PANTHEON ENTERPRISES
Innovating Through Conscious Chemistry

Conscious Chemistry™ Environmentally Safe Certified

Safe for people & the planet

PreKote®

Surface Pretreatment

Reference Guide

August 2016

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To ensure you have the most recent version of the PreKote Safety Data Sheet, please go to pantheonchemical.com/document-library

PreKote®
Surface Pretreatment

Minimize » Corrosion
Increase » Adhesion
Minimize » Environmental Impact
Increase » Paint Flexibility

PreKote is an all-in-one, ready-to-use environmentally-friendly cleaner, pretreatment and adhesion promoter.

Safe & Effective On:

- » Aluminum
- » Anodized
- » Composite
- » Fiberglass
- » Galvanized
- » Magnesium
- » Plastic
- » Steel
- » Titanium
- » Wood
- » Metal
- » Scuff-sanded

Steps	Chromate Conversion Coatings (14 Steps)	Gel Technologies (11 Steps)	Wash Primers (8 Steps)	PreKote® (6 Steps)
1	Rinse with Water	Rinse with Water	Rinse with Water	Rinse with Water
2	Apply and Scrub with Alkaline Solution	Apply and Scrub with Alkaline Solution	Apply and Scrub with Alkaline Solution	Apply PreKote® and Scrub
3	Rinse with Water	Rinse with Water	Rinse with Water	Apply PreKote®* and Scrub
4	Allow Water to Dry	Allow Water to Dry	Allow Water to Dry	Rinse with Water
5	Mask Sensitive Areas (eg: magnesium/composites)	Apply De-Oxidation or Etching Solution	Clean with Solvent	Inspect for Water Break
6	Scrub with Acid	Rinse with Water	Mix Wash Primer	Allow Water to Dry
7	Rinse with Water	Inspect for Water Break	Apply Wash Primer	Mask and Apply Primer
8	Allow Water to Dry	Allow Water to Dry	Inspect for Overcoat	
9	Mix Conversion Coating	Mix Gel and Wait (Induction Time)	Mask and Apply Primer	
10	Apply Conversion Coating	Apply Gel		
11	Rinse with Water	Remove Excess (Optional)		
12	Inspect for Water Break	Mask and Apply Primer		
13	Allow Water to Dry			
14	Wipe with Solvent			
15	Mask and Apply Primer			

Simple 6-Step Process

*PreKote® is a Ready-To-Use, All-in-One Product

Cost & Time Reduction

- » Does not require HAZMAT shipping, storage and disposal.
- » Fewer paint failures may result in decreased aircraft downtime.
- » Reduced water usage and treatment costs
- » Reduced PPE

Conscious Chemistry™ Environmentally Safe Certified

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Total Life-Cycle Cost Savings

Average customer reduces surface pretreatment costs by up to 25%

Hill Airforce Base

- Saves $6,000 per F-16
- Saves $1.2M per year in total savings—reduced labor, water, and HAZMAT fees

Delta Airlines

- Saves approximately $1M annually
- Saves 96 labor hours annually per 737

Application Types

PreKote can be used on any paintable or painted surface of any size. It can be applied by the following methods:

- Manual application
- Spray application
- Power wash
- Immersion applications
- Touch-up applications (liquid or wipes)

Performance Results

PreKote has passed all traditional testing for pretreatments.

Test Description	Test Name	Results
Salt Spray	BMS 10-72, Test #20a ASTM B117	Pass
Filliform Corrosion	BMS 10-72, Test #20b	Pass
Rain Erosion	BMS 10-72, Test #23	Pass
Flexibility	ASTM D4145 (passes 1/8" Mandrel Bend Test)	Pass
Wet Tape Adhesion	BMS 10-72, Test 16	Pass
Corrosion Resistance	ASTM G85 Annex 4	Pass
Hydrogen Embrittlement	ASTM F519-97	Pass
Paint Softening	BMS D6-17487 ASTM F502	Pass
Humidity Resistance	BMS 10-11, Test 24.8.2.16	Pass

Saves The Environment

Hexavalent chromium free

Non-flammable

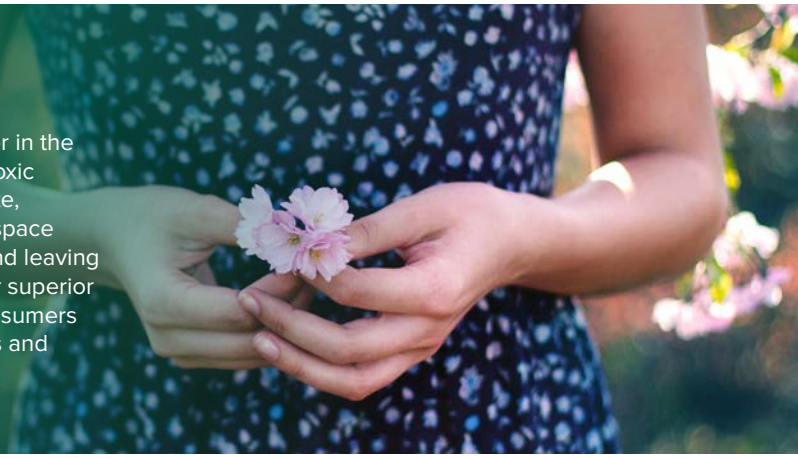
Non-hazardous

Low VOCs

Reduces Water Usage

The Company Behind PreKote

Founded more than a decade ago, Pantheon Enterprises is a pioneer in the chemical industry and firmly believes that chemicals should not be toxic or hazardous and perform better than their toxic competitors. PreKote, Pantheon's flagship product, changed the way the military and aerospace industries use pretreatments and paint—transforming the industry and leaving less of a negative ecological footprint on the earth. Pantheon's other superior products are used by governments, commercial enterprises and consumers who share the desire to promote health, improve working conditions and protect ecosystems.



