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ESD Standards - At a Glance.

For establishing an ESD control program plan and to implement ESD protective measures in an Electrostatic Discharge Protected Area (EPA) it is important to follow international ESD standards.

The new version of the IEC 61340-5-1 Ed. 1.0 (2007-08) applies to activities that manufactures, process, assemble, install, package, label, service, test, inspect, transport or otherwise handle ESDS (Electro Static Discharge Sensitive Devices) susceptible to damage by electrostatic discharges greater or equal to 100 V according to the Human Body Model (HBM).

RECOMMENDED INTERNATIONAL STANDARDS

ESD Standard:	Description:
IEC 61340-5-1 ed. 1.0 (2007-08)	Electrostatics - Part 5-1: Protection of electronic devices from electrostatic phenomena - General requirements.
IEC/TR 61340-5-2 ed. 1.0 (2007-08)	Electrostatics - Part 5-1: Protection of electronic devices from electrostatic phenomena - User Guide .
ANSI/ESD S20.20-2007 (2007-03)	ESD association standard for the Development of an Electrostatic Discharge Control Program for - Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Exposed Devices).
IEC 61340-4-1 ed. 2.0 (2003-12)	Electrostatics Part 4-1: Standard test method for specific applications - Electrical resistance of floor coverings and installed floors.
IEC 61340-4-3 (2001-08)	Electrostatics Part 4-1: Standard test method for specific applications - Footwear.
IEC 61340-4-5 (2004-07)	Electrostatics Part 4-1: Standard test method for specific applications - Methods of characterizing the electrostatic protection of footwear and flooring in combination with a person.
IEC 61340-2-1 (2002-06)	Electrostatics Part 2-1: Measurements methods - ability of materials and products to dissipate static electric charge.
IEC 61340-2-3 (2000-03)	Electrostatics Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation.
IEC 61340-3-1 ed. 2.0 (2006-12)	Electrostatics - Part 3-1: Methods for simulation of electrostatic effects - Human body model (HBM) electrostatic discharge test waveforms.
IEC 61340-3-2 ed. 2.0 (2006-12)	Electrostatics - Part 3-2: Methods for simulation of electrostatic effects - Machine model (MM) electrostatic discharge test waveforms.

NEW STANDARDS

ESD Standard:	Description:
IEC 61340-4-6 (2010-01)	Electrostatics - Part 4-6: Standard test method for specific application -Wrist straps .
IEC 61340-4-7 (2010-01)	Electrostatics - Part 4-7: Standard test method for specific application -Ionization.
IEC 61340-4-8 (2010-01)	Electrostatics - Part 4-8: Standard test method for specific application - Discharge shielding - Bags.
IEC 61340-4-9 (2010-01)	Electrostatics - Part 4-9: Standard test method for specific application - Garments .
IEC 61340-5-3 (2010-03)	Electrostatics - Part 5-3: Protection of electronic devices from electrostatic phenomena - Properties and requirements classification for packaging intended for discharge electrostatic sensitive devices.



