



AMIT TEST AND CALIBRATION CENTRE

(BIS/NABL ACCREDITED LABORATORY)

19/168, Sarai Rohilla, Old Rohtak Road, Near Shastri Nagar Metro & Usha Mata Mandir, Delhi-110035
Tel. 011-23643995, Fax : 011-23643992 (M) 9582782444, Email: info@atncc.in; amittestcc@gmail.com

TEST REPORT

(ELECTRICAL LABORATORY)

ADDRESS OF THE LABORATORY :

19/168, Basti Sarai Rohilla, Old Rohtak Road, Near Usha
Mata Mandir, Gurudwara Wali Gali, Delhi -110035

TELEGRAM :

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TEST REPORT AS PER IS:7098(Pt.-1)1988

[WITH AMENDMENT NO{s} 5]

REPORT NO: ATCC2014081105

DATED : 11.08.2014

Issue To: Finecab Wires & Cables Pvt. Ltd.

Plot No.6 & 20 Phase-IV,

IDA, Patancheru-502319

PART A. PARTICULARS OF SAMPLE SUBMITTED

a) Nature of Sample :

Cross linked Polyethylene Insulated PVC Sheathed Cables for
working Voltages Up to and including 1100 Volts

b) Grade/Variety/Type/Class/Size etc:

4C x 400 sq.mm, Stranded shaped aluminium conductor, Class-
2, XLPE Insulated, extruded PVC inner sheathed, Galvanized
Steel Formed Wire Armoured FR-LSH PVC Type ST2 Sheathed
Cable, Category C2, 1100 Volts grade, Cable Code A2XFY

5 Meters aluminium wire dia 2.90 mm H2 Grade for tensile
strength and wrapping test before stranding
5 Meters Galvanized Steel Formed Wire for before armouring
tests.

c) Declared Values, if any :

.....

d) Code No. :

.....

e) Batch No. & Date of Manufacture :

.....

f) Quantity :

40 Meters + 5 Meters + 5 Meters (Approx.)

g) Date of Receipt :

07.07.2014

h) BIS seal :

INTACT/ NOT INTACT/ NOT SEALED NIL

i) IO's Signature :

Signed/ Unsigned NIL

j) Any other Information/Expiry date,if any :

.....

k) Date of Commencement of Testing :

14.07.2014

l) Date of Completion of Testing :

06.08.2014

m)Embossing/Identification:

FINECAB HYD 1100V ELECTRIC 4C X 400 SQ.MM. A2XFY
FR-LSH

n)Party Ref. No. :

FWCPL/2014-2015/D.NO.124 Dated: 05.06.2014

PART B : SUPPLEMENTARY INFORMATIONS

a) Reference to sampling procedure, wherever applicable :

N.A

b) Supporting documents for the measurements taken and results derived like graphs,
tables, sketches and/or photographs, as appropriate to test report, if any[To be attached]:

NIL

c) Deviation from the test methods as prescribed in relevant ISS/ work instructions,
if any :

NIL

MANOHAR SINGH JADON

M.S. Jadon
11/08/2014
(C.E.O.)



