

TEST REPORT

Test Certificate No. : ATCC2014060704

Issue To: Finecab Wires & Cables Pvt. Ltd.

2-3-465/7, Minister Road,

Secunderabad-500003

Issue Date: 07.06.2014

Job Order No.: ATCC14051301

Test to be Conducted: IS 1554 Pt-1(1988)

Date of Test: 15.05.2014 to 04.06.2014

Date of Sample Received: 13.05.2014

Party Ref No.: Dated 12.05.2014

Quantity of Sample : 65 Meters (Approx.)

Sample Description : 19C x 2.5 sq.mm, (3/1.035) Annealed Bare Stranded Circular Copper Conductor, Class-2, PVC Insulated Type A, PVC Inner Sheath, Galvanized steel formed wire armoured, FR-LSH PVC Type ST1 sheathed cable, 1.1 kV Grade, Category C2, Cable code - YFY

EMBOSSING: FINECAB 1100 VOLTS AS PER IS : 1554 PART-1 ELECTRIC M.S.T.C.L. FRLS

Sl.No.	Test Conducted, Specification as per IS 1554:1988(Part-1) With Amendments No.1,2,3,4 & 5	Specified value	Test Results	Cross Referred To & Test Method of IS :10810-1984	Conformity
1	No. of cores	19	19	.....	yes
2	Core identification Cl. 10.2 & 10.3.1	For cables having more than 5 cores, as an alternate to the provisions of 10.1, the core identification may be done by numbers. In that case, the insulation of cores shall be of the same colour and numbered sequentially, starting with number 1 for the inner layer. The numbers shall be printed in Hindu-Arabic numerals on the outer surface of the cores. All the numbers shall be of the same colour which shall contrast with the colour of the insulation. The numerals shall be legible. The numbers shall be repeated at regular intervals along the core, consecutive numbers being inverted in relation to each other. When the number is a single numeral, a dash shall be placed underneath it. If the number consists of two numerals, these shall be disposed one below the other and a dash placed below the lower numeral. The spacing d between consecutive numbers shall not exceed 50 mm.	Grey with number (1 to 19)	.....	yes
3	Nature and shape of Conductor Cl. 8.1	Solid/Stranded Circular/ Compacted Circular/Shaped	Stranded Circular	Cl. 5.1, 5.2 & 5.3 of IS 8130:1984	yes

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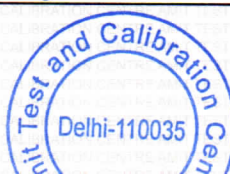
Sadana
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SADHANA JADON
(Quality Manager)

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4	Flexibility Cl. 8.1	Class-1/Class-2	Class-2	Cl. 4.1 (a) of IS 8130:1984	yes
5	No. of wire in Conductor	3 (Min.)	3	Cl. 5.2.3 & Table 2 of IS 8130:1984	yes
6	Dia. of wire ,mm	.....	1.035	Cl. 5.2.2 of IS 8130:1984	yes
7	Size of cable,sq.mm	2.50	2.52	....	yes
7.1	Test on Conductor	wire diameter			
7.2	Annealing Test for copper, % (Before Stranding)	0.41 mm to 1.36 mm elongation 18% (Min.)	N.A.	Cl. 6.1.2.1 of IS 8130 :1984 (Pt- 1) 1984	yes
7.3	Tensile Strength (for Aluminium conductor) (Before stranding) Cl. 15.1 (a) (ii)	H2 Grade Above 100 and up to and including 150 N/mm ² or H4 Grade Above 150 N/mm ²	N.A.	Cl. 6.2.1 of IS 8130: 1984, (Pt- 2) 1984	....
7.4	Wrapping Test (for Aluminium conductor) Cl. 15.1 (a) (iii)	The wire should not break	N.A.	Cl. 6.2.2 of IS 8130: 1984, (Pt- 3) 1984	....
7.5	Conductor resistance at 20°C Cl. 15.1 (a) (iv)	7.41 ohm/Km (Max.)		Cl. 6.3.6.3.1 & Table-1,6 of IS - 8130:1984, (Pt- 5) 1984	
	Grey1 to Grey19		7.28 to 7.32		yes
8	Test for Insulation & sheath				
8.1	Thickness of Insulation Cl. 9.2 & 9.3,15.1(c) and Grey1 to Grey19	Nom. mm Min. mm	Nom. Min.	(Pt- 6) 1984	yes
		0.90 0.71	0.98 0.94 to to 1.02 0.96		
8.2	Application of Insulation Cl. 9.4	It fits closely on the conductor and it shall be possible to remove it without damage to the conductor	Satisfactory	....	yes
8.3	Thickness of inner sheath Cl. 12.3 & 5.1(c) Table-4	0.3 mm (Min.)	0.60	(Pt- 6) 1984	yes
8.4	Application of inner sheath Cl. 12.1	The laid up cores shall be provided with inner sheath applied either by extrusion or by wrapping.	Extrusion	....	yes
	Cl.12.2	The inner sheath shall be so applied that it fits closely on the laid up cores and it shall be possible to remove it without damage to the insulation	Satisfactory		yes

