June 2025 Standards Summary Session

Additional Information

- For more information on the Standards Business Unit and the standards development process, please visit https://www.esda.org/standards/standards-working-groups/#references > Standards Development Presentation.

- A copy of these slides will be posted on our website https://www.esda.org/standards/standards-working-groups/#references > Standards Activity Summaries.

- For more information on recent WG activities, please visit https://www.esda.org/standards/standards-working-groups > Committees Drop Down Menu.

WG 2 – Garments

Currently published documents

- ANSI/ESD STM2.1-2018 Garments
- ESD TR2.0-01-00 - Consideration for Developing ESD Garment Specifications
- ESD TR2.0-02-00 - Static Electricity Hazards of Triboelectrically Charged Garments

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Discussed a high-level overview of the document's 5-year review status. Target for release – 2026
- WG finalized open questions on clamp method/setup, environmental conditioning, leads contacting garments, and removing Annex C.
- WG will have full review this summer with target to adjudicate comments at the September meeting.

WG 3 - Ionization

Published Documents

- ANSI/ESD STM3.1-2024 - Ionization
- ANSI/ESD SP3.3-2016 - Periodic Verification of Air Ionizers
- ANSI/ESD SP3.4-2016 - Periodic Verification of Air Ionizers Using a Small Test Fixture
- ANSI/ESD SP3.5-2020 - Air Assist Bar Ionizers, Soft X-Ray (Photon) Ionizers, Room Ionization Alternatives, and Non-Airflow Alpha Ionizers

Summary of discussions/activities/document reviews during the most recent WG meeting:

- Reviewed single-lab data from 3 labs with 5+ different types of CPM's – repeatability using current industry standard CPM's is quite good.
- Brainstormed the purpose of the document and how it affects our short-term plans. Likely STM3.1 will turn into an Instrument design document (as it currently looks), and a test method for ionizing blowers. Test patterns and other ionizer types will likely be moved to an appendix or standard practice.
- Plans for doing a round-robin test were discussed and brainstormed. 6 labs volunteered to test three blowers. We hope to have this testing mostly completed by the September meetings.

WG 4 – Worksurface

Currently published documents

- ANSI/ESD STM4.1-2017 - Worksurfaces – Resistance Measurements
- ESD TR4.0-01-02 - Survey of Worksurfaces and Grounding Mechanisms

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Reviewed the History of the Technical Report on Conveyors – Resistance Measurements: Why are we doing it, and the current status.
- The focus of the meeting was to continue the work on the Technical Report.
- Discussion on the different conveyors and what to include regarding each one, such as:
  - How the ESDS are being transported on the conveyor,
  - What is the risks of the different types of conveyor being used,
  - What resistance measurements are done and how to perform these measurements
  - How to mitigate the risk.

WG 5 – Device Testing

Currently published documents

- ANSI/ESD SP5.0-2023 - Reporting ESD Withstand Levels on Datasheets

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Review of failure criteria within the JS-001 and JS-002 docs
  - Finalized failure criteria text to be used within the next revision of JS-001 and JS-002 standards
  - Sent to JWGs for review
- Step Stressing Risks
  - Finalized text for risks of step stressing, including ATE testing at beginning and end of step stressing to be inserted into JTR-001 and JTR-002
  - Sent to JWGs for review
- Walk-on Topics
  - Addressed a walk on topic regarding 8kV HBM testing with ideas on how to address and pushed to HBM JWG for final disposition
- Technical report on curve tracing
  - No progress on curve tracing TR, plan to setup a call before September with writing team

JWG HBM

Currently published documents

- ANSI/ESDA/JEDEC JS001-2023 - Human Body Model (HBM) – Device Level
- ESD JTR001-01-12 – User Guide of ANSI/ESDA/JEDEC JS-001 Human Body Model Testing of Integrated Circuits
- ANSI/ESD SP5.1.3-2022 - Human Body Model (HBM) – A Method for Randomly Selecting Pin Pairs
- ANSI/ESD SP5.1.4-2024 – Random Supply Sampling (two-channel tester)

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Summary of changes to JS-001
- Cloned IO pin method – is it valid?
- 2 terminal testing – is it adequately covered in JS-001
- Testing of already qualified but repackaged product
- Tester artifacts – are they adequately discussed in our publications
- Status of old SP5.1.1 and SP5.1.2

JWG CDM

Currently published documents

- ANSI/ESDA/JEDEC JS-002-2022 – Charged Device Model (CDM) – Device Level
- ESDA/JEDEC JTR002-01 – CDM User Guide
- ANSI/ESD SP5.3.3-2018 – Low Impedance Contact CDM (LICCDM)
- ANSI/ESD SP5.3.4-2022 – Capacitively Coupled Transmission Line Pulsing as an Alternative CDM Characterization Method
- ESD TR5.3.1-01-18 - Contact Charged Device Model (CCDM) Versus Field Induced CDM (FICDM) A Case Study

