Wrist Straps and ESD Control

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Why Use a Wrist Strap?
Since ungrounded people are often the biggest cause of ESD damage, Wrist straps are the first line of defense in ESD control. Seated operators must wear wrist straps. All operators that handle un-packaged ESD sensitive items must be grounded.

"All personnel shall be bonded or electrically connected to ground or contrived ground when handling ESD sensitive items. When personnel are seated at ESD protective workstations, they shall be connected to the common point via a wrist strap system." [ANSI/ESD S20.20 section 6.2.2.1 Personnel Grounding Requirement]

Wrist Strap Testing
If not utilizing Continuous Monitors, the Wrist Strap should be tested daily while being worn by the operator. "The wrist strap system should be tested daily to ensure proper electrical value. Nominally, the upper resistance reading should be <10 Megohms or a user defined value." [ESD-S1.1 section 6.1.3 Frequency of Functional Testing] "Proper testing of the wrist strap includes the resistance of the groundable point on the end of the cord, the cord itself, the resistor, the cord-to-cuff snap connector, the resistance of the interface of the cuff, the cuff/wrist interface, and the resistance of the person between the wrist and the hand that contacts the test electrode." [ESD Handbook TR 20.20 section 5.3.2.4.2 Additional User Wrist Strap Testing] "A log should be maintained which verifies that personnel have tested their personal grounding devices." [ANSI/ESD S20.20 section 6.2.2.2 Personnel Grounding Guidance]

For Wrist Straps with elastic wrist bands, the primary ground contact to the operator's skin is the metal wrist band buckle, however, the band itself has conductive fibers. These will lose their conductivity over time. About once per week, the wrist strap should be tested by holding the band by the elastic inner surfaces. If the wrist band fails, replace the elastic strip or the entire wrist band. Desco sells a number of replacement elastic strips.

SUPERIOR RELIABILITY

Breakaway Force
"With the ground cord connected to the cuff in a normal manner, a force of >1 pound but < 5 pounds applied to the ground cord, in the normal disconnect direction, shall be required to separate the ground cord from the cuff." [ESD S1.1 section 5.4 Breakaway Force] "Wrist strap cuffs may have a quick parting electrical-mechanical connector that mates with a corresponding connector on the head of the ground cord. This connector serves two purposes. First, it is a physical connection for attaching the ground cord. Second, it is the groundable point on the cuff. Quick release is an important feature of the connector. The breakaway force should be low enough to allow easy release, but high enough to prevent unintentional disconnection. If the breakaway force is too light, the ground connection could be lost without the knowledge of the wearer." [ESD Handbook TR 20.20 section 5.3.2.2.1.1 Cuffs]

ESD Systems.com has reliably met this requirement utilizing solid stainless steel wrist band studs machined to exacting tolerances and precise profile. This ensures reliable path-to-ground connection to the spring loaded medical grade 4mm stainless steel constant contact coil cord socket. However, there are little springs in the socket which do wear and sometimes fail over time. Using revolutionary new technology, ESD Systems.com has an even more reliable Jewel® MagSnap Wrist Strap design utilizing a magnetic connection between wristband and coil cord.

Bending Life Testing
"At first glance, the ground cord appears to be a relatively simple assembly. However, the design requirements are considerable, given the wide range of user applications and the durability requirements of constant tugging, flexing, and dragging over the edge of workstation tops and equipment chassis." [ESD Handbook TR 20.20 section 5.3.2.2.2 Wrist Strap Ground Cord]

The Wrist Strap ground cord or coil cord includes a 1 megohm current limiting resistor at the end connecting to the Wrist Band. ESD Systems.com Wrist Straps are UL listed for safety and date coded for quality control traceability.

ESD Systems.com carefully molds its coil cords utilizing a superior resistor connection strain relief. All ESD Systems.com Wrist Straps greatly exceed the ANSI/ESD S1.1-2006 section 5.7 Bending Life Test where "Ground cord flex life is determined" with the Jewel relaxed retraction single-wire cords providing superior reliability tested at over 50,000,000 cycles vs. the 16,000 requirement

Contoured Spring Supported Banana Plugs
Collapsing banana plugs are a major reason for accidental disconnects where the banana plug "falls out" of the wrist strap ground banana jack. ESD Systems.com's premium coil cords feature a patented contoured supported spring banana plug design. Our US Patent 5,951,337 design resists banana spring collapse by preventing the spring from traveling beyond its limit to return. When a banana spring collapses, it loses its ability to make good contact with a banana jack, and can fall out of the jack under minimal pull force.

See the below words from one of our major users:

> "Our process calls for operators to regularly plug and unplug their ground cords. The constant plugging and unplugging of the ground cords results in the collapse of these banana plugs and poses a hindrance to the build process."
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> "We experimented with different cords but without any avail. We communicated the problem to ESD Systems.com and they developed a modified banana plug which we have piloted in our facility for four months. We found no fall-out from the evaluation samples we tested."
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> "Based on the test environment and the lack of fall-out of the cords we evaluated, we are convinced that this modification will save money in replacement cords. We therefore, strongly recommend the implementation of this modified banana plug across the board. It is our opinion that the modified banana plugs have resolved the collapsing problem on the existing cords."

The author used our Wrist Straps "Solving the Wristband Snap Release Problem". Read the Evaluation Engineering Magazine Article by E. E. Bliley, then at Lucent Technologies.

Wrist Strap Selection
Wrist straps are the first line of defense in ESD control and all wrist straps are not the same. Don't put your ESD sensitive products at risk. Improve quality and productivity by selecting premium Wrists Straps from ESD Systems.com.