

CPRI

TEST REPORT



Central Power Research Institute

(A Govt. of India Society,)

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Bangalore - 560 080(INDIA)



CENTRAL POWER RESEARCH INSTITUTE

TEST REPORT

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Report Number

: DCCD-12934 **Dated** : 18.12.2012

Name & Address of the Customer

: M/s. Wiremann Industries Pvt. Ltd.,
Plot No. 281 to 286, Malur Industrial Area,
3rd Phase, Kasaba Hobli, Malur- 56130, Kolar – Dist, Karnataka.

Name & Address of the Manufacturer

: M/s. Wiremann Industries Pvt. Ltd.,
Plot No. 281 to 286, Malur Industrial Area,
3rd Phase, Kasaba Hobli, Malur- 56130, Kolar – Dist, Karnataka.

Particulars of sample tested

: 1X1.5 sq.mm, 1.1 kV, FR LSH Cable

Condition of the sample on receipt

: New

Type

: FR- LSH Cable , Category C2

Designation

: Conductor Material : Copper (Class 2)
Size : 1.5 Sq.mm

Number of cores : One

Insulation : FR –LSH PVC

Armour : Unarmoured

Outer sheath: Unsheathed

Voltage Rating : 1.1 kV

Embossing : WALNA FR-LSH PVC CABLE 1.5 SQ.MM
1100V IS:694 CML -4427460

Serial Number

: Nil

Number of Samples tested

: One

Date(s) of Test(s)

: 10.12.2012 to 17.12.2012

CPRI Sample Code no(s)

: DCCDCAB12S0199

Particulars of test conducted

: Conductor Resistance Test, Thickness of Insulation,
AC High Voltage test, Insulation Resistance Test at ambient,
Flammability Test, Oxygen Index Test, Oxygen Index Test at
Elevated Temperature, Halogen Acid Gas Generation test,
Smoke Density Test

**Test in accordance with
Standard /Specification**

: As per IS : 694 – 1990 with Am 1, Am2, Am3 Am4 & Am5,
ASTM D-2843 – 1999 RA 2009

Sampling plan

: Not Applicable

Customer's requirement

: Nil

Deviation if any

: Nil

Name of the witnessing persons

Client's representatives

: None.

Other than client's representatives

: None

**Test subcontracted with address
of the laboratory**

: Nil

Documents constituting this report (in words)

Number of sheets

: Eight

Number of oscillogram/s

: Nil

Number of graphs

: Nil

Number of photos

: Nil

Number of test circuit diagrams

: Nil


(Thirumurthy)
Test Engineer




(K.Mallkarjunappa)
Joint Director



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TEST RESULTS

1. CONDUCTOR RESISTANCE TEST :

- a) Specified Value of conductor Resistance in Ω/km at 20°C : 12.1 (Max)
- b) Observed Value of conductor Resistance in Ω/km at 20°C : 11.706
- c) **Conclusion : The specimen meets the requirements of the specification**

2. THICKNESS OF INSULATION :

- a) Specified minimum thickness : 0.53 mm
- b) Observed minimum thickness : 0.686 mm
- c) Specified Average thickness : 0.70 mm
- d) Observed Average thickness : 0.818 mm
- e) **Conclusion : The specimen meets the requirements of the specification**

3. AC HIGH VOLTAGE TEST:

- a) Test connection : High voltage connected to conductor & water bath grounded
- b) Test Voltage : 3 kV ac
- c) Duration of test : Five minutes
- d) Ambient Temperature : 26°C
- e) Length of Sample : 3.5 metres
- f) Result : Withstood
- g) **Conclusion : The specimen meets the requirements of the specification**

4. INSULATION RESISTANCE TEST:

- a) Test Connection : Between conductor and water bath
- b) Ambient Temperature : 26°C
- c) Specified Volume Resistivity in $\Omega\text{-cm}(\text{min})$: 1×10^{13}
- d) Observed Volume Resistivity in $\Omega\text{-cm}$: 1.07×10^{14}
- e) **Conclusion : The specimen meets the requirements of the specification**

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TEST RESULTS

The FR-LSH PVC insulation was moulded in the form of sheets to obtain the desired thickness and the following tests were conducted.

5. OXYGEN INDEX TEST

No. of specimen tested : Five
Type : Self supporting material.
Conditioning : Samples were conditioned at $27 \pm 2^\circ\text{C}$ & $50 \pm 5\%$ R.H for 24 Hours.

