2012 EOS/ESD Symposium

Year in Review- Factory Standards

David E. Swenson

Affinity Static Control Consulting, LLC

Round Rock, TX

512-244-7514

www.affinity-esd.com

ESD Association

- Standards, Standard Test Methods and ANSI recognized Standard Practice documents require a 5 year review
  - Re-affirm
  - Revise
  - Rewrite
  - Terminate

Numerous Documents in the last 12 months

- Reviewed By Working Group
  - Major changes
    - Technical – values, procedures, document status
  - Minor changes
    - Wording, spelling corrections
- When ?
- Impact on ESD control programs?

Boiler Plate Items

- The Technical and Administrative Support (TAS) committee maintains the ESD Association Standards Boiler Plate document
  - Common elements that appear in many documents
    - Resistance Measurement Apparatus
      - Product Qualification
      - Acceptance Testing
      - Compliance Verification

Boiler Plate Continued:

- Environment
  - Low Humidity Environment
    - 12±3% relative humidity and 23±3°C. Preconditioning of the samples shall be for a period of at least 48 hours (some items 72 hours)
  - Moderate Humidity Environment
    - 50±5% relative humidity and 23±3°C. Preconditioning of the samples shall be for a period of at least 48 hours (some items 72 hours)

Boiler Plate Continued:

- Personnel Safety
- Resistance Measurement Electrodes
- Hand-Held Electrodes
- Specimen Support Surface
  - Resistivity Measurement ≥1 x 10^{13} Ω/Sq.
    - Uses ASTM D257
  - Or
  - Test the material with ANSI/ESD STM 11.11 Surface Resistance method ≥ 1 x 10^{12} Ω
    - Some changes expected for qualifying support surfaces in the near future

Boiler Plate Continued:

- Resistance Measurement Procedure
  - Start at 10 volts
  - If greater than 1 x 10^6 ohms
  - Go to 100 volts and record measurement
- Criteria – Specifications (before S20.20 gets them)
- Product Qualification Equipment
- Acceptance Equipment
- Compliance Verification (Periodic Testing) Equipment
- Referenced Publications
- Compliance Verification

