






TEST REPORT

SHEET: 1 of 9

NAME & ADDRESS OF CUSTOMER KEC International Ltd., Pl. No. 803, Samlaya-Savli Road, Village Godampura, Taluka - Savli, Vadodara, Gujarat - 391 520. (INDIA)	REPORT NO.: HCCT/05/495-1 DATE : 17.07.2012	
	CUSTOMER REF. NO Nil	DATE 27.04.2012
	DATE OF SAMPLE RECEIPT 10.05.2012	DATE OF TESTING 30.05.2012 to 17.07.2012
	SAMPLE IDENTIFICATION: ERDA SAMPLE CODE NO. : HCCT - 177 EMBOSSING: KEC INTERNATIONAL LTD., "ASIAN", [RPG] 19/33 KV ELECTRIC CABLE 3 C X 500 mm ² XLPE A2XFY[P] 2012 U.ID.NO : 0006	
SAMPLE DESCRIPTION: 3 Core X 500 sq. mm. HT XLPE insulated and black colored PVC outer sheathed armoured cable Cable code : A2XFY(P) Voltage Grade : 19/33 kV Class of Aluminium conductor : 2 Type of insulation : XLPE Type of PVC outer sheath : ST-2	TEST SPECIFICATION IS : 7098 (Part 2) - 1985	
TEST RESULTS: As per sheet No. 3 of 9 to 9 of 9.		
ENCLOSURE: Annexure - 1 (Sheet 1 to 4 - Impulse Waveforms)		
REMARKS: The sample CONFORMS to the requirements of the above mentioned test specification with respect to the tests carried out.		
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REPORT NO. : HCCT/05/495-1

SHEET: 2 of 9

DATE : 17.07.2012

TEST DETAILS :

TEST SPECIFICATION : IS : 7098 (Part 2) - 1985

1	18.1.a	Test On Conductor
2	18.1 b	Tests for formed steel wire(strip) armour
3	18.1.c	Test for Thickness of Insulation and Sheath
4	18.1.d	Physical Tests for Insulation
5	18.1.e	Physical Tests for Outer Sheath
6	18.1.k	Insulation Resistance (volume Resistivity) test
7	18.1.q	Flammability test
8	18.1.g	Partial Discharge test
9	18.1.h	Bending test
10	18.1.j	Dielectric Power Factor test
11	18.1.m	Heating Cycle test
12	18.1.n	Impulse withstand test
13	18.1.p	High Voltage test

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**REPORT NO. : HCCT/05/495-1****SHEET: 3 of 9****DATE : 17.07.2012****TEST RESULTS:**

SR. NO.	PARTICULARS OF TESTS AND CL. NO.	REQUIREMENT AS PER SPECIFICATIONS	OBTAINED VALUE	REMARKS
1.	Test on conductor [Cl. No. 18.1.a of IS : 7098 (Part 2) - 1985] (iv) Resistance test (Corrected at 20°C), ohm/km	Max. 0.0605	Red 0.0585 Yellow 0.0585 Blue 0.0603	Conforms
2.	Tests for formed steel wire (strip) armour : [Cl. No. 18.1.b of IS : 7098 (Part 2) - 1985] 1) Dimensions, mm 2) Physical tests on formed wire: (i) Tensile strength, N/mm ² (ii) Elongation at break, % (iv) Winding test (v) Uniformity of zinc coating (vi) Mass of zinc coating, gm/m ² (vii) Resistivity, ohm-cm (Corrected at 20°C)	A 4.0 ± 0.4 C 0.8 ± 0.08 Max. 580 Min. 250 Min. 6 The zinc Coating shall not show any crack and shall not flake off on rubbing by the bare finger. No red scale shall be observed Min. 105 Max. 14.5 X 10 ⁻⁶	4.0 0.80 427 12 The zinc coating did not show any crack and did not flake off on rubbing by bare finger. No red scale was observed 178 13.2 X 10 ⁻⁶	Conforms Conforms Conforms Conforms Conforms Conforms