PreKote Liquid Products	Stock Numbers
PreKote 1 Quart	#065-1002 | NSN: 6850015138589
PreKote 1 Gallon	#065-1030 | NSN: 6850015138586
PreKote 5 Gallon Pail	#065-1040 | NSN: 6850015138567
PreKote 55 Gallon Drum	#065-1050 | NSN: 6850015138560
PreKote 275 Gallon Drum	#065-1060 | NSN: 6850015493632
PreKote Large Repair Kit Treats 200-300 sq. ft.	#065-1072 | NSN: 6850015058688

PreKote Wipes		Stock Numbers
PreKote Wipes *with Container*	50 per container	#065-1081 NSN: 6850-01-602-6830
Wipes Only	50 per pckg. No container	#065-1080 NSN: 6850-01-602-6827

Technical Questions or Concerns?

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PANTHEON ENTERPRISES
Innovating Through Conscious Chemistry

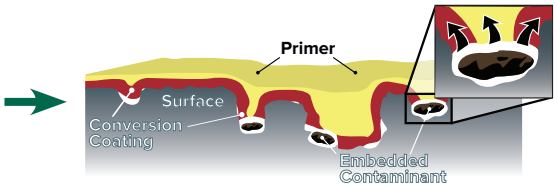
PreKote® Technical Data Sheet | *Liquid & Wipes*

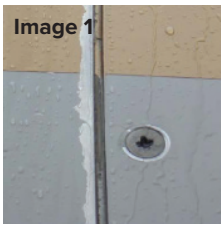
PreKote is an all-in one surface pretreatment product available in both a liquid and wipe form.

PreKote replaces both chromate and non-chromate conversion coating systems. It replaces acid etches, solvent washes, and other toxic substances used on metal and composite substrates prior to priming and painting. It can also be used as an adhesion promoter for metal to metal bonding. PreKote is a flexible surface pretreatment and works with virtually any paint or bonding process including large surface area paint jobs, immersion processes, and touch-up applications.

Paintable surfaces have millions of microscopic pores where dirt and contaminants become embedded. Over time, these microscopic contaminants become incredibly difficult to remove, and can actually block adhesion of primers and paint to the aircraft's surface when processes such as chromate conversion are used. *(See Figure A)*. This can lead to paint failures such as chipping, peeling, blistering, and out-gassing *(See Image 1)*.

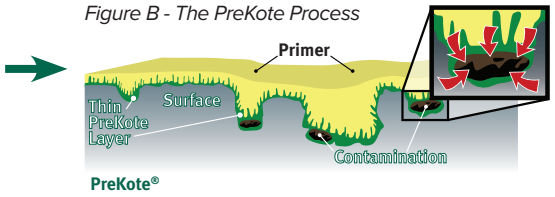
Figure A - The Chromate Conversion Process





PreKote's technology cleans the surface, and removes contaminants by creating a closer, stronger bond between the surface and coating *(See Figure B)*. This results in fewer paint adhesion failures and better overall corrosion protection *(See Image 2)*.

Figure B - The PreKote Process



About the photos to the right: To compare the pretreatment process, a leading commercial airline treated one 737-800 with PreKote and another 737-800 with a chromate conversation coating. When the aircraft returned for a 24-month inspection, the airline declared PreKote provided superior protection and out-performed the chromate conversion coating.

Works On Any Paintable or Prepainted Surface:

✓ Aluminum ✓ Annodized ✓ Composites ✓ Galvanized ✓ Magnesium ✓ Plastic ✓ Scuff-sanded ✓ Steel ✓ Titanium

Physical & Chemical Properties

Boiling Point . . . . . 219°F (104°C)
Freezing Point . . . . . 28°F (-2°C)
pH (concentrate) 10.0-11.5
VOC . . . . . 65.5 g/L
Evaporation Rate . . . . . Less Than Water
Specific Gravity at 25°C 1.01
Vapor Pressure . . . . . 0.02mm Hg at 20°C
Vapor Density 1
Water Solubility 100%
Biodegradable Rate . . . . . +90% in 28 days
Appearance . . . . . Clear Amber Liquid
Odor . . . . . Odorless
Rinsability . . . . . No Visual Residual
Application Temp. . . . . 40-110°F (4-43°C)
Application Humidity. 0-100%

Performance Results

PreKote has passed all traditional testing for pretreatments.