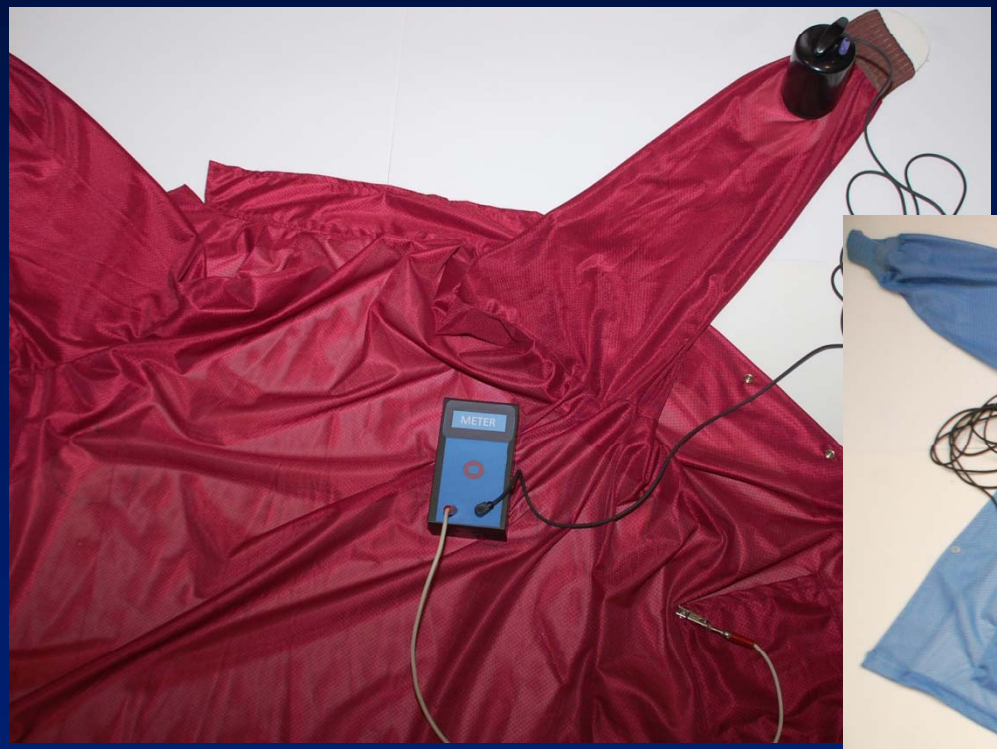
Wrist Straps – WG1
ANSI/ESD S1.1

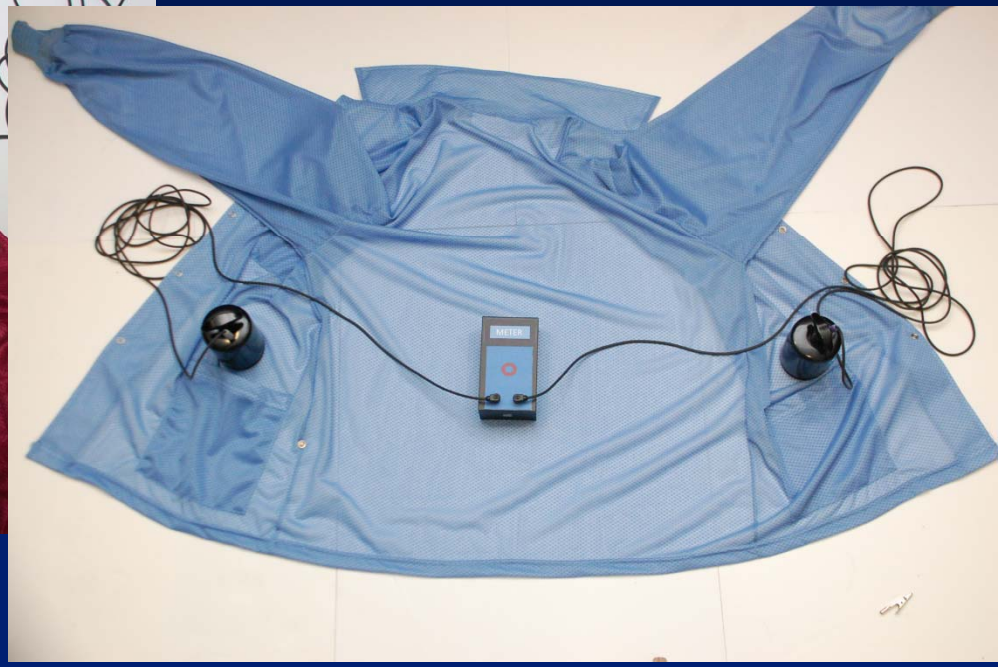
- Major change:
  - Adjusted limit to <35 MΩ from <10MΩ to be in line with S20.20
- Minor change
  - Changed “Cuff” to Wristband throughout the document (Cuff is used in Garments)

Garments –WG2
ESD STM2.1 (Last one in 1997)

- Numerous changes – complete rewrite
  - Garment opened up and laid out flat for measurements
  - Sleeve insulating inserts to separate sides of sleeves
  - Measurement with a person for groundable garment system
  - 3 Categories
    - Static control garment, Groundable static control garment and Groundable static control garment system (for grounding a person in place of a wrist strap).

Garments





ANNEX A (INFORMATIVE) – GARMENT CATEGORIES AND RESISTANCE VALUES

Table 2. Garment Categories and Resistance Values

Common Industry Description / Use of Garment System	Garment Categories	Recommended Resistance Values
Garments with some electrical field suppression properties	Static Control Garment ESD Category 1	< 1.0×10^{11} ohms
Garments with a designated groundable point	Groundable Static Control Garment ESD Category 2	< 1.0×10^{9} ohms
Garment in continuous electrical path with a person; however, not the primary ground path	Groundable Static Control Garment ESD Category 2	< 1.0×10^{9} ohms
Grounded with dual paths to ground via continuous monitoring equipment that requires two separate paths to ground	Groundable Static Control Garment System (Garment in Combination with Person) ESD Category 3	< 3.5×10^{7} ohms
Grounded through a single wire constant monitor system*	Groundable Static Control Garment System (Garment in Combination with Person) ESD Category 3	< 3.5×10^{7} ohms*
Garment used as primary grounding path for personnel	Groundable Static Control Garment System (Garment in Combination with Person) ESD Category 3	< 3.5×10^{7} ohms

