

PHILIPS HEALTHCARE

Trainee Name:	
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Date:	

Course Title	Local Course Code	Revision
PHNA ESD Control Policy	5104-0218	E

By submitting this form, I agree that I have completed the required training for this course and understand the material and the impact on my job responsibility.

Signed by 3rd Party Contractor Training Representative:

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PHILIPS PHNA

Document Number: 5104-0218 E
Title: PHNA ESD Control Policy
Effective Date: See Matrix

Approvals:	Title	Name	Date
Process Owner:	Sr. Director, Customer Service	Duane Floyd	See Matrix
Designated User(s):	VP, Field Customer Service	Lou DePeters	See Matrix
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Note: The Process Owner and Designated User names are here for reference only and may not be current. See Matrix for the current Process Owner and Designated User names.

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Rev	Major / Minor	Description
E	Major	The technical values for testing wrist straps and grounding cords was found to be incorrect. The technical values in Section 4.2 have been corrected. References to GSSNA were removed and replaced with PHNA.
D	Major	Added detailed wrist strap and grounding cord requirements, wrist strap and grounding cord test requirements, removed obsolete references. Changed PO from Erwin Thomas to Robert Stevens.
A-C	Major	See Matrix

1.0 PURPOSE AND SCOPE

This policy applies to Philips Healthcare North America (PHNA) Field Service personnel who have contact with electrostatic sensitive components, assemblies, systems, or electronic equipment that is owned or serviced by Philips Healthcare (PH).

NOTE: Each Philips Healthcare Business Unit is responsible for the origination and maintenance of Electrostatic Discharge (ESD) Control Policies specific to their respective product lines. This includes the training, logging and supply of ESD control devices for Field Service personnel that may be product specific.

The intent of this policy is to identify requirements that protect electrostatic sensitive components and assemblies.

The scope of this document includes all equipment serviced by PH in the U.S. and Canada.

2.0 EXPLANATION OF KEY TERMS

2.1 *Conductive*

A material that has a surface resistivity of less than $1 \times 10^5 \Omega$ per square or a volume resistivity less than $1 \times 10^4 \Omega/\text{cm}$. *Surface conductivity specified in units of "ohms per square" or " Ω " are equivalent.*

2.2 *DMM*

Digital Multi-Meter, typically portable test equipment used to test resistance, impedance, voltage and current

2.3 *Electrostatic Discharge (ESD)*

ESD is the transfer of electrostatic charges between bodies at different electrostatic potentials. Damage can be caused by direct contact or induced by electrostatic fields.

2.4 *Electrostatic Sensitive Components*

Unless otherwise classified by Procurement Quality Engineering static sensitive devices are all semiconductors and sub-assemblies containing these devices, such as: diodes, photo LED's, crystals, transistors, Integrated Circuits (IC's).

2.5 *ESD Control*

ESD Control is to minimize or eliminate the discharge or transfer of electrostatic charges between bodies at different electrostatic potential.

2.6 *ESD Protective Station*

An area that is constructed and equipped with the necessary protective materials and equipment to limit damage to ESD susceptible items handled therein.

2.7 Faraday Cage

A Faraday Cage is a container or package that minimizes penetration of an electrostatic field. Nickel coated bags or conductive plastic (black) totes are common Faraday cages used for board handling or non-shielded parts.

2.8 Ground

(1) A conducting connection, whether intentional or accidental between an electrical circuit, or equipment and the earth, or to some conducting body that serves in place of earth. (2) The position or portion of an electrical circuit at zero potential with respect to the earth. (3) A conducting body, such as the earth or the hull of a steel ship used as a return path for electric currents and as an arbitrary zero reference point.

2.9 Groundable Point

A point on the work surface that is intended to accommodate an electrical connection from the work surface to an appropriate electrical ground

2.10 Grounding Reference Point

The power box or strip at the ESD protected station or other work area. When no power box is available, an earth-grounding electrode (such as a post, rod, continuous metal water pipe in contact with the earth, conductive vehicle frame, etc.) shall be the grounding reference point.

2.11 Point-To-Point Resistance

The resistance in ohms measured between two electrodes placed on any surface.