S. Sadhana
11/08/2014
SADHANA JADON

TEST REPORT

PART C: TEST RESULTS

REPORT NO: ATCC2014081105

IS : 7098(Pt.1)-1988

SL.No.	TESTS/CL. REF.	Specified Requirements	Results																			
1	No. of cores	4	4																			
2	Core identification Cl. 10.1, 10.2	Red, Yellow, Blue & Black	Red, Yellow, Blue & Black																			
3	Nature and shape of Conductor Cl. 8.0, Cl. 5.1, 5.2, 5.3 Table 1 & 2 of IS 8130:1984	Solid/Stranded Circular/Compacted Circular/Shaped	Shaped																			
4	Flexibility Cl. 8.1, Cl. 4.1(a) of IS 8130:1984	Class-1/Class-2	Class-2																			
5	No. of wires in Conductor Cl. 5.3.3 Table 2 of IS 8130:1984	53 (Min.)	61																			
6	Cross sectional area of reduced neutral conductors Cl. 8.3 Table 2		N.A.																			
7	Test on Conductor																					
7.1	Annealing Test, (%) (for copper) Before stranding Cl.15.1(a)(i),Cl.6.1.2.1of IS 8130:1984, IS:10810(Pt-1)	<table><tr><td>Wire Diameter</td><td>Elongation,Min</td></tr><tr><td>Over</td><td>Up to and including</td></tr><tr><td>mm</td><td>mm</td><td>Percent</td></tr><tr><td>----</td><td>0.21</td><td>9.0</td></tr><tr><td>0.21</td><td>0.41</td><td>13.5</td></tr><tr><td>0.41</td><td>1.36</td><td>18.0</td></tr><tr><td>1.36</td><td>----</td><td>22.5</td></tr></table>	Wire Diameter	Elongation,Min	Over	Up to and including	mm	mm	Percent	----	0.21	9.0	0.21	0.41	13.5	0.41	1.36	18.0	1.36	----	22.5	N.A.
Wire Diameter	Elongation,Min																					
Over	Up to and including																					
mm	mm	Percent																				
----	0.21	9.0																				
0.21	0.41	13.5																				
0.41	1.36	18.0																				
1.36	----	22.5																				
7.2	Tensile Strength (for Aluminium Conductor) Before Stranding Cl.15.1(a) (ii),Cl.6.2.1 of IS8130:1984, IS:10810(Pt-2)	<table><tr><td>0 grade</td><td>upto and including 100 N/mm²</td></tr><tr><td>H2 Grade</td><td>Above 100 and up to and including 150 N/mm²</td></tr><tr><td>H4 Grade</td><td>Above 150 N/mm²</td></tr></table>	0 grade	upto and including 100 N/mm ²	H2 Grade	Above 100 and up to and including 150 N/mm ²	H4 Grade	Above 150 N/mm ²	H2 Grade 139.0													
0 grade	upto and including 100 N/mm ²																					
H2 Grade	Above 100 and up to and including 150 N/mm ²																					
H4 Grade	Above 150 N/mm ²																					
7.3	Wrapping Test (for Aluminium conductor) Before Stranding Cl. 15.1(a)(iii),Cl.6.2.2of IS 8130:1984, IS:10810(Pt-3)	The wire should not break	Satisfactory																			
7.4	Conductor resistance at 20 ⁰ C Cl. 15.1 (a) (iv), Cl. 6.3, Table-1 & 2 of IS-8130:1984, IS:10810(Pt-5)																					
	Red	0.0778 ohm/Km (Max.)	0.0762																			
	Yellow		0.0764																			
	Blue		0.0760																			
	Black		0.0761																			
8	Tests for Armouring Cls. 15.1 (b)																					
8.1	Application of armour																					
8.1.1	Cl. 13.1.1	Over the insulation (Single Core) over the inner sheath (twin/three/multicore)	Satisfactory																			