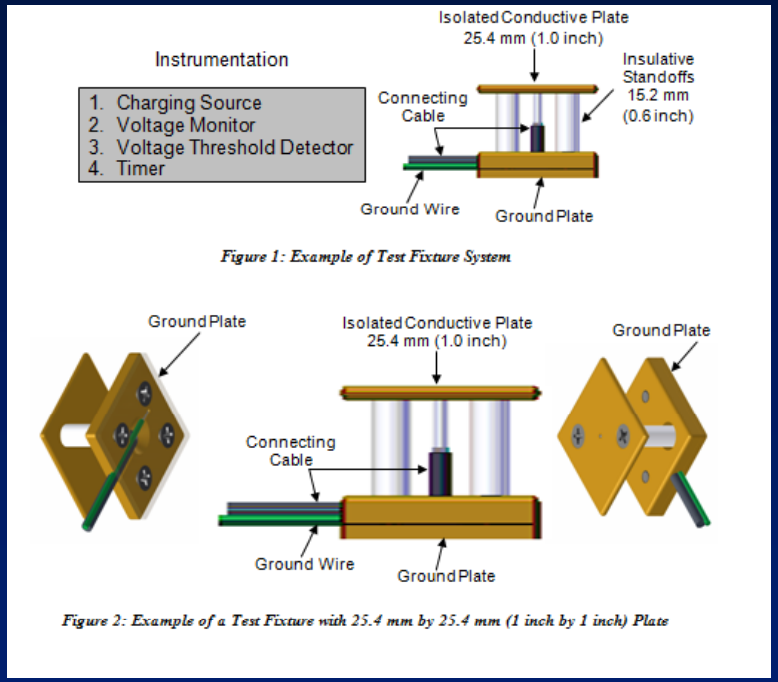
* Some single wire constant monitor systems measure parameters other than resistance.

Ionization WG-3
ANSI/ESD STM3.1, ANSI/ESD SP3.3, 3.4

ANSI/ESD STM3.1 is in Review right now – some changes in test instruments coming – to include Voltage Follower type Charge Plate Monitors that did not exist when the original method was devised

ANSI/ESD SP 3.3 is in final stages of revision approval – no major changes – Grammar and terminology adjustments

WIP 3.4 – Small Plate



WIP 3.4 – Small Plate is out for Industry review

Worksurfaces WG-4
ANSI/ESD S4.1, STM4.2

STM4.2 – Minor revision - wording

S4.1 will be changed to STM4.1 in next revision – test values and specs in S20.20

Addition of carts, shelving and conveyor systems to worksurfaces since measurement method is the same

