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EMC Engineering and Safety Ltd.

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ESD/LPD Trade/473

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RE: Measurement Results of antistatic Hand Tools, Gloves and Dusters

Reference:
1) LPD Trade/FBK Catalog of Antistatic tools
2) ESD TR53-01-06: Compliance Verification of ESD protective Equipment and Materials, ESD Association (USA)
3) ASTM D-257-78: electrical resistance measurement methods of insulating materials
4) CENELEC/TR 50404-2003: Electrostatics - Code of practice for the avoidance of hazards due to static electricity
5) IEC 60079-32-2/Ed1: Explosive atmospheres – Part 32-2: Electrostatics hazards – Tests

1. Background

Tested Material

Several black polypropylene hand tools, textile gloves and dusters, and a small plastic bottle, were received for lab characterization. The items are manufacturer by FBK. ID. All of which included in the table of measurement results, including items catalog number provided by LPD Trade.

According to CENELEC/TR 50404-2003 ESD standard (Ref 4) acceptable antistatic tools would have resistivity (measured from tool handle to its end making a contact with HAZMATs) less than 1.0 X $10^8\Omega$, as is presented in the following table:

Sub clause	Type of installation	Maximum resistance to earth, ohms
10.3.4	Items fabricated from non-conductive or dissipative materials	10^6 to 10^8

2. Measurement Details

- Measurement methods are per Ref.2, Ref. 3, and Ref 5, tests 4.3 (surface resistivity) and test 4.5 (leakage resistance).
- Measurement voltage: 10-100V
- Instrument: Resistance Meter, Prostate, Model PRS-812; Upper measurement range $10^{14}\Omega$
- Calibration due date: 8 August 2021.
- Tested items electrical resistivity was measured from end to end (handle to tool's end making a contact with ESD sensitive material/component); wherever it was possible surface resistivity measurement were performed and recorded.

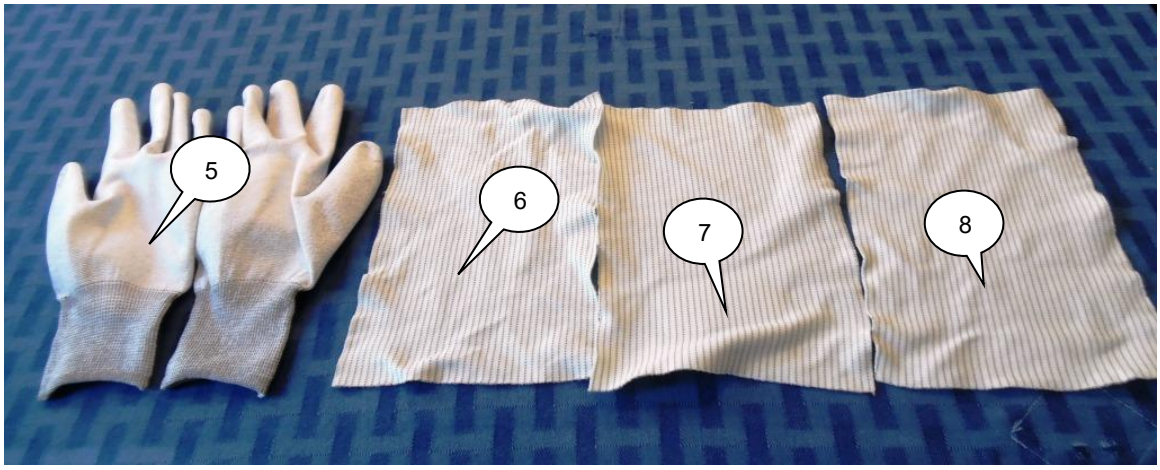
3. Measurement Results

All measurements were conducted at 24˚C and RH 55 %

No.	Cat. #	Tool Description	end-to-end Resistivity Ω	Surface Resistivity Ω/Square	Pass/ Fail
1	C57159	Hand held Brush	43k	-	Pass
2	C80105	Bucket	$2.5 \cdot 10^9$	$3.5 \cdot 10^9$	Marginal
3	C28290	11 cm wide Scrapper	17k	3.3k	Pass
4	CSD8-250	Bottle (pal blue)	$8.5 \cdot 10^8$	$1.2 \cdot 10^9$	Pass
5	C-GCPF	Textile Gloves	190k	480k	Pass
6	TS 1810	Small Duster	1.5k	3.4k	Pass
7	TS 1820	Medium Duster	520	3k	Pass
8	TS 1830	Large Duster	1.2k	3.4k	Pass

K=1000; M=10^6; G=10^9

4. Product Depiction



5. Conclusions

All tested hand tools were found to have very good static dissipative characteristics. They are good quality tools and need only GMP approval for pharmaceutical materials. For other processing industries such as food, hi-tech, chemicals, and petro-chemicals these hand tools and textile items are the **best tools approved by our lab, so far, for ESD control.**

Best Regards,

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