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SR. NO.	PARTICULARS OF TESTS AND CL. NO.	REQUIREMENT AS PER SPECIFICATIONS	OBTAINED VALUE	REMARKS
3.	Test for thickness of insulation & sheath: [Cl. No. 18.1.c of IS : 7098 (Part 2) - 1985] -Thickness, mm A) Insulation B) Inner sheath C) Outer sheath	 Nom. / Min. 8.8 / 7.82 Min. 0.7 Min. 3.0	 Red 9.4 / 8.86 Yellow 9.6 / 8.87 Blue 9.5 / 8.71 1.6 3.54	 Conforms Conforms Conforms
4.	Physical tests for insulation: [Cl. No. 18.1.d of IS : 7098 (Part 2) - 1985] (i) Tensile strength and elongation at break - Tensile strength, N/mm ² - Elongation at break, % (ii) Ageing in air oven (At 135 ± 3°C for 7 days) Variation, % - Tensile strength - Elongation at break	 Min. 12.5 Min. 200 Max. ± 25 Max. ± 25	 Red 16.3 Yellow 16.6 Blue 15.9 Red 438 Yellow 425 Blue 450 Red +17 Yellow +16 Blue +16 Red +11 Yellow +18 Blue +6	 Conforms Conforms Conforms Conforms

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DATE : 17.07.2012**SHEET: 5 of 9**

SR. NO.	PARTICULARS OF TESTS AND CL. NO.	REQUIREMENT AS PER SPECIFICATIONS	OBTAINED VALUE	REMARKS
	(iii) Hot set test (At $200 \pm 3^{\circ}\text{C}$ for 15 minutes) - Elongation under load, %	Max. 175	Red 75 Yellow 78 Blue 63	Conforms
	- Permanent Elongation (set), %	Max. 15	Red 0 Yellow 0 Blue 0	Conforms
	(iv) Shrinkage test (At $130 \pm 3^{\circ}\text{C}$ for 1 hour) - Shrinkage, %	Max. 4	Red 1 Yellow 1 Blue 1	Conforms
	(v) Water absorption test (Gravimetric) (at $85 \pm 2^{\circ}\text{C}$ for 14 days) - Water absorbed, mg/cm^2	Max. 1	Red 0.01 Yellow 0.00 Blue 0.01	Conforms
5.	Physical tests for outer sheath: [Cl. No. 18.1.e of IS : 7098 (Part 2) -1985]			
	(i) Tensile Strength and Elongation at break			
	- Tensile strength, N/mm^2	Min. 12.5	13.4	Conforms
	- Elongation at break, %	Min. 150	225	Conforms

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SR. NO.	PARTICULARS OF TESTS AND CL. NO.	REQUIREMENT AS PER SPECIFICATIONS	OBTAINED VALUE	REMARKS
	(ii) Ageing in air oven (At $100 \pm 2^\circ\text{C}$ for 7 days)			
	- Tensile strength, N/ mm^2	Min. 12.5	13.7	Conforms
	- Elongation at break, % Variation, %	Min. 150	250	Conforms
	- Tensile strength	Max. ± 25	+2	Conforms
	- Elongation at break	Max. ± 25	+11	Conforms
	(iii) Shrinkage test (At $150 \pm 2^\circ\text{C}$ for 15 min.)			
	- Shrinkage, %	Max. 4	1	Conforms
	(iv) Hot deformation test (At $80 \pm 2^\circ\text{C}$ for 6 hours)			
	- Depth of indentation, %	Max. 50	31	Conforms
	(v) Loss of Mass in air oven (At $100 \pm 2^\circ\text{C}$ for 7 days)			
	- Loss of mass, mg/cm^2	Max. 2	1	Conforms
	(vi) Heat shock test (at $150 \pm 2^\circ\text{C}$ for 1 hour)	No sign of crack or scale shall be observed	No sign of crack or scale was observed	Conforms
	(vii) Thermal stability test (At 200°C), minutes	Min. 80	> 180	Conforms