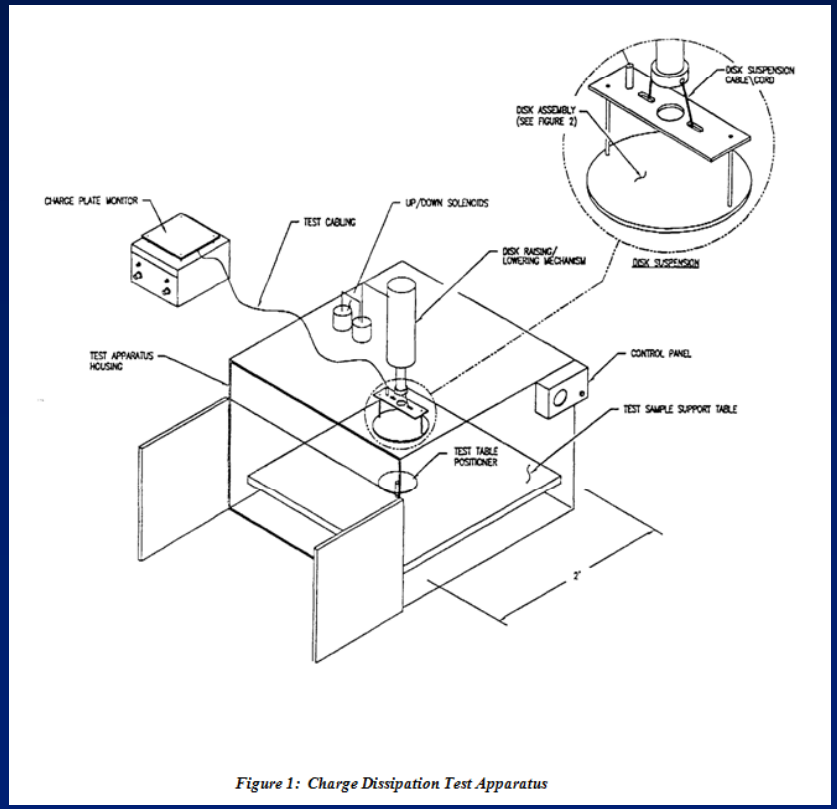


Figure 1: Charge Dissipation Test Apparatus

Device Testing WG5

Many Documents – Not covered here

- HBM – Joint JEDEC ESDA document
  - ANSI/ESDA/JEDEC JS-001
- CDM – Working on a Joint Standard
- MM – Changed designation to STM – not used for device qualification
- TLU – No STM – 3 TR's published
- TLP – No changes at this time – start review of VFTLP soon

Grounding WG6

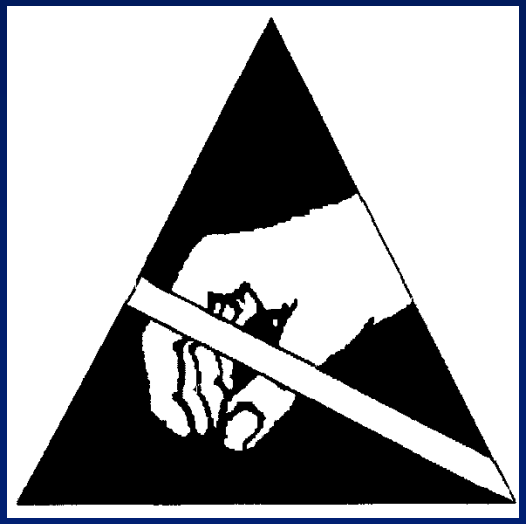
- No changes – up for revision next year
  - Minor changes expected to reflect test procedure updates and application information from users

