

## Test Report

No. 2101590/EC

Date : Jan 26 2010

Page 1 of 8

ARMOUR HONG KONG LTD.  
SUITE 14, 7/F., BLOCK A, HOI LUEN INDUSTRIAL CENTRE,  
55 HOI YUEN ROAD,  
KWUN TONG, KOWLOON  
HONG KONG

The following sample was submitted and identified on behalf of the client as :  
LSOH CABLE

SGS Job No. : 1323391  
Item No. : QE4040 / QX5CV-SC  
Sample Receiving Date : JAN 14 2010  
Testing Period : JAN 14 - 26 2010

### **Test Requested:**

1. To determine the Smoke density of cables of IEC 61034-1:2005 Measurement of smoke density of cables burning under defined conditions –Part 1: Test apparatus and IEC 61034-2:2005 Measurement of smoke density of cables burning under defined conditions –Part 2: Test procedure and requirements.
2. To determine the vertical flame propagation of single cable of IEC 60332-1-2: 2004 Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame
3. To determine the gases evolved pH and conductivity of IEC 60754-2:1991(Amendment 1,1997) Test on gases evolved during combustion of electric cables – Part 2: Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity

**Test Results:** --- See attached sheet ---

Signed for and on behalf of  
SGS Hong Kong Ltd



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Lee Fu Wa, Leo  
Section Manager

**1. Test for smoke density of cables**

**I. Test Conducted**

This test is conducted as per IEC 61034-1:2005 Measurement of smoke density of cables burning under defined conditions –Part 1: Test apparatus and IEC 61034-2:2005 Measurement of smoke density of cables burning under defined conditions –Part 2: Test procedure and requirements.

**II. Sample details**

Materials / Color / Diameter	6 core cable / Green / Ø12mm
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**Conditioning**

Before testing, all test pieces was carefully straightened and then conditioned for at least 16 h at 23 °C ± 5 °C.

**III. Preparation of specimen**

<p><b>Length of specimen pieces:</b> (1.00±0.05)m  <b>Number of specimen:</b> N<sub>1</sub>= 3 pieces</p>
<p>*Formula:        D&gt;40mm,            N=1                          20mm&lt;D≤40mm,        N=2                          10mm&lt;D≤20mm,        N=3                          5mm&lt;D≤10mm,        N<sub>1</sub>=45/D                          1mm&lt;D≤5mm,        N<sub>2</sub>=45/3D</p> <p>D——overall diameter of cable.          N<sub>1</sub>——number of specimen.          N<sub>2</sub>——number of bundles which contain 7 test pieces twisted together with a lay between 20D and 30D and bound with two turns of approximately 0.5 mm diameter wire in the centre and at every 100mm each side from the centre.</p>
<p><b>Details of mounting test sample:</b>  <b>Circular cables:</b> Individual test piece or bundles of test pieces shall be bound together at the ends, and at 300mm from each end, at which place they shall be clamped to the support by means of wire binders.</p>

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**IV. Test results**

The minimum light transmittance (%)	73
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**Recommended performance requirement**

In the absence of any given requirement, it is recommended that a value of 60 % cable light transmittance is adopted as a minimum for any cable tested against this standard.

**Sub-conclusion**

Based on the test results, the test sample would meets above recommended performance requirements.

**Remark:** Evaluation of test results

- I. For cables up to and including 80 mm overall diameter, the recorded minimum light transmittance shall be taken as the cable light transmittance.
- II. For cables above 80 mm overall diameter, the recorded minimum light transmittance shall be normalized by multiplying by a factor of  $D/80$  (where  $D$  is the actual diameter in millimeters of the cable under test) and the resulting value shall be taken as the cable light transmittance.

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**2. Test for vertical flame propagation for a single insulated wire or cable**

**I. Test conducted**

This test was performed in accordance with IEC 60332-1: 2004. Test for vertical flame propagation for a single insulated wire or cable.

**II. Sample details**

Color	Green
Inter Wire Diameter	3.6mm
Overall Diameter	12mm

**Conditioning**

Before testing, all test pieces was conditioned at (23±5) °C for not less than 16h at a relative humidity of (50±20) %.

**III. Test results**

Flame Application: 60±2s

During the test duration, recorded:	
If the filter paper has ignited or not;	NO
If the filter paper has ignited, the time from ignition of the filter paper to cessation of the burning;	NO
If the distance between the lower edge of the top support and the onset of charring is less than 50mm or not;	NO
If charring extends downwards to a point greater than 540 mm from the lower edge of the top support.	NO

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**Recommended performance requirements**

The performance requirements for a particular type or class of insulated conductor or cable should preferably be given in the individual cable standard. In the absence of any given requirement it is recommended that those given below should be taken as a minimum acceptable level.

