998	0.01 mm to 300 mm
		UV Radiation T	ASTM G 154: 2000	Upto 2500 N Upto 300 mm
	Thermal EMF	ANSI MC 96.1: 1982 IEC 60584 -3: 2007 IS 8784: 1987	1 mv to 1000 mv	

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		Smoke Emission	IEC 61034 -1: 2013 IEC 61034-2: 2013 IS 10810 (Part 63): 1993 (RA 2003)	Upto 100 %
		Fire Resistance	IEC 60331-11: 2009 IEC 60331-12: 2009 IEC 60331-21: 1999 IEC 60331-25: 1999 IEC 60331-31: 2002-07 BS 6387: 2013	Upto 950 °C Upto 1200 V
		Mutual Capacitance Capacitance Unbalance	BS 5308 (Part 1/Sec II): 1986 BS EN 50288-7: 2005	1pF to 1000 µF
		Inductance L/R Ratio Test	BS 5308 (Part 1/Sec II): 1986 BS EN 50288-7: 2005	Upto 100 Max.
	Flammability Test (Flame Retardance ) for Bunched Cables	IS 10810 (Part 62): 1993 (RA 2003) IEC 60332/3-10: 2009-02 IEC 60332/3-21: 2000-10 IEC 60332/3-22: 2009-02 IEC 60332/3-23: 2009-02 IEC 60332/3-24: 2009-02 IEC 60332/3-25: 2009-02	0.00001 g to 180 g Upto 1000 mm	

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**Discipline** Electrical Testing **Issue Date** 18.06.2015

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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
	<b>All Types of Wires, Conductors and Cables - EHV, HT &amp; LT Power, Control, Instrumentation, Thermocouple and Elastomeric Cables. (Upto &amp; including 220 kV)</b>	Ageing in Air Bomb	IS 6380: 1984 Appendix A IEC 60811-412 (Edition 1.0): 2012-03	127 °C Upto 2500 N 0.01 mm to 150 mm
		Ageing in Oxygen Bomb	IS 6380: 1984 Appendix A	127 °C Upto 2500 N 0.01 mm to 150 mm
		Oil Resistance	IS 10810 (Part 31): 1984 (RA 2006) IEC 60811-404 (Edition 1.0): 2012-03	100 °C Upto 2500 N 0.01 mm to 150 mm
		Ozone Resistance	IS 10810 (Part 13): 1984 (RA 2001) IEC 60811-403 (Edition 1.0): 2012-03	Qualitative

-X-X-X-X-X-X-X-X-X-X-X-X-X-X-