

Overview of DoD chromate usage and database

Keith Legg
ASETSDefense Technical Manager
Rowan Technology Group
Libertyville, IL

Report Documentation Page

Form Approved
OMB No. 0704-0188

Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.

1. REPORT DATE SEP 2009		2. REPORT TYPE		3. DATES COVERED 00-00-2009 to 00-00-2009	
4. TITLE AND SUBTITLE Overview of DoD chromate usage and database				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S)				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) Rowan Technology Group, 1590 S. Milwaukee Ave., Suite 205, Libertyville, IL, 60048				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES ASETSDefense 2009: Sustainable Surface Engineering for Aerospace and Defense Workshop, August 31 - September 3, 2009, Westminster, CO. Sponsored by SERDP/ESTCP.					
14. ABSTRACT					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

Cr⁶⁺ (CrVI, hexavalent chrome, chromate) is our primary corrosion

Cr⁶⁺-containing coatings

- Chromate conversion coatings
- Chromate sealers
- Chromated primers
- Chromate washes
- Chromated metallic-ceramics

Cr⁶⁺ processes, non-Cr⁶⁺ coatings

- Hard chrome plating
- Chromic acid anodizing
- Chromic acid passivation

Cr⁶⁺-containing coatings are a problem for sustainment (repaint, touch-up, corrosion control)

Material	Status of alternatives
Chromate conversion coating	Trivalent chrome and non-Cr commercially available. Not yet as good as Cr⁶⁺. Used on cars, Boeing 777, various military systems, USAF T.O. 1-1-8 Prekote;
Chromate primers	Non-Cr primers commercially available. Used on F-35, AH-64 Apache. Performance good on Cr⁶⁺ conversion coating. Moving toward total non-Cr⁶⁺
Chromate finish system	Low temperature powder coat and UV curable finishes in validation to replace primer/topcoat for aircraft and vehicles.
Chromate conversion of Mg	Tagnite now used on EFV gearbox, some sumps, gearboxes for AH-64, CH-53. Performance much better than Cr⁶⁺ conversion and anodize. DoD use still very
Metallic-ceramics	Low-Cr and non-Cr available commercially. Performance uncertain
Chromate washes	Direct-to-metal used for MRAP. Poor performance

Cr⁶⁺-free processes now in use

Material	Status
Hard chrome plating	HVOF on F-35 landing gear, all new commercial and military landing gear. Being implemented for
Chromic acid anodize	TFSAA approved by NAVAIR, BSAA by Boeing





ASETSDEFENSE SOURCES OF INFORMATION



MAIN MENU

- Home
- Surface Engineering Database
- Clean Alternative Information
- ASETSDefense Workshops
- DoD Policies
- Team Work Spaces
- Tools
- Assistance
- Links
- Contact ASETSDefense

ASETSDefense

Advanced Surface Engineering Technologies for a ASETSDefense - is a Department of Defense (DoD) [Strategic Environmental Research and Development Environmental Security Technology Certification Program](#) facilitate the implementation of new, environment engineering (coatings and surface treatments) by background information and technical data from re-evaluation efforts as well as the status of approved ASETSDefense provides defense organizations with improve weapons system performance and life-cycle environmental safety and occupational health (ES) treatment processes that utilize hexavalent chromium (chromate, chromic acid); coatings that contain volatile organic compounds (VOC).

Surface Engineering Database

Together with SERDP and ESTCP, ASETSDefense designed with a search capability to provide access needed to make informed decisions on the use of technologies for surface engineering that pose environmental information includes detailed engineering data, background information on processes and products that have been implemented. For more information and to access

Alternatives Quick Links

- Cadmium Plating
- Chromate Conversion
- Chromate Metallic-Ceramics
- Chromate Primers
- Chromate Sealants
- Chromic Acid Anodize
- Hard Chromium Plating
- High VOC Materials

Quick information on alternatives

ASETSDefense workshop agendas, briefings, summaries (HCAT meetings coming soon)

Database

Team Work Spaces

Tools to be added

MAIN MENU

- Home
- Surface Engineering Database
- Clean Alternative Information
- ASETSDefense Workshops
- DoD Policies
- Team Work Spaces
- Tools
- Assistance
- Links
- Contact ASETSDefense

Chromate Conversion Alternatives

Current Usage

Chromate conversion coatings and chromated sealers are used to create a self-healing conversion coating on Al and Mg alloys that is resistant to corrosion. They are also used for sealing electroplated and anodized coatings. These treatments are typically used prior to painting and finishing, since they generally improve adhesion of paints and sealants.



Typical Applications	Typical Chromate Conversion Coatings	Specifications
<ul style="list-style-type: none"> • Aircraft skins • Al frames for aircraft and vehicles • Mg gearboxes • Corrosion-resistant coatings (Cd, Al, ZnNi, etc.) • Anodize sealing • Fasteners and electrical connectors (Zn or Cd plated) • Wash primer for steels, armor 	<ul style="list-style-type: none"> • Conversion and sealing coatings for Al (e.g., Alodine, Iridite, etc.) • Conversion and sealing coatings for Mg (e.g., Dow 7, 17, 19, HAE anodize) 	<ul style="list-style-type: none"> • MIL-DTL-81706 • MIL-C-5541 • MIL-M-45202 • AMS 3171 • TO 1-1-8 • MIL-A-8625 • MIL-C-3171 • MIL-C-17711 • MIL-M-45202 • DOD-P-15328 • QQ-P-416

ESOH Issues

Cr⁶⁺ (CrVI, hexavalent chromium) is a known carcinogen that is strongly regulated under

- EPA Clean Air Act rules
- OSHA Occupational Exposure to Hexavalent Chromium (Cr⁶⁺ PEL is currently 5µgm⁻³)
- European rules (RoHS, WEEE, ELV)

Exposure

Personnel may be exposed during manufacture, depot overhaul, repaint, and operational level touch-up and repair.



