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# **CORROSION POLICY AND OVERSIGHT**

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**OFFICE OF THE UNDER SECRETARY OF DEFENSE  
FOR ACQUISITION, TECHNOLOGY, AND LOGISTICS**



**Corrosion Prevention & Control (CPC) Standards  
for DoD Weapon Systems & Facilities**



# Standards Topics to be Addressed



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- **Joint Industry CPC Planning Standard**
  - ❑ **SSPC CPC-1**
  - ❑ **NACE SP21412-2016**
- **DoD Aerospace Standards Example**
- **How Does DoD Use These Standards**
- **Summary Thoughts**
- **Questions?**





# CPC Planning

CORROSION POLICY AND OVERSIGHT



- **The Department of Defense (DoD) recognizes that Corrosion Prevention and Control (CPC) planning is critical to acquisition program success. The need for CPC planning is paramount:<sup>1</sup>**
  - ❑ **It Is In Law**—CPC planning is mandated in 10 U.S.C. 2228 and must be part of the 10 U.S.C. 2366(b) certification;
  - ❑ **It Is In Policy**—CPC planning is required in DoD Directive (DODD) 5000.01, DoD Instruction (DODI) 5000.02, DODI 5000.67, and other policy; and
  - ❑ **It Is Costly Not To**—Approximately \$20 billion annually goes into maintenance due to corrosion, which is almost 20% of every maintenance dollar. Availability and safety of systems/equipment is also impacted significantly by corrosion.
  
- **So what is CPC Planning?**
  - ❑ There was no single consolidated source that described what the key elements of CPC planning are nor how to go about doing CPC Planning!



1) DOD CPC Guidebook MS&E



# Corrosion Prevention & Control Planning Standard



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- FY15: NACE & SSPC established the joint task group (JTG-527) consisting of both DoD and Industry Corrosion SMEs.
- FY15/FY16: A draft CPC Planning Standard was developed covering both products & facilities.
- FY16: The CPC Planning Standard was balloted and approved by members of both NACE & SSPC.
- Nov 2016: Both NACE & SSPC ratified the CPC Planning Standard. (1 Dec 2016 Official Approval Date).
- Standard has Two ID's: SSPC CPC-1 & NACE SP21412-2016
- FY17 DoD Adoption being pursued with NAVAIR as Adopting Activity



NACE SP21412-2016/SSPC-CPC 1  
Item No. 21412  
Approved December 1, 2016

## Corrosion Prevention and Control Planning

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### ABSTRACT

This new standard on corrosion prevention and control (CPC) planning is intended to support future CPC improvements to national acquisition and sustainment of equipment, systems, facilities, and infrastructure at an acceptable cost. It provides a standardized framework for a supplier's plan to control corrosion of supplied products and structures. The standard is intended for use by public and private facility owners/acquisition agencies that require their suppliers to provide corrosion prevention and control procedures as a deliverable provided with the purchased product, installation, or system. The standard includes:

- Attributes of the supplied product, system or facility that require planning for CPC;
- Considerations for material selection and design of a product, system or facility to minimize corrosion;
- Items or topics that should be addressed in a CPC plan;
- Items or topics that should be addressed in CPC planning which affect CPC in design, fabrication and construction, operation and use, and maintenance and sustainability.

### KEYWORDS

Corrosion prevention and control, CPC, planning, design, material selection, JTG 527.

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# Corrosion Prevention & Control Planning Standard



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## SCOPE and Coverage of CPC Planning Standard

### 1.2 Scope and Limitations

This standard defines the key elements/composition of what corrosion prevention and control planning encompasses for design, manufacturing, construction, operation and sustainability of products and facilities. It is designed for use by U.S. federal agencies, but may also be used by other governmental bodies and other industries where appropriate. Failure to produce a joint standard limits the ability to influence change in the prevention and mitigation of corrosion in procurement/contracting and sustainability projects where investment in proper corrosion prevention and control planning is beneficial. While products and facilities follow different processes and requirements, this standard attempts to provide both areas with assistance in determining the best approach for CPC Planning with the desired outcome of realizing the useable service life consistent with the investment and expectations.

### 1.3 Overview of Topics Covered by this Standard

- Generic CPC Planning Matrices/Checklists
- Elements of CPC Planning
- Attributes that contribute to or affect CPC Planning considerations for material selection & design
- Miscellaneous issues that affect CPC in the design, fabrication and construction, operation and use, and maintenance and sustainability
- Definitions relevant to this standard





# Corrosion Prevention & Control Planning Standard



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## Usage of CPC Planning Standard

### 2.0 Checklists for Products and Facilities

There are two checklists contained in this standard

- Table 1 for Products
- Table 2 for Facilities

These checklists are hot-linked to the specific topic requirement (Body of the standard) which are hot linked to Guidance and detail information (Appendix of the Standard).

