Test report | Electrostatic properties

1. Introduction

Filcoflex B.V. manufactures flexible connections for the food industry. In many applications, the flexible connection must comply to certain propeties regarding electrostatic energy.

Inburex Consulting GmbH was commissioned to develop and conduct a suitable test procedure for the evaluation of various flexible materials named in chapter 2, hereinafter collectively referred to as the "materials", to test the electrostatic properties of said materials.

Werner van Loon, Managing Director of Filcoflex B.V., attended the tests and recorded visual documentation of the test programme.

2. Tested materials

For therse products the following materials were used and tested:

- PU-UF1 (Ether based Poly Urethane 1mm)
- PU-UF3 (Ether based Poly Urethane 3mm)

3. Safety characteristics

Safety characteristics of PU-UF1, Poly Urethane (1.0mm)

Test number	Test methode	Test result
TL11590OW01	Surface resistance	5×10^{12} Ω
TL11590DW01	Volume resistance	3×10^{11} Ωm
TL11590PBD01	Possible generation of propagation bush discharges	No propogating bush discharges could be determined with respect to the described test procedure

Safety characteristics of PU-UF3, Poly Urethane (1.0mm)

Test number	Test methode	Test result
TL11590OW02	Surface resistance	2×10^{12} Ω
TL11590DW02	Volume resistance	2×10^{11} Ωm
TL11590PBD02	Possible generation of propagation bush discharges	No propogating bush discharges could be determined with respect to the described test procedure

Test results are obtained exclusively with the substance provided for the purpose of investigation and are based on the sample state at the time of the analysis. Further conclusions and evaluations based on these findings are exclusively in the customer's sphere of responsibility. It is only permitted to pass the complete test report without written consent of the test laboratory, but not in part.

4. Test results

Test TL11590OW01 (PU-UF1)
This test concludes the determination of the Surface resistance and Surface resistivity according to IEC 60093/EN 1149

Test report no.	TL/11590/17_OW01
Sample	PU-UF1 Poly Urethane (1mm)
Sample no.	11590/1
Test no.	TL11590OW01

As measuring tool a Teraohm-Meter from the company ELTEX has been used. The surface resistance is the electrical resistance between two electrodes contacting the same surface of a material or object. It is depending on the geometry of the electrode arrangement and is commonly expressed in ohms. The surface resistivity is the resistance across opposite sides of a surface of unit length and width and is commonly expressed also in [Ω] or in [Ω m]. With regard to the TRBS 2153 respectively IEC 60079-32-1 materials or objects can be classified according to their surface resistance at test conditions of 23 °C and 30 % relative humidity as conductive (<10^4 Ω), electrostatically dissipative (10^4 Ω up to 10^{11} Ω) or non-conductive (>10^{11} Ω).

The room in which the test was performed was 23°C, the relative himidity was 30%rF.

Test run	Surface resistance (Ω)
Run 1	5.0×10^{12}
Run 2	3.2×10^{12}
Run 3	5.5×10^{12}
Run 4	5.5×10^{12}
Run 5	4.0×10^{12}

With these test results the sample can be classified as non conductive, as the median value is 5×10^{12} Ω at a measuring voltage of 100V.

Test TL11590DW01 (PU-UF1)
This test concludes the determination of the Volume resistance and Volume resistivity according to IEC 60093/EN 1149

Test report no.	TL/11590/17_DW01
Sample	PU-UF1 Poly Urethane (1mm)
Sample no.	11590/1
Test no.	TL11590DW01

As measuring tool a Teraohm-Meter from the company ELTEX has been used. The volume resistivity is the electrical resistance between two electrodes contacting the top and bottom side of a material or object. It is depending on the geometry of the electrode arrangement and is commonly expressed in ohms. Materials or objects can be classified according to their volume resistivity at test conditions of 23 °C and 50 % relative humidity as conductive (<10^4 Ω m), electrostatically dissipative (10^4 Ω m up to 10^9 Ω m) or non conductive (>10^9 Ω m).

The room in which the test was performed was 23°C, the relative himidity was 30%rF.

Test run	Volume resistance (Ω)	Factor (m)	Volume resistivity (Ωm)
Run 1	4.4×10^{10}	2.86	1.3×10^{11}
Run 2	1.0×10^{11}	2.86	2.9×10^{11}
Run 3	1.0×10^{11}	2.86	2.9×10^{11}
Run 4	5.0×10^{11}	2.86	1.4×10^{11}
Run 5	1.0×10^{11}	2.86	2.9×10^{11}

With these test results the sample can be classified as non conductive, as the median value is 3×10^{11} Ωm.

Test TL11590PBD01 (PU-UF1)

This test concludes the determination of the possible generation of propagation brush charges

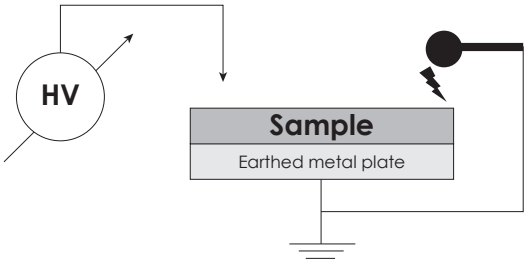
Test report no.	TL/11590/17_PBW01
Sample	PU-UF1 Poly Urethane (1mm)
Sample no.	11590/1
Test no.	TL11590PBD01

The sample is located on an earthed metal plate.

It was charged by means of a high voltage source (electrostatic gun, U = 70 kV) for about 120 sec.

Then it was tried to initiate a propagating brush discharge by decreasing the distance between an earthed metal sphere and the charged sample.

