Test Report
QuantX™ ESD Dispensing Components

This test report details the methodology and data obtained from a series of tests conducted on Fisnar QuantX ESD dispensing components by a third-party company specialising in the area of electrostatic technology.

1. Objectives & Scope

The objective of the conducted tests is to provide component surface resistivity and charge decay time, and end to end resistance and charge decay time of assemblies of components used in a representative dispensing system.

The intention of this test report is to provide documented evidence showing to the best of our knowledge Fisnar QuantX ESD dispensing components comply with industry standards relating to electrostatic components.

2. Methodology

Components supplied were conditioned for 48 hours and tested in the same controlled environment of 12 ± 3 % rh and 23 ˚C unless otherwise stated. The following measurements were made,

- Surface resistance using miniature 2-pin probe based on ANSI/ESD STM 11.13 and IEC61340-2-3 as closely as practicable
- Charge decay based on IEC 61340-2-1
- Component and system end to end resistance based on suitable proprietary method (no applicable standards are available)

Revision 01

Surface resistance was measured using a Trek 152-1 high resistance meter with 2-point probe compliant with IEC 61340-2-3 and ANSI/ESD STM 11.13.

End to end resistance was also measured using the Trek 152-1 with suitable means of connecting to the item under test. Measurement results less than 1 MΩ (106 Ω) were made using 10 V test voltage. Measurement results greater than 1 MΩ (106 Ω) were made using 100 V.

Figure 1. Measurement of end-to-end resistance of dispenser assembly

Charge decay was measured using a Trek 158 Charged Plate Monitor (CPM) with conductive foam contact pad. To perform the test, one end of the item or assembly under test was connected to ground and the CPM charged to 1000 V. The item was then touched to the contact pad and the charge decay time read.

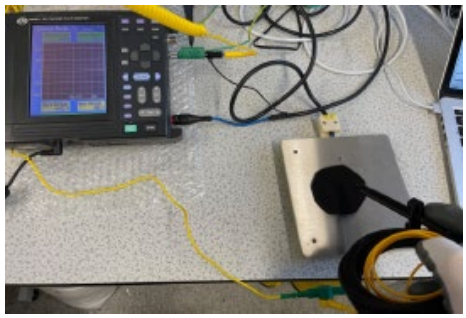

Figure 2. Measurement of charge decay time of assembly

Where multiple specimens of components were available, at least three measurements were normally made on each type of component under tests. Each measurement was normally made on a new specimen of the component under test (referred to in tables as Spec. 1 – Spec. n)

3. Experimental

3.1 Specimens supplied and test combinations

Specimens supplied included

- Dispensing system components listed in Table 1

The dispensing system components were assembled to make a handheld syringe dispensing system (Figure 3).

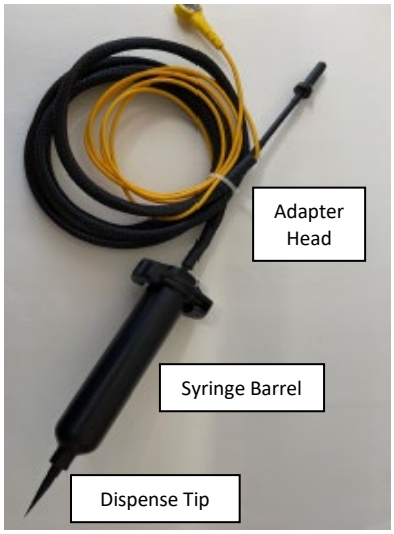

Figure 3. Syringe dispensing system

Item Description	Item Number	Size
QuantX ESD safe syringe barrel	8501001	3cc
	8501002	5cc
	8501003	10cc
	8501004	30cc
	8501005	55cc
QuantX ESD safe adapter head assembly	8501018	3cc
	8501019	5cc
	8501020	10cc
	8501021	30/55cc
QuantX ESD safe taper dispense tip	8501270	16ga
	8501271	18ga
	8501272	20ga
	8501274	25ga
	8501298	27ga
	8501276	30ga

Table 1. Dispensing system components supplied

3.2 Conditioning and test atmosphere

The specimens were conditioned for over 48 hours at 12 ± 3 %rh before test. All resistance tests were made in this atmosphere.

