

# **NAVSEA 05Z3**

## ***Electrical Systems Technical Update***

National Shipbuilding Research Program  
Electrical Technologies Panel Meeting

Southwest Research Institute  
San Antonio, TX

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SEA 05Z33

NAVAL SEA SYSTEMS COMMAND

## Agenda



- NAVSEA 05Z3 Areas of Responsibilities
- Status of Standards and Specifications Projects of Interest
  - Specifications and standards project status
  - Cable Sealant, Multi-Cable Transits, Stuffing Tubes
  - Electrical Cable
  - Circuit Breakers / Switchboards
  - Other Electrical Projects
  - Insulation, Varnishes and Tape
  - Lighting
  - Instrumentation
- SEA 05Z3 Supported Electrical Technologies Panel Projects
  - Recent Past
  - Current
  - Future

## NAVSEA 05Z3 Provides Technical Competency, Standards and Expertise

### Areas of Responsibilities

- Electrical System Power Generation, Conversion and Propulsion
- Electrical System Architecture, Control and Interface
- Electrical System Protection and Distribution**
  - Electrical System Components
    - Cables
    - Cable Transits
    - Penetrations
    - Connectors
    - Tape and Insulation
    - Enclosures
  - Safety
  - Installation Methods
  - Lighting and Lighting Power Distribution
  - Instrumentation
- Batteries
- Battery Certification Authority
- Future Power and Energy Storage Architecture
- Electronics (NSWC CRANE)

## High Priority Projects

- **NSTM 300 (S9086-KC-STM-010-300)** Naval Ship's Technical Manual Chap 300 Electric Plant  
Separated into 2 volumes (New)
  - Volume 1 Electric Plant - General
  - Volume 2 Shipboard Electrical Safety
  - ✓ Approved for Publication
- **NSTM 320 (S9086-KY-STM-010/320 Rev 8)** Naval Ship's Technical Manual Chap 320 Electric Power Distribution Systems
  - ✓ SRB review and comment adjudication complete
    - Publication expected in FY26
- **MIL-DTL-917** Detail Specification Electric Power Equipment, Basic Requirements for
  - In progress of review of and update to requirement
  - Publication expected in FY26
- **MIL-STD-X743 LIGHTING ON NAVAL SHIPS** →
  - DoD-HDBK-289 being converted to MIL-STD-X743
  - Publication in late 2026 / early 2027
- **MIL-STD-1399-300-3** Low Voltage DC Interface
  - ✓ Published 9 April 2026

## Cable Sealants / Multicable Transits / Stuffing Tubes

- **MIL-DTL-3064** INSULATION, ELECTRICAL, PLASTIC-SEALER COMPOUND (July 2025)
  - Cable Sealant Manufacturers have submitted qualification test plans to meet new requirements updated to meet (tailored) requirements of **MIL-STD-3020 Fire Resistance of U.S. Naval Surface Ships**
- **MIL-DTL-24705 and 3 Slant Sheets -1, 3, 4** Penetrators, Multiple Cable, for Electric Cables, General Specification (New Start)
  - Needed to allow requalification of “block and frame” multicable transits.
  - Testing on 4’ x 6’ deck and bulkhead sections assemblies
    - ❖ Vibration
    - ❖ Shock
    - ❖ Watertightness (FA and FS frames only)
    - ❖ Fire resistance
    - ❖ Hose stream
    - ❖ EMC (when specified)
    - ❖ Intermixing of blocks
  - 24705/4 for enclosure penetrations – updating in coordination with Chris Good and NSWC DD
- **MIL-DTL-24235 and 19 Slant Sheets** Stuffing Tubes, Metal, and Packing Assemblies for Electric Cables, General Specification for
  - SRB comment adjudication complete - updating figures – compliance review
  - Publication expected in 3rd Qtr. 26

## Cables

### **MIL-HDBK-299** Electrical Cable Comparison Handbook

Cable Data Pertaining to Electric Shipboard Cable

- ✓ Complete Publication May 2026

### **MIL-DTL-24640** Cables, Lightweight, Low Smoke, Electric, for Shipboard Use, General Specification

- in progress – reviewing comments from cable manufacturers

### **MIL-DTL-24643/61B TYPES LSC5P, LSC5POS, AND LSC5POSR**

- Corrected issues with Surface Transfer Impedance (type LSC5POS and LSC5POSR only)
- Corrected Smoke Index for fillers
- Published 12 March 2026

### **MIL-DTL-24643/70** 1 kV Cable

- SRB comment period was extended by request.

