



**BELOW IS AN INDEPENDENT REPORT ON THE DAYSTRONG HYDRIN® DUAL LAYER ESD MAT
BY DAVE SWENSON**



**Test Report For Zeon Chemical, Inc. &
DayStrong Rubber Products Mat**

Introduction:

Mr. Andrew Mittermiller from Zeon Chemical, Inc. (*Zeon*), requested that Affinity Static Control Consulting, LLC (*Affinity*), conduct a series of tests to evaluate a worksurface/floor mat product produced by Daystrong Rubber Products using *Zeon* compounds. The mat sample was evaluated using ANSI/ESD STM4.1¹ - Worksurfaces, ANSI/ESD STM7.1² - Flooring, and ANSI/ESD STM97.2³ - Voltage Measurement. The electrical resistance and voltage measurements were made at 50% RH at 73°F and after conditioning the mat at 12% ± 2% RH at 73°F for 72 hours. The measurements were conducted in the conditioning environment.

Test Preparation:

The mat construction is two layers with a dissipative top surface laminated to a conductive backing. Two grounding terminals were installed on the mat sample at opposite corners of the long side of the 3' x 4' 10" mat. The grounding terminals were of the type that push through the mat with sharp pins that fold over on the back side to contact the conductive layer. It should be noted that the material of the mat is very dense, and it is extremely difficult to install the push-through grounding terminals without the use of a grommet installation tool with the correct heads.

Test Results:

The resistance measurements were as follows: resistance point-to-point with two electrodes (Rp-p), resistance from five (5) points on the mat to each ground terminal (Rtgp) and resistance to ground (Rtg) from five (5) points on the mat.

Charts 1-2 show the results of the mat electrical resistance testing at the two (2) humidity conditions and the two (2) ground points.

¹ ESD Association Standard Test Method- *For the Protection of Electrostatic Discharge Susceptible Items – Worksurfaces, Resistance Measurements (Including Shelving and Mobile Equipment)*, ESD Association, 7900 Turin Road, Building 3, Rome, NY 13440-2069, 315-339-6937, www.esda.org

² ESD Association Standard Test Method – *For the Protection of Electrostatic Discharge Susceptible Items – Flooring Systems – Resistive Characterization*, *ibid*

³ ESD Association Standard Test Method- *For the Protection of Electrostatic Discharge Susceptible Items – Footwear/Flooring System – Voltage Measurement in Combination with a Person*, *ibid*

