



L C I E

TEST REPORT

N° 92634-584827Cr2009/07/20

English version – Original in French

ISSUE TO : **TTK S.A.S.**
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SUBJECT : MEASUREMENT OF DENSITY AND DEGREE OF ACIDITY OF SMOKE (pH
and conductivity)

Material tested : 2 cables : FG-EC LSZH and FG-ECS LSZH
2 materials : PolyOne-ECCOH 1092 and Pre-Mix-Pre-Elec PP 1394

**Specification
applied** : IEC 61034-2 (2005) and IEC 60754-2 (1991) + Amendment 1 (1997)

Test date : June 2009

This document includes : 7 pages.

Fontenay-aux-Roses, the 20 July 2009
The technical manager

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Original in French signed on 20th July 2009 by
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1. – MATERIALS TESTED

Two cables and two materials in the form of pellets were delivered to the LCIE on the 25th May 2009 for tests.

The following marks were noticed on cables:

FG-EC LSZH et FG-ECS LSZH

The following references were noticed on the packaging of materials:

PolyOne –ECCOH 1092 et Pre-Mix –Pre-Elec PP 1394

2. TEST PROGRAM AND PROCESS

The test program has been established according to the requirements of the customer. It comprises the following tests:

- Measurement of smoke density according to the requirements of the Publication IEC 61034-2.
- Determination of degree of acidity of gases evolved during combustion of materials by measuring pH and conductivity, according to the requirements of the Publication IEC 60754-2.

3. – RESULTS

3.1 MEASUREMENT OF SMOKE DENSITY :

Cable tested : FG-ECS LSZH

Overall diameter of the cable : 7.1 mm

Number of test pieces : 6

Number of wire binder : 4

The following results have been obtained:

In the absence of any given requirement, it is recommended that a value of 60 % cable light transmittance is adopted as a minimum

CABLE TESTED	MINIMUM VALUE OF TRANSMITTANCE (%)
FG-ECS LSZH	79

Conclusion : Satisfactory result

Cable tested : FG-EC LSZH

Overall diameter of the cable : 7.5 mm

Number of test pieces : 6

Number of wire binder : 4

The following results have been obtained:

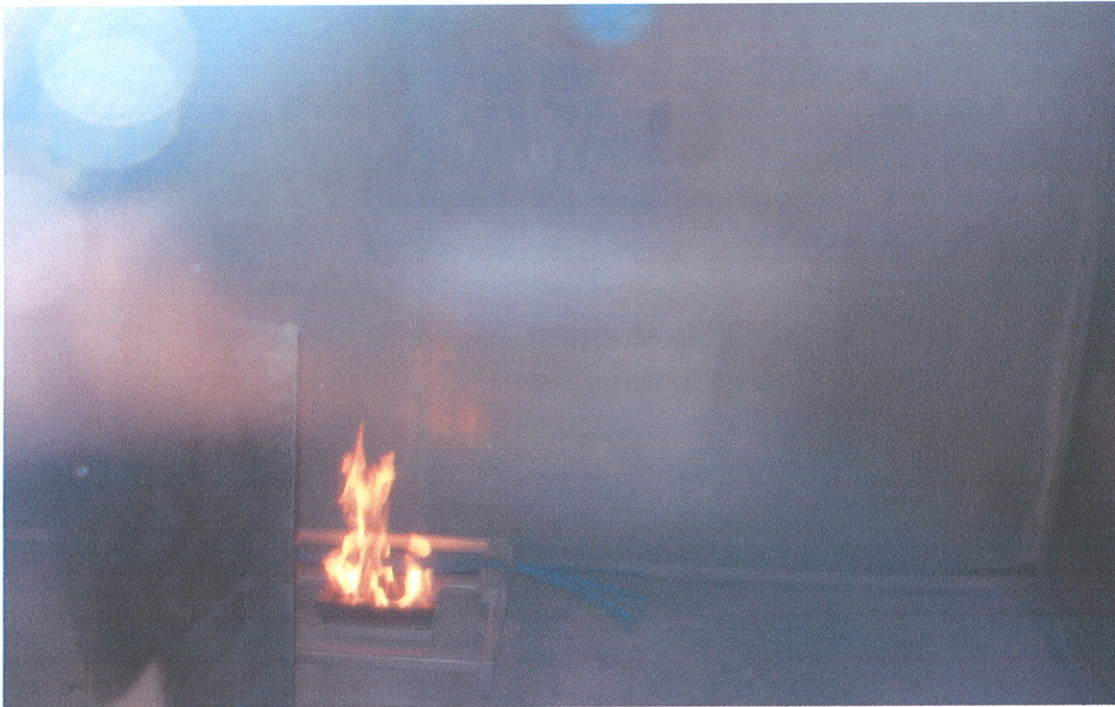
In the absence of any given requirement, it is recommended that a value of 60 % cable light transmittance is adopted as a minimum