Test Description	Test Name	Results
Salt Spray	BMS 10-72, Test #20a ASTM B117	Pass
Filliform Corrosion	BMS 10-72, Test #20b	Pass
Rain Erosion	BMS 10-72, Test #23	Pass
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Application Types

PreKote can be used on any paintable or painted surface of any size. It can be applied by the following methods:

- **Manual application**
- **Spray application**
- **Power wash**
- **Immersion applications**
- **Touch-up applications (liquid or wipes)**

Concentration

PreKote is used at full concentration for most applications. Please visit PantheonChemical.com and consult the application guide for more information.

Minimum Recommended Personal Protective Equipment (PPE)

A face shield/goggles and rubber gloves are recommended for handling PreKote during application. Please refer to the SDS for more information and check your company's safety policies.

Safety Benefits

PreKote has a long list of environmental, health, and safety benefits. PreKote does non contain chrome and is non-toxic, non-hazardous, non-flammable, non-corrosive, CFC free, odor free, does not deplete ozone, and the liquid is also readily biodegradable upon disposal. Because PreKote is non-hazardous, users can reduce HAZMAT shipping and storage charges. The product requires less rinsing, reducing water consumption.

The **US Environmental Protection Agency (EPA)** found PreKote to have environmentally preferable chemistry. PreKote has been recognized with the Design for the Environment (DfE) award.

The EPA has also determined that PreKote is not one of the six core metal finishing effluent operations and does not trigger categorical industrial user (CIU) status.

First Aid Information

Please review the SDS before using PreKote. Safety Data Sheets are available website at PantheonChemical.com

- **Skin:** Wash thoroughly with hand soap and rinse with water.
- **Eyes:** Flush with large amounts of water. If irritation persists, seek medical attention promptly.
- **Inhalation:** No fumes. No precautions necessary.
- **Ingestion:** Drink plenty of water or fruit juice. Do not induce vomiting. Seek medical aid.
- **Spill response:** Flush with water. Mop up any remainder and dispose of in normal fashion. Please follow all federal, state or local regulations regarding the treatment of waste.

PreKote Liquid Products	Stock Numbers
PreKote 1 Quart	#065-1002 NSN: 6850015138589
PreKote 1 Gallon	#065-1030 NSN: 6850015138586
PreKote 5 Gallon Pail	#065-1040 NSN: 6850015138567
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PreKote 275 Gallon Drum	#065-1060 NSN: 6850015493632
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PreKote Wipes		Stock Numbers
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Wipes Only	50 per pckg. No container	#065-1080 NSN: 6850-01-602-6827

Liquid Shelf Life

Unopened: 36 months from the date of manufacturing.
Store at 40-100°F (4.4-37.7°C).

Opened: 12 months. Seal container when not in use.

Wipe Shelf Life

Unopened: 12 Months from the date of manufacturing.
Store at 40-100°F (4.4-37.7°C).

Opened: 90 days. Seal container when not in use.

Manual PreKote Application Procedure | *Liquid*

PreKote® Surface Pretreatment

Use PreKote to pretreat any and all paintable or prepainted surfaces, including metal and composite surfaces. Prime and paint within 24 hours of PreKote application.

Tools & Materials Needed

- ☐ **PreKote (liquid)**
- ☐ **Aluminum oxide pads[1]**
- ☐ **Spray Gun[2]**
- ☐ **Municipal Water**
- ☐ **Optional: Pole scrubber or pneumatic sander[3]**

Pre-Application

Before Applying PreKote:

- ☐ Strip and clean aircraft in accordance with standard operating procedures. High soil areas such as bottom of aircraft engines and fuel access panels may require extra work to ensure a clean surface.
- ☐ Thoroughly rinse the aircraft to remove all dust and debris.
- ☐ Mask all areas that will not be treated

Workflow Recommendations and Considerations:

- Work from the tail section forward; always begin on the top and outboard of the aircraft, working in and down.
- Work in small sections; horizontal surfaces will allow for larger work areas than vertical areas; the top of the vertical stabilizer will require a smaller work area.
- Pay particular attention to leading edges and high erosion areas.
- Take special care when working on high erosion areas just aft of leading edges on wings and engines, radome, the vertical stabilizer, and aft of cockpit windows.

The PreKote 6-Step Application Process	*Important Notes*
1 Apply a flood coat of PreKote to the designated area.	*See Workflow Recommendations and Considerations above.*
2 Agitate surface area with an aluminum oxide pad using OVERLAPPING HORIZONTAL motions until you see a rich lather.	*Never let PreKote dry on the surface. If work area does dry reapply PreKote.*
3 In same area just treated, apply a second application of PreKote.[4]	*Do not rinse between applications.*
4 Re-agitate surface with an aluminum oxide pad, this time using OVERLAPPING VERTICAL motions until a rich lather.	*Do not allow PreKote to dry on the surface.*
5 Immediately following the second application of PreKote, rinse the completed area thoroughly from top down.	*When rinsing, pay special attention to seams and depressions to ensure thorough removal of PreKote.*
6 Look for a water break-free surface as an indicator of proper application (typically 2-10 seconds).	*If water beads or breaks immediately, repeat PreKote process.*

Repeat steps 1-6 for remaining sections of the plane.

