

**Updates to MIL-STD-2003**

***Electric Plant Installation  
Standard Methods  
for  
Surface Ships and Submarines***

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## MIL-STD-2003

Details requirements for standard installation methods employed for submarine and surface ship electrical distribution systems.

Application to new construction, conversion, repair, and alteration of ships.

Intended for use by all Navy installation activities, public and private yards, repair/maintenance depots, ships, including MSC and USCG.

Divided into 5 Parts:

- ❖ Cable
- ❖ Equipment
- ❖ Penetrations
- ❖ Cableways
- ❖ Connectors

*MIL-STD-2003 has over 1,000 pages of procedures and methods*

## Reasons for revision to MIL-STD-2003

- No comprehensive update since initial issue 24 June 1987.
- Updates for new electrical installation methods, ship design and construction techniques developed over the past 30 years.
- To include practices selected from the 2013 NAVSEA Enterprise Commonality Cost Reduction Review of Electrical Installation Standard Methods.
- To eliminate references to cancelled specifications and standards.
- To eliminate inconsistencies across procedures.
- Evaluate and incorporate changes recommended through the Command Standards change system.

## MIL-STD-2003 revisions additionally include:

- NAVSEA approved methods from shipyard standard electrical installation methods drawings from:
  - Newport News Shipbuilding
  - Ingalls Shipbuilding
  - General Dynamics Electric Boat
  - Puget Sound Naval Shipyard
  - SUPSHIP Gulf Coast
  - Regional Maintenance and Repair Centers
- Implementation of current applicable versions of accepted commercial standards and practices.
- Major effort to update guidance on fasteners in accordance with NSTM 075 and latest Navy and industry practices.
- New guidance for MV cable installation and terminations to prevent Corona and Partial Discharge.

## Timeline

- ✓ Approval to proceed with development of MIL-STD-2003B - 2014
- ✓ Intermediate Review complete - 2015
- ✓ Final Review complete - October 2016
- ✓ Released for Standards Review Board (SRB) complete - November 2016
- ✓ Comment Period complete – March 2017
- ✓ Adjudication of Comments complete - October 2017
- Clean revision of 2003 to NAVSEA 08 - February 2018
- Publication of MIL-STD-2003B (planned) – June 2018

## 1B Cables – 90 Comments Received

- Added a new method for repair of insulation directly over cable conductors if conductor is completely intact and NAVSEA approval is obtained.
- Added cable shielding requirements from VIRGINIA Class Standard Methods drawing, NAVSEA 803-7016612. New methods for cable shield grounding, for splicing, and for cable repair.
- Added references to (new) MIL-DTL-32483 for medium voltage switchgear and cable installation requirements.
- Added new, alternate, less labor intensive, method for insulating connections for motors & transformers from SSGC drawing SP0002019.
- Adding instructions for end connections and installation guidance of higher voltage cables (>5kV) to prevent Corona and Partial Discharge. Added methods for splicing 5kV cables.

## 1B Cables - continued

- Allows for cold shrink sleeving as a substitute for heat shrink sleeving per the requirements of ASTM F1835 for splices of cables rated  $\leq 500$  volts above the ship waterline where watertight integrity is not required.
- Corrected the numbers in table 1E2-II “Splice dimensions for multi-conductor cable” to match all of the numbers of conductors in the table.
- Adding Ampacity Rating guidance on mixing cables of different temperature ratings in cable trays:

“Cables rated for upper temperature limits of +105 Deg C or higher are limited to +90 Deg C rated service when placed with other cables that are rated for lower temperatures regardless of whether in raceways, trays, cableways, or otherwise bundled together; unless the higher temperature rated cables are physically and/or thermally isolated from other cables of a different (i.e., lower) upper temperature rating.”

## 2B Equipment – 91 Comments Received

- MAJOR update to fastener requirements including:
  - Revisions to Table 1-A. Fastener Materials and Fastener Specifications for Bolted Joints Refers to SAE, ASTM and NAS standards.
  - Limits the use of split ring lock washers
  - Prohibits alloys of copper used in threaded contact with aluminum
  - Washers of the same material and coating as the bolts to be fitted below nuts and bolt heads which adjoin aluminum
  - Guidance to use self-locking nuts in place of jam nuts. If jam nuts must be used, refers to NSTM 075 for guidance.
- Added methods for bulkhead clip mounting of smaller electrical boxes from method 502-NG NNS Standard Methods Drawing NAVSEA 302-7526370.
- Added detailed methods to illustrate bonding and grounding of equipment to meet MIL-STD-1310 requirements.
- Added allowance to use junction boxes to extend power / signal cables to replacement components if the replacement component junction box is in a different location than the original junction box.



## 3B Penetrations - 112 Comments Received

- Numerous updates to Figure 3B20 and new instructions for installation of the MCP wedge to figure 3B22 from Roxtec procedure for Multiple Cable Penetrators.
- Added general methods for installation of bulkhead square frame back-to-back MCTs for certain protected bulkheads and decks. Based on Newport News Standard Methods Drawing.
- Added instructions for installing MCTs with the capability of providing EMC grounding. Based on method 616-NG Newport News Standard Methods Drawing.
- Added requirements for spare MCP area to support future growth of 20 percent.
- Added retest requirements for MCP installation. Retest requirements for all MCP types changed to require airblast or vacuum box test for airtight, oil-tight and watertight penetrations. Based on input from PSNS and SSGC.
- Added requirements, methods and figures for the use of RISE sealing.

## 4B Cableways – 122 Comments Received

- Eliminates requirement for channel rubber for cable banding in certain circumstances as a labor and material cost savings.
- Specifies CRES 304 (nylon coated) or CRES 316 for cable bands for submarine outboard cableways. Corrosion of CRES 304 occurs as they are electrically isolated by channel rubber. Nylon coated CRES 304 is preferred due to superior corrosion resistance.
- Added methods to allow cable hanger extensions to avoid adding new cableways. Added methods for the use of Y-hangers. Based on Ingalls drawing SP002109, Non-Standard Cableway Methods.

## 4B Cableways - continued

- Allows stud welding for major cableways. Based on NNS Standard Methods Drawing for CVN's.
- Allowed use of Panduit banding for larger cable bundles for non-weight bearing applications with NAVSEA approval. Not approved for weight bearing applications with larger cable bundles - not shock qualified.

## 5B Connectors – 96 Comments Received

- Made numerous changes to correct dimensional and procedural information in Appendices 5B – 5H for SAE-AS81511, SAE-AS50151, 26482, 28840, 27599, 22992 and 38999 type connectors.
- Acknowledges other connector types e.g. RF, DB, and RJ connectors. Directs installers to follow specific ship installation drawings for connector installation procedures.
- Refers to SAE AIR1651 instructions for guidance on proper torque and tightness for assembling electrical connectors.
- Numerous changes made in Appendix 5A Cable Lead Preparation to correct dimensional errors and incorporate new methods.
- Deleted references to canceled specifications . Added notes on how to handle canceled specifications.