### **MIL-DTL-24643/87** 15kV Cable **New**

- Design in progress

### **S9320-AM-PRO-020/MLDG, Rev 3** Underwater Cable Assembly and Encapsulated Components, Fabrication, Repair, and Installation Manual, Volume II: Molding and Inspection Procedures

- ✓ Complete

### **NAVSEAINST 9304.1E** Shipboard Cable and Cableway Inspection and Reporting Procedure

- Resolving open comment with SEA 08

## Circuit Breakers / Switchboards

- **MIL-DTL-17587D and /3A, 5A, and 6A** – Circuit Breakers, ACB, Low Voltage, Electric Power, Air, Removable Construction, General Specification for
- **MIL-DTL-17588F** Breakers (Automatic - ALB-1) and Switch, Toggle (Circuit Breaker, Non-Automatic - NLB-1) Air, Insulated Housing, 125 Volts and Below AC and DC (Naval Shipboard Use)
- **MIL-DTL-32485** Amendment
- **MIL-DTL-32485/1** - MSVCB-4.76KV-1200 and MSVCB-4.76KV-1600 **NEW**
- **UL 2831, Rev. 1 Funding required**  
US Naval COTS 3-Pole, Rated Vmax 4.76, 8.25, & 15kV, AC, VCBs, Drawout Type, Without Internal OC Protection, & Accessories/Components for Use on Non-Nuclear Naval Combatant Ships
- **MIL-DTL-17361H** - Circuit Breaker Types AQB/NQB, Air, Electric, Low Voltage, Insulated Housing (Shipboard Use), General Specification for
- **MIL-DTL-16036N** – Part 1 (Amendment); Part 2 (Revision) Switchgear, Power, LV, Naval Shipboard
- **MIL-DTL-XX663** - Switchgear, Power, Shock-Mounted, Low Voltage, Naval Shipboard
  - Will start when 16036 is complete.

## Other Electrical Projects

- **MIL-DTL-17059** Motor, 60 Cycle, Alternating Current, Fractional H.P.
  - Update in Progress
- **MIL-DTL-17060** Motors, Alternating Current, Integral-Horsepower
  - Update in Progress
- **MIL-DTL-3124** Generator, Alternating Current, 60-Hertz
  - Start in 2026
- **MIL-R-2729** Regulator-Exciter Systems, Voltage, A.C. General
  - SEA 08 Review
- **MIL-PRF-XXX733** Multi-layer, Multi-Conductor Laminated Electrical Bus, AC / DC
  - SEA 08 Review
- **MIL-PRF-17773** Switch, Bus Transfer, Electric Power, Automatic
- **MIL-DTL-15108** Transformers, Power Step Down, Single Phase, 60 Hz, 1 KVA, Dry Type
- **MIL-R-23098** Regulator, Line Voltage, Single Phase, 400 Hz AC
- **MIL-T-17221** Transformers, Power, Distribution, Single Phase, 400 HZ, 220 Deg. C, Dry (Air Cool)
  - *New Start*

## Insulation, Varnishes and Tape

- **MIL-I-24092** Insulating Varnishes & Solventless Resins 11 Slant Sheets
  - Cancelled
- **MIL-I-24718 & Slant Sheets** - Insulating Resins, Solventless, Vacuum-pressure-impregnating
  - *New Start*
- **MIL-DTL-19166** Insulation Tape, Electrical, High-Temperature, Glass Fiber, Pressure-Sensitive
  - Update of Qualification Flammability Test Requirements in progress
  - Allowance for 3" widths
  - Expected to complete in FY26
- **MIL-I-24391** Insulation tape, electrical, plastic pressure sensitive
  - Update of Qualification Flammability Test Requirements in progress
- **MIL-I-3505** Insulation Sheet and Tape, Electrical, Coil and Slot, High Temperature
  - Update of Qualification Flammability Test Requirements in progress