Post Application

- ☐ Remove all masking and perform a final rinse. DO NOT USE SOLVENT WIPES after applying PreKote.
- ☐ Allow surfaces to static or hot air dry. There should be no visual evidence of a wax-like appearance on the surface.[5]
- ☐ Inspect all areas previously masked to prevent intrusion of chemicals used for surface preparation and to ensure chemicals have NOT entered any cavities.
- ☐ Prior to priming, if there is dust on the surface use a water dampened, lint-free cloth to remove it. If fuels and oils are on the surface, moisten a lint-free cloth with PreKote and wipe fluid off in one direction so as not to smear the contaminant. In the same direction immediately wipe excess PreKote off with a dry lint-free cloth and prime immediately.

Footnotes:

1. *Commercial/GA: 280-400 grit aluminum oxide pads (3M Scotch-Brite P/N 7447, Maroon)/ MILITARY: A-A-58054, Type I, Grade A). Important: Use only aluminum oxide pads to scrub surface. Use of any other pad may contaminate surface and prevent adhesion of primer.*
2. *Spray gun tip should be approximately .065" - .071".*
3. *Pole scrubbing recommended; however, pneumatic sanders can be used.*
4. *The second application of PreKote is necessary in order to remove all the soil and contaminants lifted by the first PreKote application.*
5. *If there is a wax-like film, reapply PreKote per steps 1 and 2 above.*

PreKote Application Procedure | *Wipes*

PreKote® Surface Pretreatment

Use PreKote Wipes to pretreat any and all paintable or prepainted surfaces, including metal and composite surfaces. Prime and paint within 24 hours of PreKote application.

Tools & Materials Needed

- ☐ **PreKote Wipes**
- ☐ **3M Scotch Brite® 7447 Pad or pneumatic sander (for oxidized metal substrates and composites only)**

Important Application Information: Read First

PreKote Wipes should be only damp to the touch. Unlike most cleaners and adhesion promotors, less is more when it comes to PreKote. Never add liquid PreKote to the Wipes.

- » Before using PreKote Wipes, ensure surface is free of heavy contamination and loose debris.
- » IMPORTANT! Only wipe in one direction in order to maximize removal of contaminants and ensure a clean surface. Wiping back and forth or in circles may lesson soil removal and/or further embed contaminants.
- » Use minimal and uniformed pressure on the Wipe during the application process.
- » Each Wipe covers 4 sq. ft. of surface
- » Wipe may be folded and used multiple times as long as a clean side of the Wipe is used on each pass.
- » Wait for substrate to dry. Forced hot air drying is acceptable as long as the air is filtered and free of particulates. Once dry, it is ready for paint. Paint within 24 hours of PreKote application.

Application Process

For Painted, Prepped & Non-Oxidized Substrates

1. Wipe surface in one direction using a PreKote Wipe. If necessary, wipe may be folded and used again as long as a clean side of the wipe is used on each pass.
2. Allow surface to dry before applying coating, stain, or sealant.
3. Prime or paint surface within 24 hours.

For Oxidized Substrates or Composites

NOTE: PreKote Wipes will provide adhesion promotion without a wet abrade step; however, for best results, scarification and oxide removal (wet abrasion) is recommended.

1. Clean surface with PreKote Wipe.
2. Wet abrade surface with an aluminum oxide pad (3M Scotch Brite 7447) or pneumatic sander
3. With a damp microfiber towel, wipe up oxides. If only a small amount of oxides is present, this step may be skipped and oxides may be wiped up with a PreKote Wipe. This will, however, cause the wipes to soil faster.
4. Wipe substrate in one direction several times with a PreKote Wipe.
5. Allow surface to dry before applying coatings or sealants.
6. Prime and/or paint within 24 hours.

Technical Questions or Concerns?
888.608.7888 | engineering@pantheonchemical.com | PantheonChemical.com

Frequently Asked Questions

PreKote® Surface Pretreatment

1. Why Should I Use PreKote?

PreKote's non-hazardous formula and unbeatable performance makes it the pretreatment of choice. It's an all-in-one, easy-to-use product which saves users valuable time and money. Multiple tests conducted by the Department of Defense (DOD) and other agencies have confirmed aircraft treated with PreKote held up better than those treated with conversion coatings.

2. Where can PreKote be used?

PreKote is extremely versatile and can be used on **any painted and paintable surface.** It can be used on aluminum, anodized aluminum, cadmium, magnesium, titanium, steel, composites and plastics. In short, if you can paint it, you can PreKote it.

3. How does PreKote save me time?

PreKote's application process is very quick and easy because it's an all-in-one product. That means you'll save by not having to apply other products such as alkaline wash, acids, de-oxidizers, chromate conversion coatings or solvent wipes. With PreKote, there is little to no masking required.

4. What is the PreKote process like? Why is it faster?

The PreKote process is faster because it's easy and requires the least amount of products. The main steps are:

1. Rinse the aircraft
2. Apply PreKote and scrub horizontally
3. Reapply PreKote and scrub vertically
4. Rinse.

5. What size jobs can I use PreKote on?

PreKote is incredibly versatile and can be used on jobs of any size. PreKote comes in both liquid and wipes. For larger applications either spray the solution on or immerse the parts. For smaller applications, spray the solution on or use the PreKote Wipes.

