NAVSEA 05Z3

Electrical Systems Technical Update

Presented at the National Shipbuilding Research Program
Joint Panel Meeting
Electrical Technologies & SWSI Panels

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NAVAL SEA SYSTEMS COMMAND

NAVSEA 05Z Update to NSRP

- NAVSEA 05Z3 Organization
- Summary of Selected Current Projects
- Circuit Protection Technical Advisory Board (CPTAB)
- Related NSRP Electrical Technologies Panel Projects

05Z3 Electrical Power Division

Electrical System Power Generation, Conversion and Propulsion

Power Conversion Modules
Transformers
Drives
Generators
Voltage Regulators
Motors and Controllers
MGs
Propulsion Motors VFD/VSD
UPS

Electrical Systems Architecture, Control and Interface

Electric Plant Architecture
Interface Requirements
Control & Stability
Power Quality
Modeling & Simulation
Design Practices
NAV Lights Certification

Electrical System Protection, Safety, Distribution, Lighting and Instrumentation

Circuit Breakers
Switchboards
Cables
Shore Power
Lighting includes SSL
Navigation Lighting
ABT / MCT
Grounding & Bonding
Instrumentation
AFD
EHP
Safety
Test Instrumentation
EPISM
Workbenches

Energy Storage

Batteries / Li Ion
Energy Magazines
Storage Components
Fuel Cells
Flywheels
Capacitors
Battery Safety

05Z Electrical Systems Updates

Selected Current Projects

- Naval Combatant Design Standards – Electrical Section Updates
- MIL-STD-2003 Rev B - Electric Plant Installation Standard Methods for Surface Ships and Submarines
- NAVSEA Instruction 9304.1E - Shipboard Cable and Cableway Inspection and Reporting Procedures (Rev E)
- Specs, Standards and Drawings Updates

NCDS UPDATES (proposed)

SECTION	TITLE	Data Call Notes
307 - New	Electric Plant Control System	Develop new design specifcation based on problems and lessons learned from surface casualties and failure review boards
235	Electric Propulsion	Create a Propulsion Motor Specifcation (CPES requirement from 5/18/2016 for MVDC Propulsion Motor Module)
300	1399-LVDC	This task proposes to identify modifications to MIL-STD-1399 to incorporate Interfaces for LVDC.
235	Electric Propulsion	Create a Propulsion Motor Drive Specifcation (CPES requirement from 5/18/2016 for MVDC Propulsion Motor Module and for MVDC ground reference device)
313	Batteries and Facilities	Revise NCDS Section 313 and associated battery CID's referenced in table 1. The revision will include referencing PD-133 Fork Lift battery spec, non-chargeable and chargeable lantern battery information, and lithium battery information as required. This task is recommended in FY18, but after NSTM 313 Rev 3 gets published.
332	Lighting Fixtures	Revise current design specifications to reflect advancing technologies that will ensure future ship classes are well equipped to support Fleet Mission Requirements. Revisions will also consider and incorporate lessons learned and commonality.
310	Electric Power Generation	Revise MIL-G-21296B and MIL-G-22077C Generator Specification to cover Medium Voltage.
314	Power Conversion Equipment UPS, Static Frequency Changers, Rectifiers, Power Supplies, Variable Frequency Drives	Revise Specifications: 1) PCM 1A and PCM 1B, 2) Update MIL-PRF-32272 3) MVDC ground referenence specification for MVDC power converters
422	Electrical Navigation Aids (incl. Navigation Lights)	Revise current design specifications to reflect advancing technologies that will ensure future ship classes are well equipped to support Fleet Mission Requirements. Revisions will also consider and incorporate lessons learned and commonality.
310	Electric Power Generation	Revise current design specifications to reflect advancing technologies that will ensure future ship classes are well equipped to support Fleet Mission Requirements. Revisions will also consider and incorporate lessons learned and commonality.