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REPORT NO. : HCCT/05/495-1
DATE : 17.07.2012

SHEET: 7 of 9

SR. NO.	PARTICULARS OF TESTS AND CL. NO.	REQUIREMENT AS PER SPECIFICATIONS	OBTAINED VALUE	REMARKS
6.	Insulation resistance (Volume resistivity): [Cl. No. 18.1.k of IS : 7098 (Part 2) - 1985] Volume Resistivity, ohm-cm - At 27°C - At 90°C	Min. 1×10^{14} Min. 1×10^{12}	Red 3×10^{16} Yellow 1×10^{17} Blue 9×10^{16} Red 2×10^{15} Yellow 1×10^{16} Blue 2×10^{16}	Conforms Conforms
7.	Flammability test: [Cl. No. 18.1.q of IS : 7098 (Part 2) - 1985] - Period of burning after removal of flame, seconds - Unaffected portion from the lower edge of the top Clamp, mm.	Max. 60 Min. 50	3 355	Conforms Conforms
8.	Partial discharge test: [Cl. No. 18.1.g of IS : 7098 (Part 2) - 1985] - At 1.5U _o	Max. 20 pC	Red 2 pC Yellow 2 pC Blue 2 pC	Conforms


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DATE : 17.07.2012

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SR. NO.	PARTICULARS OF TESTS AND CL. NO.	REQUIREMENT AS PER SPECIFICATIONS	OBTAINED VALUE	REMARKS
9.	Bending test: [Cl. No. 18.1.h of IS : 7098 (Part 2) - 1985] - Partial discharge test after bending test	The sample shall be subjected to 3 bending cycles. The sample shall conform the partial discharge test after bending test. Max. 20 pC	Red 2 pC Yellow 2 pC Blue 2 pC	Conforms
10.	Dielectric power factor test: [Cl. No. 18.1.j of IS : 7098 (Part 2) - 1985] [a] As a function of voltage: - At U ₀ - Rise from 0.5 U ₀ to 2 U ₀ [b] As a function of temp.: - At an ambient temp. & At 2 kV - At max. Conductor temp. (90°C) at 2 kV	Max. 0.004 Max. 0.002 Max. 0.004 Max. 0.008	Red 0.000203 Yellow 0.000207 Blue 0.000398 Red 0.000081 Yellow 0.000090 Blue 0.000140 Red 0.000127 Yellow 0.000143 Blue 0.000282 Red 0.000192 Yellow 0.000294 Blue 0.000452	Conforms Conforms Conforms Conforms



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SR. NO.	PARTICULARS OF TESTS AND CL. NO.	REQUIREMENT AS PER SPECIFICATIONS	OBTAINED VALUE	REMARKS
11.	Heating cycle test: [Cl. No. 18.1.m of IS : 7098 (Part 2) - 1985] - Partial discharge test after heating cycle - Dielectric power factor after heating cycle a) At U _o b) Change in dielectric power factor from 0.5 U _o to 2 U _o	The sample shall be subjected to three cycles (including 2 hrs. heating followed by 4 hrs. cooling in natural air). Sample shall conform to the partial discharge & dielectric power factor test after heating cycle test. Max. 20 pC Max. 0.004 Max. 0.002	Red 2 pC Yellow 2 pC Blue 2 pC Red 0.001656 Yellow 0.000169 Blue 0.000302 Red 0.000084 Yellow 0.000076 Blue 0.000087	Conforms Conforms Conforms
12.	Impulse withstand test: [Cl. No. 18.1.n of IS : 7098 (Part 2) - 1985]	Sample shall withstand 170 kV without breakdown for 10 +ve & 10 -ve shots	Please refer Annexure - 1 for detail results	Conforms
13.	High voltage test: [Cl. No. 18.1.p of IS : 7098 (Part 2) - 1985]	Sample shall withstand power frequency voltage of 3U _o for four hours without any breakdown	All the three cores withstood the applied voltage of 3U _o for four hours without any breakdown	Conforms