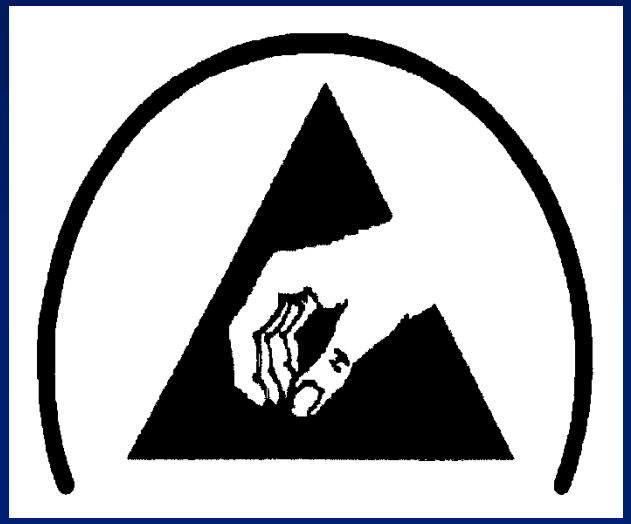
Flooring WG7
ANSI/ESD S7.1

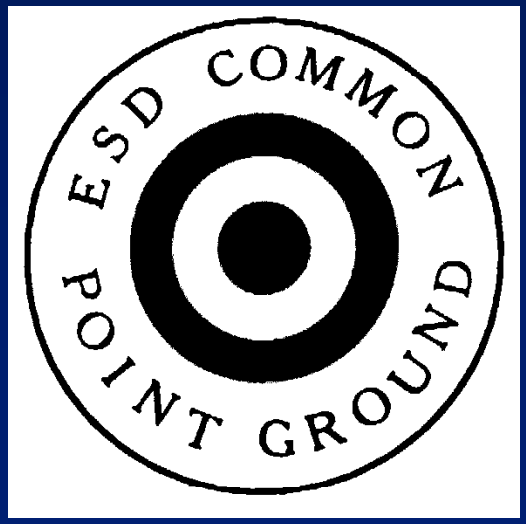
- Changing to a STM, values in S20.20
- Reports raw resistance measurement
- Grammar and structure changes
- Methods stay the same

Symbols – WG8
ANSI/ESD S8.1

- Minor revision to text
- Changes in Foreword
- No technical implications



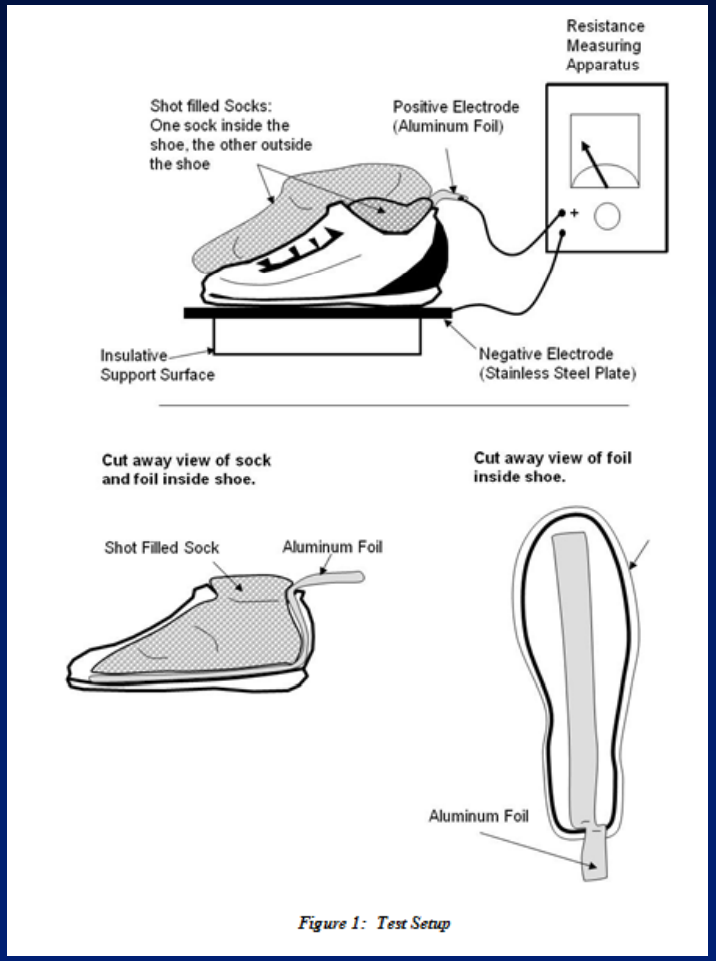




Footwear – WG9
ANSI/ESD STM9.1, SP9.2

STM9.1 – main change is in the conditioning time for shoes – to 72 hours from 48 hours

Improved diagrams



Handlers - WG10
ANSI/ESD SP10.1

- Going into review now – Looking for additional members (here is a great opportunity to participate)
- Adding Contact Voltmeter to test equipment and test methods

WIP 10.2

- WG is developing a test procedure to evaluate discharge events that occur inside automated handlers