6. Can PreKote be used for touch-ups?

Yes, PreKote Wipes are an excellent alternative to toxic, chromated touch-up pens. They are much easier to use, safer, less costly and provide better results.

7. Can I use PreKote with an immersion process?

Yes, parts can be immersed in PreKote. Contact Pantheon Technical Services at 888.608.7888 for advice on immersion processes.

8. How does PreKote prevent corrosion?

The application process cleans the surface and changes the surface energy creating an extremely strong bond for coatings to stick to. This strong bond prevents corrosion.

9. Are there approvals for PreKote?

Yes. PreKote has passed numerous tests and has both military and commercial approvals. In fact, the USAF has specified that PreKote is the *only* replacement for chromated conversion coatings in the T.O. 1-1-8, the umbrella technical order for aircraft painting. PreKote has been qualified and is being used by Air Canada, Delta, Southwest, United Parcel Service (UPS), and American Eagle among others. Many of these customers have obtained OEM approval or NTOs to use PreKote. In addition, OEMs including Dassault Aviation, Mooney Airplane Company and Gulfstream have approved and implemented PreKote for production aircraft.

See the extensive *PreKote Approval List* in this Reference Guide.

10. How much safer is PreKote than chromate conversion coatings?

PreKote is extremely safe. It's non-hazardous, non-toxic, and quickly biodegradable. It has a pH of approximately 10–11.5. Chromated conversion coatings (such as Alodine) are highly corrosive acids (pH of 1.3–3.0), contain a known carcinogen, do not biodegrade, and are extremely hazardous to humans.

11. Do I have to mask composites or magnesium like I do with Alodine®?

No. PreKote is safe for these materials.

12. Can PreKote be used on an aircraft previously treated with a conversion coating (such as Alodine®)?

Yes. It can be used on surfaces previously treated with other surface pretreatments.

13. Can I use PreKote on scuffed primer?

Yes, PreKote is used extensively by the USAF on scuffed primer and topcoat. The application process is the same for new or stripped surfaces.

14. What tools are needed to apply liquid PreKote?

Only three tools are needed:

1. Pump sprayer with nozzle
2. Aluminum oxide pads (3M Scotch-Brite 7447 non-woven pad 280-400 grit; for MILITARY: A-58054, Type I, Grade B)
3. For bigger jobs we recommend flexible pad holders that can attach to poles.

You will also need municipal water for rinsing.

15. What should I wear while using PreKote?

Please see the PreKote SDS available on pantheonchemical.com. We recommend wearing eye protection and rubber gloves, but please contact your company's Health & Safety Officer for your company's specific PPE policies and protocols.

16. Do I need to use ventilation or air exhaust equipment while using PreKote?

No. PreKote does not contain toxic vapors or fumes, so normal air circulation is sufficient.

17. What if PreKote gets on my skin or in my eyes?

Please see the PreKote SDS available on pantheonchemical.com. for first aid procedures.

18. Why do I have to apply PreKote twice?

Applying PreKote twice ensures complete coverage.

19. Why don't I need to rinse between applications?

Rinsing between applications is not required for the PreKote chemistry to work. The application process is designed to generate as little waste water as possible.

Frequently Asked Questions

PreKote® Surface Pretreatment

20. If my parts are already deoxidized, or I need to deoxidize them separately, do I still need to apply PreKote twice?

No, the first scrubbing application of PreKote is meant to remove the metal oxide layer. If the part is deoxidized prior to PreKote, a single application of PreKote with a two-minute dwell, immediately followed by a rinse is adequate.

21. What kind of primer can I use over PreKote?

PreKote works best with high-quality primers. It is compatible with any modern direct metal, chrome, non-chrome, epoxy, urethane primer, or topcoat from major manufacturers.

22. How soon after the PreKote application can primer or paint be applied?

Primers and paints can be applied as soon as the surface is completely dry. PreKote dry times are similar to that of water dry times. If ovens or heated air blowers are available, PreKote can be dried at temperatures of up to 150°F.

23. How long can I wait to paint?

Prime or paint within 24 hours of the PreKote application. If the environment is dirty or the part is subject to the accumulation of dust and oil, 24 hours is the maximum suggested time before priming in order to achieve the best finish possible. If it's been more than 24 hours, or there is obvious dirt, dust, fuel, or oil, wipe the surface with a lint-free cloth lightly dampened with PreKote to remove the contamination. Proceed with primer when dry.

24. Will I get a water break-free surface?

Yes. In most cases you will get a water break-free surface within 2-10 seconds, indicating the part is clean and properly pretreated.

25. What if I don't get a water break-free surface?

The surface may still be dirty or have an oxide layer. In this case, scrub the surface in question with PreKote. If repeated scrubbings do not yield a water break-free surface, there may be an issue with the rinse water. However, if the surface is clean the primer will stick even without a water break-free surface.

26. What if PreKote dries before it has been rinsed?

Simply reapply enough PreKote to fully wet the surface, lightly scrub, and immediately rinse off.

27. What if I apply paint over a PreKote surface I have not rinsed?

Applying paint over a PreKote surface that has not been rinsed will cause paint adhesion failures. PreKote must be rinsed off while still wet.

