

APPROVAL

FOR ESD PROTECTIVE PRODUCTS ACCORDING TO IEC 61340-5-1

Validity of the approval

Until 2024-10-04.

Holder of the approval

Fristads AB, Borås, Sweden

Category of product

Protective clothing

Products

| Manufacturer/ supplier | Type designation | Description |
|------------------------|------------------|---|
| Fristads AB | 120955 | Coat made of polyester (67 %), cotton (31 %) and conductive fibres (2 %). |
| Fristads AB | 120954 | Trousers made of polyester (67 %), cotton (31 %) and conductive fibres (2 %). |

Washed 45 times in 60 °C.

Documentation for approval

Test report O175022.

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.

RISE Research Institutes of Sweden AB Electrification and Reliability - Product Safety



Henrik Hylving

Signed by: Henrik Hylving
Reason: I have reviewed this document
Date & Time: 2021-10-04 21:07:46 +02:00



Sven Byheden

Signed by: Sven Byheden
Reason: I am the author of this document
Date & Time: 2021-10-04 18:19:35 +02:00

RISE Research Institutes of Sweden AB

Postal address
Box 857
SE-501 15 BORÅS
Sweden

Office location
Brinellgatan 4
SE-504 62 BORÅS

Phone / Fax / E-mail
+46 10 516 50 00
+46 33 13 55 02
info@ri.se

This document may not be reproduced other than in full, except with the prior written approval of RISE.

Contact person
Sven Byheden
Safety and Transport
+46 10 516 56 83
sven.byheden@ri.se

Date
2021-09-04

Reference
O175022

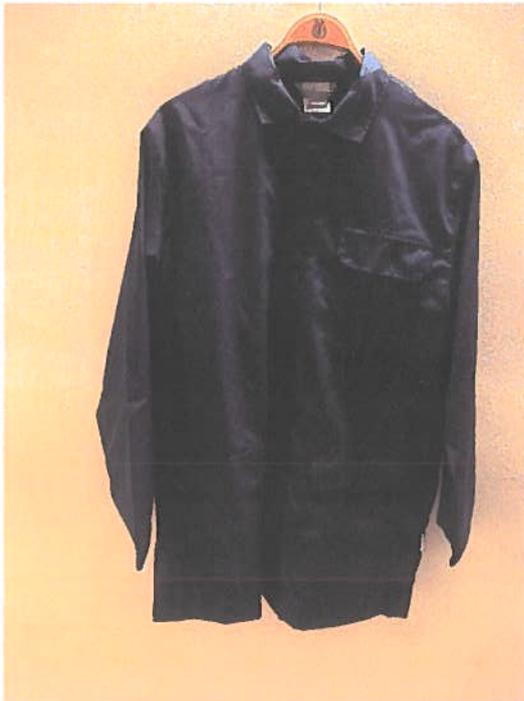
Page
1 (4)

Fristads AB
Anna Hacker
Box 1102
501 11 BORÅS

Test of garments regarding electrostatic protective properties (1 appendix)

Test objects

Garments manufactured by Fristads AB.



Model 120955

RISE Research Institutes of Sweden AB Electrification and Reliability - Product Safety

Performed by



Sven Byheden

Signed by: Sven Byheden
Reason: I am the author of this document
Date & Time: 2021-10-04 18:19:04 +02:00

Examined by



Henrik Hylving

Signed by: Henrik Hylving
Reason: I have reviewed this document
Date & Time: 2021-10-04 21:08:19 +02:00

RISE Research Institutes of Sweden AB

Postal address
Box 857
SE-501 15 BORÅS
Sweden

Office location
Brinellgatan 4
SE-504 62 BORÅS

Phone / Fax / E-mail
+46 10 516 50 00
+46 33 13 55 02
info@ri.se

This document may not be reproduced other than in full,
except with the prior written approval of RISE.

Summary

Both model 120955 and model 120954 fulfilled the requirements according to IEC 61340-5-1: 2016.

1 Commission

Tests according to IEC 61340-5-1: 2016 and IEC 61340-4-9:2016.

2 Client

Fristads AB, Borås, Sweden

3 Test objects

Garments manufactured by Fristads AB.

Coat with art. No. 120955.

Trousers with art. No. 120954.

The garments were made of polyester (67 %) cotton (31 %), and carbon fibres (2 %).

Three garments of each type arrived at RISE 2021-09-14.

4 Performance and result

Measurements were performed according to IEC 61340-5-1:2016 and IEC 61340-4-9:2016 (SP-method 2472, issue 10 with appendix 12, issue 5).

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 2021-09-29--30.

The test results apply to the tested items only.

4.1 Point to point resistance

Two conductive electrodes (2.5 kg; Ø 65 mm) were placed on different panels of the test objects.

The electrode assembly was energized at maximum 100 V d.c. and the resistance values were recorded after 15 ± 2 s.

The measurement was repeated between all panels of the garments.

All garments were tested.

Instrument: RISE inv. No. 502589

Result

| Tested garment | Panels tested | Point-to-point resistance [Ω] | | |
|----------------|---------------------------|--|-------------------|-------------------|
| | | #1 | #2 | #3 |
| 120955 | Back 1 to left arm 1 | 9.2×10^5 | 4.1×10^5 | 3.8×10^6 |
| | Back 1 to left arm 2 | 6.1×10^5 | 7.3×10^6 | 1.9×10^6 |
| | Back 1 to left cuff | 1.3×10^6 | 1.3×10^6 | 4.4×10^6 |
| | Back 1 to right arm 1 | 3.7×10^6 | 2.4×10^6 | 4.1×10^6 |
| | Back 1 to right arm 2 | 9.8×10^6 | 3.2×10^6 | 4.1×10^6 |
| | Back 1 to right cuff | 9.2×10^6 | 3.3×10^6 | 4.5×10^6 |
| | Back 1 to back 2 | 1.5×10^6 | 8.9×10^5 | 4.2×10^6 |
| | Back 1 to front 1 | 7.6×10^5 | 6.7×10^5 | 1.1×10^6 |
| | Back 1 to front 2 | 9.4×10^6 | 2.0×10^6 | 3.2×10^6 |
| | Back 1 to collar | 7.3×10^5 | 4.4×10^5 | 2.6×10^6 |
| 120954 | Left leg 1 to left leg 2 | 4.3×10^5 | 2.0×10^5 | 2.4×10^5 |
| | Left leg 1 to right leg 1 | 1.3×10^6 | 6.0×10^5 | 1.2×10^6 |
| | Left leg 1 to right leg 2 | 1.1×10^6 | 5.6×10^5 | 9.8×10^5 |

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

4.2 Cuff-to-cuff resistance

| Tested garment | Panels tested | Point-to-point resistance [Ω] | | |
|----------------|------------------------------------|--|-------------------|-------------------|
| | | #1 | #2 | #3 |
| 125037 | Cuff 1 (inside) to Cuff 2 (inside) | 8.2×10^6 | 9.2×10^6 | 8.6×10^6 |

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

4.3 Electrostatic potentials

Tests according to SP-method 2472, issue 7, section 7.3.

Electrostatic potentials were additionally measured in close vicinity of parts having a resistance to ground higher than $10^9 \Omega$. The test person wore the garments with regular clothes underneath and was grounded with a wrist strap. 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 thin metal plate (\varnothing 15 mm, 2 pF). All garments were tested. Instrument RISE inv. No. 502920 (instrument uncertainty less than $\pm 1\%$).

Result, 120955: Maximum measured electrostatic potential was 37 V.

Result, 120954: Maximum measured electrostatic potential was 51 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

Appendix 1



Appendix 1