- 1) The single insulated conductor or cable shall pass the test if the distance between the lower edge of the top support and the onset of charring is greater than 50 mm.
- 2) In addition, a failure shall be recorded if charring extends downwards to a point greater than 540 mm from the lower edge of the top support.

If a failure is recorded, two more tests shall be carried out. If both tests result in passes, the single insulated conductor or cable shall be deemed to have passed the test.

**Sub-conclusion**

Based on the test results, the test sample would meets above recommended performance requirements.

**3. Test for pH and conductivity**

**I. Test Conducted**

This test is conducted as per IEC 60754-2:1991(Amendment 1,1997) Test on gases evolved during combustion of electric cables – Part 2: Determination of degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH and conductivity

**II. Sample details**

Name / Diameter	Cable / Ø12mm
Non-metal materials	Outer Layer of Cable - Green Plastic w/ Black Printing
	Inner Layer of Cable - Red Plastic w/ Black Plastic w/Blue Plastic w/Yellow Plastic w/ Green Plastic
	Wire Insulator - White Plastic
	Small Wire Insulator - Transparent Red Plastic w/ Transparent Blue Plastic w/ Transparent Grey Plastic w/ Transparent Plastic

**Conditioning**

Before testing, all test pieces was conditioned at (23±2) °C for not less than 16h at a relative humidity of (50±5) %.

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**III. Test Results**
**a) Outer layer of cable**

S/N	Specimen mass(m), g	PH	PH		Conductivity, uS/mm	Conductivity	
			$\bar{\sigma}$	Cv		$\bar{\sigma}$	Cv
1	1.0008	5.23	0	0.09%	7.23	0.01	0.11%
2	1.0070	5.22			7.25		
3	1.0050	5.23			7.24		
Average		5.23			7.24		

$\bar{\sigma}$ , means Standard deviation of PH or Conductivity  
 Cv, means Coefficient of variation of PH or Conductivity

**b) Inner Layer of Cable**

S/N	Specimen mass(m), g	PH	PH		Conductivity, uS/mm	Conductivity	
			$\bar{\sigma}$	Cv		$\bar{\sigma}$	Cv
1	1.0010	5.24	0.01	0.18%	7.25	0.01	0.11%
2	1.0012	5.26			7.24		
3	1.0014	5.24			7.23		
Average		5.25			7.24		

**c) Wire Insulator**

S/N	Specimen mass(m), g	PH	PH		Conductivity, uS/mm	Conductivity	
			$\bar{\sigma}$	Cv		$\bar{\sigma}$	Cv
1	1.2000	5.15	0.01	0.24%	7.20	0.01	0.11%
2	1.2300	5.12			7.21		
3	1.2400	5.13			7.22		
Average		5.13			7.21		

**d) Small Wire Insulator**

S/N	Specimen mass(m), g	PH	PH		Conductivity, uS/mm	Conductivity	
			$\bar{\sigma}$	Cv		$\bar{\sigma}$	Cv
1	1.1100	5.12	0.03	0.65%	7.14	0.01	0.11%
2	1.1020	5.05			7.15		
3	1.1000	5.05			7.16		
Average		5.07			7.15		

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e) Weighted value calculation

Non-metal materials	PH	PH'	C	C'
Outer layer	5.23	5.22	7.24	7.24
Inner Layer	5.25		7.24	
Wire insulator	5.13		7.21	
Small Wire Insulator	5.07		7.15	

Equation, weighted value of PH,

$$PH' = \lg \frac{\sum W_i}{\sum (W_i / 10^x)}$$
 among them,

$x$  is PH value of each non-metal materials

Equation, Conductivity:

$$C' = \frac{\sum C_i W_i}{\sum W_i}$$
 among them,

$C_i$  is conductivity of each non-metal materials;

$W_i$  is weight per unit length of cable, approximately measured upon balance method;

**Recommended values**

1. The weighted PH value should not be less than 4.3, when related to 1 litre of water;
2. The weighted value of conductivity should not exceed 10uS/mm

**Sub-conclusion**

Based on the test results, the test sample would meets above recommended performance requirements.

**STATEMENT:**

The test results relate to the behaviour of the test specimens of a product under the particular conditions of the test; they are not intended to be the sole criterion for assessing the potential fire hazard of the product in use.

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**Remark: Test results were obtained by SGS affiliated laboratory.**

**Photo Appendix:**



\*\*\*End of Report\*\*\*

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