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# ESD Control Program

Based on ANSI/ESD S20.20-2021 · RH Electronics, Inc. · Document ESD-01 · Revised 2026

This document demonstrates the structure for an ESD control program that is compliant with ANSI/ESD S20.20-2021. The basis of this program is as follows:

1. Personnel are grounded by either a wrist strap or a footwear/flooring system.
2. Handling operations are performed at a grounded work surface.
3. ESD-sensitive devices are moved from operation to operation inside a metallized shielding bag.

## 1.0 Purpose

The purpose of this procedure is to document the key administrative and technical requirements of the ESD Control Program used by RH Electronics. This program has been developed to comply with the ESD control-program requirements of ANSI/ESD S20.20-2021.

## 2.0 Scope

This procedure applies to all areas and the associated operations where unprotected ESD-sensitive products are handled.

## 3.0 Responsibilities

RH Electronics has assigned an ESD Coordinator who is the owner of this document and shall be responsible for ensuring compliance with this procedure.

## 4.0 References

- ANSI/ESD S20.20-2021
- ANSI/ESD S541-2019
- ANSI/ESD ADV1.0 — Glossary of Terms

## 5.0 Definitions

**ESD Protected Area (EPA):** a designated environment provided with materials and equipment to limit electrostatic potentials.

## 6.0 ESD Control Program Plan

This procedure meets the requirements of ANSI/ESD S20.20-2021. The controls referenced in this document have been selected to ensure that ESD-sensitive devices (ESDS) susceptible to Human Body Model discharges of 100 volts or greater will not be damaged. For the purposes of this ESD program, it is assumed that all ESDS have a Human Body Model ESD sensitivity greater than or equal to 100 volts. ESDS devices that are more sensitive may require additional control measures. The basic guidelines that comprise the local ESD control program are as follows:

4. All semiconductor electronic devices are considered to be ESD-sensitive.
5. All employees who handle unprotected ESD-sensitive products shall have successfully completed the company's initial ESD training class and must attend re-certification training every 24 months.
6. All employees shall be grounded when handling unprotected ESD-sensitive devices.
7. ESD-sensitive products shall be moved between grounded workstations in metallized shielding bags. ESD-sensitive products are only to be handled in an ESD protected area by grounded employees.
8. All ESD control elements must be periodically verified per the compliance-verification plan.
9. Non-essential insulators must be removed from the ESD Protected Area (EPA).

## 7.0 Training Plan

### 7.1 Initial Training

RH Electronics employees who handle ESD-sensitive products (whether on a continual or intermittent basis) must attend initial ESD orientation training before handling ESD-sensitive products. The initial training classes are provided by RH Electronics training-department personnel. The initial ESD class covers ESD basics as well as a description of the RH Electronics ESD controls. At the conclusion of the ESD training class, each employee shall take an ESD comprehension test. The RH Electronics Management training department will mark the test, and in order to pass, the employee must obtain a score of 80%.

If an employee passes the test, a training record will be set up in the training database controlled by the training department. If the employee fails to obtain a score of 80%, the employee will attend a supplemental class held by the training department and will be required to take a second test and obtain a score of 80% in order to pass. If the employee passes the second test, a record will be set up in the training database.

### 7.2 Refresher Training

All RH Electronics employees who handle ESD-sensitive products must receive refresher training once every 24 months. On a monthly basis, the training department shall prepare a list of employees who require re-training in the next two months. The employees on the list, as well as their immediate supervisor, will be notified that re-training is required, and the affected employee will be invited to attend a re-training session held by the training department. At the conclusion of the re-training

session, the employee must pass a written test and obtain a score of at least 80%. The training department will update the records for employees who pass. If the employee fails to obtain a score of 80%, the procedure outlined in the initial-training session will be followed. If an employee fails to attend a re-training session before their certification period expires, the employee will not be allowed access to the manufacturing areas until the re-training session has been successfully completed.

## 8.0 Compliance Verification Plan

The ESD control-program verification requirements established by RH Electronics to control ESD can be found in Table 1. The ESD Coordinator is responsible for ensuring that all ESD control items used in the facility have been qualified per the requirements of ANSI/ESD S20.20-2021. Product qualification data, to the required test methods and standards, is compiled and maintained by the ESD Coordinator. The ESD Coordinator is also responsible for defining the ESD control items that require periodic verification, for developing the audit procedures, and for training any person performing ESD audits. The ESD Coordinator will ensure that all non-conformances found during audits have been closed prior to publishing the quarterly audit report to management.

*Note: Audit test methods not covered by ESD Association Technical Report TR53 can be found in Annex 1 of this document.*

**Table 1 — Compliance Verification Requirements**

| Technical Control Item | Limits | Test Procedure | Test Frequency | Checked By |
|---|---|---|---|---|
| Wrist strap (system test) | Rs < $1.0 \times 10^7$ Ω | ESD TR53 — Wrist Strap section | Daily (before use) | Operator |
| Footwear | Rs < $1.0 \times 10^7$ Ω | ESD TR53 — Footwear section | Daily (before use) | Operator |
| Flooring | Rg < $1.0 \times 10^6$ Ω | ESD TR53 — Flooring section | Every 3 months | Site Facilities |
| Work surface | Rg < $1.0 \times 10^9$ Ω | ESD TR53 | Every 3 months | ESD Coordinator |
| Wrist-strap connection point | Rg < 1 Ω | Annex A.1 | Every 3 months | Quality Dept. |
| Static generators | < 2,000 V/inch | Annex A.2 | Every 3 months | Quality Dept. |
| Shielding bags | Visual indications of damage | Random visual inspection | Every 3 months | Quality Dept. |

*Rs* = system resistance including the person, the wrist band, and the grounding cord or ESD footwear. *Rg* = resistance to ground.