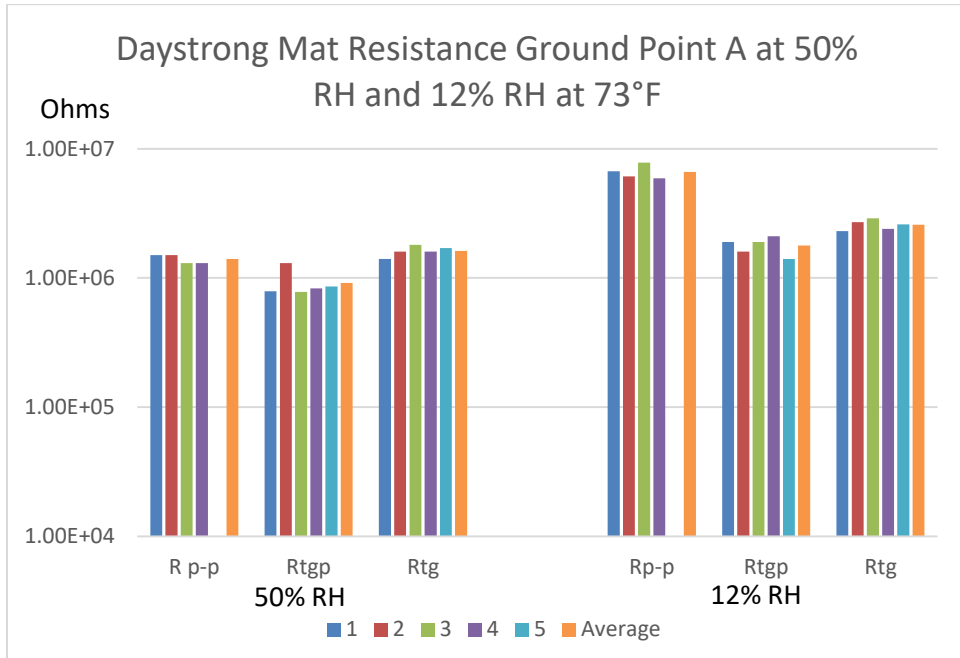


Chart 1: Electrical Resistance at 50% RH and 12% RH – Ground Point A

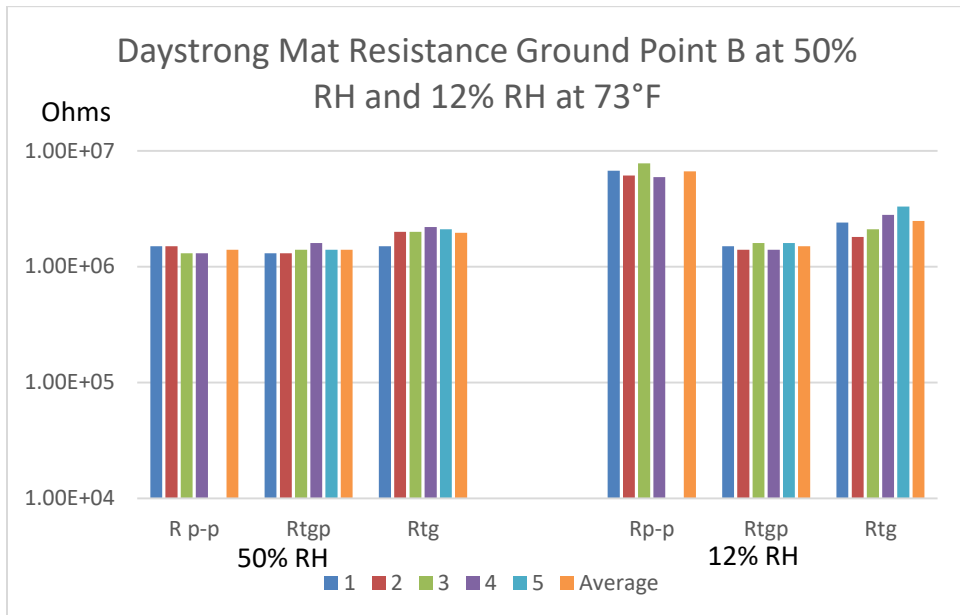
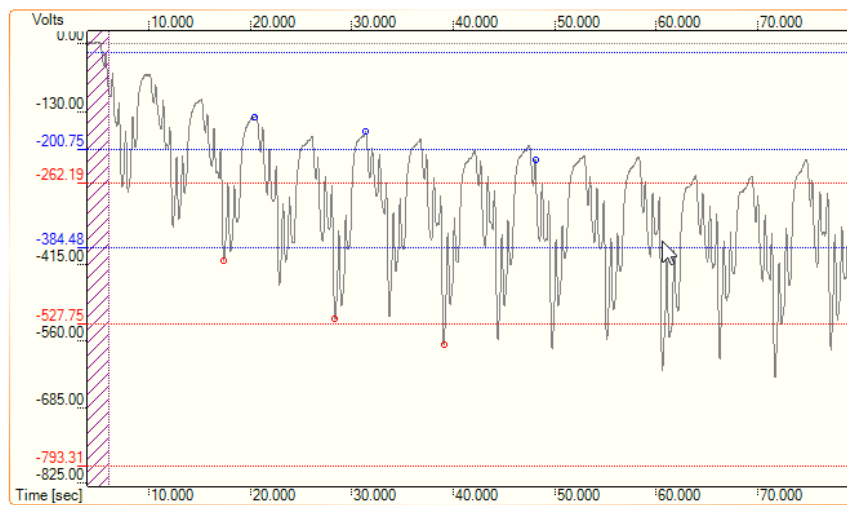