## Lighting

- **NSTM 422 S9086-N2-STM-010/422, Rev 4, Navigation and Signal Lights**
  - In progress
- **16377/27D** 50W Watertight SYM 92.2, 93.2, 93.4, 93.5, 92.2SSL, 93.2SSL, 93.4SSL, 93.5SSL  
Action needed to reinstate plastic housing for non-topside installations (DLA request)
- **16377/60B** Incandescent Floodlights 150W Sym 316 & 317 **25-Jan-2022**  
Developing requirements for dimmable SSL floodlights compatible with ship lighting distribution.  
Address topside nighttime security minimum lumen requirements.
- **16377/61A** Incandescent & LED Floodlights 300W Sym 303.2 303.3 303.4 303.2SSL  
303.3SSL 303.4SSL **02-Nov-21**  
Action needed to add electrical ground check test for Type III (SSL) fixture.
- **16377/86B** Lamp SSL for use as Replacement for Commercial Fluorescent Lamp **02-Nov-21**  
Action needed to address electrical safety tests for LED tubes.
- **MIL-STD-X743 LIGHTING ON NAVAL SHIPS**
  - DoD-HDBK-289 being converted to MIL-STD-X743
  - In progress publication late 2026 / early 2027
- **MIL-L-24282 SYM 106.1** Light Signal Multi-Purpose
  - Publication expected in June 2026
- **MIL-DTL-24174 and /2 and /5** formerly MIL-P-24174  
Control, Navigation Lights, General Specification for  
✓ Published 19 March 2026
- **MIL-P-24175 5 slant sheets** will become MIL-DTL-24175  
Panels Power Supply and Control for Navigation Lighting  
✓ SRB Complete
  - Publication expected in June 2026

## Instrumentation

- **MIL-DTL-16034 - and /1-18** Meters, Electrical Indicating (Switchboard and Portable Types)
  - Cancel all portable meter and 6" Switchboard Meters Spec Slant Sheets
  - Incorporate requirements for and then cancel:
    - **MIL-V-23151** - Voltmeter, Expanded Scale Switchboard Type
    - **MIL-M-19261** - Meter, Power Factor 4-1/2 Inch, Switchboard Type
    - **MIL-W-19088** - Wattmeter, Switchboard Type, 4-1/2 inch
    - **MIL-M-23167** - Frequency Meter, Expanded Scale Switchboard Type
- **MIL-S-16104** - Synchroscope –
  - ✓ SRB Comment Adjudication @ 99%
  - Publication expected in June 2026
- **MIL-I-16103** - Phase Sequence, Indicator, Switchboard and Panel  
Update in progress
- **MIL-M-16125** - Frequency Meters, Electrical (Portable)  
Cancellation request with NAVSE 08 for approval
- **MIL-DTL-15103** Salinity Indicating Equipment
  - SRB Comment adjudication
  - Publication expected in July 2026
- **NSTM Chapter 504** Pressure, Temperature and Other Electromechanical Measuring Instruments
  - *New Start*
- **Temperature and Pressure Transducer and Gage Specifications**
  - Review all in 2026



## Recent Past

- Evaluation of Self-Sealing Cable Transit Devices
- Low Voltage Lighting
- Solid State and Remote Source Navigation Lighting
- Thermal Imaging Windows Evaluation for MV Switchboards
- **DOD-HDK-289 Shipboard Lighting**  
Report delivered to SEA 05Z3 and NSWC PD c/447  
Information collected by the project will be used in the development of the new MIL-STD-X743 Standard Lighting for Ships and Submarine that will replace the Lighting Handbook.

## Current

- **Distributed Temperature Sensor for Electrical Switchboards**  
SEA 05Z3 and NSWC PD working on project to demonstrate a prototype on LBES.
- **MIL-DTL-24643/ 87 15KV cable design and specification development**

## New

- **Evaluate Nord-Lock Wedge Washers for Electrical Applications on Navy Ship**
- **Multiphysics-Driven Arc-Fault Detection for Shipboard Electrical Systems**
- **Shore Power Connector Testing Prototype System Project Teams - delayed**