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## Objective

The purpose of this document is to cover the handling requirements for Mitel product. This includes mechanical handling by the customer, packing requirements and static precautions to be taken to avoid ESD damage.

Mitel prides itself in the quality of all manufactured product leaving the company. All product is subjected to two quality verification gates during the manufacturing process and visual inspection upon completion. All product is 100% electrically tested to ensure total customer satisfaction.

The following document will ensure that this built-in quality remains with the device in the customer's application.

# Understanding Product Handling and ESD Precautions

## Handling of Hybrid Devices



By handling, we mean any operation that involves moving work from one place to another.

All components have hard cases that appear to protect them from rough handling. However, poor handling can cause internal damage, which is invisible. This internal damage can then cause electrical failure or reliability problems.

Hybrid devices are manufactured onto a base material of alumina. The alumina substrate is a brittle material and therefore all devices must be handled with care. Caution should be taken never to allow the devices to rub together or fall onto hard surfaces. The devices should not be emptied into a common bin.

It is recommended that the devices be left in the supplied packaging in order to maintain protection prior to insertion into boards.

It is recommended the devices are not auto-inserted due to their size, but inserted by hand into the boards.

Unless specifically ordered as a surface mount variant, hybrids cannot be passed through an I.R. solder process, only a wave solder process is acceptable. If they are to be loaded on a board that passes through a wave solder process, then only the leads may enter the solder. Maximum temperature of wave allowed is 260°C for 60 seconds.

## Electrostatic Discharge (ESD)

Electrostatic discharge (ESD) is one of the most significant factors leading to damage and failure of a wide variety of electronic components. This damage results in increased manufacturing and warranty costs, and unreliable products are the result.

For this reason Mitel instituted and now maintains a comprehensive program for control of static electricity generation and discharge. This program covers all levels of operations.

The implementation and maintenance of a Static Control Program should be the goal of all Mitel's customers.

## Designated Static Control Areas

Designated static control areas should be identified using signs, barriers, etc., to clearly define their location and extent.

Whenever facilities, work areas or material's flow are changed, then the static control requirements should be considered and included in the changes to ensure ongoing effective static control.

## Flooring

It is recommended that all workstations where Electrostatic Discharge Sensitive devices and assemblies are handled outside of full static protection packaging (i.e., within static control areas) should be provided with some form of ground conductive or dissipative flooring. This flooring should ideally extend at least 18" (45cm) beyond the work station where the devices are handled. It is preferable that this flooring extends continuously between all work stations within the static control area.

Suitable materials for this flooring include:

- Static dissipative carpets
- Carbon loaded plastic matting
- Laminated dissipative matting
- Dissipative paint
- Dissipative wax or untreated concrete (if tested and found acceptable).
- Tests should be performed regularly on all installed static control flooring to ensure its continuing effectiveness.

## Footwear/Footstraps

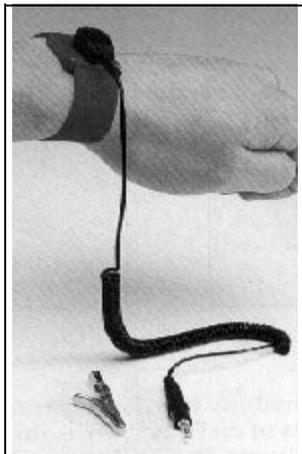


Some form of grounding footwear should be provided so that all individuals, while in the static control areas, have a low resistance path (<25 Mega-ohms) from their hands to the bottom surface of their footwear. This can be achieved by using approved:

- footstrap assemblies
- conductive shoes (some leather or composition soled shoes give sufficient conductivity)

Mitel enforces a discipline of grounding footwear to be worn on each foot and it is recommended that Mitel's customers do the same.

## Wrist Straps



Wrist straps may be selected from a number of approved commercial designs that are acceptable if they provide a path to ground of less than 1 Mega-ohm from the operator's free hand exclusive of the limiting resistor. Detachable connections are employed by Mitel with a breakaway force of 5lb (2.3kg).

## Footwear and Wrist Strap Testers



A sufficient number of devices for testing the conductivity of footwear/footstraps and wrist straps must be provided at, or near all entrances to static control areas to facilitate individuals testing the condition of their footwear or wrist straps. This testing should be performed after fitting and prior to returning to work at a static safe work station.

Personnel should be encouraged to develop the habit of testing their straps each time they enter a room where static controls are in place.

**NOTE: If the static strap fails to conform to the test specification, it should be replaced.**

## Humidity

The recommended relative humidity in all static control areas is within 35-50%.

