ESD Requirements for Electronic Assembly Equipment and Part Handling in an EPA

Global Common

SD-1037

ISSUED	January 9, 2013
REVISED	January 10, 2022

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1. Scope

This specification details the additional and specific ESD (Electrostatic Discharge) requirements for machinery and material handling devices used inside an EPA (ESD Protected Area). The characteristics of critical electronic components shall be included in the design. To provide a static safe environment, IEC-61340 standards (technical equivalent is ANSI/ESD S20.20 and other ESD Association Standards and Standard Test Methods) should be considered during design phase.

2. ESD Requirements for EPA Machinery

2.1 Products to be processed on these systems are ESD sensitive. The system shall not transfer or emit any electrical shock or electrostatic charge to the assembly. The entire line, including material handling, must be ESD protected. All non-metallic guarding (Lexan, Plexiglas, etc.) must be static dissipative.

2.2 All machinery electrical panels and connections shall comply with the Nexteer Global Machinery and Equipment Specifications and current National Electrical Code (or local equivalent)'

2.3 Any materials for fixtures, pallets, clamps or other components of the assembly process contacting the ESD sensitive electronic portion of the Nexteer product shall not have an electric field potential exceeding 100V @ 1 inch. This can be measured with a field meter at a distance of 1 inch from the product during the process being performed.

2.4 IEC61340-5-1 requires an electrical field strength of <10,000 volts per meter within any EPA. Which is equal to <254 Volts @ 1 inch as measured with a field meter (recommended field meters are: Prostat PFH711A and Desco 1942). The supplier shall provide the test data at or before machine qualification in the supplier facility. Each process required for testing shall be tested at a minimum of 10 times and data for each logged.

2.5 Items such as Phenolic, Delrin (black/white), Nylon, Ultem, and UHMW in their natural states must not be used as pathways, guides, conveyor belt guides or rails when ESD-sensitive devices are being handled.

2.6 Conductive or dissipative conveyor belts must be connected to ground through conductive rollers, idlers, and guides that are connected directly to ground.

2.7 It is recommended that a dual polarity overhead DC fan ionizer (pulsed DC is unacceptable) installed at the point in the production process where the ESD sensitive components (example: motor controller) are removed from ESD safe packaging and placed in/on a staging area or are loaded to a pallet or fixture. The ionizer shall be selected according to ESD Association TR3.0-02-05. Proper grounding is required for use of an ionizer therefore a Ground Hub Continuous Monitor or AC Outlet Analyzer to check the ground is required. The ionizer shall meet the requirements in steps 5.2.3 & 5.2.4. It shall be tested according to ESD/SP3.3. The device shall be clearly labeled with a date of certification and due date of next certification. Nexteer will perform the subsequent verifications at a set frequency established by Nexteer procedures.

3. EPA Product Movement and Storage Requirements

3.1 Any conveyor, Creform rack, cart, work benches or part buffering devices that are used as a function of or have contact to the production line (within EPA) or ESD sensitive component shall be of the dissipative or conductive variety and shall be tested to and compliant with ESD TR53. Each fore mentioned item shall be clearly labeled with a date of certification and a copy of the test data. If electronic parts are moved across conveyor systems (outside the boundaries of the EPA) other than those in direct contact with the production line and not of the dissipative or conductive variety, the parts must be contained in static discharge shielding containers (shielding bags or conductive tote boxes).

3.2 All carts shall have conductive wheels (on opposite corners at a minimum) or a sufficiently heavy grounding chain contacting the floor at all times with a measured resistance to electrical ground of $< 1 \times 10^9$ ohms standing and when in motion.

3.3 A spot test for surface resistance of vendor supplied ESD products such as totes, or part buffering stations between cells shall be completed by Nexteer at a frequency set by Nexteer procedures and according to ANSI/ESD S541, IEC 61340-5-3, ESD TR 53 and ANSI/ESD S20 20.

4. Assembly of Full Cylindrical MPP in a Non-Grey room EPA

4.1 Definition of "full cylindrical MPP" – Cylindrical shaped motor housing and CCA/cover module with press fit phase lead electrical connections. No soldering or welding required by Nexteer.

4.2 The location of assembly line within the plant shall be limited by environmental factors to ensure certain levels of cleanliness are maintained. The assembly line shall not be located within 15 meters (50 feet) of debris or airborne particulate emitting processes. Examples may include, but are not limited to: Machining, Welding, Heat treat, open exterior door passage, high air movement fans, or areas where work may be performed above the line at high frequency. In situations where overhead work must be done, a secure barrier to shall be used above the line to protect from falling debris. Humidity in the area shall be monitored and recorded but is not required to be controlled.

4.3 Incoming material shall be handled with the same requirements as currently used in Grey room EPA's regarding storage and cleanliness of area. This includes, but is not limited to, no removal of tape on cardboard boxes inside the EPA, Environmental restrictions for CCAs to limit exposure time in open plant floor. CCA ESD containers are not to be opened until loaded to assembly line covered conveyor. Any part staging area near the line should be covered.

4.4 Assembly equipment shall follow the Modular Bill of Design which limits product exposure to debris. Product exposure is limited by enclosing the machines and connecting conveyors using ESD Lexan (ESD Mesh not allowed). Connecting conveyors tunnels shall remain open under the conveyor. Gaps between the machine and conveyor tunnel, or conveyor tunnel to tunnel connections are not allowed (gasket material may be required). Areas where components are staged, such as the pallet load station, shall have a solid ceiling as part of the open station. If directional airflow is used in a station, it shall be antistatic as mentioned above in section 2.7.

RECORD OF REVISIONS

Revision No	Date	Section	Description
001	09JA13	ALL	Initial release.
002	03JN19	ALL	Reformatted to common specification template. No content changes.
003	10JA22	4	Addition of section 4 "Assembly of Full Cylindrical MPP in a Non-Grey room EPA"
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