Chart 2: Electrical Resistance at 50% RH and 12% RH – Ground Point B

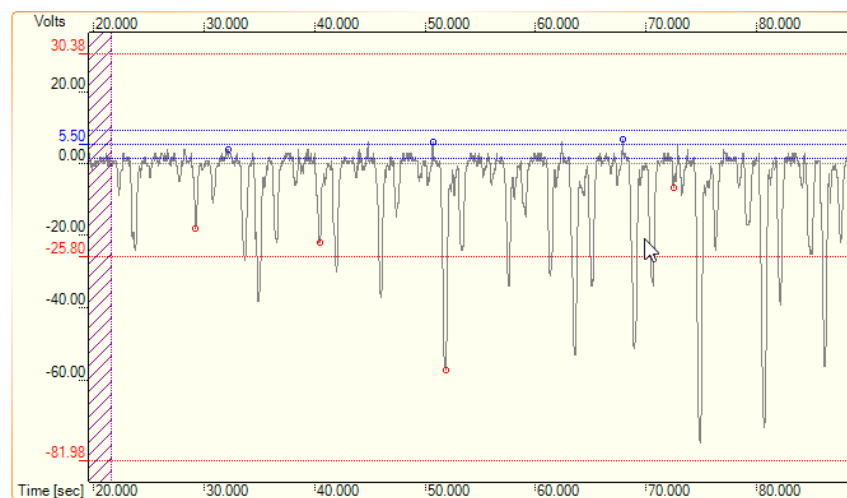


Walking Voltage:

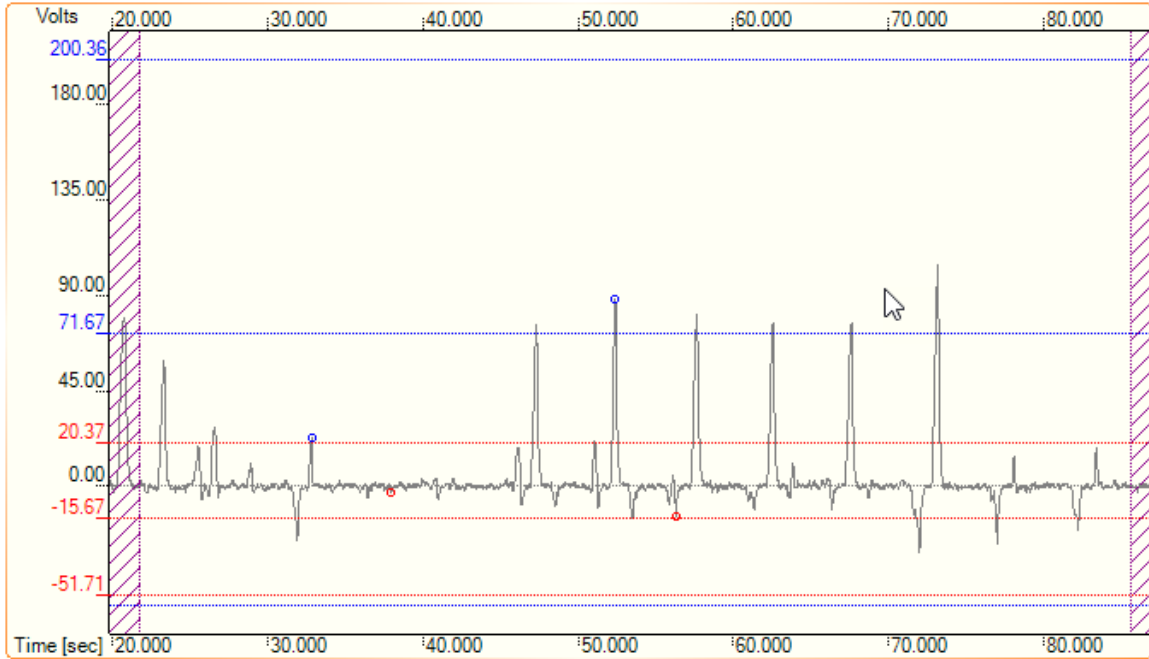
An application of the mat could be for use as a floor mat in an electrostatic protected area (EPA). A walking voltage test is required for qualification of the mat for application as a floor mat. The STM97.2 test requires walking in a pattern on the floor material while wearing shoes selected for the application. In general, this means using ESD control rated footwear or shoe grounding straps. The following graphs show the walking voltage using two (2) ESD control footwear and a pair of running shoes.



