

### **Xmultiple ESD Overview**

Xmultiple has an ESD staff committee in each manufacturing plant. This group is responsible for the personnel in the plant and to oversee the ESD control programs in their plant. Each plant has a measurement level and indicator which pertains to the level of success of their ESD control program. The ESD program system has controls in place for continuously reviewing and improving the plant's ESD control program. There are regular ESD control audits conducted in each plant. This checklist is used during ESD audits. The ESD audit checklist below includes actual measurements and field voltages measurements from monitoring equipment.

Each plant has a resistivity meter and a field meter for actual measurement and voltage build-ups during audits. There is a system for tracking and closing open action items generated by the internal ESD audits.

In addition, ESD Control requirements are imposed on visitors. A system for monitoring employee violations of ESD controls is in place and there is a system for correcting system issues that lead to ESD control violations. MIL-HDBK-263K has a suggested checklist to use in performing an ESD audit. Our Xmultiple ESD Audit Checklist uses these suggested items in our audit checklist below.

### **ESD Audit Checklist**

1. Maintain logs, records and procedures showing the frequency for cleaning all ESD protective flooring/surfaces to maintain their conductive/dissipative properties. Maintain log for all ESD procedures and assure there is one common ESD ground for the entire facility.
2. Employees wear and test personal grounding devices. Non-essential personnel and items are restricted from all ESD controlled areas.
3. Check for ESD insulators and remove them from the work area.
4. Check that ESD sensitive equipment is in proper anti-static packaging with labels.
5. Ensure that approved cleaners are on hand.
6. Check that wiring of discharge devices is grounded.
7. Ensure that ionizer is positioned and working properly.
8. Ensure that non-grounded personnel stay a least 4 feet away from your static-safe area.
9. Ensure ESD protective flooring is used in ESD controlled areas.
10. Ensure that ESD protective flooring is grounded to the plant's common ESD ground. Measure the resistivity of the ESD protective flooring; Spec:  $0-1e5$  Ohms/Square. Measure field voltages at different areas of the floor; Spec:  $< 200V$ . Measure the resistance between a flooring ground point and the common ESD ground; Spec:  $< 1$  Ohm
11. Ensure where conductive footwear is used, all personnel check continuity to ground upon entering the area.
12. Ensure all ground points of all workstations are grounded to the common ESD ground of the plant. Measure the resistance between a workstation ESD ground point and the common ESD ground; Spec:  $< 1$  Ohm

13. Ensure that all Xmultiple personnel wear grounded wrist straps. Ensure personnel are checking their wrist straps at regular intervals and the results of these checks are logged consistently and kept. All Wrist Bands, footwear and ground monitors are checked and maintained on a regular basis.
14. Ensure employees dispose of foot grounders after one-time use.
15. Ensure personnel wear ESD protective garments or smocks. Measure the resistivity of the ESD protective garment/smock; Spec: 0-1e5 Ohms/Square
16. Ensure all ground points of equipment are grounded to the common ESD ground. Measure the resistances between equipment ESD ground points and the common ESD ground; Spec: < 1 Ohm. Measure field voltages around the equipment; Spec: < 200V.
17. Ensure ESD test schedule is maintained.
18. Ensure all charge-generating equipment is at least 4 feet away from any ESD sensitive areas.
19. Ensure anti-static mats are used on all work area equipment. Use static mats on the work area tables with a proper grounding to the ESD common ground. Measure the resistivity of the worktable surface; Spec: 1e5-1e9 Ohms/Square. Measure the resistance of the dissipative mat ground point to the common ESD ground; Spec: < 1 Ohm. Measure field voltages at different areas of the worktable surface; Spec: < 200V
20. Ensure all ground points of workstations and equipment are properly labeled.
21. Keep anti-static materials in ESD controlled areas, including plastic bags, plastic sleeves, plastic folders, boxes, bins, organizers and any other material product used in these areas. Use ionizers in ESD areas.
22. Maintain ionizers on a regular basis. Measure field voltages around any triboelectric items in the workplace; Spec: < 200V
23. Ensure that relative humidity is monitored and maintained above 40% in ESD controlled areas.
24. Ensure all racks, shelving and cabinets are covered with dissipative liners in areas contacting ESD sensitive items.
25. Ensure all personnel have grounded themselves before handling ESD sensitive items.
26. Ensure all shelves carts, racks, cabinets or any equipment of this type is grounded to the common ESD ground and if they have wheels, the wheels are grounded. Measure the resistance of the rack/cabinet ground point to the common ESD ground; Spec: < 1 Ohm
27. Ensure that all bins, organizers, trays, boxes, etc. are made for use to store ESD sensitive materials. Measure field voltages around the storage racks and cabinets; Spec: < 200V.
28. Ensure that all devices used for storage or moving items are grounded to the other levels if they are multi-level.
29. Ensure all personnel ground themselves first before handling ESD sensitive items from a cart/container or on the work table and if connectors and components (boards/units) are transported from one area to another are in dissipative containers with dissipative lids and the personnel reground themselves upon returning to a work area.
30. Ensure that all dissipative containers transported are discharged through a dissipative mat on the work table before they are opened.

**ESD Control Training and Compliance**

All Xmultiple employees in our plants are trained on ESD awareness and control. There is a record of all employees' ESD training history maintained. Xmultiple uses the 3M Corporations handbook and a standard training manual for use for training new employees on ESD control. There is a central repository of ESD training materials and references maintained in each plant. The table below describes the test intervals recommended by the Electronics Industry Association, in accordance with Standard ANSI/EIA-625.

<b>ESD Test Schedule</b>	
<b>Test Schedule</b>	<b>ESD Control Item</b>
<b>Daily</b>	<b>Wrist straps, foot straps, footwear, smocks</b>
<b>Weekly</b>	<b>Workstations, floor mats, ESD ground connections</b>
<b>Monthly</b>	<b>Static surveys of EPA and work stations</b>
<b>Quarterly</b>	<b>RTG of flooring, ESD ground continuity</b>
<b>Semi-annually</b>	<b>Ionizer balance and charge decay</b>
<b>Annually</b>	<b>ESD system compliance to the ESD document 8. ESD Audit Checklists</b>

**ESD Audits**

Xmultiple's ESD audits are an essential part of maintaining our ESD control program. This audit checklist provides the ESD control practices and it points to potential problem areas regarding equipment and personnel. This audit checklist provides information for personnel duties and responsibilities.

**ESD Standards**

ANSI/ESD S20.20 provides a collective resource for ESD recommended constraints on product performance. Xmultiple designed our ESD audit around specific ESD components and in compliance with ANSI/ESD S20.20.