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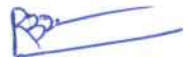
TE 0938862





TEST REPORT

SHEET: 1 of 2

NAME & ADDRESS OF CUSTOMER KEC International Ltd., Pl. No. 803, Samlaya-Savli Road, Village Godampura, Taluka – Savli, Vadodara, Gujarat – 391 520. (INDIA)			REPORT NO.: HCCT/05/495-2 DATE : 17.07.2012	
			CUSTOMER REF. NO	DATE
			Nil	27.04.2012
			DATE OF SAMPLE RECEIPT	DATE OF TESTING
			10.05.2012	18.06.2012
SAMPLE DESCRIPTION: Aluminium wire (Before stranding) Grade- H2			SAMPLE IDENTIFICATION: ERDA SAMPLE CODE NO. : HCCT – 177	
SR. NO.	CL.NO.	TEST DETAILS	TEST SPECIFICATION	
1	6.2.1(a)	Tensile test	IS:8130-1984	
2	6.2.2	Wrapping test		
TEST RESULTS: As per sheet No. 2 of 2.				
REMARKS: The sample CONFORMS to the requirements of the above mentioned test specification with respect to the tests carried out.				
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REPORT NO. : HCCT/05/495-2

SHEET: 2 of 2

DATE : 17.07.2012

Sr. No.	Particulars of Tests and cl. No.	Requirement as per specifications	Obtained Value	Remarks
1.	Tensile test (N/mm²): [Cl. No. 6.2.1(a) of IS : 8130-1984]	Above 100 upto and including 150	102	Conforms
2.	Wrapping test: [Cl. No. 6.2.2 of IS : 8130-1984]	Wire shall not break	Wire did not break	Conforms

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ANNEXURE - 1

TEST REPORT No.: HCCT/05/495-1
DATE : 17/07/2012

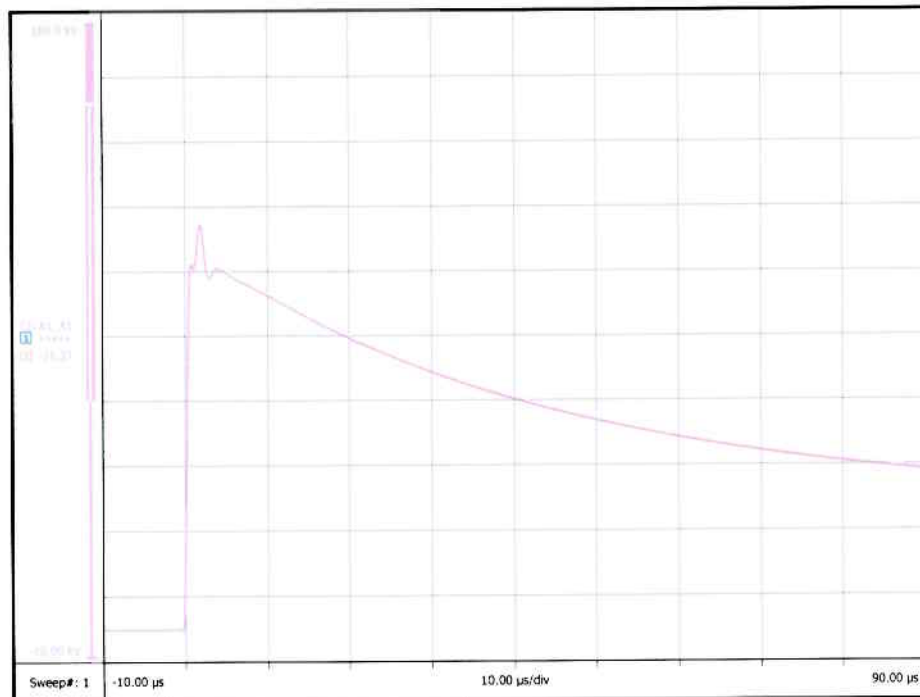
SHEET No.: 1 OF 4

LIGHTNING IMPULSE VOLTAGE WITHSTAND TEST ON H. T. XLPE CABLE

TEST PARAMETERS:

SIZE OF CABLE : 3C X 500 sq. mm
VOLTAGE GRADE : 19/33 kV
TEST VOLTAGE : 170 kVp
No. OF SHOTS APPLIED : 10 +VE & 10 -VE POLARITY SHOTS/PHASE
SHOTS RECORDED : CALIBRATION PULSE, FIRST & LAST SHOT BOTH POLARITY EACH PHASE

CALIBRATION PULSE



T1 1.354 μs

T2 56.33 μs

Up 115.6 kV

TE 0992415

R. J. Mistry
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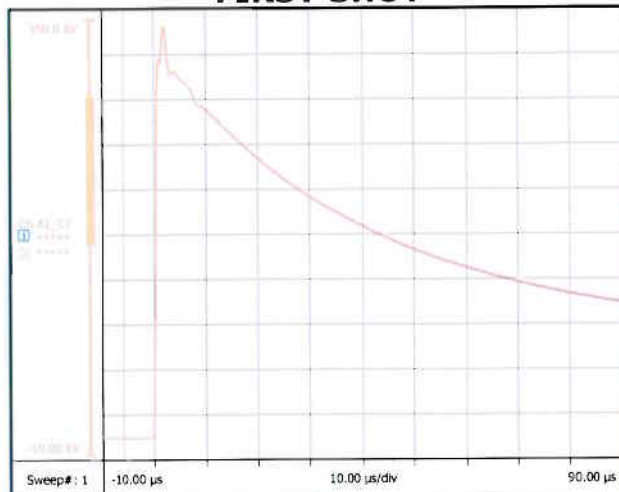
TEST REPORT No.: HCCT/05/495-1
DATE : 17/07/2012

SHEET No.: 2 OF 4

LIGHTNING IMPULSE VOLTAGE WITHSTAND TEST ON H. T. XLPE CABLE (R-PHASE)

