

TEST REPORT

N° 41737010BC1

English version – Original in french

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FRANCE

SUBJECT : - **TESTS PERFORMED** : Surface resistivity.
Determination of sparks generated by friction

- **REFERENCE DOCUMENTS** : IEC 60093 Standard dated 1980
IEC 1087 Technical Report dated 1991

- **TEST SUBJECTS** : Four transparent PVC referenced: Antistatic
clear ref 180

Test date : 26 June 2002

This document is composed of 3 pages + 1 annex

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Fontenay-aux-Roses, le 23/07/02.
Technical manager,

P.O.



ROGER LE BIHAN

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■ **LABORATOIRE CENTRAL DES INDUSTRIES ELECTRIQUES**

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1. - TEST SAMPLES

Transparent PVC

Reference : Antistatic clear ref 180

Test samples :

Dimensions : 300 mm x 200 mm
Thickness : 1.9 mm (measured)
Number : 4

2. - TEST PERFORMED

Electrostatic characterization by means of the following measurements :

- Surface resistivity according to IEC 60093 standard dated 1980 "Method for determination of transversal and surface resistivity of solid electric insulating materials".
- Charge acceptance according to IEC 1087 Technical Report dated September 1991 " Evaluation guide for sparks issued from charged surface".

3. - INSTRUMENTS NEEDED

Surface resistance measurements :

- High voltage power supply
- Keithley 617 Electrometer used as a pico-ammeter
- Fluke 25 Multimeter
- Resistivity calculation: $\rho_s = (2\pi / (\ln(D2 / D1))) * R_s$

Sparks energy measurements :

- Mobile electrode moving at 5cm/s
- Keithley 617 Electrometer
- Drawing table.

4. - RESULTS

The measurements were performed after the samples stayed for 48 hours or more in an air conditioned room where temperature and relative humidity levels were $23\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$ and $25\text{ \% RH} \pm 2\text{ \% RH}$ respectively. Tests were performed in the same conditions.

4.1. Resistivity

Surface resistivity

Tests conditions :

- Electrodes : 30 mm circular electrode with a 3 mm wide and 57 mm internal diameter annular ring and a conducting guard plate under the sample.
- Power supply : 500 V
- Time before measurements : 1 minute
- Atmospheric conditions : 23°C, 25%HR

Reference	Test power supply (V)	Surface resistivity (Ω/\square)	
		Individual values	Mean value
Antistatic clear ref 180	500	1.75 10^{12}	2.03 10^{12}
		2.68 10^{12}	
		1.64 10^{12}	

4.2. Charge acceptance

Tests conditions :

The samples were placed on a metallic surface connected to ground.

The operator connected to ground applied a strong friction to the sample surface by means of cotton, polyamide or acrylic material. Immediately after friction a spherical electrode connected to a known capacitance was neared to the surface.

The voltage at the capacitor terminals was measured. If sparks were present while the electrode was approaching the surface, the charge quantity transferred in the spark was determined, in nano-coulombs (nC) as well as the spark length, in millimeters. The spark energy was calculated, in micro-joules, from these values.

Reference	Friction stick	Result
Antistatic clear ref 180	Cotton	No spark transferred
	Polyamide	No spark transferred
	Acrylic	No spark transferred

5. COMMENTS RELATIVE TO USE IN EXPLOSIVE ATMOSPHERE

For the tested samples, no spark was observed, whatever the friction stick . This material includes no risk related to static electricity, provided that all components are connected to earth

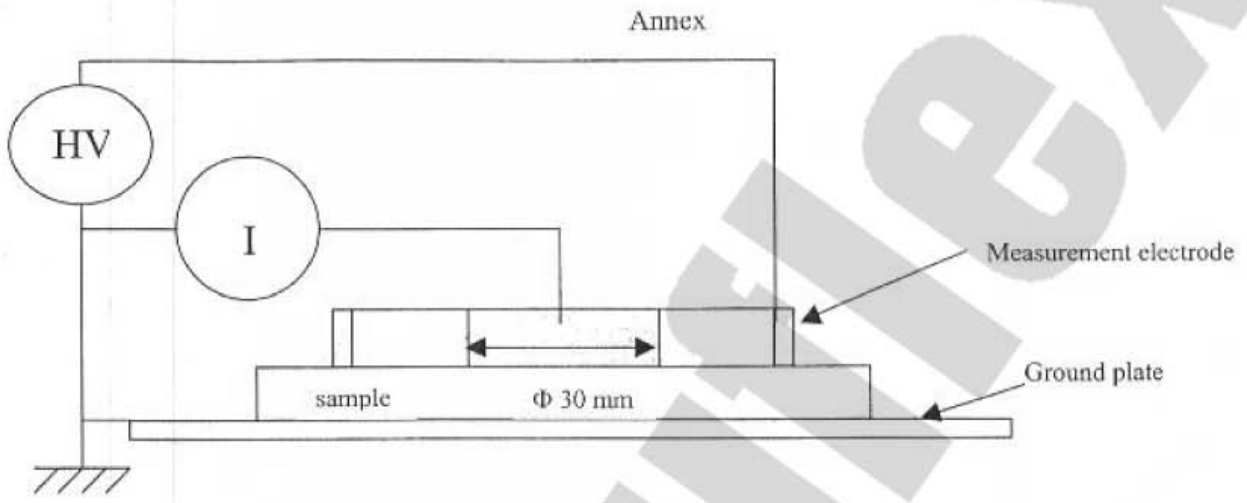


Fig 1 : Surface resistance measurement