❖ CPC Planning Standard DEMO:



Adobe Acrobat Document

The Standard provides a common Baseline for CPC Planning.

All requirements are tailorable, as needed, to any Program.

The Standard also includes definitions and key references.

Adoption IAW DoD Manual 4120.24M Defense Standardization Program (DoD Adopting Activity: NAVAIRSYSCOM)

Standard Communication Plan being Executed (MP Article Mar 2017; SSPC News Release Winter 2017; Paper at DoD ANTCC 2017, etc...)

### Table 1. Products

CPC Planning Area	Requirement	Guidance	CPC Planning Element
Strategy	<a href="#">3.1</a>	<a href="#">A3.1</a>	CPC Strategy
Design	<a href="#">3.2.1</a>	<a href="#">A3.2.1</a>	Usage & Operational Environment
	<a href="#">3.2.2</a>	<a href="#">A3.2.2</a>	Design/Useful Life
	<a href="#">3.2.3</a>	<a href="#">A3.2.3</a>	Legacy Lessons/Best Practices
	<a href="#">3.2.4</a>	<a href="#">A3.2.4</a>	Materials Selection
	<a href="#">3.2.5</a>	<a href="#">A3.2.5</a>	Finish Specification
	<a href="#">3.2.6</a>	<a href="#">A3.2.6</a>	Protection/Preservation Measures
	<a href="#">3.2.7</a>	<a href="#">A3.2.7</a>	Durability
	<a href="#">3.2.8</a>	<a href="#">A3.2.8</a>	Costs
	<a href="#">3.2.9</a>	<a href="#">A3.2.9</a>	Risk Assessment
	<a href="#">3.2.10</a>	<a href="#">A3.2.10</a>	Design Geometries
Management	<a href="#">3.2.11</a>	<a href="#">A3.2.11</a>	Design Concept
	<a href="#">3.3.1</a>	<a href="#">A3.3.1</a>	Organizational Structure
	<a href="#">3.3.2</a>	<a href="#">A3.3.2</a>	Liaison (Internal/External)
	<a href="#">3.3.3</a>	<a href="#">A3.3.3</a>	Contract Requirements
	<a href="#">3.3.4</a>	<a href="#">A3.3.4</a>	Resourcing
	<a href="#">3.3.5</a>	<a href="#">A3.3.5</a>	Configuration Management
	<a href="#">3.3.6</a>	<a href="#">A3.3.6</a>	Issue Identification/Resolution Process
	<a href="#">3.3.7</a>	<a href="#">A3.3.7</a>	Data Management/Rights
Sustainability	<a href="#">3.3.8</a>	<a href="#">A3.3.8</a>	Inventory Management
	<a href="#">3.4.1</a>	<a href="#">A3.4.1</a>	Storage Environments
	<a href="#">3.4.2</a>	<a href="#">A3.4.2</a>	Operations/Maintenance Data
	<a href="#">3.4.3</a>	<a href="#">A3.4.3</a>	Product Aspects
Supplemental	<a href="#">3.5.1</a>	<a href="#">A3.5.1</a>	HazMat/Environmental Issues
	<a href="#">3.5.2</a>	<a href="#">A3.5.2</a>	Prohibited Materials
	<a href="#">3.5.3</a>	<a href="#">A3.5.3</a>	Training
	<a href="#">3.5.4</a>	<a href="#">A3.5.4</a>	Warranties
Supportability	<a href="#">4.1.1</a>	<a href="#">A4.1.1</a>	Sustainability
	<a href="#">4.1.2</a>	<a href="#">A4.1.2</a>	Maintenance Planning
	<a href="#">4.1.3</a>	<a href="#">A4.1.3</a>	Monitoring/Inspections/Assessments
Product/System Qualification	<a href="#">4.2.1</a>	<a href="#">A4.2.1</a>	Fabrication & Production Processes
	<a href="#">4.2.2</a>	<a href="#">A4.2.2</a>	Manufacturing/Construction QA
	<a href="#">4.2.3</a>	<a href="#">A4.2.3</a>	Performance Demonstration
	<a href="#">4.2.4</a>	<a href="#">A4.2.4</a>	Test Methodology
	<a href="#">4.2.5</a>	<a href="#">A4.2.5</a>	Component/Assembly Testing
	<a href="#">4.2.6</a>	<a href="#">A4.2.6</a>	Operational Testing
	<a href="#">4.2.7</a>	<a href="#">A4.2.7</a>	Verification/Validation Criteria
	<a href="#">4.3</a>	<a href="#">A4.3</a>	Life Extension Strategy