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8.5	Thickness of outer sheath Cl. 14.4 and Table 7	Min. 1.40 mm	1.65	(Pt- 6) 1984	yes
8.6	Application of outer sheath Cl. 14.1 (a,b,c) & 14.2	The outer sheath shall be applied by extrusion. It shall be applied. (i) Over the insulation in case of unarmoured single-core cables. (ii) Over the inner sheath in case of unarmoured twin, three-and multi-core cables; and (iii) Over the armouring in case of armoured cables. The outer sheath shall be so applied that It fits closely over insulation, inner sheath/ armouring. It shall be possible to remove it without damage to the insulation/inner sheath	N.A. N.A. Satisfactory Satisfactory	(Pt- 6) 1984 yes Yes
8.7	Colour of outer sheath Cl. 14.3	The colour of outer sheath shall be black, unless any other colour is agreed to between the purchaser and the supplier.	Black	...	yes
9	Tests for Armouring Cls. 15.1 (b)				
9.1	Application of armour Cl. 13.1.1	Over the insulation (Single Core) over the inner sheath (twin/three/multicore)	Satisfactory		yes
	Cl. 13.1.2	The armour wires/formed wires shall be applied as closely as possible with a coverage of not less than 90 percent. The coverage of armour shall be done as per Appendix C	92.65	....	yes
9.2	Direction of armouring Cl. 13.1.3	The Direction of lay of the armouring shall be left-hand	Left Hand	....	yes
9.3	Type of Armouring Cl. 13.2	a) Galvanized steel round wire b) Galvanized steel formed wire	Galvanized Steel Formed wire	....	yes
9.4	Dimension of Armouring, mm Cl. 15.1(b),13.3 & Table-5	A = 4.0±10% C = 0.80±10%	3.96 to 4.00 0.77 to 0.80	Cl. 7, Table-3 & 4 of IS :3975 :1999 (Pt- 36)/1984	yes yes

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9.5	Mass of Zinc coating Cl.13.6 (f)	104.5 gm/m ² (Min.)	138.0	Cl. 9.1 & of IS :3975 :1999 (Pt- 41)/1984	yes
9.6	Uniformity of Zinc Coating Cl. 15.1(b), 13.6(e) & Table-6, Cl. 9.2 of IS :3975 :1999, IS:10810 (Pt-40)	Red deposit of copper Yes /No	No Red Spots	Cl. 9.2 (b) of IS :3975 :1999(Pt-40)/1984	yes
9.7	Tensile strength, N/mm ² Cl.13.6 (a)	250-580	380 to 432	Cl. 8.1 & Table-5 of IS :3975 :1999 (Pt- 37)/1984	yes
9.8	Elongation cl. 13.6 (b)	6% (Min.)	10	Cl. 8.1 & Table-5 of IS :3975 :1999 (Pt- 37)/1984	yes
9.9	Torsion Test (For Round Wire Only) Cl. 13.6 c	The wire should not show breaking splits of other defects For Min.19 No. of turns	N.A.	Cl. 8.2 & Table-6 of IS :3975 :1999 (Pt- 38)/1984	....
9.10	Winding Test (For Galvanized formed wire & Tapes only) Cl. 13.6 (d)	The Zinc coating shall show no cracks and particles of the coating shall not be detached by rubbing with bare finger	Satisfactory	Cl. 8.3 of IS :3975 :1999 (Pt- 39)/1984	yes
9.11	Resistance Test Resistivity at 20°C.(For wires & Strips Only) Cl. 13.6 (g)	14.5 x 10 ⁻⁶ Ohm-cm (Max.)	14.06 x 10 ⁻⁶	Cl. 8.4 of IS :3975 :1999 (Pt- 42)/1984	yes
10	Laying up of cores Cl. 11.1	in twin,three- and multi-core cables,the core shall be laid up together with a suitable lay; the outermost layer shall have right-hand lay and the successive layers shall be laid with opposite lay; where necessary, the interstices shall be filled with non-hygroscopic material	Satisfactory	...	yes
	Plan for lay-up of cores 11.2 & Table 3	1-6-12	1-6-12		yes
11	Physical tests for insulation (Type-A)				
11.1	Tensile strength Cl. 15.1d(1)	12.5 N/mm ² (Min.)		Cl. 4.1(iii)a & Table-1 of IS 5831-1984, (Pt- 7)1984	
	Grey1 to Grey19		16.55 to 17.20		yes