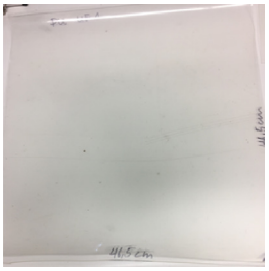
Principle of the test method



The room in which the test was performed was 23°C, the relative himidity was 30%rF.

Test run	Determination of a propagating brush discharge
Run 1 (200×200mm)	No propagating brush discharges could be determined with respect to the described test procedure.
Run 2 (465×465mm)	No propagating brush discharges could be determined with respect to the described test procedure.

Photo of the test sample



Test TL11590OW02 (PU-UF3)
This test concludes the determination of the Surface resistance and Surface resistivity according to IEC 60093/EN 1149

Test report no.	TL/11590/17_OW02
Sample	PU-UF3 Poly Urethane (1mm)
Sample no.	11590/2
Test no.	TL11590OW02

As measuring tool a Teraohm-Meter from the company ELTEX has been used. The surface resistance is the electrical resistance between two electrodes contacting the same surface of a material or object. It is depending on the geometry of the electrode arrangement and is commonly expressed in ohms. The surface resistivity is the resistance across opposite sides of a surface of unit length and width and is commonly expressed also in [Ω] or in [Ω m]. With regard to the TRBS 2153 respectively IEC 60079-32-1 materials or objects can be classified according to their surface resistance at test conditions of 23 °C and 30 % relative humidity as conductive (<10^4 Ω), electrostatically dissipative (10^4 Ω up to 10^{11} Ω) or non-conductive (>10^{11} Ω).

The room in which the test was performed was 23°C, the relative himidity was 30%rF.

Test run	Surface resistance (Ω)
Run 1	3.5×10^{12}
Run 2	1.9×10^{12}
Run 3	2.2×10^{12}
Run 4	1.9×10^{12}
Run 5	2.2×10^{12}

With these test results the sample can be classified as non conductive, as the median value is 2×10^{12} Ω at a measuring voltage of 100V.

Test TL11590DW02 (PU-UF3)
This test concludes the determination of the Volume resistance and Volume resistivity according to IEC 60093/EN 1149

Test report no.	TL/11590/17_DW02
Sample	PU-UF3 Poly Urethane (1mm)
Sample no.	11590/2
Test no.	TL11590DW02

As measuring tool a Teraohm-Meter from the company ELTEX has been used. The volume resistivity is the electrical resistance between two electrodes contacting the top and bottom side of a material or object. It is depending on the geometry of the electrode arrangement and is commonly expressed in ohms. Materials or objects can be classified according to their volume resistivity at test conditions of 23 °C and 50 % relative humidity as conductive (<10^4 Ω m), electrostatically dissipative (10^4 Ω m up to 10^9 Ω m) or non conductive (>10^9 Ω m).

The room in which the test was performed was 23°C, the relative himidity was 30%rF.

Test run	Volume resistance (Ω)	Factor (m)	Volume resistivity (Ωm)
Run 1	1.2×10^{11}	2.86	3.4×10^{11}
Run 2	7.8×10^{10}	2.86	2.2×10^{11}
Run 3	6.2×10^{10}	2.86	1.8×10^{11}
Run 4	6.0×10^{10}	2.86	1.7×10^{11}
Run 5	8.5×10^{10}	2.86	2.4×10^{11}

With these test results the sample can be classified as non conductive, as the median value is 2×10^{11} Ωm.

Test TL11590PBD02 (PU-UF3)
This test concludes the determination of the possible generation of propagation brush charges

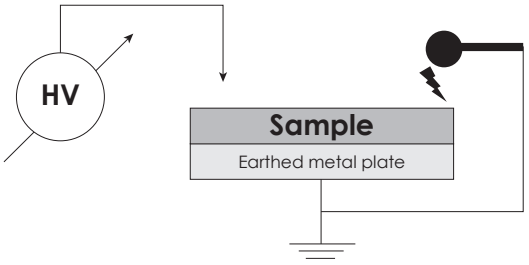
Test report no.	TL/11590/17_PBW02
Sample	PU-UF3 Poly Urethane (1mm)
Sample no.	11590/2
Test no.	TL11590PBD02

The sample is located on an earthed metal plate.

It was charged by means of a high voltage source (electrostatic gun, U = 70 kV) for about 120 sec.

Then it was tried to initiate a propagating brush discharge by decreasing the distance between an earthed metal sphere and the charged sample.

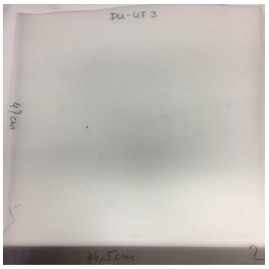
Principle of the test method



The room in which the test was performed was 23°C, the relative himidity was 30%rF.

Test run	Determination of a propagating brush discharge
Run 1 (200×200mm)	No propagating brush discharges could be determined with respect to the described test procedure.
Run 2 (465×465mm)	No propagating brush discharges could be determined with respect to the described test procedure.

Photo of the test sample



5. Summary

In summary, based on the tests, it can be stated that the materials are non conductive for the Surface resistance as well as for the Volume resistance. Also, could no brush charges be determined for the materials with respect to the described test procedure. Meaning that the materials are suitable for applications in which the flexible connection comply to the non-conductive electrostatic properties.

Name: Werner van Loon
Function: Managing Director
Date: 29/07/2026

Disclaimer

The tests referred to in this document were conducted by the Willem-Jost-Institut [1], an institute for applied physical-chemical process and safety engineering, on May 9, 2017. The tests were carried out in collaboration with Filcoflex B.V., with managing director Werner van Loon present during the testing.

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[1] The Willem-Jost-Institut is the research and testing laboratory of INBUREX GmbH