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Bare die testing ESD TR5.3.1-02-2X
  - Plan to finalize the document by September and send it to TAS in October
  - Debating comments review during the meeting

Cont. on next slide

JWG CDM

- WG discussion on contact methods.
  - Both LI-CCDM and CC-TLP can be used when it is not possible to use FI-CDM (e.g., small pitches, low voltage).
    - This does not mean they are 100% equivalent to FI-CDM, but they are the best choices in certain situations.
  - They will not be incorporated into JS002, but there will be a reference to STMs in the document.
  - To move SPs to STM, the WG shall conduct an RR:
    - The WG must agree if the RR data are sufficient to guarantee that the method is repeatable and reproducible.
    - While evaluating RR data, the WG shall also take published data into account.
    - TAS needs to review the round robin results and statistician recommendation.

Cont. on next slide

JWG CDM

- CC-TLP Round Robin Experiment.
  - Test one part up to failure
    - Inconsistencies were observed in the data (failure level and failure electrical signature).
  - Next Step
    - Infineon to further verify the expected failure spread and better define failure detection criteria.
    - Review the measurement setup to verify systematic deviations (@100V) on open/short.
- LI-CCDM Round Robin Experiment.
  - Previous RR data were insufficient to move LI-CCDM to STM.
  - New RR using the same parts already available for the CC-TLP RR.
    - Failure criteria should be defined to correlate with the CC-TLP signature or a new one. In the latter case, no information will be available on the CC-TLP vs. LI-CCDM relationship.
  - RR shall begin after the ongoing CC-TLP RR.
  - A single-lab experiment can be initiated to verify repeatability.
- AEC 3-zap vs. 1-zap CDM. HBM alignment to ESDA/JEDEC standards
  - Plan to schedule a meeting before September symposium with Q100 committee chair to get approval to reform the CDM subcommittee

WG 5.5 – Transmission Line Pulse (TLP)

Currently published documents

- ANSI/ESD STM5.5.1-2022, the standard test method for (VF-)TLP
- ESDTR5.5-04-23, the user and application guide for (VF-)TLP
- ESDTR5.5-05-20, technical report on transient analysis with TLP
- 3 older technical reports

Summary of discussions/activities/document reviews:

- Draft TR on Statistical Application of TLP was reviewed. 260 comments from 13 respondents. 18 selected comments discussed and agreed. All comments to be processed for next update.
- An board swap experiment was done to analyze difference in results between 2 labs. Results remained identical, proving that boards are identical. Discussion lead to hypothesis that difference in the initial part of the rising edge for the 2 TLP systems might lead to the different results. Simulations will be done to verify this hypothesis.
- S-parameter data from Qorvo on DUT board shows unexpected behavior for capacitors. Similar measurements by NXP were as expected. Further verification and comparison with STM data are planned.

WG 7 - Flooring

Currently published documents

- ANSI/ESD STM7.1-2020 – Flooring Systems – Resistive Characterization
- ESD TR7.0-01-23 – Protective Flooring Systems

Summary of discussions/activities/document reviews during the most recent WG meeting.

- A revision of STM7.1 was generated based on decisions made at our first meeting on this activity and changes were made based on group comments and discussion. That revised draft was sent to TAS for a first round of TAS comments. TAS comments were received prior to this meeting for adjudication.

Cont. on next slide

WG 7 - Flooring

- The TAS comments included a number of items that needed to be discussed by the group. At this meeting we completed discussion on many of those comments including
  - Discussed – proposed changes to scope – Moved 1st line of Forward to 1st line of Scope
  - Simplified Scope to a single statement.
  - Discussion on upper limit number – should it be included somewhere in the scope (or note) – note was amended to include high end value.
  - Discussion on whether the application (1.3) is needed. – WG decision to remove
  - Discussion – clarifying definition of resistance measurements of conductive flooring (adding point to ground). WG decision not to include.
  - Discussion on the note about AC line resistance note: keep or remove? WG decision is to remove.
  - Discussion about verification or calibration of meters use – WG decision is to leave statement as currently written.
  - Discussion on specimen preparation section. No new text, just re-organization of information. Clarified terms of cleaning prior to environmental (humidity) conditioning.
  - Discussed about isolating leads – note is for information only
  - Discussed about how the testing steps were cleaned up for accuracy of completion. (suggested to remove steps on de-energizing meter at certain steps.)
  - Reviewed changes to reporting document – WG decided that the new form is ok. Do need to review wording for consistency for what data should be obtained.