Packaging – WG11
ANSI/ESD STM11.11, 11.12. 11.13, 11.31
ANSI/ESD S541, ESD S11.4

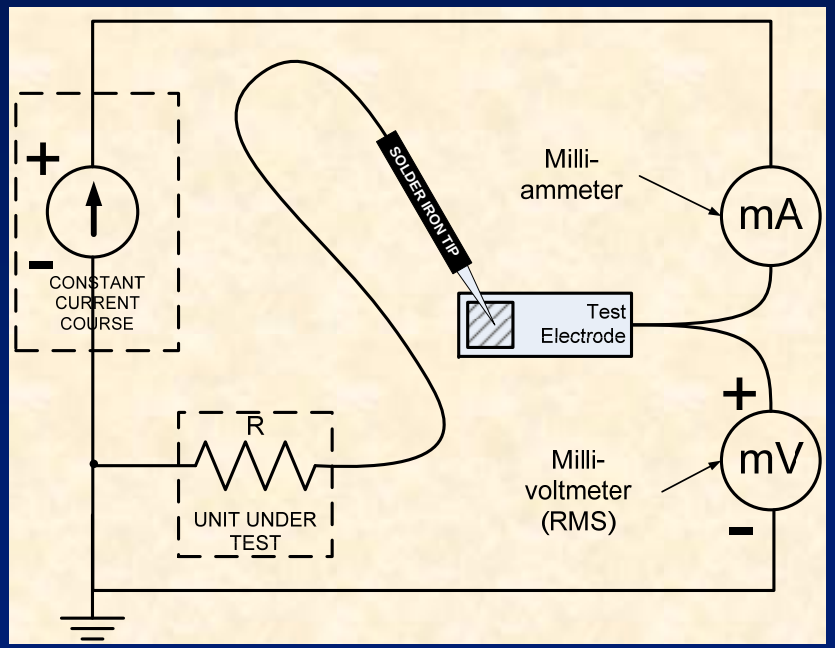
- Almost all the 11.xx documents are in a state of revision
- No significant changes in STM11.11 or STM11.12 – reaffirmation in September 2012
- Technical change to STM11.13 – specimen support surface
- ANSI/ESD S541 review is in progress
- New document S11.4 – Commercial Static Control Bag document (Commercial version to help with references when MIL PRF 81705 comes up in contract discussion)

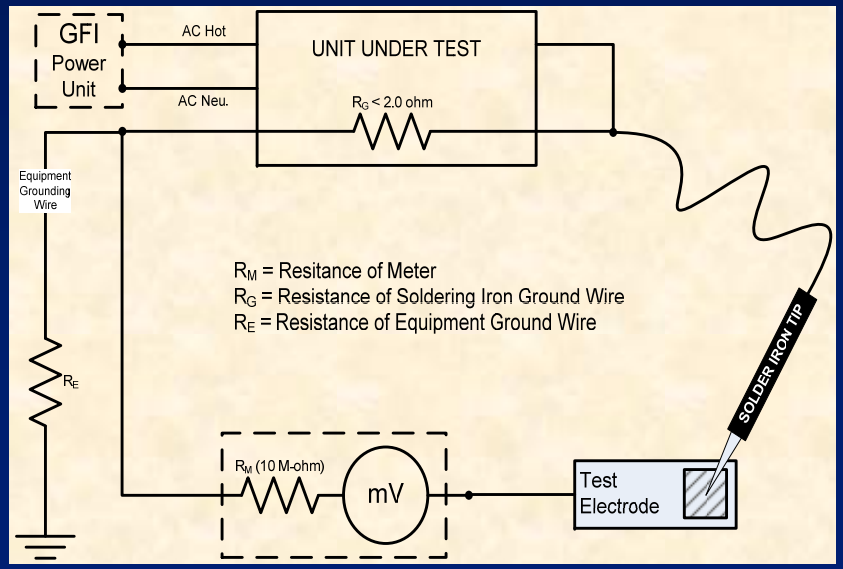
Seating – WG12
ANSI/ESD STM12.1

- Many technical changes to the document that are having an affect on release date. Going through another review now
- Specimen support surface changes; metal plate for chair caster to rest on for measurement also on top of support surface
- Lower limit discussion revised to allow for end-user definition