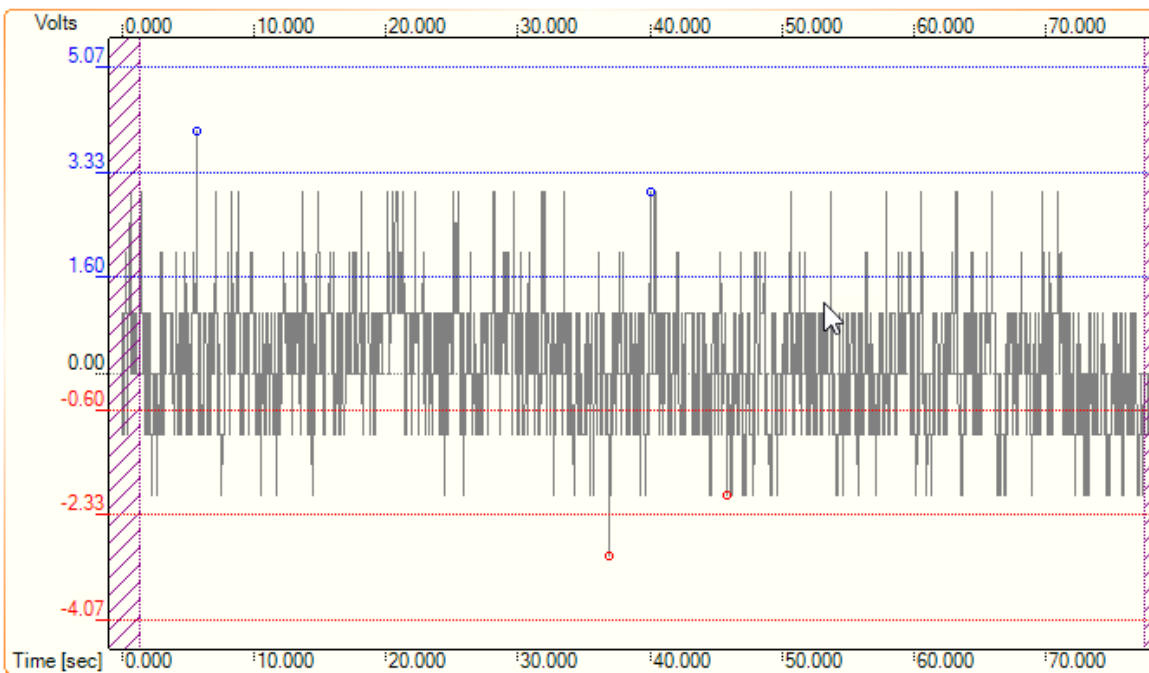
Graph 1: Running Shoes – 50% RH – STM97.2 voltage – 567 volts



