

# APPROVAL

## FOR ESD PROTECTIVE PRODUCTS ACCORDING TO IEC 61340

### Validity of the approval

Until 2019-12-19.

### Holder of the approval

Fristads Kansas Sverige AB, Borås, Sweden

### Category of product

Protective clothing

### Products

Manufacturer/ supplier	Type designation	Description
Fristads Kansas Sverige AB	125037	Sweatshirts made of cotton (48 %), polyester (48 %) and conductive fibres (4 %).

Washed 45 times in 60 °C.

### Documentation for approval

Test report 6F022844.

The ESD-approval does not include any requirements regarding electrical safety properties. If work will be performed close to live voltages, requirements according to national regulations shall be obeyed.

### Conditions for approval

General conditions, according to SP-Method 2472, for approval and registration of approved products with regard to ESD-protection qualities.

### SP Technical Research Institute of Sweden Electronics – Product Safety



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## Test of sweatshirts regarding ESD-protective properties (1 appendix)

### Test objects

Sweatshirt, art. No. 125037.



art. No. 125037

### SP Technical Research Institute of Sweden Electronics - Product Safety

Performed by



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## Summary

The sweatshirts fulfilled the requirements according to IEC 61340-5-1, edition 1.0, 2007.

### 1 Commission

Tests for ESD-approval according to IEC 61340.

### 2 Client

Fristads Kansas Sverige AB, Borås, Sweden

### 3 Test objects

Sweatshirts manufactured by Fristads Kansas Sverige AB.  
Art. No. 125037.

The garments were made of cotton (48 %), polyester (48 %), and conductive fibres (4 %).

Three garments arrived at SP 2016-12-01.

### 4 Performance and result

Measurements were performed according to ANSI/ESD STM 2.1 and NT ELEC 037, 2006 (SP-method 2472, issue 6 with appendix 12, issue 3).

Before the tests all garments were washed 45 times in 60 °C and conditioned during more than 72 h in 23 ±2 °C and 12 ±3 % RH.

The measurements were performed in the same atmosphere.

Testing was carried out by Sven Byheden 2016-12-16.

The test results apply to the tested items only.

#### 4.1 Point to point resistance (ANSI/ESD STM 2.1)

Two conductive electrodes (2.5 kg; Ø 63.5 mm) were placed on different panels of the test objects.

The electrode assembly was energized at 100 VDC and the resistance values were recorded after 15 s ± 2 s.

The measurement was repeated between all panels of the garments.  
All garments were tested.

Result: All measured values were in the range  $2.1 \times 10^6 \Omega$  to  $4.5 \times 10^6 \Omega$ .

The requirement was fulfilled. All resistance values were less than  $10^9 \Omega$ .

#### **4.2 Discharge time measurement, worn garment (NT ELEC 037)**

The test person wore the garments with regular clothes underneath and was grounded with a wrist strap. A capacitor (1000 pF) was charged to 550 V and was discharged to a clip connected to the garments. The test was repeated with the clip connected to different parts of the garments.

Discharge time from 500 V to 100 V was measured.

Result: Maximum measured value was 1.01 sec.

The requirement was fulfilled. All discharge times were less than 20 s.

#### **4.3 Electrostatic potentials (IEC 61340)**

Tests according to SP-method 2472, issue 6, section 7.3.

Electrostatic potentials were additionally measured in close vicinity of parts having a resistance to ground higher than  $10^9 \Omega$ . The potentials were measured 2 s after a slight touch with the hand or cloth of the tested part. The measurements were performed at a distance of 20 mm with a metal plate ( $\varnothing$  15 mm, 2 pF).

Instrument SP inv. No. 501781 ( instrument uncertainty less than  $\pm 1\%$ ).

Result: Maximum measured electrostatic potential was 35 V.

The requirement was fulfilled. All measured electrostatic potentials were less than 100 V.

#### **4.4 Marking**

The garments were marked with manufacturers name, type designation and ESD-symbol.

Requirements were fulfilled.

### **Appendix**

Appendix 1: Photographs