

IDEMA STANDARDS

ESD

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MR and GMR Heads General Practices for ESD Control

1.0 PURPOSE:

- 1.1 This standard establishes the procedures and minimum requirements for ESD control equipment and materials and describes safe handling practices for use with Magnetoresistive (MR), Giant Magnetoresistive (GMR) and related new concepts in disk drive read-write head manufacturing and processing.
- 1.2 This standard is based on ESD controls capable of controlling electrostatic potentials to levels on personnel lower than what can cause damage to the most sensitive parts handled. User defined lower minimums shall be used to establish electrostatic potentials allowed in the work place. Maintaining personnel at the lowest practical resistance to ground level shall be the most important facet of this General Practices ESD Control Standard. This standard also requires implementation of methods to control electrostatic fields on the necessary non-conductors in the work area.

2.0 SCOPE:

- 2.1 This Standard applies to all MR/GMR head static safe workstations and the production process.

3.0 REFERENCE DOCUMENTS

Unless otherwise specified, the following document of the latest issue, revision or amendment, forms a part of this standard to the extent specified herein.

EOS/ESD ADV 1.0 EOS/ESD Association Glossary of Terms

EOS/ESD ADV 2.0 Handbook (Device Testing)

ANSI/ESD S5.2 Machine Model Component Level

ANSI/EOS/ESD S5.1 Human Body Model Component Level

EOS/ESD ADV 2.0 Handbook (Wrist Straps)

ESD STM 2.1 - Garments

ANSI/EOS/ESD S3.1 Ionization

ANSI/EOS/ESD S4.1 Worksurface Resistive Characterization

ANSI/EOS/ESD S6.1 Grounding Practice

ANSI/EOS/ESD S7.1 Flooring

ESD S 97.1 – Resistance Characterization – Personnel Floor and Footwear

EOS S 97.2 – Voltage Characterization – Personnel Floor and Footwear

EOS/ESD ADV 2.0 Handbook (Workstations)

ESD DS 20.20 Electrostatic Discharge Control Program for Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive

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Devices)

EIA – 625 REQUIREMENTS FOR HANDLING

ELECTROSTATIC-DISCHARGE-SENSITIVE (ESDS) DEVICES

4.0 WORKSTATION ESD CONTROL REQUIREMENTS FOR MR/GMR HEADS:

4.1 The Resistance to Ground (R_{TG}) requirements apply to static-safe workstations in cleanroom and non-cleanroom environments. This includes all aspects of the production process.

4.2 Access to the workstation or storage area for MR/GMR heads must be controlled at all times to limit access to trained personnel only.

4.3 ESD protective worksurfaces must measure $< 1 \times 10^9 \Omega$ from worksurface to ground (R_{TG}).

4.4 ESD protective flooring must have a $R_{TG} > 25$ Kilohms ($2.5 \times 10^4 \Omega$) and $< 1 \times 10^7 \Omega$ for 120 VAC work environments and a $R_{TG} > 50$ Kilohms ($5 \times 10^4 \Omega$) and $< 1 \times 10^7 \Omega$ for 240 VAC environments.

Note: Local safety ordinances should be followed to establish lower limit of resistance to ground where personnel are involved.

4.5 It is *recommended* to identify workstations with a unique serial number and to conduct periodic verification tests for resistance to ground and other attributes as established by the end user.

5.0 Grounding

5.1 The MR/GMR head static-safe workstation shall use a common point grounding System as described in ANSI/EOS/ESD S 6.1. This allows the workstation, operators, and tooling to maintain the same electrical potential.

6.0 Personnel Grounding Requirements

6.1 A continuous wrist strap monitoring system is recommended, with a dual-conductor resistance or voltage monitoring type being preferred. All seated operators must wear approved wrist straps or other approved personnel grounding systems that are compatible with the monitoring system in use. Resistance to ground of seated personnel shall be $< 1 \times 10^7 \Omega$.

6.2 ESD protective footwear heel straps or conductive shoes shall:

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- a. Provide a continuous electrical path from the user directly to the ESD protective flooring or floor mat.
- b. Be worn on both feet.
- c. Limit current to less than 0.5 mA at the highest power supply voltage that may be encountered
- d. Not to be relied upon for grounding of seated personnel.
- e. Resistance to ground as measured through the factory floor shall be less than $3.5 \times 10^7 \Omega$ when the floor and footwear are used as the primary grounding system for personnel.

6.3 ESD protective footwear acceptance limits:

- a. >250 Kilohms and $< 1 \times 10^9 \Omega$ for 120 volts.
- b. >500 Kilohms and $< 1 \times 10^9 \Omega$ for 240 volts.

Note: Floor and footwear compatibility in terms of resistance to ground and charge generation need to be evaluated according to ESD STM 97.1 and ESD STM 97.2

6.4 Smocks and Cleanroom garments, when used, shall ***be evaluated using the referenced test method documents to user defined values.***

7.0 IONIZATION

7.1 Ionization will be used at MR/GMR head workstations when the removal of all static generators is not possible.

7.2 All ionizers used within the MR/ GMR head workstation will meet the offset voltage level required to maintain the workstation at or below the user established voltage level.

7.3 Specifications for ionization discharge time in user environments will be established by the end user.

8.0 SPECIAL TOOLS REQUIREMENT

8.1 Hand tools and manufacturing aides used at the MR and GMR head static-safe workstation should be evaluated and approved for use with MR and GMR heads, including the following examples:

- Hand Tools
- Gloves
- Tweezers
- Swabs

9.0 TEST EQUIPMENT

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9.1 All test equipment used at or in close proximity to workstations where MR and GMR heads are assembled or tested shall be verified for suitability of use from an ESD perspective.

10.0 HANDLING PRACTICES

10.1 The single most important handling practice for MR/GMR head assembly from an ESD protection viewpoint is to limit the electrical potential across the head element during all phases of assembly. Each operation should be evaluated with this principle in mind.

Some examples of critical processes are:

- Slider Processing
- Charge generation levels at wire bonding
- HGA handling and test
- Hot plugging at test