DATABASE

MAIN MENU

- ● ● Home
- ● ● Surface Engineering Database
- ● ● Clean Alternative Information
- ● ● ASETSDefense Workshops
- ● ● DoD Policies
- ● ● Team Work Spaces
- ● ● Tools
- ● ● Assistance
- ● ● Links
- ● ● Contact ASETSDefense

Hide Menu

Help

Simple Search: Choose options by drop-down arrows in boxes, and click Search

Detail Search: Click Search button to activate. Choose options in search boxes

Alternative To:

Document Category:

Generic Systems:

Applications:

Alternative To: All

Document Category: All

Generic Systems: Cadmium plate

Generic Systems: Chromic acid anodize

Applications: All

Applications: Al and Mg alloys

Applications: Composites

Applications: Electrical

Applications: Engines

Applications: Fasteners

Applications: Hydraulic systems

Applications: Skins, structures

Applications: Steels

Applications: Wheels, tracks

Designed to answer question "What alternative to hard chrome (etc) is available (authorized, implemented, spec'd) for my type of system and application?"

Detail search

02GN098
02Y40
03GY321
03GY369 A/B
05510WEP/05511CEH-X
10PW22-2
16708TEP/16709CEH
17176KEP/16709CEH
44GN007
44GN008A
55W002/82X001
65Y003
99GY001 APC
AC-130/131 (Boegel)
Aklimate
Al-ceramic (chrome free)
Alodine 1200S
Alodine 5200/5700
Alodine 5900
AlumiPlate
Anodizing: Tagnite
Cd electroplate
Chemidize 727ND
Conversion: Adhesion promoter
Conversion: Hexavalent Cr
Conversion: Non-chrome
Conversion: TCP-license (Trivalent Chromate)



- MAIN MENU**
- Home
 - Surface Engineering Database
 - Clean Alternative Information
 - ASETSDefense Workshops
 - DoD Policies
 - Team Work Spaces
 - Tools
 - Assistance
 - Links
 - Contact ASETSDefense

Hide Menu Help

Simple Search: Choose options by drop-down

Detail Search: Click Search button to activate

Alternative To: All

Document Category: All

Generic Systems: All

Applications: All

Search Reset

Clear Filters

Change page: < 1 2 3 4 5 6 7 8 9 10 ... > Change

Document Title	Systems
corrosion	All Systems
Technical Report, D... Chromate Aluminum Phase 1 Report	Solid rocket booster F-16 LCAC S-3 F-18 C-46 AAAV

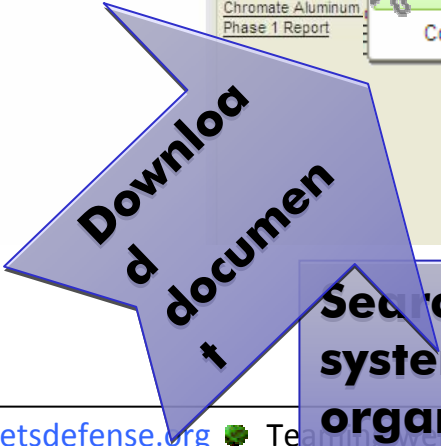
All Coatings

Document Title	Systems
Conversion: Hexavalent Cr Conversion: Trivalent Cr - not TCP Conversion: Non-chrome PreKote Conversion: Adhesion promoter Alodine 5200/5700 AC-130/131 (Boegel) Aklimate Chemidize 727ND Oxsilan AL-500 Sanchem 7000 Alodine 1200S TCP (NAVAIR)	

Displaying page 1 of 20, items 1 to 5 of 99.

Contact Names

Document Title	Systems
All Tests	
All Tests	
Adhesion	
Corrosion	
Embrittlement	
ESOH (toxicity)	
Fatigue	
Field testing	
Material properties	
Rig testing	
Wear, erosion, etc	
Weathering	



Search for specific materials, systems, tests, people, organizations



From: Commander, Naval
 To: Distribution
 Subj: NAVAL AIR SYST
 CHROMATED PAI

Ref: (a) CNASC Ltr: 131
 Implementation
 (b) Materials Engine
 of MIL-PRF-23;
 Coatings, Inc.",
 (c) Materials Engine
 of MIL-PRF-23
 Coatings, Inc.
 (d) Mat

- Reference (a) authorizes Specification MIL-PRF-23 paint of the existing pair the cumulative results of
- References (b), (c), and Class N for Defl, Inc. (1 Product Code: 16708TE respectively. Solventbo must meet the same criti 85582. In addition, refe materials. The extended primers conforming to M primer conforming to M term acidified salt fog (
- Based on this data, NAV the products described a non-chromated primers reference (a), apply to it
- The NAVAIR points of River, MD, phone: (301 phone: (904) 542-4516;

U.S. DEPARTMENT OF
 Environmental Security Tech
 (ES)
 Joint Group on Polluti

JOINT TEST

Validation of HVOF The
 Replacements for H
 On Hydraulic/Pne

Test p
 Date: Aug

Prepar
 Hard Chrome Altern



Fatigue and images HVOF on Actuator materials.xls

HCAT HYDRAULIC ACTUATOR FATIGUE PROGRAM PH15-5 SUBSTRATE