## 9.0 ESD Protected Area Requirements

ESD-sensitive products will only be handled in an ESD Protected Area (EPA). The EPA is defined by yellow floor tape that outlines its borders. ESD protected workstations within the EPA are identified with a sign indicating that the workstation is ESD protected. Unprotected ESD-sensitive devices shall only be handled at an ESD protective workstation by grounded, ESD-certified employees. Visitors and untrained employees shall be escorted by ESD-certified employees; in no instance shall untrained visitors or employees handle unprotected ESD-sensitive devices. Non-essential insulators, including packaging materials, shall be removed from all ESD protected workstations. Process-required insulators are permitted at an ESD protective workstation as long as the measured electrostatic field does not exceed 2,000 V/inch; if it exceeds 2,000 V/inch, the process-required insulator must be moved a minimum of 12 inches from the ESD-sensitive device.

### 9.1 Grounding Plan

Equipment (AC) ground shall be used as the ground reference for all ESD control items used by RH Electronics. All wrist-strap connection points and work surfaces shall be connected to ground via a common point ground as defined in ANSI/ESD S6.1-2019. All newly installed work surfaces and wrist-strap connection points shall be tested before use to ensure they are connected to ground. The ESD floor shall be connected directly to AC ground.

### 9.2 Personnel Grounding Plan

Personnel shall be connected to ground with either a wrist-strap system or, for standing operations, through the ESD floor when wearing approved ESD footwear.

**Wrist-strap system:** the wrist band must be worn such that there is 360 degrees of contact with the employee's skin. The wrist cord must be plugged into the wrist-strap receptacle located at every ESD protected workstation.

**Footwear system:** employees working at stand-up operations while handling ESDS must wear ESD footwear that has been qualified by the ESD Coordinator per the requirements of ANSI/ESD STM9.1 and ANSI/ESD STM97.1.

**Testing:** employees shall test their wrist strap and footwear at least once per day (before use) using the testers located at the entrance to the work area. If the tester gives a "pass" indication, the employee shall initial the log sheet located next to the tester. If the tester gives a "fail" indication, the employee shall contact their supervisor or the ESD Coordinator, who will help determine the cause of the failure. Employees must not handle ESDS until both the wrist strap and footwear have passed the daily test. Employees who only visit the lines periodically must test their wrist strap and footwear on the days when they handle ESD-sensitive devices, before handling, and initial the log sheet.

**Tailoring statement:** RH Electronics has one process step where personnel grounding rules do not apply — the repair operation, which involves work with exposed, powered products. Because operators might come into contact with dangerous voltages, management has decided that any person working on this operation must not wear a wrist strap. In addition, an insulative floor mat is

installed at this process step to isolate operators from the ESD floor while wearing ESD footwear. The final product is handled by the edges, and contact with ESDS is avoided where possible. As an additional protective measure, an air ionizer has been installed at this location to reduce charge levels. A sign is posted above the workstation to inform personnel of the special handling conditions.

### 9.3 Work Surfaces

All work surfaces within the EPA on which ESDS may be placed shall have a grounded surface compliant with Table 1. Any surfaces that do not comply shall be marked to indicate that they are not suitable for holding unprotected ESDS.

### 9.4 Packaging

Only new metallized shielding bags (qualified per ANSI/ESD S541-2019) shall be used to transport ESD-sensitive products from one ESD protected workstation to another. ESD-sensitive products must be completely enclosed by the shielding bag and are to be removed from packaging only at an ESD protected work surface by grounded employees. Once the ESD-sensitive product has been tested, it will be returned to the shielding bag and sealed, then placed in a protective container for shipment to the customer. Where specific ESD protective packaging is specified by the customer, by contract or purchase order, those materials shall be used.

### 9.5 Marking

RH Electronics has not received specific marking requirements from its customers. However, to ensure the customer is aware that a product is ESD-sensitive, an “ATTENTION — CONTENTS STATIC SENSITIVE” label will be used to seal the metallized shielding bag used to ship all products to the customer.

## Annex 1 — Audit Procedures

### Annex A.1 — Testing of Wrist-Strap Connection Point

*Equipment:* calibrated multimeter.

10. Connect one lead of the multimeter to ground.
11. Connect the second lead to the wrist-strap connection point.
12. Turn on the multimeter and read the resistance.
13. If less than 2 ohms, the reading is acceptable.
14. If greater than 2 ohms, have the wiring connection checked and fixed if necessary.

### Annex A.2 — Checking for Static Generators

*Equipment:* calibrated electrostatic field meter.

15. Turn on, ground, and zero the electrostatic field meter.

16. Measure all items in the work area where ESD-sensitive devices are handled. If a reading exceeds 2,000 V/inch, the non-compliant material must be either moved 12 inches away from the area where ESD-sensitive products are handled, or removed from the area completely.
17. If readings are less than 2,000 V/inch, no further action is required.