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ESD ASSOCIATION STANDARDS

ANSI ESD S1.1:1998-Evaluation, acceptance, and functional testing of wrist straps.
ANSI ESD S4.1:1997-Work surfaces-Resistance measurements.
ANSI ESD STM5.1:2001-Electrostatic discharge sensitivity testing-Human body model.
ANSI ESD S6.1:1999-Grounding-Recommended practice.
ANSI ESD S8.1:2001-ESD awareness symbols.
ANSI ESD S20.20:1999-Standard for the development of an ESD control program.
ANSI ESD STM2.1:1997-Resistance test method for electrostatic discharge protective garments.
ANSI ESD STM3.1:2000-Ionization.
ANSI ESD STM4.2:1998-Work surfaces-Charge dissipation characteristics.
ANSI ESD STM5.2:1999-Electrostatic discharge sensitivity testing-Machine model.
ANSI ESD STM5.3.1:1999-Charged device model (CDM)-Component level.
ANSI ESD STM9.1:2001-Resistive characterization of footwear.
ANSI ESD STM11.11:2001-Surface resistance measurement of static dissipative planar materials
ANSI ESD STM11.12:2000-Volume resistance measurement of static dissipative planar materials.
ANSI ESD STM12.1:1997-Seating-Resistive characterization.
ANSI ESD STM11.31:2001-Evaluating the performance of electrostatic discharge shielding bags.
ANSI ESD STM97.1:1999-Floor materials and footwear-Resistance in combination with a person.
ANSI ESD STM97.2:1999-Floor materials and footwear-Voltage measurement in combination with a person.
ESD S541:2003-Packaging materials for ESD sensitive items.
ESD SP9.2:2003-Foot grounders-Resistive characterization.
ESD SP3.3:2000-Periodic verification of air ionizers.
ESD SP10.1:2000-Automated handling equipment.
ESD STM7.1:2001-Floor materials-Resistive characterization of materials.
ESD STM13.1:2000-Electrical soldering and desoldering hand tools.

ESD ASSOCIATION ADVISORY DOCUMENTS

ESD ADV1.0:2003-Glossary of terms.
ESD ADV3.2:1995-Selection and acceptance of air ionizers.
ESD ADV11.2:1995-Triboelectric charge accumulation testing.
ESD ADV53.1:1995-ESD protective workstations.

ESD ASSOCIATION TECHNICAL REPORTS

ESD TR 01:1999-Can static electricity be measured?
ESD TR 02:1999-High-resistance ohmmeters-

Voltage measurements.
ESD TR 03:1999-Glove and finger cots.
ESD TR 04:1999-EOS safe soldering iron requirements.
ESD TR 06:2000-Static electricity hazards of triboelectrically charged garments.
ESD TR 07:2000-Calculation of uncertainty associated with measurement of electrostatic discharge (ESD) current.
ESD TR 08:2000-Socket device model (SDM) tester.
ESD TR 09:2000-Transient-induced latch-up (TLU).
ESD TR 10-01-Machine model (MM) electrostatic discharge (ESD) investigation-Reduction in pulse number and delay time.
ESD TR 11-04-Electrostatic guidelines and considerations for cleanrooms and clean manufacturing.
ESD TR 12-01-Survey of constant (continuous) monitors for wrist straps.
ESD TR 13-02-Alternate techniques for measuring ionizer offset voltage and discharge time.
ESD TR 14-02-Measurement and ESD control issues for automated equipment handling of ESD sensitive devices below 100 V.
ESD TR 15-02-Survey of static control work surfaces and grounding mechanisms.
ESD TR 16-03-Voltage and energy susceptible device concepts, including latency considerations.
ESD TR 20.20-ESD handbook.