# Aerospace CPC and M&P Standards Efforts



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## ▶ **MIL-STD-1568D: Aviation Corrosion Prevention and Control:**

- *Standard and Associated Data Item Descriptions Issued 22 Aug 2015 and is being cited in new DoD ACQ programs.*

## ▶ **MIL-STD-1530D: Aircraft Structural Integrity Program:**

- *Standard updated in Aug 2016 with Change 1 released in Oct 2016. Standard is cited in AF ACQ programs.*

## ▶ **MIL-STD-1587D: Materials & Processes for Aerospace Weapon Systems**

- Following formal coordination with the Services, a *modernized version of MIL-STD-1587* is targeted for release/re-instated in June 2017. Following the release of the “D” version, a *complete technical update of this standard will be executed with formal release targeted for early 2019 time frame.*

## ▶ **MIL-STD-889: Dissimilar Metals**

- A modernized version of this standard (*MIL-STD-889C*) was released on 22 Aug 2016. A technical revision effort (including a new approach and additional materials by area) began in FY17 with a target completion date in 2019 with the release of MIL-STD-889D.





# Aerospace CPC and M&P Standards Efforts



CORROSION POLICY AND OVERSIGHT

## ▶ MIL-HDBK-1250: Avionics Corrosion Prevention & Control (SAE-AS-12500)

- DSC selected SAE Int'l for re-instating this standard. The SAE G-25 Committee (DoD & Industry Electronics, Avionics & Corrosion SMEs) developed the draft SAE-AS-12500. Comment adjudication from the Jan 2017 successful Ballot is in progress. Publication is targeted for late FY17, with DoD Adoption targeted for late 2017 (Adopting Agency TBD).

## ▶ MIL-STD-7179: Aerospace Finish Systems

- An effort to update MIL-STD-7179 is planned to begin in FY17 in conjunction with the 1587 effort. A technical update revision is planned for completion and release in 2018.

## ▶ MIL-HDBK-808: Finish Systems for Support Equipment

- L-HDBK-808 has been assessed and the support equipment requirements could be incorporated into 1587 and 7179. Pursuing concurrence from Service Reps on the path forward: 1) Incorporation during the 1587/7179 technical revision processes for these standards or 2) Reinstatement and technical revision path.

## ▶ MIL-STD-810: Testing

- MIL-STD-810 (Army Lead) is in the technical revision process. Once completed, formal Service coordination followed by comment adjudication & released (Target date: TBD).





# Aerospace CPC and M&P Standards

**(JTG-527) SSPC/NACE  
CPC Planning Standard**  
(Key Elements of CPC Planning)

**MIL-STD-1568D**

(Material and Processes for CPC  
in Aerospace Weapon Systems)

**MIL-STD-1587D**

(M&P Requirements for Air  
Force Weapon Systems)

**M&P DID**

**EC-434-000-005**

(CPC Navy/Marine Corps Aviation  
Systems: Vol 1- Acquisition)

**DIDs for CPC Plan  
and Finish Spec**

**EC-434-000-003**

(Prohibited/Restricted Materials)

**MIL-STD-889C**

(Dissimilar Metals)

**SAE-AS-12500**

(CPC for Electronic Components  
& Assemblies {MIL\_HDBK-1250})

**MIL-STD-1530**

(AF ASIP STD)

**MIL-STD-810**

(Testing)

## Overarching A/C Design Requirements



### Operations & Sustainment

**NAVAIR-01-1A-509 (Vol 1-4)**

**AF T.O. 1-1-689 (Vol 1,3,5)**

(Joint Service CPC Maintenance Manual)

**AF TO 1-1-691**

(CPC Maintenance Manual)

**EC-434-DFT-006**

(CPC for Navy & Marine  
Corps Aviation Systems:  
Vol 2- Sustainment)

**MIL-HDBK-6870A**

(NDI Program Requirements:  
NDI for Aircraft and Missile  
Materials and Parts)



### Coating/Finishing Systems

**MIL-DTL-5002E**

(Surface Treatments and Inorganic Coatings  
for Metal Surfaces of Weapon Systems)

**MIL-STD-7179A**

(Finishes, Coatings & Sealants for  
Protection of Aerospace Weapon Systems)