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SL.No.	TESTS/CL. REF.	Specified Requirements	Results
8.1.2	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	92.85
8.2	Direction of armouring Cl. 13.1.3	The Direction of lay of the armouring shall be left-hand	Left hand
8.3	Type of Armouring Cl. 13.2	a) Galvanized steel round wire b) Galvanized steel formed wire	Galvanized Steel formed wire
8.4	Dimension of Armouring 13.3 & Table-5, Cl. 7, Table-3 & 4 of IS :3975 :1999, IS:10810(Pt-36)	A=4.0 mm $\pm$ 10% C=0.8 mm $\pm$ 10%	3.78 to 3.89 0.77 to 0.80
8.5	Tensile strength N/mm² 13.6(a) & Table-6, Cl. 8.1 & Table-5 of IS:3975 :1999, IS:10810 (Pt-37)	(250 to 580)	394.5 to 429.0
8.6	Elongation Cl. 15.1(b), 13.6(b) & Table-6, Cl. 8.1 & Table-5 of IS:3975 :1999, IS:10810 (Pt-37)	6 % (Min.)	9.2
8.7	Torsion Test (For Round Wire Only) Cl. 15.1, 13.6(c) & Table-6, Cl. 8.2 & Table-6 of IS :3975 :1999, IS:10810 (Pt-38)	The wire should not show breaking splits of other defects For Min. 19 No. of turns	N.A.
8.8	Winding Test (For Galvanized formed wire & Tapes only) 13.6(d) & Table-6, Cl. 8.3 of IS :3975 :1999, IS:10810 (Pt-39)	The Zinc coating shall show no cracks and particles of the coating shall not be detached by rubbing with bare finger	Satisfactory
8.9	Resistance Test Resistivity at 20°C (For wires & Strips Only) 13.6(g), Cl. 8.4 of IS :3975 :1999, IS:10810 (Pt-42)	14.5 x 10 ⁻⁶ Ohm-cm (Max.)	13.91 x 10 ⁻⁶
8.1	Mass of Zinc coating 13.6(f), Cl. 9.1 & of IS :3975 :1999, IS:10810 (Pt-41)	104.5 gm/m ² (Min.)	143.0
8.11	Uniformity of Zinc Coating Cl.13.6 (e), Cl. 9.2 of IS :3975 :1999, IS:10810(Pt-40)	Red deposit of copper Yes /No	No Red Spots
9	Tests for Galvanized Steel Formed Wire (Before Armouring) Cls. 15.1 (b)		
9.1	Dimension for Galvanized formed wire Cl. 7.3, Table- 4 of IS :3975 :1999, IS:10810(Pt-36)	A=4.0 mm $\pm$ 10% C=0.8 mm $\pm$ 10%	3.83 to 3.95 0.78 to 0.80
9.2	Tensile strength MPa Cl. 8.1 & Table-5 of IS:3975 :1999, IS:10810 (Pt-37)	(300 to 500)	398 to 439
9.3	Elongation Cl. 8.1 & Table-5 of IS:3975 :1999, IS:10810 (Pt-37)	10 % (Min.)	16.0

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SL.No.	TESTS/CL. REF.	Specified Requirements	Results
9.4	Torsion Test (For Round Wire Only) Cl. 8.2 & Table-6 of IS :3975 :1999, IS:10810 (Pt-38)	The wire should not show breaking splits of other defects For Min. 19 No. of turns	N.A.
9.5	Winding Test (For Galvanized formed wire & Tapes only) Cl. 8.3 of IS :3975 :1999, IS:10810 (Pt-39)	The Zinc coating shall show no cracks and particles of the coating shall not be detached by rubbing with bare finger	Satisfactory
9.6	Resistance Test Resistivity at 20°C (For wires & Strips Only) Cl. 8.4 of IS :3975 :1999, IS:10810 (Pt-42)	14.5 x 10 ⁻⁶ Ohm-cm (Max.)	13.83 x 10 ⁻⁶
9.7	Mass of Zinc coating Cl. 9.1(b) of IS:3975:1999, IS:10810 (Pt-41)	110 gm/m ² (Min.)	151.5
9.8	Uniformity of Zinc Coating Cl. 9.2(b) of IS :3975 :1999, IS:10810(Pt-	Red deposit of copper Yes /No	No Red Spots
10	Test for Insulation		
10.1	Thickness of Insulation Cl. 9.2 & 9.3 and Table 3, IS:10810 (Pt-6)	Nom. mm Min. mm	Nom. Min.
	Red		2.10 2.00
	Yellow		2.12 1.99
	Blue	2.00 1.70	2.11 1.98
	Black		2.09 1.97
10.2	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
11	Thickness of inner sheath Cl. 12.3 & Table-5, IS:10810 (Pt-6)	0.70 mm (Min.)	0.88
11.1	Application of inner sheath Cl. 12.1 & 12.2	The laid up cores shall be provided with an inner sheath applied either by extrusion or by wrapping. It shall be ensured that it is as circular as possible. 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.	Extursion Satisfactory
12	Thickness of outer Sheath Cl. 14.3 and Table 8, IS:10810 (Pt-6)	2.68 mm (Min.)	2.91
12.1	Application of outer Sheath Cl. 14.1 (a,b,c)	The outer sheath shall be applied by extrusion. It shall be applied: a) Over the insulation in case of unarmoured single core cables. b) Over the inner sheath in case of unarmoured twin, three and multi-core cables and c) Over the armouring in case of armoured cables	N.A. N.A. Satisfactory