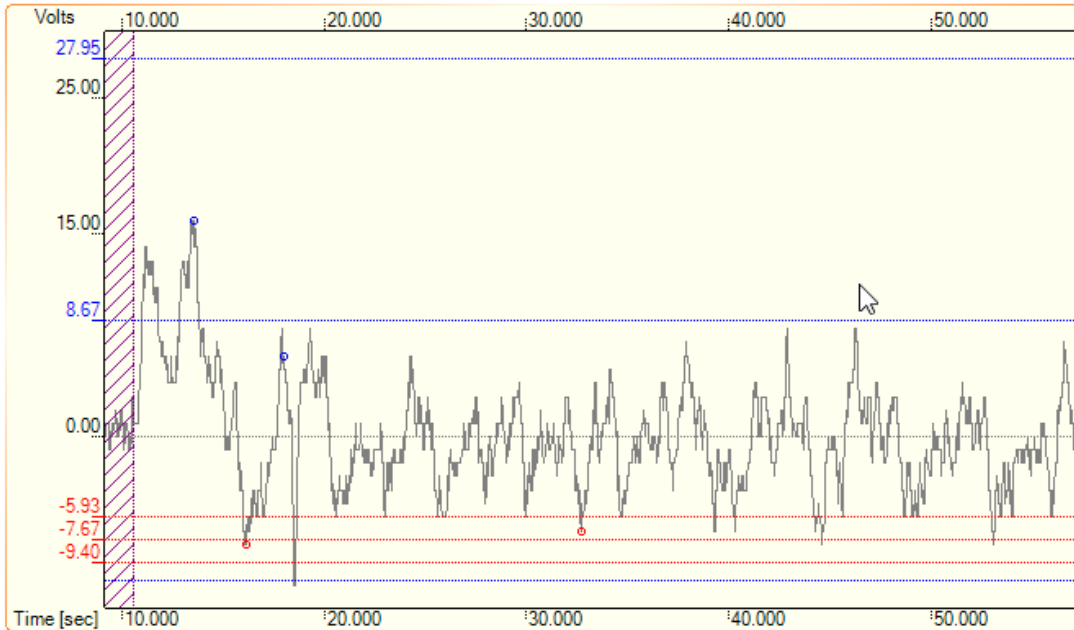
Graph 2: Running Shoes with Heel Grounding Straps – 50% RH -STM97.2 voltage 25 volts



Graph 3: Running Shoes with Heel Grounding Straps – 12% RH -STM97.2 voltage 88 volts



Graph 4: Static Dissipative Safety Shoes – 50% RH – STM97.2 Voltage – 3 volts



Graph 5: Static Dissipative Safety Shoes – 12% RH – STM97.2 Voltage – 8 volts

Summary:

The new mat from Daystrong Rubber Products meets requirements for use as a table mat or a floor mat.

Respectfully Submitted,

A handwritten signature in black ink, appearing to read "David E. Swenson".

David E. Swenson - President

Annex A – Test Equipment

Excel Data File – sent separately.



Annex A

Test Equipment

Resistance Measurements:

Prostat PRS-801 Resistance System – Verified prior to use with *Affinity* Resistor Set CX5291 – maintained by Micro Precision Calibration Service – Round Rock, TX

2 each 5lb., 2.5-inch diameter electrodes – 290 ohms on metal plate

Walking Voltage:

Prostat PFK-100 Field Meter Set – PFM-711A field meter with CPM-720 charged plate monitor assembly – Calibration due date 12/2020.

Prostat PGA-710B Autoanalyzer/with software – System self-checked prior to each use

IBM Model 60 dedicated computer with Prostat Autoanalysis System software

Environmental Conditions:

The *Affinity* lab environment is maintained at a relative humidity of 50% \pm 5% RH at 72°F \pm 2° F. Testing is not done if the lab environment goes outside of the stated conditions for moderate humidity.

Low humidity is maintained as needed at 12% \pm 2% RH in a large double-sided glove box. Low humidity is maintained with twin 28 inch CaSO₄ desiccant columns and regulated using ETS Model 514 Automatic Humidity Controller and air pump.