2.12 The five basic principles of ESD Control are:

- Operators will be grounded when handling ESD sensitive devices or assemblies.
- Establish "ESD protective stations or areas" to handle ESD sensitive devices or assemblies outside of their static protective containers.
- Minimize and manage static generating material in an "ESD protective station".
- ESD sensitive devices or assemblies shall be enclosed in static protective containers (Faraday Cages) when transporting them outside of an "ESD protective station".
- ESD education and awareness

2.13 Identification of ESD Sensitive Components and Assemblies

The following items are considered ESD sensitive components and assemblies:

- All semiconductor products.
- All devices designated by the manufacturer as ESD sensitive.
- All circuit boards, or assemblies, containing any ESD sensitive components.
- Any OEM or system containing ESD sensitive devices with shielding or covers removed.

- 2.13.1 All ESD Sensitive items must be protected when moved through unprotected areas; and between static-safe workstations.
- 2.13.2 The handling of ESD sensitive parts, assemblies and equipment without ESD protective covering or packaging shall be performed at workstations. ESD sensitive items are to be opened or removed from protective containers only within an ESD protective workstation.
- 2.13.3 Any complete system, OEM, or stand-alone peripheral with all the exterior enclosures installed is not considered to be an ESD sensitive device and requires no special handling or protective packaging.

2.14 ESD Control Devices

ESD Control Devices are those items specifically used to limit electrostatic discharge as heel straps, mats, etc.

Field-Protected Area - The protected area is the static-safe workstation plus the area within 1 foot surrounding the ESD sensitive items.

- 2.14.1 If the workstation is to be left unattended, all ESD sensitive items shall be properly protected.
- 2.14.2 ESD protected workstation surface is to be clean and clear of unnecessary material, particularly common plastics or any other electrostatic generating material. All nonessential insulators, such as those made of plastics and paper (e.g. coffee cups, food wrappers, and personnel items) must be removed from the workstation.

2.15 OEM

Original Equipment Manufacturer or Original Equipment Manufactured items such as: products or individual parts.

2.16 Personal Safety

Personal safety takes precedence over component or product safety. The grounding of personnel around electrical line voltage is a possible hazard. The ESD Control Program is not intended to replace or supersede any requirements for personnel safety.

2.17 Static Protective Containers or Packaging Materials

Static Protective containers that provide an effective Faraday cage for handling ESD sensitive items will be utilized whenever possible.

3.0 ESD Guidelines

3.1 The FSE must be grounded with a tested wrist strap with grounding cord prior to working on ESD-sensitive materials or equipment.

3.1.1 **Do Not** handle, transport or store a circuit board except in a static safe environment. Three corrective steps are required to create such an environment:

First, control static build-up wherever possible. Remove *all* unnecessary non-conductive materials from the workplace. Common items such as polystyrene foam cups and plastic sheet protectors generate and hold *significant* static charges. These charges will not generally drain to an available ground.

Second, eliminate charges wherever they exist. How these charges are removed depends upon whether the charged object is a conductor or a non-conductor. Charges on a non-conductor must be either shielded from the sensitive device or neutralized by use of an air ionizer, which safely showers the work area with both positive and negative ions.

Third, ground *all* conductors, *both* people and equipment, in the workplace. A ground safely drains away a charge from a conductor. Work surfaces upon which circuit boards are handled should be static-dissipative to drain any remaining charges away to ground at a safe, controlled rate. **Do Not** touch a circuit board unless the board and individual are properly grounded.

3.1.2 Handle all circuit boards only by the faceplate or latch and by the top and bottom outermost edges. Do Not touch the components, conductors or connector pins.

3.1.3 **Do Not** place an unprotected circuit board on top of another unprotected unit *or* onto any surface not constructed of either dissipative or anti-static material.

Proper Circuit Board Handling Procedures

3.1.4 All packaging materials used in connection with circuit board shipment or transport must be static-safe.

3.1.5 Anti-static materials must not be used beyond their effective design or shelf life.

Do *not* assume that manufacturers' packaging for bulk shipment is static-safe for individual circuit board handling.