Hand Tools – Soldering Irons WG13 ANSI/ESD STM13.1

- Many changes coming in Soldering Irons – a lot of work to add RF type soldering irons to the test procedures (to make sure the test procedures work with RF devices too)



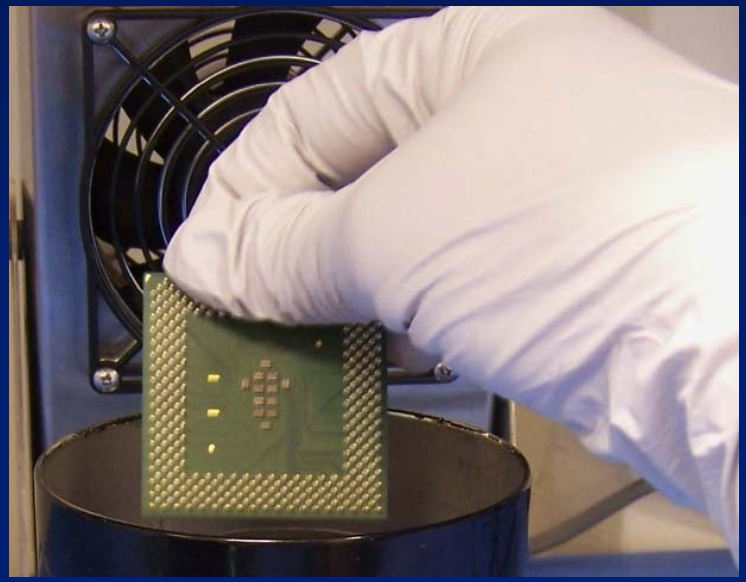


ESD Simulators – WG14
ANSI/ESD STM14.1

- Revision of 14.1 completed – no major changes
- Trying to merge 14.3 - Radiation from ESD Simulators and WIP14.4 – Measurement of Cable Discharge Events

Gloves – WG15
ANSI/ESD SP15.1, 15.2

- New Gloves resistance method SP15.1 document released last year
- 15.2 is a triboelectric test method for gloves and finger cots – uses Faraday Cup – Nano Coulombmeter for charge measurements – 2nd Vote by Mail



WG 16 - Workstations

- A revision of ADV53 (Workstations) is in progress but whether or not this document is needed is up in the air.
- The WG also owns the work on TR53 which is the Compliance Verification document used in conjunction with S20.20. The extra Workstation document may not be needed.
- TR53 is an important document and is used in establishing and maintaining an ESD Control Program according to S20.20 – reviewed and updated as needed