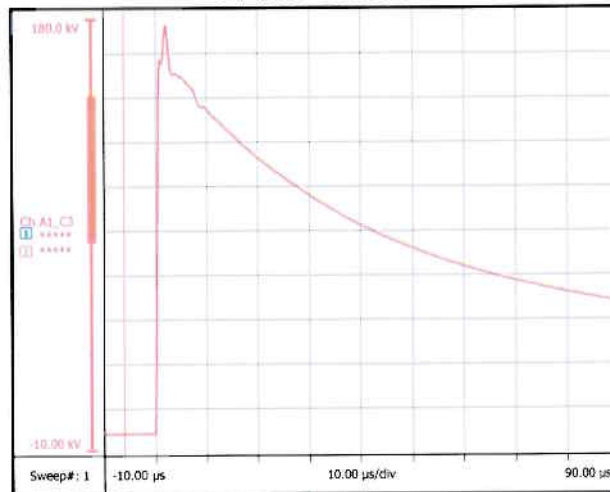
POSITIVE POLARITY

FIRST SHOT



T1 1.219 μs	T2 44.30 μs
Up 171.3 kV	

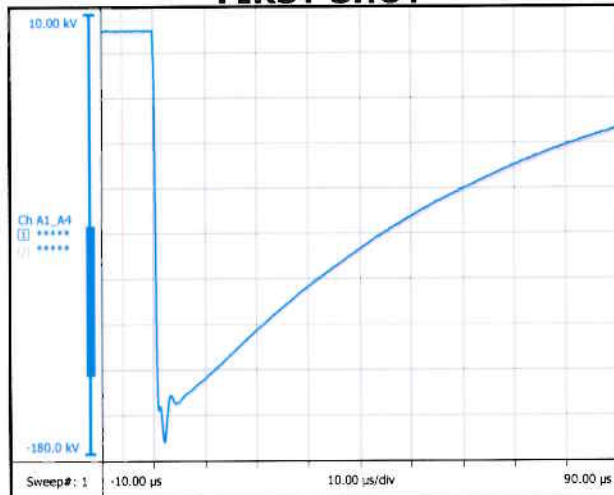
LAST SHOT



T1 1.223 μs	T2 43.93 μs
Up 172.7 kV	

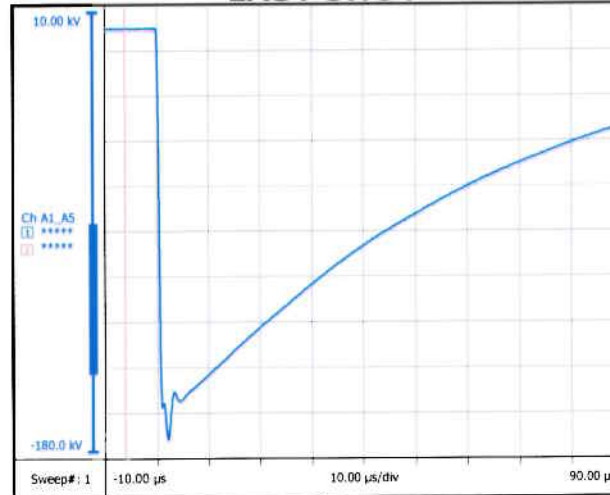
NEGATIVE POLARITY

FIRST SHOT



T1 1.243 μs	T2 45.09 μs
Up -169.4 kV	

LAST SHOT



T1 1.259 μs	T2 45.07 μs
Up -169.5 kV	

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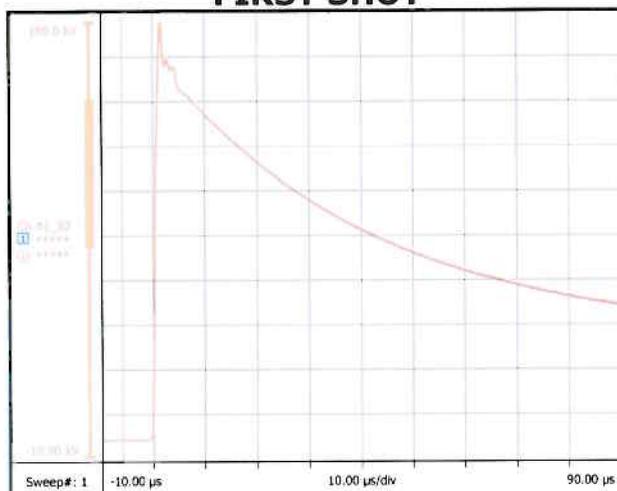
TEST REPORT No.: HCCT/05/495-1
DATE : 17/07/2012

SHEET No.: 3 OF 4

LIGHTNING IMPULSE VOLTAGE WITHSTAND TEST ON H. T. XLPE CABLE (Y-PHASE)