Sample Number	Sample Dimensions (in mm)		Period of Burning (in Sec)	Extent of Burning (in mm)	Oxygen Index At 24°C (in %)
	Length 150 mm	Width Thickness			
1.	6.51	3.01	180	≤ 50	35.2
2.	6.52	3.01	180	≤ 50	35.2
3.	6.52	3.02	180	≤ 50	35.2
4.	6.52	3.02	180	≤ 50	35.2
5.	6.52	3.01	180	≤ 50	35.2

Specified Value of Oxygen Index as per IS 694 : 29 % (Min)

Observed Oxygen Index : 35.2 %

Observation : No charring, dripping, severe shrinkage or erratic burning, after glow was observed during the test.

Note: The test results relate only to the behaviour of the test specimens under the conditions of this test method and that these results must not be used to infer the fire hazards of the material in other forms or under other conditions

Conclusion: The Specimen meets the requirement of specification.


(Thirumurthy)
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TEST RESULTS

6. OXYGEN INDEX AT ELEVATED TEMPERATURE: (TEMPERATURE INDEX TEST)

No. of specimen tested : Three
Type : Self supporting material.
Conditioning : Samples were conditioned at 27±2°C & 50±5% R.H for 40 Hours.

Test Results:

Sample Number	Sample Dimensions (in mm)		Temperature In degree C	Oxygen Index value (Avg) in %
	Length 150 mm	Thickness		
1.	6.52	3.01	40	34.3
2.	6.52	3.01	60	33.6
3.	6.51	3.01	80	32.9

Specified Value of Temperature Index as per IS 694 : 250 °C (Min)

Observed Temperature index by extrapolation method : 370 °C

Observation: None of charring, dripping, severe shrinkage or erratic burning, after glow was observed during the test.

Note: The test results relate only to the behaviour of the test specimens under the conditions of this test method and that these results must not be used to infer the fire hazards of the material in other forms or under other conditions

Conclusion: The Specimen meets the requirement of specification.


(Thirumurthy)
TEST ENGINEER



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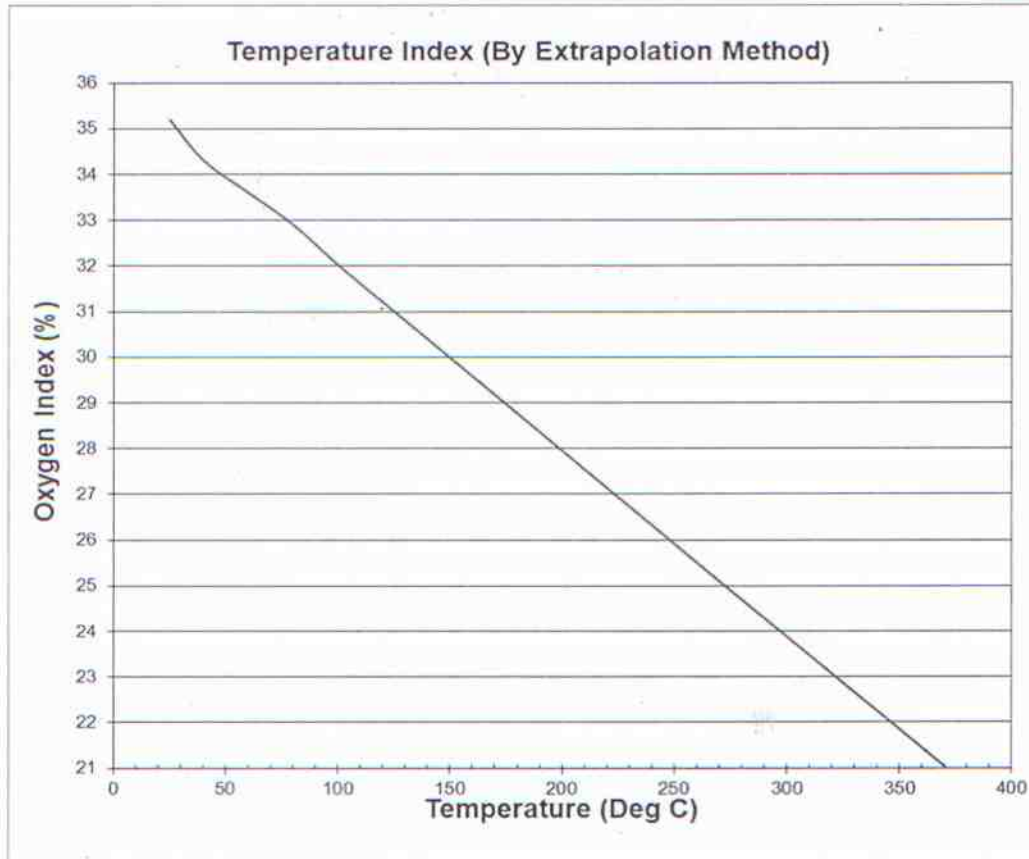
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TEST RESULTS



