

ESD WORKBENCH

Implementation of Electrostatic Discharge Control test.



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1.0 Purpose

Implement ESD electrostatic control test in accordance with the ANSI / ESD-S20.20 patent policy on a table with LisStat TM laminated surface. Applying the following points:

- ESD S 4.1: Protection of articles susceptible to electrostatic discharges - work surfaces - characterization of resistance.
- ESD STM 4.2: Protection of articles susceptible to electrostatic discharges - surfaces and work - load dissipation characteristics.

2.0 Scope and Focus

The tests were applied to the surfaces of the work tables with LisStat™ laminate with respect to the ESD S 4.1 and ESD STM 4.2.

Table 1.0 TECHNICAL REQUIREMENTS OF THE ESD CONTROL PROGRAM

Technical Request	Implementation Method or Process	Test Method, Standard or Warning	Recommended Range
Protected surface	Work surface	ESD S 4.1 ESD STM 4.2	<1 X10 ⁹ ohm <200 volts

Note: The ESD STM4.2 test was applied at 100 volts.

Note: ANSI S20.20 does not specify any lower limit, however, ANSI / ESD S4.1 recommends in the manufacturing environment a resistance range greater than or equal to 1 x 10⁶ to less than 1 x 10⁹ ohms.

3.0 USED TOOL




- DESCO LCD MEGOHMMETER A50070



4.0 Process

The tool (DESCO LCD MEGOHMMETER A50070) was placed on different points on a laminated surface LisStat™ obtaining the following results with unit of measurement in ohms.

TABLE 1

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.7 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.4 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.4 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$


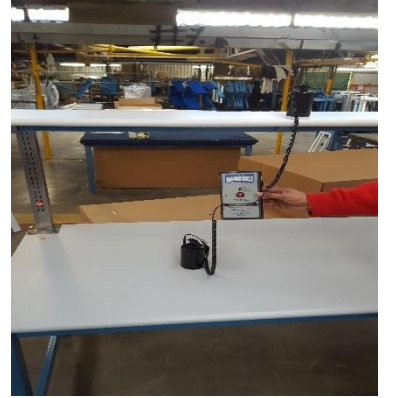
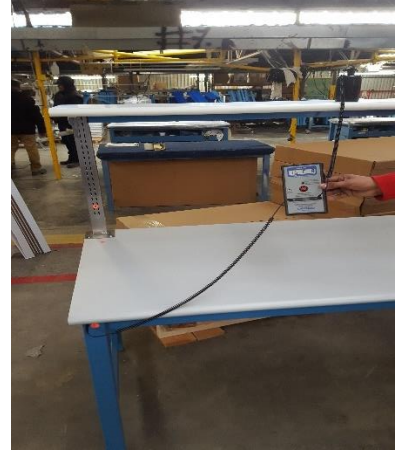


	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.3 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.5 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.6 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 2

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	7.3×10^7 Ohms.	$< 1 \times 10^9$ Ohms OR < 200 Volts
	Point to Point (Table to slotted uprights)	ANSI / ESD 4.1 ANSI / ESD STM 4.2	1.1×10^7 Ohms	$< 1 \times 10^9$ Ohms OR < 200 Volts
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	1.1×10^7 Ohms	$< 1 \times 10^9$ Ohms OR < 200 Volts











	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.2 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.1 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.4 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 3

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$5.3 \times 10^7 \text{ Ohms.}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.1 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$9.8 \times 10^6 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.3 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.3 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.6 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 4

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$9.4 \times 10^7 \text{ Ohms}$.	< $1 \times 10^9 \text{ Ohms}$ OR < 200 Volts
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.2 \times 10^7 \text{ Ohms}$	< $1 \times 10^9 \text{ Ohms}$ OR < 200 Volts
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.1 \times 10^7 \text{ Ohms}$	< $1 \times 10^9 \text{ Ohms}$ OR < 200 Volts
	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.1 \times 10^7 \text{ Ohms}$	< $1 \times 10^9 \text{ Ohms}$ OR < 200 Volts



	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$3.3 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.6 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 5