WG 11- Packaging

Currently published documents:

- ANSI/ESD S11.4 – Bags
- ANSI/ESD STM11.11 and 11.12 – Surface and Volume Resistance
- ANSI/ESD STM11.13 – Two-Point Probe
- ANSI/ESD S541 – Packaging
- ANSI/ESD STM11.31 – Bags – Discharge Shielding

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Final review of WG comments for STM11.31 – mostly editorial, a few comments needed more discussion.
- Review suggested changes to STM11.13
- Started the 5-year review of STM11.11 and STM11.12

WG 13 – Hand Tools

Currently published documents

- ANSI/ESD S13.1-2019 - Electrical Soldering/Desoldering Hand Tools
- ESD TR13.0-01-99 - EOS Safe Soldering Iron Requirements

Summary of discussions/activities/document reviews during the most recent WG meeting.

- WG agrees that redesignation of ANSI/ESD S13.1 to a standard test method (STM) is useful; all limits are defined in ANSI/ESD S20.20. However, ANSI/ESD S13.1 may be fast-tracked into IEC TC101, and as IEC 61340-5-1 does not define limits for soldering/desoldering irons, WIP13.1 will remain a standard (S) for the moment. It will be redesignated later (no round-robin required).
- WG discussed comments from its review of WIP13.1. Main technical concern: The accuracies defined for the instruments do not match verification procedures and are not aligned between procedures; verification procedures in the document and the Annex are not aligned. Document needs significant rework.
- WG highlights the increased importance of battery-operated soldering/ desoldering irons and other battery-powered hand tools. Discussion will be continued after submission of WIP13.1 to TAS.

WG 14 – System Level

Currently published documents

- **TR14.01** Calculation of Uncertainty Associated With Measurement of Electrostatic Discharge (ESD) Current (Formally TR-07-00)
- **TR14.02** System Level Electrostatic Discharge (ESD) Simulator Verification (Formally SP14.1)
- **SP14.5** Near Field Immunity Scanning - Component/Module/PCB Level (EMC/ESD Scanning)

Summary of discussions/activities/document reviews during the most recent WG meeting.

- SP14.5 EMC Scanning, 5-year review
  - WG was asked to review the document to see what issues may exist in the present document and comments were reviewed during the meeting
  - Focus was on the Technical comments, to determine whether they would affect the usage of the document to determine whether they should be made
  - Test equipment manufacturers and SP users are going to be contacted and asked to review the comments to determine whether changes would improve the document

Cont. on next slide

WG 14 – System Level

- WG discussed the System Level Direct PIN ESD (SL-DPE) survey by the Industry Council and they're request for WG14 to work on a test method.
  - WG decided additional inputs would be required from the Council before work could be done on the development of a test method
  - During discussions, references to other direct pin injection test methods were brought up.
    - IEEE Std C62.38-1994, IEEE Guide on Electrostatic Discharge (ESD): ESD Withstand Capability Evaluation Methods (for Electronic Equipment Subassemblies)
    - ANSI/IEEE C63.16-2016, American National Standard Guide for Electrostatic Discharge Test Methodologies and Acceptance Criteria for Electronic Equipment
  - WG intends to review the above mentioned documents to determine whether these methods could be used as a basis for a new method development

WG 17 – Process Assessment

Currently published documents

- ANSI/ESD SP17.1, “Process Assessment Techniques” (2020)
- ANSI/ESD SP10.1, “Automated Handling Equipment (AHE)” (2016)
- ESD TR17.0-01-15, “For ESD Process Assessment Methodologies in Electronic Production Lines – Best Practices Used in Industry” (2015)

Summary of discussions/activities/document reviews during the most recent WG meeting.

- ANSI/ESD SP17.1 Rev. 2:
  - WG continued discussion of the comments from the TAS review, encompassing comments accepted by the IEC TC101 WG5, totaling 214 comments.
  - WG completed the adjudication of comments and plans to return the document to TAS by the end of June 2025.

Cont. on next slide

WG 17 – Process Assessment

- ANSI/ESD SP17.2 “Process Assessment of Electrical Disturbances”:
  - WG agreed to focus on “ground noise” first. A Writing Team has been established; further volunteers are welcome.
- Technical Report on Application of ANSI/ESD SP17.1:
  - Will be a teaching document on accomplishing ANSI/ESD SP17.1 assessments.
  - Reviewed and agreed upon the basic outline of the document content and the timeline.
  - Document timeline:
    - WG agreed on the outline of the document, with drafts of contributions expected by September 2025.
    - WG review will start in December 2025.