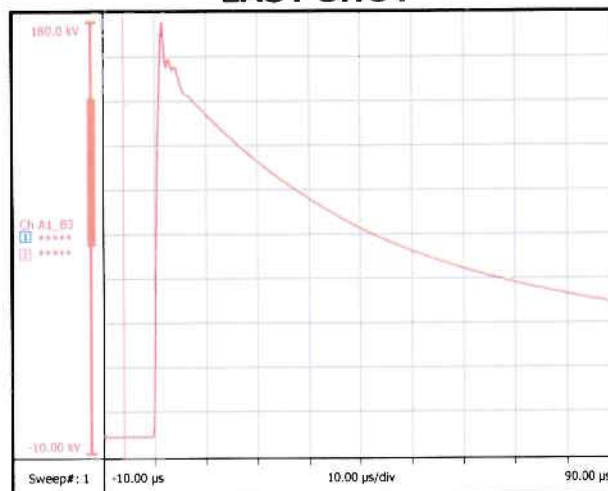
POSITIVE POLARITY

FIRST SHOT



T1 1.427 μs	T2 44.03 μs
Up 170.5 kV	

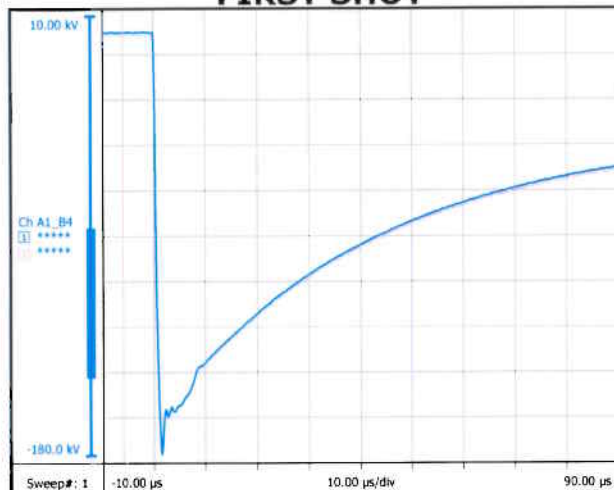
LAST SHOT



T1 1.427 μs	T2 43.94 μs
Up 170.4 kV	

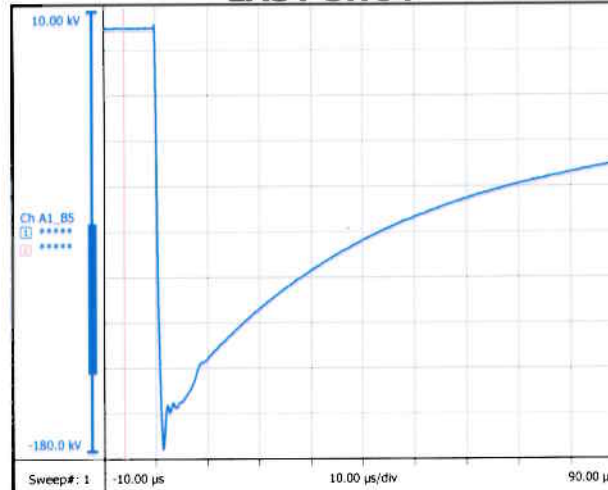
NEGATIVE POLARITY

FIRST SHOT



T1 1.406 μs	T2 43.73 μs
Up -170.6 kV	

LAST SHOT



T1 1.398 μs	T2 43.71 μs
Up -170.6 kV	

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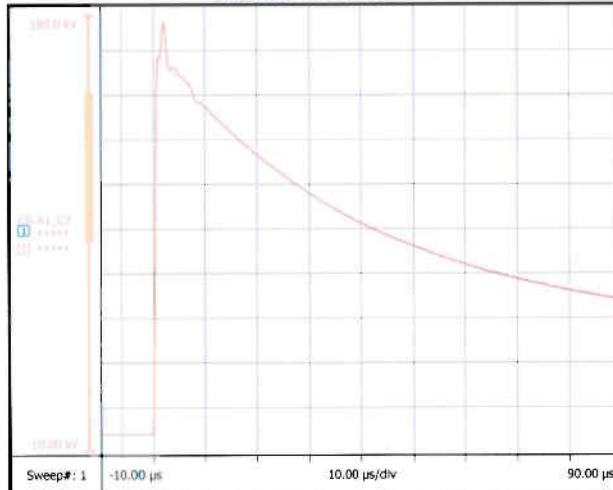
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DATE : 17/07/2012

