



FORM NO : NTH/CHN/F5



भारत सरकार Government of India  
राष्ट्रीय परीक्षण शाला (द.क्षे.)  
NATIONAL TEST HOUSE (SR)  
तरमणी, चेन्नई - 600 113. Taramani, Chennai - 600 113.  
Phone : 22432374, 22431157 Fax : 22433158 email : nthsr@tn.nic.in

T-0183, T-0184, T-0185, T-0189  
C-0791, C-0792, C-0793

## TEST CERTIFICATE

**345328**

Test Certificate No.	Date of Issue	Code No.	Page	No. of Pages
NTH(SR)/EL(C)/2012/217(A)	17.07.2012	1336731408693	01	07

**Issued in two copies**

<b>Issued to &amp; address</b>	: M/s. Wiremann Industries Pvt. Ltd., #74, 3 <sup>rd</sup> floor, Sri Plaza, A.M. Lane, Chickpet, Bangalore – 560 053.
<b>Customer's Ref. No.</b>	: WIPL/NTH/Type test/694/09/13, Dated: 10.05.2012.
<b>Description of Test Item</b>	: PVC insulated and sheathed circular 4 core stranded cable with bunched copper conductor, 1100V Grade cable suitable for outdoor & low temperature application. Cable code YYOUZS.
<b>Identification of Test Item</b>	: i) 4 Core x 50 mm <sup>2</sup> , PVC insulated & sheathed circular stranded cable with bunched copper conductor Class 2, Type A insulation and Type ST1 sheath.  ii) Plain annealed copper wire (Before stranding) of diameter 0.4 mm
<b>Date of Receipt of Sample</b>	: 11.05.2012
<b>Method used for test/Specification</b>	: As per IS: 694 – 1990 (Reaffirmed 2005 up to amendment No.5) & IS: 8130-84
<b>Remarks</b>	: The sample of cable & bare copper wire meets the requirements of the specification IS : 694-1990, reaffirmed 2005 (with amend. No.5) & IS: 8130-1984 respectively for Type tests

**Tested by**

V. Sivaguru  
Scientific Assistant (Elect.)

**Checked & Approved by**

P. Somu  
Scientist.SC (Elect.)

Note: 1. This Test Certificate or report may not be published for commercial purpose except in full, unless permission for the publication of an approved abstract has been obtained from the Director, National Test House, Taramani, Chennai.

Note: 2. This certificate applies only to sample tested.



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### 1. Description of the sample :

- a. Nomenclature : PVC insulated and Sheathed circular cable with bunched Copper conductor. Cable code YYOUSZ.
- b. Size : 4 Core X 50 mm<sup>2</sup>.
- c. Quantity : One number of cut length coil of cable approximately 15 meter, Plain annealed copper wire (Before stranding) of diameter 0.4mm length 5 mtr.
- d. Packing : Packed in a carton box.
- e. Markings : Salient markings found on the label attached with the Cable sample  
Description: One sample of PVC insulated circular cable, 4 Core Sheathed, Cl. 2, ST1, Type A, 50 Sq.mm  
: Salient markings found on label attached with the bare copper wire  
Description : One sample of Copper wire, Size: 0.4 mm, Qty : 5 mts.

As requested the sample has been subjected to the Type tests as per IS: 694 -1990, reaffirmed 2005(up to amendment no. 5) with the results noted below.

2. Material (Section 2 of the specification)	Specified	Observed
a. Conductor (Cl. 4)	Plain copper	Plain Copper
b. Insulation (Cl. 5)	Shall be Type 'A' PVC Compound	PVC Compound Type 'A'
c. Fillers (Cl.6)	Fillers shall be vulcanized rubber, unvulcanized rubber, thermoplastic compound or textile materials.	Not applicable
d. Binder tape (Cl.7)	Binder tape shall consists of plastic or proofed textile material.	Not applicable
e. Sheathing (Cl.8)	Type 'ST1' PVC Compound	PVC Compound Type 'ST1'

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3. Construction (Section 2 of the specification)	Specified	Observed
a. Number of cores	Single, Twin, Three or multi cores	Four cores
b. Number of wires (Cl.9)	19 wires (Min) for Class 2 conductor Table 2 of IS : 8130-1984	396 strands of 0.4 mm dia each. Conductor Class 2.
c. Area of the conductor (Cl. 9)	50sq.mm. (Nominal)	50 sqmm (Calculated)
d. Insulation (Cl.10)	Insulation shall be applied by extrusion by PVC compound. It shall fit closely to the conductor and shall be possible to remove the insulation without damage to the conductor.	PVC Insulation applied over the conductor by extrusion and found fit closely to the conductor. It is possible to remove it without damage to the conductor.
e. Core identification (Cl. 11)	For four core cable: Red, Yellow, Blue & Black	Red, Yellow, Blue & Black
f. Laying up of cores (Cl. 12)	Circular multi core cable: Laid together with suitable right hand lay.	Laid together with suitable right hand lay.
g. Sheathing (Cl.13)	Shall be applied with black colour PVC compound by extrusion over the laid up cores. It shall fit closely and shall be possible to remove without damage to the cores.	Applied above the laid up cores using Black colour PVC compound by extrusion and found fit closely to the laid up cores. It is possible to remove it without damage to the cores.
h. Ovality (Cl.14)	Values of overall diameter of circular cables shall not exceed 15 percent of maximum measured value at the same cross section.	Satisfactory 4%