7. HALOGEN ACID GAS GENERATION TEST :


Temperature during the test : 800 deg.C
Duration of Test after attaining 800 °C : 20 minutes

Results :

Amount of Halogen Acid(Observed) : 19.67 %
Amount of Halogen Acid(Specified) : 20 % (Max)

(Report No.DMDPOL12G 0190 Dated. 14.12.2012 enclosed)

Conclusion: The Specimen meets the requirement of specification.


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TEST RESULTS

8.SMOKE DENSITY TEST:

Reference Specification : As per ASTM-D-2843-1999, RA 2004

No. of specimen tested : Three

Sample Dimensions : Length: 25 mm, Width: 25 mm,

Conditioning : Samples were conditioned for 48 hours at 23±2°C & 50 ± 5% RH

Time in		Absorbance in percent			
Mts.	Secs.	Sample 1 (Thickness 6.0 mm)	Sample 2 (Thickness 6.0mm)	Sample 3 (Thickness 6.0 mm)	Average Absorbance in percent
00	15	0.98	2.22	3.2	2.13
00	30	3.41	5.98	6.24	5.21
00	45	6.34	7.31	8.21	7.29
01	00	11.22	13.78	12.15	12.38
01	15	15.12	16.78	15.97	15.96
01	30	18.54	18.79	18.54	18.62
01	45	23.41	22.74	23.18	23.11
02	00	28.78	29.12	30.48	29.46
02	15	34.15	33.97	35.78	34.63
02	30	40	41.27	42.57	41.28
02	45	42.44	44.44	45.27	44.05
03	00	43.41	46.27	45.27	44.98
03	15	43.41	46.27	46.58	45.42
03	30	44.88	47.05	46.58	46.17
03	45	46.34	47.05	47.11	46.83
04	00	46.34	47.05	47.11	46.83

Maximum smoke density in Percent light Absorption : 46.83 %

Area in percent under the light absorption

Time curve (Smoke density rating) : 26.6 %

Observation of time taken for sample to burst into flame : 15 seconds

Obscurement of 'EXIT' sign : 'EXIT' sign was visible throughout the test

NOTE: This standard should be used to measure & describe the response of the materials, products or assemblies to heat & flame under controlled laboratory conditions & should not be used to describe or appraise the fire hazard or fire risk of materials, products or assemblies under actual fire conditions. However, results of this test may be used as elements of a fire hazards assessment or a fire risk assessment which takes into account all of the factors which are pertinent to an assessment of the fire hazard or fire risk of a particular end use.