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11.2	Elongation at break Cl. 15.1d(1)	150% (Min.)	265 to 288	Cl. 4.1(iii)b & Table-1 of IS 5831-1984,	yes
	Grey1 to Grey19				
11.3	After Ageing in Air Oven Cl. 15.1d(2)	12.5 N/mm ² (Min.)	17.82 to 18.95	Cl. 4.1(iv) & Table-1 of IS 5831-1984, (Pt- 11) 1984	yes
11.3.1	Tensile strength Grey1 to Grey19				
11.3.2	Variation Grey1 to Grey19	± 20% (Max.)	-10.17 to -7.67	Cl. 4.1(iv) & Table-1 of IS 5831-1984, (Pt- 11) 1984	yes
11.3.3	Elongation at break Grey1 to Grey19				
11.3.4	Variation Grey1 to Grey19	± 20 % (Max.)	+7.99 to +8.30	Cl. 4.1(iv) & Table-1 of IS 5831-1984, (Pt- 11)1984	yes
11.4	Shrinkage test Cl. 15.1d(3) Grey1 to Grey19				
11.5	Hot Deformation Test Cl. 15.1(d) (4) Grey1 to Grey19	50 % (Max.)	24.20 to 24.68	Cl. 4.1(vi)& Table 1 of IS 5831:1984, (Pt- 15) 1984	yes
11.6	Loss of Mass in air oven Cl. 15.1 (d) (5) Grey1 to Grey19				
11.7	Heat Shock test Cl. 15.1(d) (6) Visual Examination Grey1 to Grey19	No signs of cracks or scales	no signs of	Cl. 4.1(vii)& Table 1 of IS 5831:1984, (Pt- 14) 1984	yes
11.8	Thermal Stability Cl. 15.1(d) (7) Grey1 to Grey19				
12	Physical tests for Outer sheath (Type ST1) Cl. 15.1(d)	80 Minutes (Min.)	>80	Cl. 4.1(Xiii)& Table 1 of IS 5831:1984, (Pt- 60) 1988	yes
12.1	Tensile strength Cl. 15.1(d) (1)				
12.1.1	Elongation at break Cl. 15.1(d) (1)	150% (Min.)	260	Cl. 4.1(i)b & Table 2 of IS 5831:1984 (Pt- 7) 1984	yes

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12.2	After Ageing in Air Oven Cl. 15.1(d) (2)				
12.2.1	Tensile strength	12.5 N/mm ² (Min.)	15.18	Cl. 4.1(ii) & Table 2 of IS 5831:1984, (Pt- 11) 1984	yes
12.2.2	Variation	± 20% (Max.)	-6.75		yes
12.2.3	Elongation at break	150% (Min.)	243		yes
12.2.4	Variation	± 20% (Max.)	+6.54		yes
12.4	Shrinkage test Cl. 15.1d(3)	4% (Max.)	1.0	Cl. 4.1(vi) & Table 2 of IS 5831:1984, (Pt- 12) 1984	yes
12.5	Hot Deformation Test Cl. 15.1(d) (4)	50% (Max.)	24.6	Cl. 4.1(iv) & Table 2 of IS 5831:1984, (Pt-15) 1984	yes
12.6	Loss of Mass Cl.15.1 (d) (5)	2 mg/cm ² (Max.)	0.568	Cl. 4.1(iii) & Table 2 of IS 5831:1984, (Pt- 10) 1984	yes
12.7	Heat Shock test Cl. 15.1(d) (6) Visual Examination	No signs of cracks or scales	No signs of cracks	Cl. 4.1(v) & Table 2 of IS 5831:1984, (Pt- 14) 1984	yes
12.8	Thermal Stability Cl. 15.1(d) (7)	40 Minutes (Min.)	>40	Cl. 4.1(xi) & Table 2 of IS 5831:1984, (Pt- 60) 1988	yes
12.9	Insulation Resistance Test: Cl. 15.1(e)				
12.9.1	Volume Resistivity At 27°C				
	Grey 1	1 x 10 ¹³ Ohm-cm (Min.)	5.93 x 10 ¹³	Cl. 4.1(i)a & Table-1 of IS 5831-1984, (Pt- 43)1984	yes
	Grey 5		6.19 x 10 ¹³		yes
	Grey 9		7.33 x 10 ¹³		yes
	Grey 14		8.14 x 10 ¹³		yes
	Grey 19		7.28 x 10 ¹³		yes
12.9.2	At Maximum rated temp.				
	Grey 1	1 x 10 ¹⁰ Ohm-cm (Min.)	3.11 x 10 ¹¹	Cl. 4.1(i)b & Table-1 of IS 5831-1984, (Pt- 43)1984	yes
	Grey 5		2.95 x 10 ¹¹		yes
	Grey 9		3.48 x 10 ¹¹		yes
	Grey 14		2.08 x 10 ¹¹		yes
	Grey 19		3.71 x 10 ¹¹		yes