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TEST REPORT

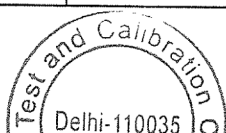
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SL.No.	TESTS/CL. REF.	Specified Requirements	Results
12.2	Colour of outer sheath Cl. 14.2	Colour of outer sheath shall be black or any other colour as agreed to between the purshaser and the supplier.	Black
13	Physical tests for insulation		
13.1	Tensile strength Cl.15.1d(i),4.1(i) & Table-1, IS:10810(Pt-7)		
	Red Yellow Blue Black	12.5 N/mm ² (Min.)	18.29 17.96 17.85 18.03
13.2	Elongation at break Cl.15.1d(i),4.1(ii) & Table-1 IS:10810(Pt-7)		
	Red Yellow Blue Black	200 % (Min.)	473 480 470 490
13.3	Ageing in Air Oven Cl.15.1d(ii),4.1(iii) & Table-1, IS:10810(Pt-11)		
13.3.1	Tensile strength Variation Red Yellow Blue Black	± 25 % (Max.)	-8.37 -9.11 -7.48 -7.47
13.3.2	Elongation Variation Red Yellow Blue Black	± 25 % (Max.)	+8.41 +7.69 +11.11 +10.43
13.4	Hot set test (insulation) Cl.15.1d(iii),4.1(iv) & Table-1, IS:10810(Pt-30)		
13.4.1	Elongation under load Red Yellow Blue Black	175% (Max.)	91.85 90.08 91.35 90.65
13.4.2	Permanent elongation after cooling Red Yellow Blue Black	15% (Max.)	1.91 1.50 1.88 2.13
13.5	Shrinkage test Cl.15.1d(iv),4.1(v) & Table-1, IS:10810(Pt-12)		
	Red Yellow Blue Black	4 % (Max.)	1.0 0.5 1.0 1.0

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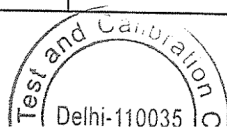
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SL.No.	TESTS/CL. REF.	Specified Requirements	Results
13.6	Water Absorption test(Gravimetric) Cl.15.1d(v),4.1(vi) & Table-1, IS:10810(Pt-33)		
	Red Yellow Blue Black	1 mg/cm ² (Max.)	0.028 0.034 0.031 0.027
14	Physical tests for Outer sheath (Type- ST2) Cl. 15.1(e) , Cl. 4.1& Table 2 of IS 5831:1984, IS:10810(Pt-7)		
14.1	Tensile strength Cl. 15.1(e) (i)	12.5 N/mm ² (Min.)	15.08
14.2	Elongation at break Cl. 15.1(e) (i)	150% (Min.)	253
14.3	After Ageing in Air Oven Cl. 15.1(e) (ii), Cl. 4.1& Table 2 of IS 5831:1984, IS:10810(Pt-11)		
14.3.1	Tensile strength	12.5 N/mm ² (Min.)	16.13
14.3.2	Variation	± 25% (Max.)	-6.96
14.3.3	Elongation at break	150% (Min.)	235
14.3.4	Variation	± 25% (Max.)	+7.11
14.4	Loss of Mass Cl.15.1 (e) (iii), Cl. 4.1& Table 2 of IS 5831:1984, IS:10810 (Pt-10)	2 mg/cm ² (Max.)	0.729
14.5	Shrinkage Test Cl. 15.1 (e) (iv), Cl. 4.1& Table 2 of IS 5831:1984, IS:10810 (Pt-12)	4% (Max.)	1.5
14.6	Hot Deformation Test Cl. 15.1(e) (v), Cl. 4.1& Table 2 of IS 5831:1984, IS:10810 (Pt-15)	50% (Max.)	21.05
14.7	Heat Shock test Cl. 15.1(e) (vi), Cl. 4.1& Table 2 of IS 5831:1984, IS:10810 (Pt-14) Visual Examination	No signs of cracks or scales	No signs of cracks
14.8	Thermal Stability Cl. 15.1(e) (vii), Cl. 4.1& Table 2 of IS 5831:1984, IS:10810 (Pt-60)	80 Minutes (Min.)	>80
15	Insulation Resistance Test (Volume resistivity) Cl.15.1(f),4.1(vii) & Table-1, IS:10810 (Pt-43)		
15.1	Volume Resistivity At 27°C Red Yellow Blue Black	1 x 10 ¹⁴ Ohm-cm (Min.)	5.78 x 10 ¹⁵ 6.04 x 10 ¹⁵ 3.69 x 10 ¹⁵ 4.71 x 10 ¹⁵
15.2	At 90°C Red Yellow Blue Black	1 x 10 ¹² Ohm-cm (Min.)	3.09 x 10 ¹³ 2.17 x 10 ¹³ 4.89 x 10 ¹³ 3.03 x 10 ¹³