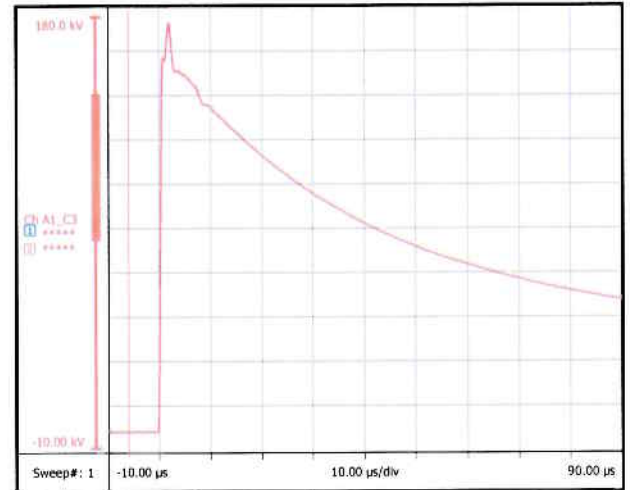
SHEET No.: 4 OF 4

LIGHTNING IMPULSE VOLTAGE WITHSTAND TEST ON H. T. XLPE CABLE (B-PHASE)

POSITIVE POLARITY

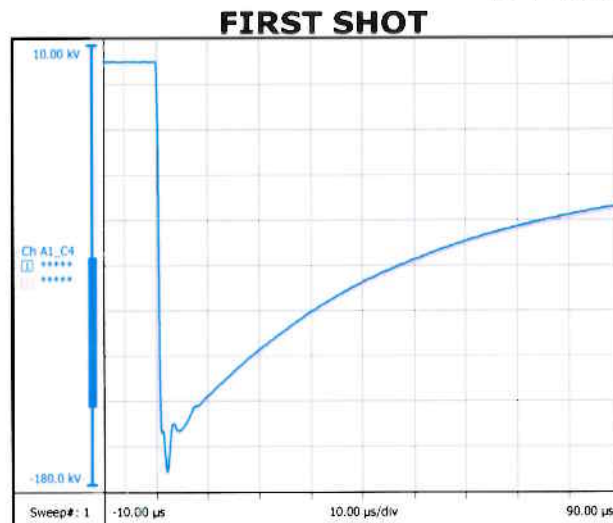


T1 1.274 μ s	T2 44.20 μ s
Up 171.0 kV	

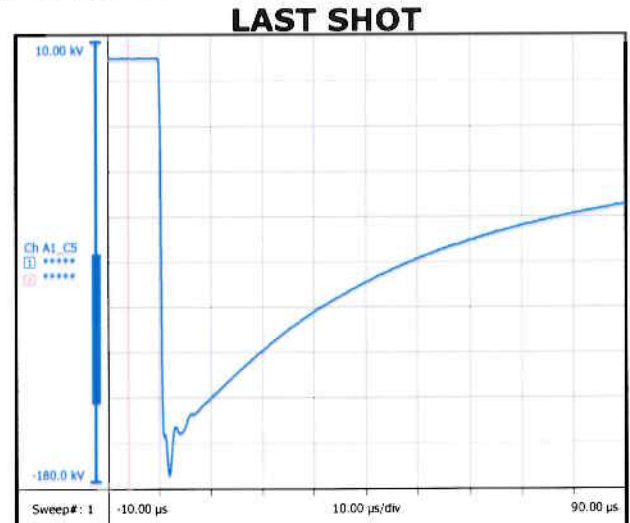


T1 1.270 μ s	T2 43.73 μ s
Up 170.8 kV	

NEGATIVE POLARITY



T1 1.350 μ s	T2 48.46 μ s
Up -168.9 kV	



T1 1.338 μ s	T2 48.18 μ s
Up -171.6 kV	

REMARKS: The above sample "CONFORMS" to the requirements of aforesaid reference standard with respect to the test carried out.

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