

Comparative Surface Resistance of Three Glove Types

Measured on a calibrated ACL Staticide Model 800 megohmmeter

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Location	Shenzhen, China	Instrument S/N	R01172234

1. Purpose

Gloves sold for electronics assembly are routinely described as “anti-static” without a published resistance figure. This report presents measured surface resistance for three glove constructions tested on the same instrument, in the same room, on the same day.

Two of the three samples — the carbon fibre glove and the plain white glove — are the same knitted construction with the same PU fingertip coating. They differ in one respect: whether conductive carbon fibre is present in the yarn. This makes the comparison a direct test of what the carbon fibre actually contributes.



Figure 1 — Sample C (left, plain knitted) and Sample A (right, carbon fibre). Same knit, same PU fingertip coating.

2. Instrument and Calibration

Item	Detail
Instrument	ACL Staticide Model 800 Environment & Megohmmeter
Serial number	R01172234
Measurement	Surface resistance, concentric ring electrodes (ohms/sq)
Calibration date	19 August 2026
Next calibration due	18 August 2027
Calibration result	All ranges PASS. Error –2.00% to +5.00% against ±10% MPE

The 10 V range of the instrument covers 10^3 – 10^8 ohms/sq and the 100 V range covers 10^6 – 10^{12} ohms/sq. Test voltage was selected according to the range of each sample and is recorded per sample below.

3. Samples

Sample A — Carbon fibre knitted glove, PU fingertip coating. Grey/white carbon fibre yarn, white PU dip on fingertips, green cuff band.

Sample B — Nitrile glove, powder-free. Disposable nitrile butadiene rubber. Purple and black variants.

Sample C — Plain white knitted glove, PU fingertip coating. Polyester/nylon yarn with no conductive fibre. White PU dip on fingertips. Same knit construction and coating as Sample A.

4. Method

1. The glove was laid flat on an insulating white work surface.
2. The concentric ring electrodes were placed on the back-of-hand area.
3. Test voltage was selected for the expected range.
4. The reading was allowed to stabilise before recording.
5. Relative humidity and temperature were recorded for each reading.
6. Multiple locations and samples were measured.

All measurements reported here were taken on the same insulating white surface. Readings taken on other substrates during the same session are excluded from this report.

5. Results

Sample A — Carbon fibre knitted glove | Test voltage 10 V

ID	Surface resistance (ohms/sq)	RH	Temp (°C)
A-01	2.52×10^6	63.0%	30.1
A-02	4.24×10^6	61.9%	30.2
A-03	5.60×10^6	64.7%	30.1
A-04	7.87×10^6	61.9%	30.2
A-05	9.23×10^6	61.7%	30.3
A-06	2.01×10^7	64.8%	30.1

Range: 2.52×10^6 – 2.01×10^7 ohms/sq



Figure 2 — Sample A, reading A-01: 2.52 e06 ohms/sq at 63.0% RH, 30.1 °C.

Sample B — Nitrile glove, powder-free | Test voltage 10 V

ID	Colour	Surface resistance (ohms/sq)	RH	Temp (°C)
B-01	Purple	3.72×10^8	62.8%	30.2
B-02	Black	4.13×10^8	62.9%	30.1
B-03	Black	4.28×10^8	63.1%	30.1

Range: 3.72×10^8 – 4.28×10^8 ohms/sq

Sample C — Plain white knitted glove | Test voltage 100 V

ID	Surface resistance (ohms/sq)	RH	Temp (°C)
C-01	6.47×10^{10}	61.1%	30.7
C-02	6.91×10^{10}	60.8%	30.6
C-03	7.78×10^{10}	60.4%	30.6
C-04	8.16×10^{10}	61.0%	30.7