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Scientific Assistant (Elect.)

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**4. Tests (Table 8, Cl.15.1 of the specification)**

a. Test on Conductor	Specified values		Observed Values				Outer Sheath
			Red	Yellow	Blue	Black	
i. Annealing Test (Before stranding) (as per Cl. 6.1.2.1 of IS: 8130 - 1984 & IS: 10810 (Part-1) - 1984) Elongation percent	13.5 (Min)		24				
ii. Conductor resistance test (as per Cl. 6.3 & Table 3 of IS: 8130 - 1984 & IS: 10810 (Part-5) - 1984)  Calculated resistance corrected to 20 °C in Ohm/km	Class 2 conductor  0.387 (Max)		0.379	0.380	0.378	0.379	
b. Test for overall dimensions, Ovality and thickness of insulation & sheath. (as per Cl. 14.1, 10, 13 and table 5 of IS: 694-1990 & IS:10810(Part-6)-1984)	Insulation	Sheath	Insulation				Outer Sheath
			Red	Yellow	Blue	Black	
i. Overall dimension in mm	35.0 (Max)		31.45				
ii. Average thickness of insulation & sheath in mm	1.4 (Nominal)	1.8 (Nominal)	1.5	1.5	1.5	1.5	2.0
iii. Minimum thickness of insulation & sheath in	1.16(Min)	1.24(Mi)	1.32	1.28	1.31	1.32	1.72
c. Physical Test on Insulation & Outer Sheath (as per Table 1 & table 2 of IS: 5831 - 1984)							
i. Tensile strength & elongation at break (as per IS: 10810 (Part - 7) – 1984)							
Tensile strength in N/mm <sup>2</sup>	12.5 (Min)		14.3	14.4	14.3	14.2	14.4
Elongation at break in percent	150 (Min)		190	185	190	200	190

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ii. Ageing test (Sample kept at 80±2°C for 7 days) (as per IS: 10810 (Part - 11) - 1984)	Specified Insulation & Outer Sheath	Observed				
		Insulation				Outer Sheath
		Red	Yellow	Blue	Black	
Loss of mass in mg/cm <sup>2</sup> (as per IS: 10810 (Part - 10) - 1984)	2 (Max)	0.6	0.7	0.6	0.7	0.9
Tensile strength in N/mm <sup>2</sup>	12.5 (Min)	15.4	15.6	15.4	15.5	15.6
Elongation at break in percent	150 (Min)	180	175	175	185	175
Tensile strength variation in percent	±20 (Max)	(-)8	(-)8	(-)8	(-)9	(-)8
Elongation variation in percent	±20 (Max)	(+)5	(+)5	(+)8	(+)8	(+)8
iii. Shrinkage in % (as per IS: 10810(Part - 12) - 1984) (150±2°C for 15minutes)	4 (Max)	2	2	1	1	2
iv. Hot deformation test (80±2°C for 6 hours) (as per IS: 10810 (Part - 15) - 1984)						
Depth of indentation in percent	50 (Max)	26	25	24	26	25
v. Heat shock test (150±2°C for 1 hour) (as per IS: 10810 (Part - 14) - 1984)	Shall not show scales or cracks	Satisfactory as no signs of Scales or cracks observed				
d. Insulation resistance test (as per Cl. 15.1 of IS: 694 - 1990 & IS: 10810 (part - 43) - 1984)		Cores				
		Red	Yellow	Blue	Black	
i. Volume resistivity in Ω Cm						
At Room temperature	1 X 10 <sup>13</sup> (Min)	14 x 10 <sup>13</sup>	13 x 10 <sup>13</sup>	14 x 10 <sup>13</sup>	12 x 10 <sup>13</sup>	
At 70°C	1 X 10 <sup>10</sup> (Min)	12 x 10 <sup>10</sup>	11 x 10 <sup>10</sup>	12 x 10 <sup>10</sup>	10 x 10 <sup>10</sup>	
ii. Insulation Resistance Constant in MΩ km						
At Room temperature	36.7 (Min)	517.3	474.2	495.8	431.1	
At 70°C	0.037 (Min)	0.431	0.388	0.453	0.345	