3.1.6 Unpack incoming circuit boards for identification, inspection, testing or inventory control *only* at a static safe workstation, at which:

A. The workstation has a static dissipative work surface, and is properly grounded to allow drainage of charges at a safe, controlled rate.

B. Personnel are grounded via an ESD wrist strap with a grounding cord.

C. There are no static-generating materials, such as food wrappers, plastic sheet protectors, polystyrene foam containers or other untreated nonconductors.

3.1.7 Transport circuit boards at all times in shielded, static-safe transport devices such as barrier bags, static-safe pouches, cases or containers.

3.1.8 Remove circuit boards from their protective device at the equipment bay, storage cabinet or static-safe workstation only after the person(s) performing the removal is properly grounded.

3.1.9 Use ESD precautions when handling cords, wiring connectors and plugs which are directly connected to peripherals or the common equipment.

3.1.10 Handle defective or replaced circuit boards with the same static precautions as with working units. Since mishandling can damage additional components, repairable circuit boards may be destroyed.

3.1.11 Do not attach instructions, customer orders or repair tags to the circuit boards or place them inside protective bags, pouches, cases and containers.

3.1.12 Static control procedures apply to everyone in the work environment, including installation and maintenance personnel, supervisors and visitors.

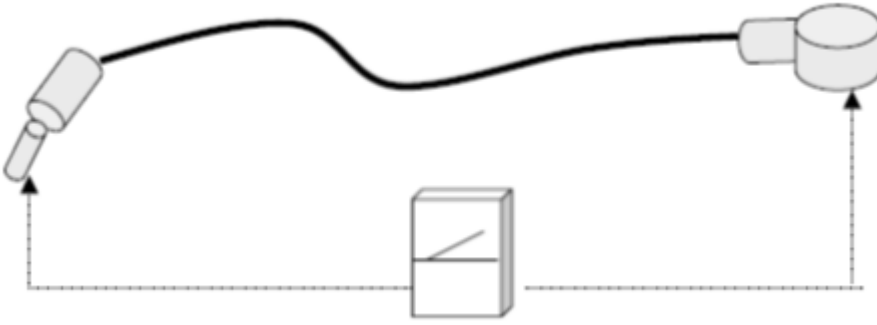
4.0 TESTING REQUIREMENTS OF ESD STRAP AND CORD

4.1 FSEs are required to use the following ESD Control Equipment:

- Field Service Mat
- Wrist Strap and Cord (ESD protection service kit – P/N 452298036471)
- Wrist Strap with grounding cord (P/N 453560138841)

4.2 Field testing of wrist straps with grounding cords

4.2.1 The wrist strap and grounding cord are to be tested to ensure there is an acceptable meter reading prior to each use. The resistance should be between 0.8 M ohms and 1.2 M ohms. If the resistance is outside of these limits, the cord should be replaced.



4.2.1.1 If an out of tolerance measurement is found for the ESD wrist strap and cord, discard the defective items and obtain a tested defects free working strap and cord.

4.2.1.2 Because the multi-meter is a calibrated tool, the FSE must record the multi-meter make, model and serial number on every SWO where the ESD wrist strap and grounding cord are used.

This includes Installations, Planned Maintenance, Field Change Order and Corrective Maintenance Service Work Orders.

4.3 Operation

Wrist Strap with grounding cord

Wrist Straps will be properly connected to the Field Service Static Dissipative Mat, which, will be connected to the grounding lug on a system frame in order to be effective. Wrist straps are not to be used when servicing any portion of the system where the electrical circuitry exceeds 250 volts (e.g. adjusting a monitor, measuring voltages on a power supply, checking input voltages, etc.).

Static Dissipative Field Service Mat

Insure that the mat grounding connector is firmly attached to a system-grounding lug. Restrict all activity involving ESD sensitive items to within the area of the mat surface.

Maintenance: See applicable manufacturer's specification.

4.4 Potential ESD Device Damage

When an ESD device is suspected to have sustained ESD damage due to faulty ESD Control devices, poor handling, etc., the suspected root cause of the damage will be corrected immediately (e.g.; defective wrist strap and grounding cord).

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