OTHER STANDARDS

AATCC 134:2001-Electrostatic propensity of carpets.
AFLCR 65-8:1998-Maintenance-Engineering and supply: Electrostatic discharge (ESD) control program.
ANSI C37.06:2000-American national standard for switchgear-Ac high-voltage circuit breakers rated on a symmetrical current basis-Preferred ratings and related required capabilities.
ANSI C37.06.1:2000-American national standard trial-use guide for high-voltage circuit breakers rated on a symmetrical current basis-Designated "Definite purpose for fast transient recovery voltage rise times."
ANSI C37.16:2000-American national standard for switchgear-Low-voltage power circuit breakers and ac power circuit protectors-Preferred ratings, related requirements, and application recommendations.
ANSI C37.17:1997-American national standard for trip devices for ac and general-purpose dc low-voltage power circuit breakers.
ANSI C37.22:1997-American national standard preferred ratings and related required capabilities for indoor ac medium-voltage switches used in metal-enclosed switchgear.
ANSI C63.14:1998-American national standard dictionary for technologies of electromagnetic compatibility (EMC), electromagnetic pulse (EMP), and electrostatic discharge (ESD)-Dictionary of EMC/EMP/ESD terms and definitions.
ANSI C63.16:1993-American national standard guide for electrostatic discharge test methodologies and criteria for electronic equipment.
ANSI T1.308:1996 (R2002)-Central office equipment-Electrostatic discharge immunity requirements.
ASTM D257:1999-Standard test methods for dc resistance or conductance of insulating materials.
ASTM D991:1989 (R2000)-Standard test method for rubber properties-Volume resistivity of electrically conductive and antistatic products.
ASTM D2679:1978-Standard test method for electrostatic charge.
ASTM D5077:1990 (R2003)-Standard terminology relating to ESD packaging materials.
ASTM E1549:1993 (R2000)-Standard specification for ESD-controlled garments required in cleanrooms and controlled environments for spacecraft for nonhazardous and hazardous operations.
ASTM E2042:2004-Standard practice for cleaning and maintaining controlled areas and cleanrooms.
ASTM F150:1998-Standard test method for electrical resistance of conductive and static dissipative resilient flooring.
ASTM F1812:2002-Standard test method for determining the effectiveness of membrane switch ESD shielding.
BS 6654:1985 (R1996)-Method for determination of the electrical resistivity of textile floor coverings.
BS EN 1149-1:1996-Protective clothing- Electrostatic properties-Surface resistivity (test methods and requirements).
BS EN 1149-2:1997-Protective clothing-Electrostatic properties-Test method for measurement of the electrical resistance through a material (vertical resistance).
BS EN 1718:1999-Light conveyor belts-Test method for the measurement of the electrostatic field generated by a running light conveyor belt.
CECC 00015P1:1991-Basic specification for protection of electrostatic sensitive devices.
DI-RELI-80669A:1992-Electrostatic discharge (ESD) control program plan.
DI-RELI-80671A:1992-Handling procedures for electrostatic discharge (ESD) sensitive items.
EIA 471:1996-Symbol and label for electrostatic sensitive devices.
EIA 541-Packaging material standards for ESD sensitive items.
EIA 545:1989-Electromechanical switch test method for electrostatic discharge (ESD).
EIA 625:2000-Handling electrostatic discharge sensitive (ESDS) devices.
EN 61340-5-1:2001-Protection of electronic devices from electrostatic phenomena-General requirements.
EN 61340-5-2:2001-Protection of electronic devices from electrostatic phenomena-User guide.
EOS/ESD EP102:1988-Electrostatic discharge and electronic equipment: A practical guide for designing to prevent ESD problems.
EOS/ESD EP103:1990-ESD program management:



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A realistic approach to continuous, measurable improvement in static control.
EOS/ESD EP105:1995-ESD in silicon integrated circuits.
FTS 101C 4046-Electrostatic properties of materials.
IDEMA ESD1-00-MR and GMR heads-General practices for ESD control.
IEC 60255-22-2:Edition 2.0-Electrical relays-Part 22: Electrical disturbance tests for measuring relays and protection equipment-Section 2: Electrostatic discharge tests.
IEC 60297-5-103:1999-Plug-in unit electrostatic discharge protection for subtracks and associated plug-in units with extended features added to IEC 60297-3 and IEC 60297-4.
IEC 60455-3-11:1988-Solventless polymerizable resinous compounds used for electrical insulation-Specification for individual materials- Epoxy resin-based coating powders.
IEC 60748-2-8:1993-Specification for harmonized system of quality assessment for electronic components-Semiconductor devices-Integrated circuits-Blank detail specification: integrated circuit static read/write memories.
IEC 60801-2:1991-Electromagnetic compatibility for industrial-process measurement and control equipment-Electrostatic discharge requirements.
IEC 61000-4-2:1995 (R2001)-Electromagnetic compatibility (EMC)-Part 4: Testing and measurement techniques-Section 2: Electrostatic discharge immunity test.
IEC 61340-2-2:2000-Electrostatics-Part 2-2: Measurement methods-Measurement of chargeability.
IEC 61340-2-3:2000-Electrostatics-Part 2-3: Methods of test for determining the resistance and resistivity of solid planar materials used to avoid electrostatic charge accumulation.
IEC 61340-3-1:2002-Electrostatics-Part 3-1: Methods for simulation of electrostatic effects-Human body model (HBM)-Component testing (IEC/101/33/CD).
IEC 61340-3-2:2002-Electrostatics-Part 3-2: Methods for simulation of electrostatic effects-Machine model (MM)-Component testing (IEC/101/34/CD).
IEC 61340-4-1:1995-Electrostatics-Part 4-1: Standard test methods for specific applications-Section 1: Electrostatic behavior of floor coverings and installed floors.
IEC 61340-4-3:2001-Test method for the characterization of electrostatic protective footwear (IEC document 101/62/CD).
IEC 61340-5-1:1998-Electrostatics-Part 5-1: Protection of electronic devices from electrostatic phenomena-General requirements.
IEC/TS 61340-5-2:1999-Electrostatics-Part 5-2: Protection of electronic devices from electrostatic phenomena-User guide.
IEC/PAS 62162:2000-Field-induced charged device model test method for electrostatic discharge withstand thresholds of microelectronic components.

IEC/PAS 62179:2000-Electrostatic discharge (ESD) sensitivity testing human body model (HBM).
IEC/PAS 62180:2000-Electrostatic discharge (ESD) sensitivity testing machine model (MM).
IEEE 142:1991 (R1996)-IEEE Green Book (IEEE recommended practice for grounding of industrial and commercial power systems).
IEEE 1291:1993 (R1998)-IEEE guide for partial discharge measurement in power switchgear.
IEEE 1325:1996 (R2002)-IEEE recommended practice for reporting field failure data for power circuit breakers.
IEEE C37.04:2003-IEEE standard rating structure for ac high-voltage circuit breakers.
IEEE C37.010:1999-IEEE application guide for ac high-voltage circuit breakers rated on a symmetrical current basis.
IEEE C37.011:1994-IEEE application guide for transient recovery voltage for ac high-voltage circuit breakers rated on a symmetrical current basis.
IEEE C37.013:1997-IEEE standard for ac high voltage generator circuit breaker rated on a symmetrical current basis.
IEEE C37.081:1981 (R1988)-IEEE guide for synthetic fault testing of ac high-voltage circuit breakers rated on a symmetrical current basis; Supplement 081a:1997 to IEEE C37.081:1981.
IEEE C37.09:1999-IEEE standard test procedure for ac high-voltage circuit breakers rated on a symmetrical current basis.
IEEE C37.10:1995 (R2002)-IEEE guide for diagnostics and failure investigation of power circuit breakers.
IEEE C37.11:2003-IEEE standard requirements for electrical control for high-voltage circuit breakers rated on a symmetrical current basis.
IEEE C37.13:1990 (R1995)-IEEE standard for low-voltage ac power circuit breakers used in enclosures.
IEEE C37.14:2002-IEEE standard for low-voltage dc power circuit breakers used in enclosures.
IEEE C37.18:2003-IEEE standard for enclosed field discharge circuit breakers for rotating electric machinery.
IEEE C37.20.1:2002-IEEE standard for metal-enclosed low-voltage power circuit breaker switchgear.
IEEE C37.20.2:1999-IEEE standard for metal-clad and station-type cubicle switchgear.
IEEE C37.20.3:2001-IEEE standard for metal enclosed interrupter switchgear.
IEEE C37.20.4:2001-IEEE trial-use standard for indoor ac medium-voltage switches for use in metal-enclosed switchgear.
IEEE C37.20.6:2003-IEEE standard for 4.76 to 38 kV rated grounding and testing devices used in enclosures.
IEEE C37.21:1985 (R1998)-IEEE standard for control switchboards.
IEEE C62.11:1999-IEEE standard for metal-oxide