Range: 6.47×10^{10} – 8.16×10^{10} ohms/sq

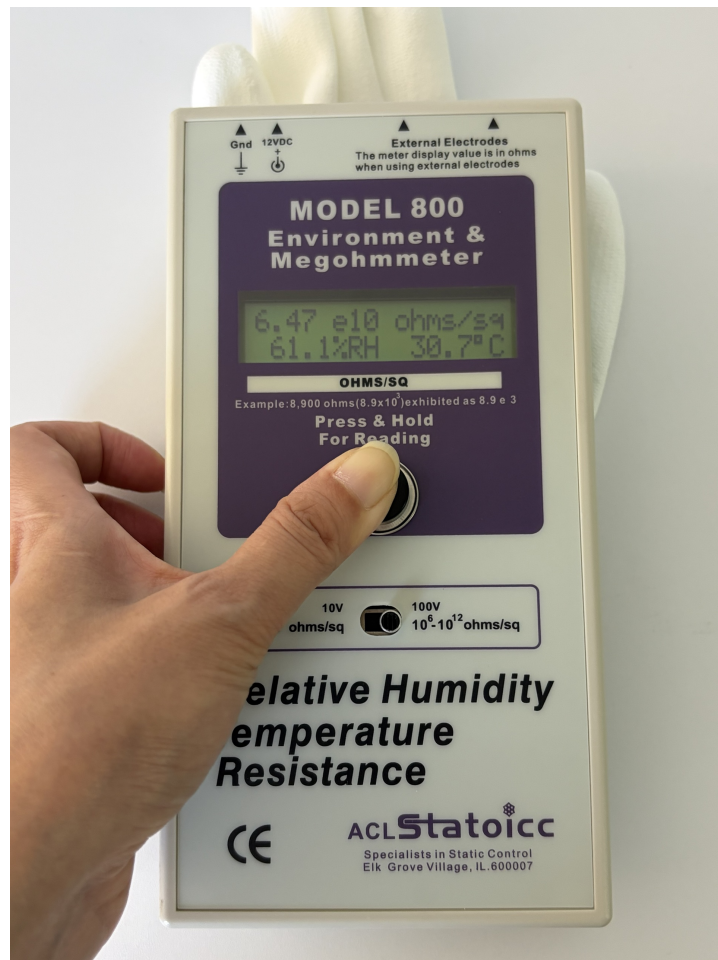


Figure 3 — Sample C, reading C-01: 6.47 e10 ohms/sq at 61.1% RH, 30.7 °C.

6. Comparison

Sample	Construction	Measured range (ohms/sq)	Order
A	Carbon fibre knitted, PU fingertip	$2.52 \times 10^6 - 2.01 \times 10^7$	$10^6 - 10^7$
B	Nitrile, powder-free	$3.72 \times 10^8 - 4.28 \times 10^8$	10^8
C	Plain knitted, PU fingertip	$6.47 \times 10^{10} - 8.16 \times 10^{10}$	10^{10}

All samples were measured between 60.4% and 64.8% RH, and between 30.1 °C and 30.7 °C.

Spread between Sample A and Sample C: approximately four orders of magnitude — a factor of about 10,000.

The two gloves are the same knit and the same coating. The carbon fibre in Sample A is the only construction difference, and it accounts for the entire gap.

7. Interpretation

Sample A measured within 1×10^6 to 1×10^9 ohms/sq, the static-dissipative range referenced in ANSI/ESD S20.20 and IEC 61340-5-1, across all six readings. The conductive path is the carbon fibre in the yarn, which does not depend on ambient moisture.

Sample B also measured within the dissipative range. Nitrile rubber is a polymer with no conductive filler, so its dissipative behaviour derives from the material surface rather than from a conductive path built into the structure. Within the humidity range of a controlled EPA, the measured values were consistent across all three samples.

Sample C measured between 6.47×10^{10} and 8.16×10^{10} ohms/sq. This is below the 1×10^{11} ohm threshold commonly used to define insulative materials, so the glove is not strictly insulative. However, it sits three to four decades above the $10^6 - 10^9$ range normally specified for ESD gloves, and is outside the range required for EPA personnel handling.

A glove that looks identical to an ESD glove is not necessarily an ESD glove. Visual inspection cannot distinguish Sample A from Sample C. Only measurement can.

8. Test Conditions

Humidity and temperature. All readings were taken between 60.4% and 64.8% RH and between 30.1 °C and 30.7 °C. This range corresponds to the operating environment of a temperature- and humidity-controlled electronics assembly EPA, and to year-round ambient conditions in Southeast Asia, southern China and Japan — the environments in which these gloves are used in production.

Scope of results. These results apply to the samples tested under the documented conditions. They should not be generalised to every production lot without corresponding QC records.

Test voltage. Samples A and B were measured at 10 V; Sample C was measured at 100 V, because its resistance falls outside the 10 V range of the instrument. Both ranges are covered by the current calibration certificate.

Substrate. All reported readings were taken on the same insulating white surface. Readings taken on other substrates during the same session were excluded.

9. Conclusion

Three glove constructions measured across roughly four orders of magnitude under comparable conditions:

- Carbon fibre knitted glove: **$10^6 - 10^7$ ohms/sq** — within the static-dissipative range
- Nitrile glove: **10^8 ohms/sq** — within the static-dissipative range

- Plain knitted glove: **10¹⁰ ohms/sq** — outside the range specified for ESD gloves

The carbon fibre glove and the plain glove share the same knit and the same PU coating. The conductive fibre accounts for the entire difference.

10. Sign-off

Tested by		Date	
Reviewed by		Date	

Original test photographs and the instrument calibration certificate are held with this report and are available to customers on request.

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