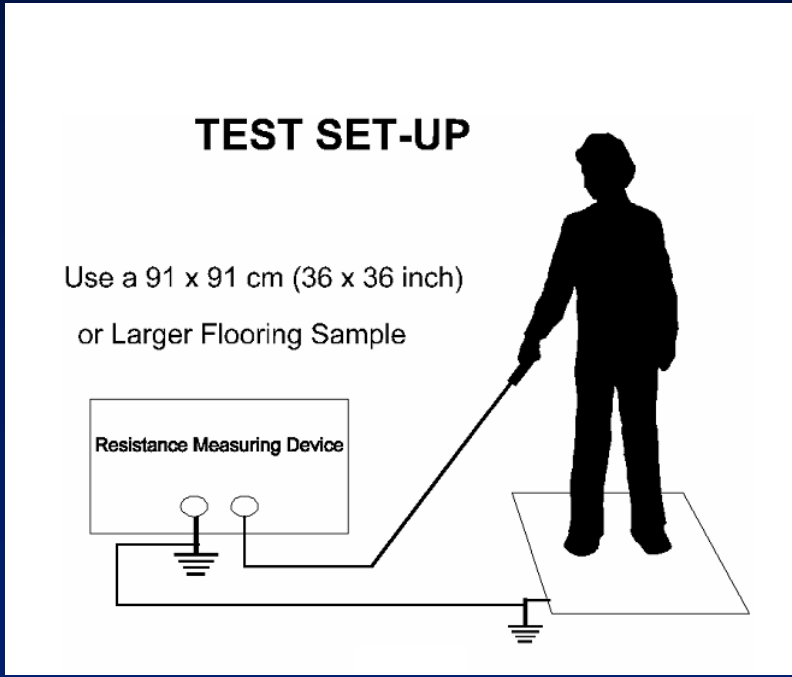
WG 17
Process Assessment

- Working Group is still in discussion mode
  - Initial document will take some time to produce as there are a lot of opinions on what to do, how to do it and the meaning of the results
    - Electrical field measurements
    - Radiated emissions from an ESD event
    - Charge measurements
    - Contact Voltage measurements
    - Electrical resistance measurements

WG 17
Process Assessment

- Reviewing published information from various authors to gather procedures used by consultants and other practitioners
- Developing process assessment flow-charts for HBM and CDM
  - Aid in understanding what to measure and where in any given process

Flooring/Footwear – WG97
ANSI/ESD STM97.1, STM97.2



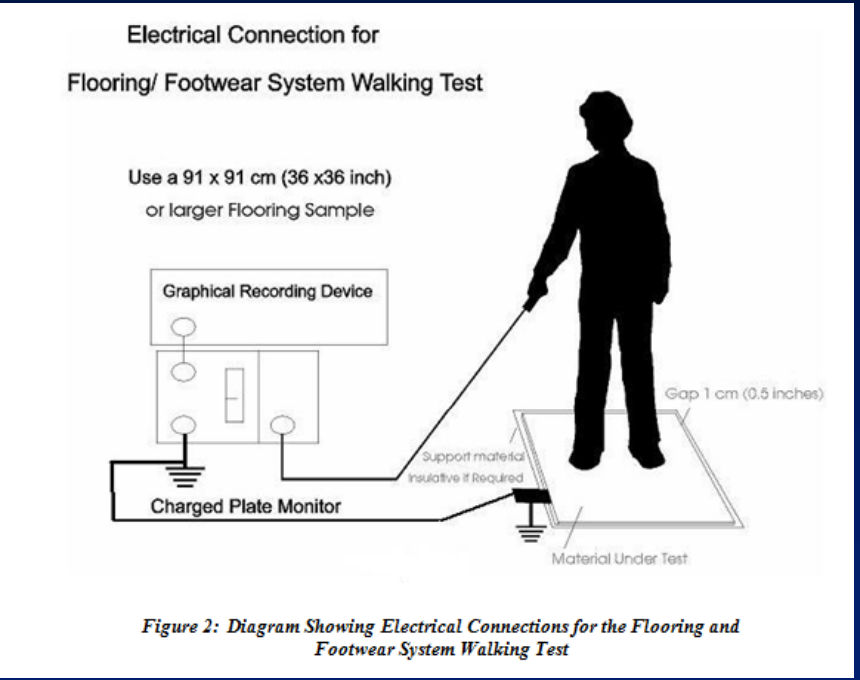


Figure 2: Diagram Showing Electrical Connections for the Flooring and Footwear System Walking Test

Two very important test methods for evaluation of the interaction of personnel with flooring. Both procedures are in the 5 year review process.

ESD Control Program – WG20.20
ANSI/ESD S20.20

- Quite a few text changes – wording improvements
- Change in Electrical Field requirements;
  - >2000 volts @ 1 inch keep 30 cm (12 inches) away or reduce Field Strength
  - >125 volts @ 1 inch keep >2.54 cm (1 inch) away or reduce Field Strength
- Change in Floor and Footwear qualification
  - Method 1 is removed – use Method 2
    - <1 x 10^9 ohms RTG AND <100 Volts ANSI/ESD STM97.2

Wrap-Up

- If you use ESD Association documents or plan to do so, this would be a great year to get the Standards Subscription
  - All new documents
  - MANY revised documents in the next year (there will be lots of them!!)
- Buy a Subscription – Great Value right now!!
  - Worth getting in line and waiting at the ESDA booth out front!!