surge arresters for ac power circuits (>1 kV).
IEEE C62.22:1997-IEEE guide for the application of metal-oxide surge arresters for alternating current systems.
IEEE C62.23:1995 (R2001)-IEEE standard draft application guide for surge protection of electric generating plants.
IEEE C62.31:1987 (R1998)-IEEE standard test specifications for gas-tube surge-protective devices.
IEEE C62.32:1981 (R1998)-IEEE standard test specifications for low-voltage air gap surge protective devices (excluding valve and expulsion type devices).
IEEE C62.33:1982 (R2000)-IEEE standard test specifications for varistor surge-protective devices.
IEEE C62.34:1996 (R2001)-IEEE standard for performance of low-voltage surge-protective devices (secondary arresters).
IEEE C62.35:1987 (R2000)-IEEE standard test specifications for avalanche junction semiconductor surge-protective devices.
IEEE C62.36:2000-IEEE standard test methods for surge protectors used in low-voltage data, communications, and signaling circuits.
IEEE C62.37:2002-IEEE standard test specification for thyristor diode surge-protective devices.
IEEE C62.38:1994-IEEE guide on electrostatic discharge (ESD)-ESD withstand capability evaluation methods (for electronic equipment subassemblies).
IEEE C62.41:1991 (R1995)-IEEE recommended practice on surge voltages in low-voltage ac power circuits.
IEEE C62.42:1992 Draft (R1999)-IEEE guide for the application of gas tube and air gap arrester low-voltage (equal to or less than 1000 V rms or 1200 V dc) surge-protective devices.
IEEE C62.43:1999-IEEE guide for the application of surge protectors used in low-voltage (equal to or less than 1000 V rms or 1200 V dc) data, communications, and signaling circuits.
IEEE C62.47:1992 (R1997)-IEEE guide on ESD-Characterization of the ESD environment.
IEEE C62.48:1995 (R2000)-IEEE guide on interactions between power system disturbances and surge-protective devices.
IEEE C62.62:2000-IEEE standard test specifications for surge-protective devices for low voltage ac power circuits.
IEEE C62.64:1997-IEEE standard specifications for surge protectors used in low-voltage data, communications, and signaling.
IEEE C62.92.1:2000-IEEE guide for the application of neutral grounding in electrical utility systems-Part 1: Introduction.
IEEE C62.92.2:1989 (R2000)-IEEE guide for the application of neutral grounding in electrical utility systems-Part 2: Grounding of synchronous generator systems.
IEEE C62.92.3:1993 (R2000)-IEEE guide for the application of neutral grounding in electrical utility systems-Part 3: Generator auxiliary systems.



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IEEE C62.92.4:1991 (R2002)-IEEE guide for the application of neutral grounding in electric utility systems-Part 4: Distribution.

ISO/DIS 10605:2000-Road vehicles-Test methods for electrical disturbances from electrostatic discharge.

ISO/TR 10605:1994-Road vehicles-Electrical disturbances from electrostatic discharge.

JESD 22-A114B:2000-Electrostatic discharge (ESD) sensitivity testing human body model (HBM).

JESD 22-A115A:1997-Electrostatic discharge (ESD) sensitivity testing machine model (MM).

JESD 22-C101C:2004-Field-induced charged device model test method for ESD withstand thresholds of microelectronic components.

QPL-87893-1:1995-Workstation electrostatic discharge (ESD) control.

RAC SOAR 6:1986-ESD control in the manufacturing environment.

SEMI E78-0998-Electrostatic compatibility- Guide to assess and control electrostatic discharge (ESD) and electrostatic attraction (ESA) for equipment.

SEMI E043-0301-Guide for measuring charge on objects and surfaces.

Telcordia GR-1421-CORE:1995-Generic requirements for ESD-protective circuit packet containers.