CABLE TESTED	MINIMUM VALUE OF TRANSMITTANCE (%)
FG-EC LSZH	94

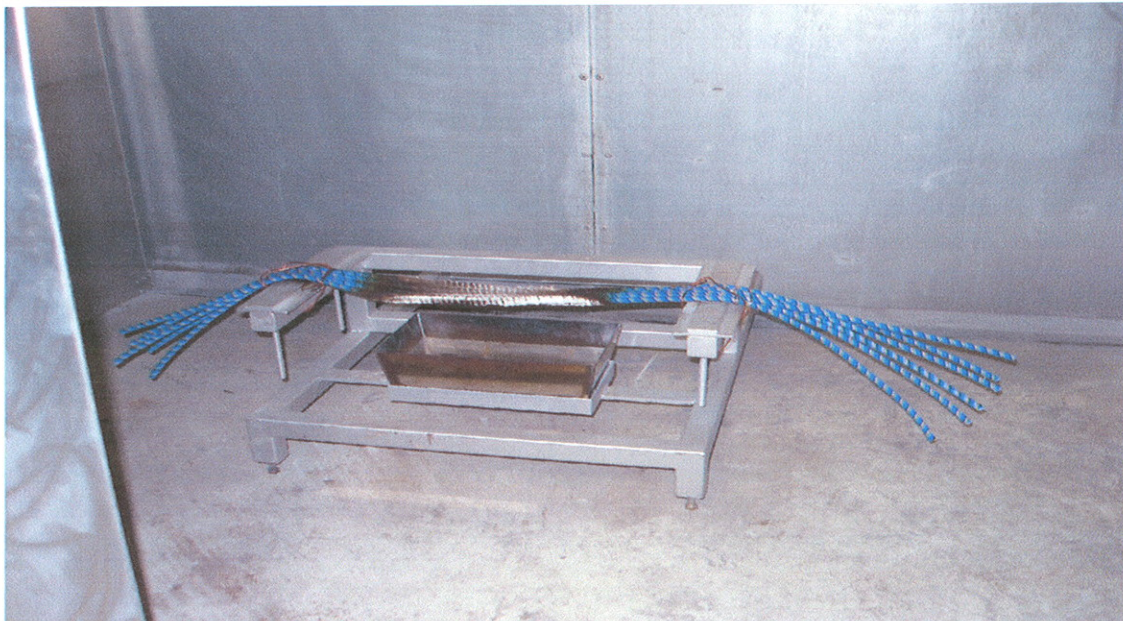
Conclusion : Satisfactory result



details of the test apparatus for the measurement of smoke density, before the test.



smoke density, during the test (FG-ECS LSZH)



smoke density, after the test (FG-ECS LSZH)

**3.2 MEASUREMENT OF DEGREE OF ACIDITY OF GASES**

Recommended values

Determination	Publication	Requirements of the Publication
pH	CEI 60754-2	≥ 4.3
Conductivity ($\mu\text{S}/\text{mm}$)	CEI 60754-2	≤ 10

- White pellets PVC PolyOne –ECCOH 1092

Trade mark of the product : ECCOH 1092
Marking noticed on the product : Nil
Nature of the component : White pellets PVC
Use : Not specified
Manufacturing process : Not specified

Tests conditions : Test temperature : 900°C
Mass of sample : 1.0 g
Flow rate of air : 25 L.h⁻¹
Mode : aspiration
Duration: 30 minutes

The following results have been obtained:

Requirements		Test n°1	Test n°2	Conformity
pH	≥ 4.3	7.4	7.5	YES
Conductivity	$\leq 10 \mu\text{S}/\text{mm}$	0.85	0.99	YES

Conclusion : Satisfactory results

**- Black pellets PVC PRE- MIX- PRE- ELEC 1394**

Trade mark of the product : PRE-MIX-PRE-ELEC PP 1394
Marking noticed on the product : Nil
Nature of the component : Black pellets PVC
Use : Not specified
Manufacturing process : Not specified

Tests conditions : Test temperature : 900°C
Mass of sample : 1.0 g
Flow rate of air : 25 L.h⁻¹
Mode: aspiration
Duration: 30 minutes

The following results have been obtained:

Requirements		Test n°1	Test n°2	Conformity
pH	≥ 4.3	5.0	5.0	YES
Conductivity	≤ 10 μS/mm	0.19	0.39	YES

Conclusion : Satisfactory results



ANNEX N°1

MAXIMUM UNCERTAINTIES CHART

This chart shows the maximum uncertainty values according to test that may be related in this document

Test	Measurement uncertainty (k = 2)
Voltage measurement	± 2.1 %
Current measurement	± 2.1 %
Leakage current measurement	± 2 %
Insulation resistance measurement	± 6 %
Tangent Delta measurement	± 6 %
Resistance per unit length measurement	± 1.5 %
Dimensional measurement performed with a rule	± 0.7 mm
Dimensional measurement performed with a calliper rule	± 0.13 mm
Dimensional and angle measurements performed with profile projector	± 7 µm ± 0,07°
Diameter measurement performed with metallic tape	± 0.2 mm
Determination of mechanical properties in tensile and compression tests – applied force	± 4 %
Time or time interval • Range from 1s to 9 min • Range > 9 min	± 0.3 s ± 0.1 %
Mass measurement (weight) • 0 g to 5 kg (0 N to 49.05 N)	± 0.2 %
Temperature measurement - with thermocouples – (conditioning, ambient temperature measurement, temperature measurement directly on devices)	± 2.8 °C
Temperature rise measurement performed with thermocouples (difference between two temperatures in K)	± 4 K
Humidity measurement (hygroscopic treatment, conditioning) • 50 % RH to 90 % RH • > 90 % RH	± 3 % RH ± 4 % RH
Hot set test – performed with a rule	± 1.8 mm
Elongation test at low temperature - performed with a rule	± 2 mm
Ball-pressure test – impression measurement	- 0 mm + 0.25 mm
Needle flame or flame test – flame height	± 1.8 mm
Loss of mass test – mass measurement	± 0.2 %
Mechanical tests on connectors	± 2.5 %
Force measurement (dynamometer) for mechanical strength, pull and gauge ingress tests	± 2.5 %
Resistance per unit length measurement – Electrical ageing test and overcurrent test	± 1.5 %
Smoke emission	± 1.5 %
Partial discharges measurement	± 15 % ou ± 1.5 pC
Impulse withstand voltage 1.2/50 (voltage amplitude)	± 4 %
Lightning impulse-voltage test Impulse amplitude Rising and falling time Impulse tail duration	± 2 % ± 7 % ± 5 %

k = coverage factor

CABLES_E_V4