Updates to MIL-STD-2003

MIL-STD-2003 revisions include:

- Latest NAVSEA approved methods from shipyard standard electrical installation methods drawings from shipyards.

- Major effort to update guidance on:
  - latest shipyard and industry practices
  - cable lugs, cable marking, end preparation and repair
  - Medium Voltage cables
  - Lithium Ion Battery management
  - Multi-Cable Penetrations - MCP Insert Blocks extensively updated
  - Fastener requirements iaw SAE, ASTM, NAS and NSTM 075
  - multi-cable connectors, connector fabrication and lead preparation

- Production of Final Copy for Review and Approval
  - Part 1: Cable – in production expected completion August 2018
  - ✓ Part 2: Equipment - ready
  - ✓ Part 3: Penetrations - ready
  - Part 4: Cableways - in production expected completion August 2018
  - ✓ Part 5: Connectors – ready

- Publication (anticipated) – Fall 2018

CABLE AND CABLEWAY INSPECTION

NAVSEAINST 9304.1E
"SHIPBOARD CABLE AND CABLEWAY INSPECTION AND REPORTING PROCEDURES"

Instruction describes requirements for planning and performing shipboard cableway inspections and correcting identified cable and cableway hazards.

Covers all cable types used in the Fleet.

Includes

- cable inspection criteria now includes CVNs (new)
- cable inspection criteria Cable Deficiencies Categories revised
- will no longer allow approval of a CAT 1 DFS
- adds guidance for dead-ended and future use cables
- adds modules on wiring techniques, terminators and a cableway print material guide to cable inspection training program

The new instruction is now consistent with the Joint Fleet Maintenance Manual (JFMM) and current cableway inspection practices.

Awaiting Signature

MIL SPECS, STANDARDS, DRAWINGS

MIL-DTL-32483A Final Review
Switchgear, Power, Hard-Mounted, Medium Voltage, Naval Shipboard

MIL-DTL-xx653 ***New*** Final Review
Switchgear, Power, Shock-Mounted, Low Voltage, Naval Shipboard

> Created to establish standard construction, testing, and safety requirements for shock-mounted low voltage switchgear that will result in consistent vendor pricing from program to program.

MIL-DTL-24643
Cables, Low Smoke

MIL-DTL-24640
Cables, Lightweight, Low Smoke

MIL-PRF-XX654
Arc Fault Detection System Performance Specification

NAVSEA 803-2145532C Started
Indicator/Indicating System Liquid Level Application/Selection Guide

Circuit Protection Technical Advisory Board (CPTAB)

Overview:
Policy and responsibilities that apply to all nuclear and non-nuclear circuit protection devices, circuit breakers, protective relays and switchboard issues.

The CPTAB will address all known circuit protection and switchboard design, installation and operational issues/ problems.

Circuit protection technology developments will be reviewed and evaluated.

The goals of the CPTAB are as follows:

- Maintain communication and share best practices and common problems.
- Coordinate procurement, design, development, and support efforts among users to maximize commonality.
- Optimize the use of Navy resources to establish and maintain a sustainable supplier base to provide reliable and economically feasible circuit protection equipment.
- Maintain standardized COTS and military specifications for circuit protection devices and switchboards (low and medium voltage).
- Ensure circuit protection is available to support Navy applications for next 5 years.
- Ensure that a replacement circuit breaker, COTS, or advance technology circuit protection device is under development for applications where the need for a new device has been identified.

DISTRIBUTION STATEMENT A: Approved for public release. Distribution is unlimited.

05Z Electrical Systems Updates

NSRP Electrical Technology Panel Projects

- Distributed Temperature Sensing for Inspection Electrical Panels on Navy Ships
- Evaluation of Efficacy of Self-Sealing Cable Transit Devices for Aluminum Bulkheads and Decks in Non-Watertight Boundaries
- Low Voltage Shipboard Lighting Feasibility Study
- High Temperature Insulated Bus Pipe (HTIBP)

05Z Electrical Systems Updates

Questions?