WG 18 – EDA

Currently published documents

- ESD TR18.0-01-14 ESDA Technical Report for ESD Electronic Design Automation Checks
- ESD TR18.0-02-20 ESDA Technical Report for Latch-Up Electronic Design Automation

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Bi-weekly virtual meetings
- New version of ESD TR18.0-01
- Cooperation with WG22 to new version of TR22.0-02
- Contribution in ESD Roadmap 2026
- Participation in 3D Integration and Advanced Packaging Task Team

Cont. on next slide

WG 18 – EDA

- New version of ESD TR18.0-01:
  - revised draft – submitted to TAS on June 16th (completed all 1st TAS review requests)
- Cooperation with WG22 to new version of TR22.0-02 (ESD parameters from IP providers)
  - contributed to chapter 8.0 FULL EDA CHECK ENVIRONMENT
- Participation in new 3D Integration and Advanced Packaging Task Team
  - WG18 interfaces included in task team and attending its periodic meetings
- Contribution in ESD Roadmap 2026
  - Added AI-DRIVEN EDA VERIFICATION as emerging method
  - Added updates in ML applications in SPICE modeling for ESD simulations
  - Added updates in standard ESD compact models creation

WG 19 – High Reliability

Currently published documents

- ESD TR19.0-01-22 Protection of High-Reliability Electrical and Electronic Parts, Assemblies, and Equipment (Excluding Electrically Initiated Explosive Devices)

Summary of discussions/activities/document reviews during the most recent WG meeting.

- The majority of the meeting was spent reviewing the submitted comments to the draft of SP19 and how those comments were incorporated into the document. Discussions during this review led to developing a couple of task teams:
  - A task team to develop a table outlining the types of ESD packaging available and their applications in an ESD control program
  - A task team to discuss failure analysis criteria and guidance

Cont.on next slide

WG 19 – High Reliability

- Following review of the current draft and submitted comments, a writing team was developed to begin the initial draft of the document. The approach to developing this document will include the following key points:
  - Requirements will be pulled from current draft and organized using Excel
  - Each requirement will include additional information such as “Risk Factor Mitigated”, “Justification or Rationale”, “Evidence or Documentation”, and “Target of Requirement”.
  - Document will include “shall” statements primarily for administrative or quality management system requirements to be considered a “high reliability” ESD control program while most technical requirements will be “should” statements to identify an industry best practice or recommendation.
  - Writing team will aim to have draft requirements to review at September meeting series
- The working group will continue to accept comments via the focused spreadsheet throughout the early phase of the document development.

WG 26 – System Level ESD Models

Currently published documents

- ESD TR26.0-01-23 – Behavioral IC Modeling to Perform System Level ESD Simulations – General Description and Trends
- ESD TR26.0-02-24 – Quasistatic Model Definition – Building Model

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Measurement data is complete
- Simulations are ongoing, other SEED models should be tested, too. But there are resources problems
- Writing of the document TR26.02 revised could start.

WG 97 – Footwear/Flooring

Currently published documents

- ANSI/ESD STM97.1-2025 - Footwear/Flooring System – Resistance Measurement in Combination with a Person
- ANSI/ESD STM97.2-2016 - Footwear/Flooring System – Voltage Measurement in Combination with a Person

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Working Group (WG) completed the review of TAS comments that been put on hold. With the new formatting being used for the STM a number of the comments were covered.
- The WG reviewed the document with the new format and the changes to the purpose, scope and basic edits and clarifications. Performed wordsmithing of sections as needed.
- Updates of the test equipment section to the new boilerplate statements. Update to the section 6.3.1 on the floor sample test points for newly installed or existing static control flooring to make if more clear.

Manufacturing Task Team

Currently published documents

(no document – decisions included in other documents and ESDA Style Manual)

Summary of discussions/activities/document reviews during the most recent WG meeting.

- Manufacturing TT approved suggestions for minor editorial changes in boilerplates for
  - Resistance measurement apparatus;
  - Resistance measurement electrode;
  - Specimen support surface.
- Annex A.1 (“Verification of Measurement Set-up – Verification of Resistance Measurement Apparatus”): A minimum of two resistances should be used for meter verification: one with the lowest resistance range of the meter and another with the highest resistance range as defined in the meter specification. Reason: Cover the entire specified resistance range of the meter.

Cont. on next slide

Manufacturing Task Team

- Manufacturing TT suggests replacing “electrification time” in the resistance measurement procedure with “… until measurement stabilizes” in documents where electrification time is not defined.
- Manufacturing TT initiated a discussion regarding the accuracy of measurement and equipment, which is not clearly defined in most current documents. This discussion will continue during the September 2025 Meeting Series.

Our next meeting is during the meeting series on September 8-12, 2025, in Riverside, CA. The full meeting schedule is available on the website under Events.