28. Can PreKote remove silicone contamination?

No, PreKote is not recommended for cleaning silicone contamination. Generally, the best means of removing silicone contamination is to sand out the contamination with fine aluminum oxide sand paper, then proceed with the normal PreKote application process.

29. How do I dispose of the rinse water?

Prekote contains no hazardous chemicals. However, depending upon the process used, as well as other materials and chemicals used, it's best to check with municipal waste stream for disposal.

30. How much PreKote do I need to use?

It depends upon the dispensing method. Higher volume dispensing systems (drum pumps) will treat 120–160 square feet per gallon. Low volume trigger spray bottles will yield 200–300 square feet per gallon of PreKote.

31. Are there any aircraft materials or parts that PreKote should not come into contact with?

No, but masking is recommended for any material not going to be primed and painted, including cockpits and windows.

32. Can PreKote be used on internal parts?

Yes. PreKote can be used on any paintable surface.

33. Can it be used on fabrics?

No. Only paintable surfaces.

34. Does the use of PreKote induce cadmium leaching from cadmium-plated substrates?

No, PreKote does not leach cadmium. PreKote operates in the alkaline range (pH=10-11.5) and therefore has no propensity to leach cadmium from cadmium-plated parts.

Technical Questions or Concerns?
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Pretreatment Product Comparison Sheet

PreKote® Surface Pretreatment

Pretreatment Process: Environmental Health & Safety Comparison

Environmental, Human Health & Safety Comparison Chart **PreKote is non-toxic, non-corrosive, and non-flammable meaning it doesn't require special handling, permitting or disposal fees. It also requires the least amount of water and PPE.**

These benefits translate into more comfortable, more productive, and safer employees as well as reduced product, labor, and HAZMAT costs.

Most Hazardous/Toxic → **Least Hazardous/Non-Toxic**

	Chromate Conversion Coatings	Gel Technologies	Wash Primers	PreKote®
Toxic				Non-toxic
Corrosive				Non-corrosive
Flammable				Non-flammable
Products Required				
Rinses				
Environmental Pollutant				Non-pollutant
Masking				No Masking
PPE				
Mixing Required				Ready to Use: No Mixing

Pretreatment Products: Application Process Comparison

Application Process Comparison Chart **PreKote only requires 6 steps. It also uses the least amount of:**

- **chemicals**
- **water**
- **manual labor**

These benefits translate into more productive employees and reduced product and labor costs.

Steps	Chromate Conversion Coatings (14 Steps)	Gel Technologies (11 Steps)	Wash Primers (8 Steps)	PreKote® (6 Steps)
1	Rinse with Water	Rinse with Water	Rinse with Water	Rinse with Water
2	Apply and Scrub with Alkaline Solution	Apply and Scrub with Alkaline Solution	Apply and Scrub with Alkaline Solution	Apply PreKote®* and Scrub
3	Rinse with Water	Rinse with Water	Rinse with Water	Apply PreKote® and Scrub
4	Allow Water to Dry	Allow Water to Dry	Allow Water to Dry	Rinse with Water
5	Mask Sensitive Areas (eg: magnesium/composites)	Apply De-Oxidation or Etching Solution	Clean with Solvent	Inspect for Water Break
6	Scrub with Acid	Rinse with Water	Mix Wash Primer	Allow Water to Dry
7	Rinse with Water	Inspect for Water Break	Apply Wash Primer	Mask and Apply Primer
8	Allow Water to Dry	Allow Water to Dry	Inspect for Overcoat	
9	Mix Conversion Coating	Mix Gel and Wait (Induction Time)	Mask and Apply Primer	
10	Apply Conversion Coating	Apply Gel		
11	Rinse with Water	Remove Excess (Optional)		
12	Inspect for Water Break	Mask and Apply Primer		
13	Allow Water to Dry			
14	Wipe with Solvent			
15	Mask and Apply Primer			