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e. High voltage test (at room temperature) (as per Cl. 16.3 of IS: 694 - 1990 & IS: 10810 (part - 45) - 1984)	Specified	Observed
An ac voltage of 3kV(rms) 50Hz was applied between each conductor of the cores and kept for 5 minutes.	Shall withstand without breakdown or flash over	The cable with stood the test satisfactorily, as no breakdown or flash over observed.
<b>f. High voltage test (Water immersion test) (as per Cl. 16.2 of IS:694-1990 &amp; IS:10810(part-45)-1984)</b>		
<b>i. ac test (as per Cl. 16.2.1 of IS: 694 - 1990 &amp; IS: 10810 (part - 45) - 1984)</b>		
The cores were kept in water at 60±3°C for 24 hrs. after that an ac voltage of 3kV(rms) at 50Hz was applied and raised to 6kV(rms) 50 Hz within 10seconds and kept for 5minutes.	Each core shall withstand without breakdown or flash over	Each core with stood the test satisfactorily as no breakdown or flash over observed.
<b>ii. dc test (as per Cl. 16.2.2 of IS: 694-1990 &amp; IS:10810(part-45)-1984)</b>		
After completion of ac test the cores were subsequently tested with dc voltage of 1.2 kV in the same water bath at same temperature for 240hours.	Shall withstand the test satisfactorily as no breakdown or flash over observed.	Each core with stood the test satisfactorily as no breakdown or flash over observed.
<b>g. Flammability test (as per cl. 16.5 of IS: 694 – 1990 &amp; IS: 10810 (part – 53) – 1984.</b>		
<b>i. Period of burning after removal of the flame in seconds</b>	60 (Max)	2
<b>ii. Unaffected portion from the lower edge the top clamp in mm</b>	50 (Min)	360
<b>h. Cold impact test [at (-)5±2°C for 2 hours] (as per table 2 of IS: 5831-1984)&amp;(as per IS: 10810 (Part-20)-1984)</b>	Shall not show cracks or scales	Satisfactory as no visible cracks or scales found on the sample

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**j. Additional ageing test (as per Cl. 16.6 of IS: 694 – 1990)**

Ageing of sample (as per Cl. 16.6.1 of IS: 694 - 1990)

A sample of 6 m length of the finished cable was suspended in a heating chamber at  $80 \pm 2^\circ\text{C}$  for 168 hours. after that the sample was kept in boiling water for a period of 8 hours and in water at  $25^\circ\text{C}$  for 16 hours, the ends of the sample protrude 225mm above the water level. This procedure was repeated for 5 days.

**i. High voltage test at  $60 \pm 3^\circ\text{C}$**

(as per Cl. 16.6.2 of IS: 694 – 1990 & IS: 10810 (Part – 45) – 1984)

After conditioning for additional ageing, a length of 5m sample kept in a water bath at  $60 \pm 3^\circ\text{C}$ . After one hour and an ac voltage of 3kV (rms) at 50Hz for 5 minutes, between each conductor, and to the water.

Shall Withstand.

With stood the test satisfactorily in each case as no breakdown or flash over observed  
Shall Withstand

**ii. Cold impact test [at  $(-5 \pm 2^\circ\text{C})$  for 2 hours]**

(as per table 2 of IS: 5831-1984)&(as per IS: 10810 (Part-20)-1984)

Remaining conditioned sample subjected to this test.

Shall not show cracks or scales

Satisfactory as no visible cracks or scales found on the sample

**Note:**

The average ambient conditions of the laboratory during the above test were as follows

Room temperature, deg C	: $27 \pm 2$
Relative humidity, percent	: 65 to 70%

«««« END OF TEST CERTIFICATE »»»»

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उपभोक्ता मामले, खाद्य एवं लोक वितरण मंत्रालय  
उपभोक्ता मामले विभाग

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Government of India

Ministry of Consumer Affairs, Food & Public Distribution

Department of Consumer Affairs

**NATIONAL TEST HOUSE (SR)**

Taramani, Chennai - 600 113.

Ref :NTH(SR)/EL(c)/2012/217(A)

Dated:27.07.2012

To

m/s Wiremann Industries Pvt. Ltd

74, 3 rd floor, Sri Plaza, A M Lane, Chickpet, Bangalore-560053

Dear Sir,

Sub: Corrections in the test certificate no. NTH(SR)/EL(C)/2012/217(A)- reg

Your observation in the referred test certificate, issued by this lab. is accepted and the new corrected test certificate is enclosed herewith.

This lab. has received the original test certificate no. NTH(SR)/EL(C)/2012/217 (A) dated 17.07.2012

The inconvenience is regretted.

Yours faithfully,

(P.Somu)