

Electrostatic Discharge (ESD) to Ordnance Technical Agent

Presented to:

CAD/PAD Technical Exchange Workshop

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Agenda

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ESD Technical Agent Function

- Program Office Funded for ESD Testing, Analysis and Certification per:
 - NAVSEAINST 8020.19
 - Joint Ordnance Test Procedure (JOTP-062) Personnel-borne ESD (PESD) and Helicopter-borne ESD (HESD) Requirements for Ordnance
- Weapon System Explosive Safety Review Board (WSESRB) Support
- Review NSN Request for Cataloging in Ordnance Information System (OIS) IAW NAVSUP P724
- Work covered by Naval Ordnance Safety and Security Activity (NOSSA) Technical Authority Warrant
- Input to ESD Specifications



ESD Technical Agent Responsibilities

- Evaluate data submitted as part of the ESD Requirement packet (both personnel & helicopter borne).
- Generate recommendation of the degree of susceptibility to ESD to NOSSA for input approval of ESD.
- *Certification requires the Program Office to obtain an official certification letter from NOSSA, which references ESD Tech Agent recommendation.*
- Provide ESD code information to NAVSUP GLS AMMO for entry into OIS-W.
- Maintain database of ESD data for items evaluated.



ESD to Ordnance Requirements

- [NAVSEAINST 8020.19 Rev A](#) ESD Safety Program for Ordnance
- Joint Ordnance Test Procedure (JOTP-062) Personnel-borne ESD (PESD) and Helicopter-borne ESD (HESD) Requirements for Ordnance
- Applies to new or modified Navy/ Marine Corps Ordnance
- Requirements based on MIL-STD-331 Fuze Specification
- [MIL-STD-464 Rev D](#): Refers to JOTP-062 (Rev C referred to MIL-STD-331)
- Covers 25 kV Personnel-borne and 300 kV Helicopter-borne
- Does not usually include manufacturing, rework, or demilitarization
- MIL-DTL-23659: EID Spec. 25 kV only. Older versions only have 5000 Ω test and often do not address pin-to-pin and shorted pins-to-case modes
- Certifying authority for ESD is NOSSA



Evaluation of Possible ESD Exposures

- For Personnel-borne ESD (PESD) evaluate:
 - Any accessible external surface points
 - Remove test/ connector covers
 - Unshielded external surfaces
- For Helicopter-borne ESD (HESD):
 - Will the item ever be around operating helicopters?
 - Will the item be in a shielding shipping container?
 - Is direct helicopter ESD to the item possible?
- Evaluate the lowest assembly level possible on the item
- Procedural controls should not be used to address safety hazards. Procedural controls may be considered to address potential reliability hazards.



PESD Exposure

- PESD exposure shall be assessed or tested for bare energetic materials, bare devices, and bare All Up Rounds (AUR) in the worst case operational mode during any of the stockpile to safe separation sequence (S4) phases (i.e. transportation/storage, assembly/disassembly, stages, loading/unloading, platform loaded, and immediate post launch).
- 25 kV from a 500 pico-farad capacitor with both a 500 Ω and a 5000 Ω series resistances
 - 5000 Ω corresponds to touch of human skin
 - 500 Ω corresponds to touch of a moist skin (previously surmised to be hand-held tool)
- Caution: Many energetic materials have been evaluated using the 6000 volts Allegheny Ballistics Laboratory (ABL) ESD test. This test is not the same as the 25 kV test. The correlation is better when the energetic material does not contain conductive ingredients.



HESD Exposure

- HESD exposure shall be assessed or tested for the following during any of the stockpile to safe separation sequence (S4) phases :
 - Vertical replenishment (VERTREP) for all items in the documented packaged configuration. This applies to all items.
 - Bare/Man carry for items carried outside the shipping container and carried in to or out of operating aircraft;
 - External-carry/Captive-carry for items already mechanically and electrically attached to the exterior of aircraft and exposed to in-flight charging; and
 - Hot tube loaded for items that are mechanically and electrically installed and connected on ungrounded aircraft;
- The test is 300 kV from a 1000 pico-farad capacitor to simulate the discharge from a hovering helicopter.