**EC-434-000-004**

(Risk Mitigation for Non-Chromate  
Coating Systems)

**MIL-DTL-18264E**

(Application and Control of Organic  
Finishes for Weapon Systems)

**MIL-HDBK-808**

(Finish, Protective & Codes for Finishing Schemes for Ground Support Equipment)



# Using CPC Planning in System Acquisition



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- **CPC performance has notoriously been traded for cost, schedule & performance reasons during acquisition**
  - ❑ Lack of awareness/focus on long-term impact (Next Guys Problem)
  - ❑ Difficult to specify corrosion requirements (What's Needed & Why)
  - ❑ Each requirement negotiated individually (Lack of Standard Approach)
  - ❑ Difficult to quantitatively measure long term corrosion performance with short term tests (Corrosion, OK When and How Severe?)
  - ❑ Increased corrosion performance often requires an investment (e.g. Increased Cost, Weight, Schedule Slip, Signature Impact, etc.)
  
- **Other Factors Affecting CPC Incorporation in Programs**
  - ❑ Acquisition \$ (My money) versus Operations/Support \$'s (OPM)
  - ❑ Belief that lessons learned aren't applicable to this "new" system...
  - ❑ Focus on "Out of Box" performance and Manufacturing Costs
  - ❑ Cost, Schedule and Performance Pressure (in that order!).





# DoD Use of Specifications & Standards



## CORROSION POLICY AND OVERSIGHT

- **Many corrosion-related specs and standards were eliminated during acquisition reform in the 1990's**
  - ❑ Causes corrosion requirements to be negotiated individually during acquisition
- **OSD CPO Worked with MilDeps to reestablish some needed Specs/Std**
  - ❑ MIL-HDBK-1568, *Materials and Processes for Corrosion Prevention and Control in Aerospace Weapon Systems* –reinstated as MIL-STD-1568C
    - ❖ Supported by DI-MFFP-81403 “*Corrosion Prevention & Control Plan*” and DI-MFFP-81402 “*Finish Specification*”
  - ❑ MIL-HDBK-1587, *Materials and Processes for Aerospace Weapon Systems* –reinstated as MIL-STD-1587D
    - ❖ Supported by DI-MFFP-82119 “*Program Unique Materials & Process Specifications*”
- **Migrating some requirements to commercial standards**
  - ❑ Developing new standards with non-governmental standards bodies (e.g. SAE-AS-12500 *Corrosion Prevention and Deterioration Control in Electronic Components and Assemblies*)
  - ❑ Joint Standard for CPC Planning (NACE SP21412-2016 & SSPC CPC-1)





# CPC Planning During System Acquisition



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## How to Include CPC Requirements in System Acquisition

(Aerospace System example)

Negotiate Hundreds of Individual Requirements



Versus

Negotiate Several Consolidated Requirements



System Finish Specification

Environmental Testing

Material & Process Selection Criteria

Corrosion Team

**Hundreds** of Individual M&P Specs for Primers/Coatings, Surface Treatments/Prep, Metals, Composites, Sealants, Dissimilar Couples, Adhesive Bonding, etc...

Legacy Lessons Learned

CPC Risk Management

Aircraft Structural Integrity

CPC Verification / Validation Criteria

NDI

Prohibited Materials

NACE/SSPC CPC Planning

1568 CPC for A/C Design

1530 Structural Integrity

7179 A/C Finishing Systems

1587 M&P for A/C Design





# Summary Thoughts



## CORROSION POLICY AND OVERSIGHT

- **Corrosion is rarely only just a technical problem**
  - ❑ Design, Technology, Environment, Materials, Processes, Training, Policy, Funding, Schedule, Availability, Usage, Inspection, Storage, etc...
  - ❑ Prevent; Detect; Mitigate & Manage
- **Corrosion may not hurt today, but it hurts tomorrow**
  - ❑ Pushing the problem/issues down the line for someone else...
  - ❑ Easier to invest in corrective (is) than preventive maintenance (might be).
  - ❑ Difficulty in quantifying the problem until after it happens.
- **Corrosion is often a “people” problem**
  - ❑ Hard to maintain leadership focus (Swamp full of Alligators...)
- **Successful corrosion control requires:**
  - ❑ Awareness and buy-in from leadership
  - ❑ Teamwork between subject matter experts, designers, and maintainers – “Corrosion prevention and control is not the most important thing we do, but it is important for us to do it...”
  - ❑ Tools, training, and time for the personnel implementing the processes





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**CORROSION POLICY AND OVERSIGHT**

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# QUESTIONS???