*PreKote® is a Ready-To-Use, All-in-One Product

PreKote® vs. Gel Technologies

	PreKote®	Gel Technologies	Takeaway
	Application Process / Ease of Use		
1	» Ready-to-use solution	» Not ready-to-use: 2-part kit that must be mixed manually	*PreKote does not require mixing—simply open and use—thus saving time and labor costs.*
2	» Can be used on any surface	» Usage limited to certain metals	*PreKote is a more versatile product; it can be used on any painted or paintable surface.*
3	» Can be used on composites and scuff-sanded paint	» CANNOT be used on composites and scuff-sanded paint	
4	» No pre-cleaning required	» Aircraft must be pre-cleaned with toxic alkaline wash and acid deoxidation (requiring two additional products)	*PreKote does not require use of additional cleaning products prior to application—saving time and reducing labor costs.*
5	» Induction time: None - Can be used immediately	» Induction time: 30-minutes	*PreKote can be applied immediately after opening, thus saving time.*
6	» Does not require masking of non-aluminum areas	» Requires masking of non-aluminum areas	*Not having to mask areas saves time/labor dollars.*
7	» It's impossible to apply excess PreKote®	» If excess product is applied, existing product must be removed and entire process must be repeated	*As potential for human error is always present, using PreKote minimizes errors saving time and money.*
8	» Product is rinsed off	» Product must dry evenly	*Using PreKote mitigates "puddling" concerns.*
9	» PreKote overspray can be removed with water	» Overspray removal requires user to scrape off	*PreKote saves time.*
10	» Application temp: 40-110 °F	» Application temp: 57-87 °F	*PreKote's wider temperature application range means greater flexibility in when aircraft can be painted.*
11	» No pot life	» 4-hour pot life	*PreKote does not have to be disposed of after partial usage, thus preventing product waste and maximizing scheduling flexibility.*
12	» PreKote provides a water break-free surface	» The aircraft MUST be cleaned to ensure a water break-free surface.	*Using PreKote requires fewer steps —saving time.*
	Environmental, Health, & Safety Factors		
13	» No hazardous by-products	» Hazardous by-products created post usage: carbon monoxide and carbon dioxide	*PreKote does not pose any ventilation risks/hazards.*
14	» Non-hazardous waste	» Classified as hazardous waste	*PreKote alone does not create hazardous waste. Hazards are limited to only those removed from the surface being prepared.*
15	» SDS warnings listed: mild irritant	» SDS warnings listed: corrosion and health hazards; In addition, these products contain a reproductive toxin.	*PreKote is much safer for people to use.*
16	» NFPA Label: Health = 1	» NFPA Label: Part A: Health = 1; Flammable = 1 / Part B: Health = 3; Flammable = 1	
17	» Odor: None	» Odor: Slight vinegar-like smell	*PreKote is odor-free, thus improving working conditions.*
	Cost Factors		
18	» Shelf Life: 36 months unopened; 12 months opened	» Shelf Life: 12 months unopened; 24 hours once mixed	*PreKote's extended shelf life means less product waste.*
19	» PreKote may be rinsed with any municipal water	» Strict rinse water requirements: water must be less than 200 ppm total dissolved solids	*Reduced hassle; saves time and reduces labor costs associated with water testing.*
20	» Pre-cleaning solvents are not required. Simply strip plane, rinse, then apply PreKote.	» Prior to use, must pre-clean aircraft using solvents such as MEK, IPA, MPK or alkaline cleaner	*PreKote saves labor dollars and reduces product cost.*
21	» PreKote does not require an additional deoxidation step/product	» Requires deoxidation with acid or manually	*Using PreKote means fewer products and less labor.*
	Product History & Testing		
22	» USAF tested and implemented on all platforms	» USAF study confirmed PreKote is superior to alternatives	*PreKote has been used on all platforms in the USAF for over two decades.*
23	» In use since 1998	» In use since 2004	*PreKote has been in service longer; It has been used on tens of thousands of planes.*
24	» Received EPA Design for the Environment Recognition	» Not recognized by the EPA	*PreKote is recognized by the Environmental Protection Agency (EPA) DfE program.*

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PreKote® Wipes vs. Alodine® Pens

Understanding the Key Differences

PreKote® Surface Pretreatment

PreKote® Wipes	Alodine® Pens	Takeaway
Cost Factors		
» Wipes cost approximately $1.25 each » Each wipe covers 4 sq. feet » Cost per sq. foot: $.31	» Pens cost approximately $100.00 each » Each pen covers 50 sq. feet » Cost per sq. foot: $2.00	*PreKote is much less expensive to use.*
» No hidden costs	» Hidden/additional costs: HAZMAT shipping, storage, and waste, additional PPE costs, additional labor costs	
Application Process / Ease of Use		
» Ready-to-use wipe	» Ready-to-use pen	
» CAN BE USED ON ANY SURFACE (painted or unpainted)	» CAN ONLY BE USED ON BARE ALUMINUM » LIMITED USAGE: » Cannot be used on sensitive materials such as magnesium and composites » Cannot be used on painted surfaces	*PreKote is a more versatile product; it can be used on any surface.*
» 3-step process for any surface	» 7-step process for *unpainted surfaces only*	*Using PreKote wipes is faster and easier.* See reverse side for step-by-step process comparison.
» One (1) coat & one (1) drying process	» Two (2) coats & two (2) drying processes	
» Process Constraints / Limitations: » Must use wipe in only one direction.	» Process Constraints / Limitations: » Must apply product with a certain thickness » Arbitrary and potentially confusing saturation requirements for different types of coatings ("damp", "moderately wet", "very wet") » Second coat must be applied within five (5) minutes of first coat drying » Must have 50% overlap on each pass » Must keep felt tip "wet," but "not too wet" » If felt tip becomes fouled, pen life is diminished or pen becomes unusable » If pen isn't capped immediately after use, the pen dries out and becomes unusable » Cannot let product puddle » Although pen can be reused, it's not easy to know how much product is remaining inside pen; this can negatively impact productivity	*PreKote is easier to use; it has minimal "hassle factor".* *PreKote's simple process yields more consistent results.*
Environmental Health & Safety Factors		
» Hazard-free, non-regulated product	» Regulated by OSHA, DOT, IAT/ICAO, and IMO/IMDG	*Using PreKote requires less paperwork and frees up time spent documenting "compliance" related to shipping, usage, storage, and disposal.* *It also reduces HAZMAT related costs.*
» Non-hazardous shipping / storage	» Classified as hazardous shipping / storage	*PreKote wipes are not shipped or stored as hazardous waste making usage easier and reducing costs and storage hassles.*
» Non-carcinogenic	» Carcinogenic	
» PPE required: gloves	» PPE required: mask, gloves, goggles, and boots	
» SDS warnings listed: mild irritant	» SDS warnings listed: corrosion and health hazards; contains a reproductive toxin.	