Implementation of JOTP-062

- The Joint Ordnance Test Procedure (JOTP) -062, PESD and HESD document provides all procedures, requirements, and data necessary to produce consistent and repeatable results independent of the test facility, test site, or Service conducting the testing.
- JOTP serves as the Joint Services ESD Test procedures until its content is included in the next revision of Military Standards, specifications and applicable documents.
- Completed efforts for incorporation of JOTP-062 language are:
 - MIL-STD-464D, Electromagnetic Environmental Effects Requirements for Systems
 - NAVSEAINST 8020.19 A, Electrostatic Discharge Safety Program for Ordnance
 - MIL-HDBK-240-3, Electromagnetic Environmental Effects to Ordnance Guide
- Ongoing efforts for incorporation of JOTP-062 language are:
 - DoDM 3222, Electromagnetic Compatibility and Electronic Warfare



Changes ESD Language Codes

- Current ESD Codes in NAVSUP P-724
 - Code E: Not sensitive to ESD. Item must be safe and operable after directly applies 25kV PESD and 300kV HESD.
 - Code F: Sensitive to Helicopter ESD. Item must be safe and operable after directly applied 25kV PESD.
 - Code H: Sensitive to all ESD. Safety and operability compromised by directly applied 25kV PESD. Safety and operability compromised by directly applied 300kV HESD.
 - Code G: Sensitive to human borne ESD only. Safety and operability compromised by directly applied 25kV PESD. Item must be safe and operable after directly applies 300kV HESD.
 - Code J: ESD requirement does not apply
 - Code K: Inert Item
- ESD Certifications issued before 2016 (dating back to 1993) specify sensitivity to ESD, but does not identify if the sensitivity is specific to safety or reliability



Changes ESD Language Codes

- ESD Certifications issued since 2016 specify susceptibility to PESD and HESD exposure per JOTP-062. This is also added in OIS-W ESD Remarks at the time of approval. Some examples are:
 - “Safe and Operable for PESD”
 - “Safe but not Operable for PESD”
 - “Safe and Operable for VERTREP HESD in its approved shipping container.”
 - “Not Safe and Not Operable PESD. Not Safe and Not Operable for HESD. Not for fleet issue, ground transportation only when in approved shipping configuration.”
- NAVSEAINST 8020.19 Rev A will include new codes for each of these and will be incorporated into NAVSUP P-724.
 - Intention of added language in certification letters is to be able to change these items with the new codes once 8020.19 Rev A gets approved.
- Currently working with NAVSUP to better define “Form, Fit & Function” (F-F-F).



NAVSEA WARFARE CENTERS

Program Office ESD Certification Process vs. Cataloging Process

- Tech Agent review should begin between Milestone B and Milestone C.
- Cataloging should occur at Milestone C.
- The overwhelming majority of items in Status 9 awaiting ESD Tech Agent Approval in the past were never reviewed or seen until they were cataloged and entered in Status 9.
- The legacy tendencies of the ESD tech agents being contacted at Milestone C resulted in using the Cataloging Process as what is suppose to be the Program Office ESD Certification Process between MS B & MS C.
- Since 2021, the ESD team has seen a paradigm shift, becoming involved with programs significantly earlier (nominally 3-5 years earlier, up to 10 years earlier).



Questions?



Backup Slides



Responsibilities for Acquisition/Program Managers

- Initiate the item identification process by submitting form 724/6, which is held at the tech agent gate until all seven (7) tech agents concur to proceed into status 9.
- If all required supporting data to NAVSUP GLS AMMO and the safety technical agents was provided at least 180 days prior to the scheduled date of introduction or distribution of the item to operating forces, item proceeds to status 9.
- Provide verification requirements of applicable international, DOT, DOD, and DON safety engineering requirements. This includes the hardware to be tested, the testing and test documentation required to obtain ESD certification.
- Provide technical data updates to all Technical Agents via cataloging revision form 724/6.