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	4.0×10^7 Ohms.	$< 1 \times 10^9$ Ohms OR < 200 Volts
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	1.6×10^7 Ohms	$< 1 \times 10^9$ Ohms OR < 200 Volts
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	2.2×10^7 Ohms	$< 1 \times 10^9$ Ohms OR < 200 Volts







	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.6 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.8 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 6

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$9.1 \times 10^7 \text{ Ohms}$.	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$4.4 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$3.4 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$5.5 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$







	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.4 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.8 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 7

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$5.5 \times 10^7 \text{ Ohms}$.	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.5 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.8 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.7 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

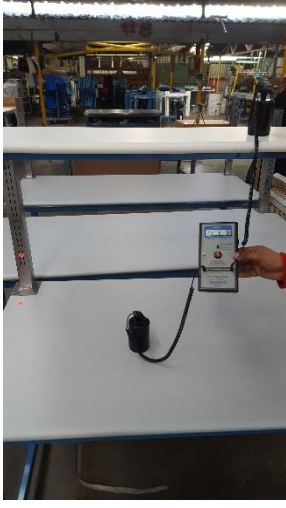




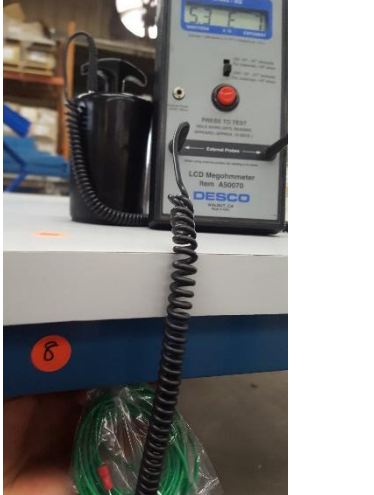
	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.8 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.2 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 8

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	5.5x10 ⁷ Ohms.	< 1x10 ⁹ Ohms OR < 200 Volts
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	1.7x10 ⁷ Ohms	< 1x10 ⁹ Ohms OR < 200 Volts
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	3.4x10 ⁷ Ohms	< 1x10 ⁹ Ohms OR < 200 Volts
	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	5.3x10 ⁷ Ohms	< 1x10 ⁹ Ohms OR < 200 Volts


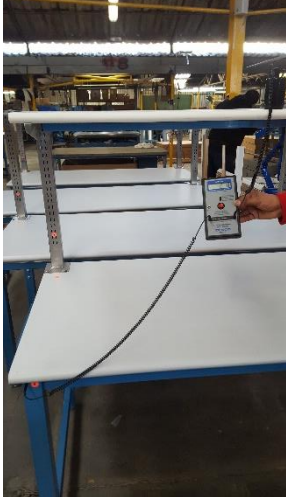



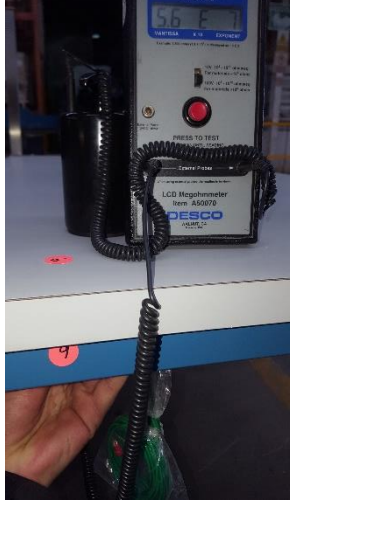


	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$3.8 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.1 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

TABLE 9

Tests	Type of test	Testing method	results	Limits
	Point to Point (Table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$9.7 \times 10^8 \text{ Ohms.}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to slotted uprights).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.7 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$2.3 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Table to ground).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$5.6 \times 10^7 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

	Point to Point (Top shelf to table).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$4.0 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$
	Point to Point (Top shelf to Banana Jack).	ANSI / ESD 4.1 ANSI / ESD STM 4.2	$1.9 \times 10^8 \text{ Ohms}$	$< 1 \times 10^9 \text{ Ohms}$ OR $< 200 \text{ Volts}$

- For standards that have multiple resistance testing methods, these limits apply to all methods.
- Tests performed ANSI / ESD STM4.2 were applied at 100 volts.