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Certificate No. T-1945

TEST REPORT

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12.9.3	Insulation Resistance constant Cl. 15.1(e)				
12.9.3.1	At 27°C				
	Grey 1		217.9	Cls. 4.1 (ii) a & Table-1 of IS 5831-1984, (Pt- 43) 1984	yes
	Grey 5	36.7 MΩkm (Min.)	227.7		yes
	Grey 9		268.5		yes
	Grey 14		299.3		yes
	Grey 19		267.4		yes
12.9.3.2	At Maximum rated temp.				
	Grey 1	0.037 MΩkm (Min.)	1.154	Cl. 4.1(ii)b & Table-1 of IS 5831-1984, (Pt- 43) 1984	yes
	Grey 5		1.093		yes
	Grey 9		1.282		yes
	Grey 14		0.771		yes
	Grey 19		1.375		yes
13	High Voltage test (Room Temp.) Cl. 15.1(g) & 16.2	The core should withstand an a.c. voltage of 3 KV (rms) for five minutes without breakdown	withstood	(Pt- 45) 1984	yes
	Grey1 to Grey19				
14	High Voltage test (water immersion) Cl. 15.1(f) & 16.3				
14.1	A.C test Cl. 16.3.1	The core shall be immersed in a water bath at 60±3°C after 24 hour a voltage of 3KV (rms) shall be applied between conductor and water. This voltage shall be raised to 6KV (rms) within 10 sec and held constant at this values for 5 minutes	withstood	(Pt- 45) 1984	yes
	Grey1 to Grey19				
14.2	D.C test Cl. 16.3.2	The core should withstand dc.voltage of 1.2 kV in the same water bath as a.c. test at 60±3°C for 240 hours continuously without breakdown	withstood	(Pt- 45) 1984	yes
	Grey1 to Grey19				
15	Flammability Test Cl. 16.4 & 15.1(h)				
15.1	Period of Buring after Removal of the Flame	60 sec. Max.	5	(Pt- 53) 1984	yes
15.2	Unaffected (uncharred) portion from the lower edge of the top clamp	50mm Min.	318	(Pt- 53) 1984	yes

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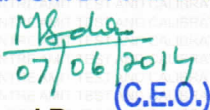
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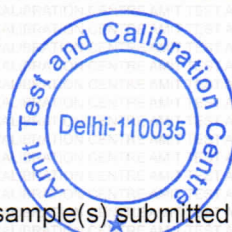
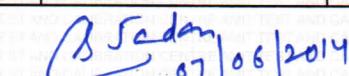
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16	Optional test				
16.1	Cold Bend Test for Insulation Cl.15.4(a) & Cl. 4.1 (ix) Table-1 of IS 5831-1984	No signs of cracks or scale	No signs of cracks	(Pt-20) 1984	yes
	Grey1 to Grey19				
16.2	Cold Impact Test for Sheath Cl.15.4(b) & 4.1 (Viii) Table-2 of IS: 5831-1984, Visual examination	No signs of cracks or scale	No signs of cracks	(Pt-21) 1984	yes
16.3	Armour Resistance Test Cl.15.4(c), Cl.13.5.1	.....	N.A.	(Pt-5)	.....
17	Additional Test for Cables with Improved Fire Performance Category(C2) Cl. 15.1.1 & Appendix A				
17.1	Oxygen index Test, % Cl. 16.5	29 Min.	31.9	(Pt-58)/1998	yes
17.2	Temperature Index at 21% Oxygen, °C Cl. 16.10	250	382.5	(Pt-64)/2003	yes
17.3	Test for halogen acid gas evolution by weight, % Cl. 16.9	The level of HCL evolved shall not exceed 20% by weight	15.71	(Pt-59)/1988	yes
17.4	Flame Retardance test on bunched cables Cl. 16.7	After burning has ceased, the cables should be wiped clean and charred or affected portion should not have reached a height exceeding 2.5 m above the bottom edge of the burner	1.58	(Pt-62)/1993	yes
17.5	Flame Retardance test on Single cables Cl. 16.6 (The external diameter of the test specimen shall not exceed 35 mm)	After the test, there should be no visible damages on the test specimen within 300 mm from its upper end	530	(Pt-61)/1988	yes
	Diameter of Cable, mm	35 (Max.)	26.65		yes

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Notes :

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