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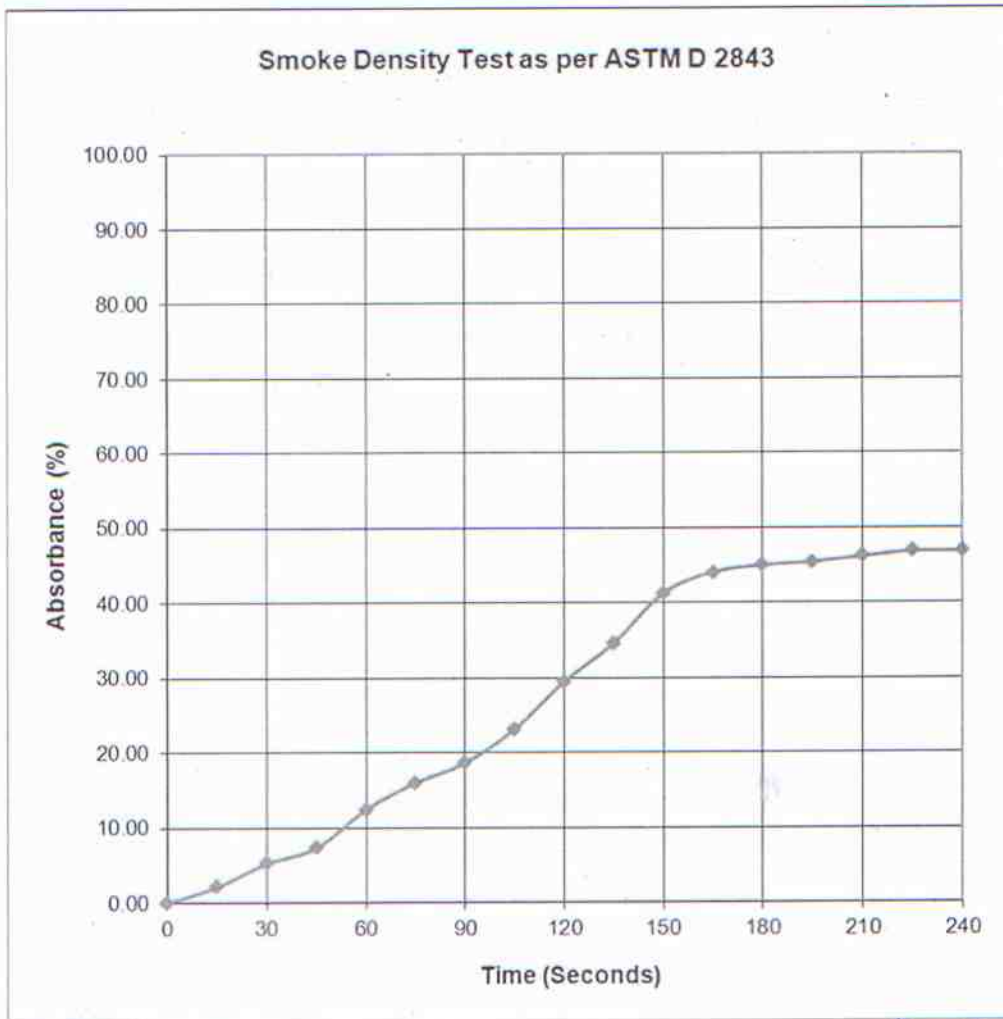
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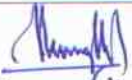
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Date: 18.12.2012

NOTE

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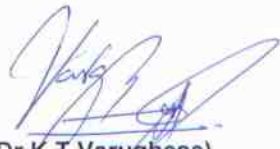
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TEST REPORT

Test Report Number : DMDPOL12G0190.
Dated : 14.12.2012.
Name & Address of the Customer : M/s. Wiremann Industries Pvt Ltd. Plot No. 281 to 286, Malur Industrial Area, 3rd Phase, Kasaba Hobli, Malur-56130.Kolar Dist, Karnataka.
Customer Reference & Date : DCCD(FRLS), dtd. 11.12.2012.
Name & Address of the Manufacturer : M/s. Wiremann Industries Pvt Ltd. Plot No. 281 to 286, Malur Industrial Area, 3rd Phase, Kasaba Hobli, Malur-56130.Kolar Dist, Karnataka.
Particulars of Sample tested : FR-LSH Insulation of 1.5 Sq.mm, 1100 V FR-LSH Cable.
Condition of Sample on Receipt : New
Type : Nil
Designation : FR-LSH Insulation of 1.5 Sq.mm, 1100 V FR-LSH Cable.
Serial No. : Nil
No. of Samples tested : One only.
Sample(s) received on : 11.12.2012.
Date(s) of Test(s) : 11.12.2012.
CPRI Sample Code No. : DCCDCAB12S0199.
Particulars of tests conducted : Halogen Acid Test.
Tests in accordance with standard/Specification : As per IS 694/1990.
Sampling Plan : As per Relevant Standard
Customer's requirement : As per IS 694/1990.
Deviation if any : Nil
Name of the witnessing persons
Customer's Representatives : None
Other than customer's representatives : None
Test Subcontracted with address of the laboratory : None
Documents constituting this report (in words) :
Number of sheets : Three only.
Number of Oscillogram/s : Nil
Number of graphs : Nil
Number of photos : Nil
Number of Test Circuit Diagrams : Nil
Number of Drawings : Nil


(Dr. P. Thomas)
Test Engineer




(Dr. K.T. Varughese)
Joint Director

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TEST REPORT

Test report No. & date : DMDPOL12G0190, Date : 14.12.2012.

Identification of the sample : Received the sample in 1000 ml flask labelled as DCCDCAB12S0199. = DMDPOL12G0190.

Sl. No.	Particulars of the Test	Results	
		mg HCl / gm	% by. Wt.
1.	FR-LSH Insulation of 1.5 Sq.mm, 1100 V FR-LSH Cable.		
	(a) Trial 1	196.73	19.67
	(b) Trial 2	196.75	


(Dr. P. Thomas)
Test Engineer

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NOTE

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Test Engineer

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