3.3 Surface resistance

Surface resistance measurements give the resistance measured across the surface of an item using the 2-pin electrodes. The surface resistance results are given in Table 2 - Table 4 and summarised in Section 4 Table 7 - Table 9.

Item Number	Item Description	Surface resistance (Ω)		
		Spec.1	Spec.2	Spec.3
8501001	Syringe barrel 3cc	$< 10^3$	$< 10^3$	$< 10^3$
8501002	Syringe barrel 5cc	$< 10^3$	$< 10^3$	$< 10^3$
8501003	Syringe barrel 10cc	$< 10^3$	$< 10^3$	$< 10^3$
8501004	Syringe barrel 30cc	$< 10^3$	$< 10^3$	$< 10^3$
8501005	Syringe barrel 55cc	$< 10^3$	$< 10^3$	$< 10^3$

Table 2. Surface resistance of syringe barrels

Item Number	Item Description		Surface resistance (Ω)		
			Spec.1	Spec.2	Spec.3
8501018	Adapter head assembly 3cc	Air in connector	$< 10^3$	$< 10^3$	
		Tube sheath	6.8×10^9	1.7×10^{10}	
		Adapter head	$< 10^3$	$< 10^3$	
8501019	Adapter head assembly 5cc	Air in connector	$< 10^3$	$< 10^3$	
		Tube sheath	5.5×10^9	3.9×10^9	
		Adapter head	$< 10^3$	$< 10^3$	
8501020	Adapter head assembly 10cc	Air in connector	$< 10^3$	$< 10^3$	
		Tube sheath	3.2×10^9	2.5×10^9	
		Adapter head	$< 10^3$	$< 10^3$	
8501021	Adapter head assembly 30/55cc	Air in connector	$< 10^3$	$< 10^3$	
		Tube sheath	8.5×10^9	4.2×10^9	
		Adapter head	$< 10^3$	$< 10^3$	

Table 3. Surface resistance of adapter head assemblies

Item Number	Item Description	Surface resistance (Ω)		
		Spec.1	Spec.2	Spec.3
8501270	Taper Dispense Tip 16ga	$< 10^3$	1.6×10^3	$< 10^3$
8501271	Taper Dispense Tip 18ga	2.0×10^3	$< 10^3$	$< 10^3$
8501272	Taper Dispense Tip 20ga	4.4×10^3	6.0×10^3	3.9×10^3
8501274	Taper Dispense Tip 25ga	$< 10^3$	4.7×10^4	$< 10^3$
8501298	Taper Dispense Tip 27ga	5.5×10^3	8.2×10^4	1.9×10^4
8501276	Taper Dispense Tip 30ga	$< 10^3$	$< 10^3$	$< 10^3$

Table 4. Surface resistance of dispense tips

3.4 End to end resistance of syringe dispensing systems

End to end resistance tests the resistance of the system to groundable point simulated as used in normal operation.

The syringe dispensing system consisted of an adapter head, syringe barrel and taper dispense tip. One terminal of the resistance meter was connected to the ESD groundable point or end of hose. The second meter terminal was connected to the end of the taper dispense tip.

The results are given in Table 5 and summarised in Section 4 Table 10

Adapter head	Syringe Barrel	Dispense Tip	End to end resistance (Ω)	
			To ESD groundable point	To end of hose
8501018	8501001	8501270	4.4×10^3	7.8×10^5
8501018	8501001	8501271	2.6×10^3	8.4×10^5
8501018	8501001	8501272	2.5×10^4	8.7×10^5
8501019	8501002	8501274	2.6×10^5	9.0×10^5
8501019	8501002	8501276	2.7×10^4	8.5×10^5
8501019	8501002	8501298	2.1×10^6	9.1×10^5
8501020	8501003	8501270	4.5×10^4	8.3×10^5
8501020	8501003	8501271	9.5×10^3	6.6×10^5
8501020	8501003	8501272	1.7×10^4	8.8×10^5
8501021	8501004	8501274	6.0×10^3	8.2×10^5
8501021	8501004	8501276	3.8×10^3	8.2×10^5
8501021	8501004	8501298	3.0×10^4	8.7×10^5
8501021	8501005	8501270	2.8×10^3	8.4×10^5
8501021	8501005	8501271	2.4×10^3	8.5×10^5
8501021	8501005	8501272	1.5×10^4	8.2×10^5
8501018	8501001	8501274	1.4×10^4	7.8×10^5
8501019	8501002	8501276	1.6×10^4	8.5×10^5
8501020	8501003	8501298	3.9×10^4	8.9×10^5