# Understanding Product Handling and ESD Precautions

## Static Control Work Station



It is recommended that all areas where electrostatic discharge sensitive (ESDS) devices and assemblies are handled outside their fully protective packaging (assembly, test, inspection, kitting, packaging, etc.), should be provided with a static control work station.

These work stations should include as a minimum, a grounded dissipative work surface of sufficient size and a grounded skin contact wrist strap. Both the wrist strap and the work surface should be connected separately to the electrical ground through a 1 Mega-ohm resistor (in some high voltage testing such as High Potential and Power Supply areas, a 10 Mega-ohm resistor is advised) for personnel safety.

### Work Surfaces

Work surfaces may be made from:

- approved static dissipative soft or hard laminate materials.

As an example, the ground wire assembly may be constructed of 16 AWG with heat shrink tubing over the 1 Mega-ohm resistor lead, or alternatively procured from an approved supplier.

**NOTE: To avoid incorrect test results at stations where live assemblies are tested, it is recommended that conductive mats are not used.**

## Tools



### Soldering Irons

It is recommended that all soldering irons have the tip connected to ground.

### Solder Extractors

It is recommended that all soldering extractors be of the non-static generating type. Replacement parts should also be non-static generating.

### Handling requirements

Appropriate containers and packaging systems for movement of ESDS assemblies and components between static control areas should be made available. This includes shipment of kits to production, sending material to and from subcontractors, moving semi-finished goods between buildings and all similar movements. All such packaging should provide full static protection. Packaging in immediate contact with the ESDS material should be static dissipative. Additionally, there should be a conductive shield totally surrounding the material. The outer surface of the container should be static dissipative.

**NOTE: No circuits should be touched without antistatic precautions. This includes electrical failures to be returned to Mitel for analysis. The touching of such circuits makes the analysis of the failure mode many times more difficult.**

## Product Packaging Materials

It is recommended that ESTS products, all plastics, bubble shooting, film, foam, etc., used for packaging finished products should have dissipative properties. No insulative packaging should be used. Since conductive plastics and foams are normally very expensive and, in fact, present a certain second order of static discharge hazard, their use should be avoided unless it is deemed to be absolutely necessary. Static dissipative packaging is much more effective at preventing damage than conductive packaging.

If work is to be returned to Mitel or repacked in any way, the original packaging should be used if possible. If this is not possible then the circuits must be packed into antistatic foam and then into conductive boxes.

## Documentation

All documentation must either be loose or contained in antistatic wallets. Documentation must not be placed in non-conductive plastic.

## Disclaimer

**Mitel reserve the right to refuse all warranty claims where the procedures for damage free handling recommended in this document have not been properly followed.**



# Understanding Product Handling and ESD Precautions

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## APPENDIX A - DEFINITIONS

### Bulk Resistivity

A property of a material relating to a per unit resistance to the movement of an electric charge through the material. Units are ohm/cm.

### Conductive

A class of materials which readily allows the movement of electric charge. The bulk and surface resistivities of these materials are less than  $10^5$  ohm/cm and ohm/square respectively. Charge will not build up in localised areas on a conductor because the low resistivity allows the charge to quickly distribute itself throughout the material. If the conductor is connected to ground, all charge will flow away.

### Static Dissipative

A class of materials whose bulk and surface resistivities range from  $10^5$  to  $10^{12}$  ohm/cm and ohm/square respectively. These materials provide a moderate opposition to the flow of electric charge which prevents localised static charge accumulation in the materials and when connected to ground a sparkless controlled dissipation of static charge occurs.

### ESD

An abbreviation for electrostatic discharge, referring to the flow of an accumulated static charge from an area of high charge concentration to an area of a concentration of an opposite charge or an area of concentration of a lower charge, particularly to ground. The rapid flow of charge in an ESD can lead to very large instantaneous currents, intense electric fields and electromagnetic radiation which can damage electronic devices if the discharge passes through or near them.

### ESDS

An abbreviation for electrostatic discharge sensitive, referring to devices or assemblies which can be damaged by having an ESD occurring through or near them.

Many devices used by Mitel are sensitive to discharges as low as 100V and some as little as 30V.

### Insulator

A class of materials which provide very significant opposition to the flow of electric charge. Both bulk and surface resistivities are greater than  $10^{12}$  ohm/cm and ohm/square respectively. Insulators allow static charges to accumulate and, since these charges cannot flow freely, the time required to dissipate these charges is extremely long. These properties make insulators a hazard that must be controlled as part of an overall program. To do this, all unnecessary insulators must be eliminated, charge generation on insulators must be minimised and the dissipation rate of charges on insulators must be increased.

### Static Control Area

Refers to designated areas within a facility where special precautions are taken to keep ESD under control such that ESDS material may be handled outside of its fully protective packaging.