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16	High Voltage test (Room Temp.) Cl.15.1(g) & 16.2.1, IS:10810(Pt-45)	The cable shall withstand a voltage of 3 kV ac (rms) at a frequency of 40 to 60 Hz or an dc voltage of 7.2 kV, between conductors and between conductors and EC (if any) for a period of 5 minutes for each test connectiondown	AC Voltage
	Red		withstood
	Yellow		withstood
	Blue		withstood
	Black		withstood
17	Flammability Test Cl. 15.1(h) & 16.3, IS:10810(Pt-53)	60 sec (Max.)	3
17.1	Period of Buring after Removal of the Flame		
17.2	Unaffected (uncharred) portion from the lower edge of the top clamp		
		50 mm (Min.)	325
18	Laying up of cores Cl. 11.1, 11.2 & Table-4	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
	Plan for laid-up of cores	4	4
19	Optional test		
19.1	Cold Impact Test for Sheath Cl.15.4(b), & 4.1 (viii) Table-2 of IS: 5831-1984, IS 10810 (Pt-21) Visual examination	No signs of cracks or scales	No signs of cracks
20	Additional Test for Cables with Improved Fire Performance Category C2 Cl. 15.1.1 & Appendix A		
20.1	Oxygen index Test, % Cl. 16.4,IS:10810(Pt-58)/1998	29 (Min.)	32.1
20.2	Flame Retardance test on Single cables Cl. 16.5 IS:10810(Pt-61)/1988 (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	N.A.
	Diameter of Cable, mm	35 (Max.)	74.49
20.3	Flame Retardance test on bunched cables Cl. 16.6, IS:10810(Pt-62)/1993	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	1.53

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SL.No.	TESTS/CL. REF.	Specified Requirements	Results
20.4	Test for halogen acid gas evolution Cl. 16.8, IS:10810(Pt-59)/1988	20% by weight, (Max.)	14.93
20.5	Temperature Index at 21% Oxygen Cl. 16.9, IS:10810(Pt-64)/2003	250 (Min.)	387.5

PART D REMARKS : The Sample conforms to various requirements specified in IS : 7098 (Pt.-1)/1988 with amendments no. 1, 2, 3, 4 & 5

Note: Any deviation from the standard, test method/specification- NIL

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(C.E.O.)

Issued By



Sadhana
11/08/2014

SADHANA JADON
(Quality Manager)

Authorized Signatory

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Notes :

(1). This Test Report refers only to the particular sample(s) submitted for testing. (2) This Test Report shall not be reproduced, except in full, unless written permission for the publication of an approved abstract has been obtained from the CEO, Amit Test and Calibration Centre, New Delhi. (3) Test Report shall not be utilized for any legal purpose and will not be produced in the court of law & no responsibility would be attached Amit Test and Calibration Centre. (4) The test results reported in this certificate are valid at the time at the time of and under the stated conditions of measurements.