Table 5. End to end resistance of syringe dispensing system

3.5 Charge decay of syringe dispensing systems

Charge decay tests were made on the assembled syringe dispensing system (Table 6). In this test the system was earthed via the ESD earth connector, and the tip touched to the conductive foam pad on the CPM.

The results are summarised in Section 4 Table 11.

Adapter head	Syringe Barrel	Dispense Tip	Charge decay time (s)
8501018	8501001	8501270	< 0.1
8501018	8501001	8501271	< 0.1
8501018	8501001	8501272	< 0.1
8501019	8501002	8501274	< 0.1
8501019	8501002	8501276	< 0.1
8501019	8501002	8501298	< 0.1
8501020	8501003	8501270	< 0.1
8501020	8501003	8501271	< 0.1
8501020	8501003	8501272	< 0.1
8501021	8501004	8501274	< 0.1
8501021	8501004	8501276	< 0.1
8501021	8501004	8501298	< 0.1
8501021	8501005	8501270	< 0.1
8501021	8501005	8501271	< 0.1
8501021	8501005	8501272	< 0.1
8501018	8501001	8501274	< 0.1
8501019	8501002	8501276	< 0.1
8501020	8501003	8501298	< 0.1

Table 6. Charge decay of syringe dispensing system

4. Summary of Results

The results of section 3 are summarised in Table 7 – Table 11.

Item Number	Item Description	Minimum Surface resistance (Ω)	Maximum Surface resistance (Ω)
8501001, 8501002, 8501003, 8501004, 8501005	Syringe Barrel		$< 10^3$

Table 7. Summary of syringe barrel surface resistance results

Item Number	Item Description	Minimum Surface resistance (Ω)	Maximum Surface resistance (Ω)
8501018, 8501019, 8501020, 8501021	Air in connector		$< 10^3$
	Tube sheath	4.2×10^9	1.7×10^{10}
	Adapter head		$< 10^3$

Table 8. Summary of adapter head surface resistance results

Item Number	Item Description	Minimum Surface resistance (Ω)	Maximum Surface resistance (Ω)
8501270, 8501271, 8501272, 8501274, 8501298, 8501276	Dispense Tip		$< 10^3$

Table 9. Summary of dispense tip surface resistance results

Item Number	Item Description	Minimum Surface resistance (Ω)	Maximum Surface resistance (Ω)
See Table 5	Syringe Dispensing System (Adapter head assy. + syringe barrel + dispense tip)	2.4×10^3	2.1×10^6

Table 10. Summary of end to end resistance of syringe dispensing system results

Item Number	Item Description	Minimum charge decay (s)	Maximum charge decay (s)
See Table 6	Syringe Dispensing System (Adapter head assy. + syringe barrel + dispense tip)		< 0.1

Table 11. Summary of charge decay of syringe dispensing system results

5. Evaluation

There are no specific requirements for syringe dispensing systems under the IEC 61340-5-1 or ANSI/ESD S20.20 ESD control standards. Similarly, there are no specific requirements for charge decay time in these standards.

The ESD ADV1.0 Glossary classifies a material that has surface or volume resistance less than 10^4 Ω as conductive. Materials that have resistance between 10^4 Ω and 10^{11} Ω are classified as static dissipative. A material that has resistance greater than or equal to 10^{11} Ω is classified as insulative.

It is widely considered that items having charge decay time less than 2 seconds are acceptable in ESD control.

References and bibliography

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