PreKote® Wipes vs. Alodine® Pens:
Process Comparison

For touch-ups and small jobs, PreKote Wipes are a versatile, easy and convenient way to clean and prep any paintable surface. They're non-toxic which makes them superior to time-consuming, unsafe alternatives such as Alodine® pens.

The process is simple with PreKote Wipes: Wipe » Wait » Paint

PreKote vs. Alodine Pens: *Process Comparison Chart*

	PreKote Wipes: *Use on Any Painted or Paintable Surface*	**Alodine Pens:** *Use on Bare Aluminum Only*
Steps	**3 Steps**	**8 Steps**
1	Ensure a debris-free, clean surface	Ensure a debris-free, clean surface
2	With PreKote Wipe, wipe surface in one direction several times	Wet abrade to remove oxide layer
3	Let surface dry	Let surface dry
4	Prime or paint	Activate Pen
5		Apply Alodine using frequent short jabs to maintain consistent flow of product
6		Let surface dry
7		Within 5 minutes of first coat drying, apply a second coat
8		Let surface dry
		Prime or paint

PreKote®
—Simply Superior

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Environmental Health & Safety Advantages

PreKote surface pretreatment products offer numerous environmental, health and safety (EH&S) advantages. PreKote is easier to use than any other product, and unlike other pretreatment products, it's non-toxic and non-hazardous. That's why we say it's "simply superior". When you consider the fact that PreKote provides better adhesion and corrosion protection and is the safest product available, it's difficult to understand why anyone would use anything else. PreKote's all-in-one, ready-to-use product provides the best results, and the best protection of people and our planet.

PreKote Offers Numerous Environmental, Health & Safety Advantages

- ✓ Does not contain chrome (a known carcinogen)
- ✓ Non-toxic
- ✓ Non-hazardous
- ✓ Non-flammable
- ✓ Non-corrosive
- ✓ CFC free
- ✓ ODS free
- ✓ Odor free
- ✓ Readily biodegradable upon disposal
- ✓ Reduce HAZMAT shipping and storage charges
- ✓ Reduces water consumption

PreKote Reduces Water Consumption

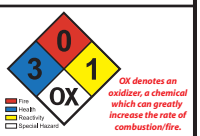
On average, using PreKote helps eliminate 2/3 of the rinse water needed when compared with traditional surface pretreatment processes.

EPA Findings

The US Environmental Protection Agency (EPA) has found:

- PreKote has environmentally preferable chemistry.
- PreKote is not one of the six core metal finishing effluent operations and **does not trigger categorical industrial user (CIU) status.**
- There are no Federal regulations restricting the disposal of PreKote in municipal wastewater systems. In situations where local regulations require treatment, PreKote reduces the throughput to the treatment system and virtually eliminates any material that must be collected and processed as hazardous waste.

SDS COMPARISON WITH TRADITIONAL CHROMATE CONVERSION COATINGS

	PreKote® Surface Pretreatment	CHROMATE CONVERSION COATINGS
pH	10.0-11.5	1.3-3.3
Corrosive	SAFE, Buffered Alkali	HAZARDOUS, Strong Acid
Chronic Toxicity	NO	YES
RCRA Corrosive Waste (D002)	NO	YES
Readily Biodegradable	YES	NO
NFPA Health		 OX denotes an oxidizer, a chemical which can greatly increase the rate of combustion/fire.
29 CFR 910.1200	NO	YES
Decomposition Products	NONE	TOXIC
SARA 311/312	NONE	ACUTE/CHRONIC**
Carcinogen	NO	YES
Reactivity	NONE	Strong alkalis, glass, concrete certain metals, silica containing materials, rubber, leather
40 CFR Part 433.10(a)*	NOT REGULATED	REGULATED
Industrial User (CIU) Status	NO (does not trigger CIU status)	YES

EPA Memorandum National Regulatory Determination for the* **PreKote *Surface Preparation Process, April 1, 2003.*

***SARA311/312:Chromate conversion coating (CCC) are categorized as carcinogens (cancer-causing). CCC users, along with people exposed to waste streams and by-products containing CCC are at higher risk for cancer, OSHA regulations require users handling CCC & CCC-based products wear full hazardous materials suits and forced air breathing systems.*

PreKote is the only aircraft surface pretreatment that has been recognized by the EPA's Design for the Environment (DfE) program.

Pantheon Enterprises, maker of PreKote, has been recognized as one of the World's Most Ethical Companies.

2012 WORLD'S MOST ETHICAL COMPANIES WWW.ETHISPHERE.COM

PreKote® Customers

Airlines & Manufacturers

- Air Canada
- Air Evac Lifeteam
- AirTran Airways
- American Airlines
- American Eagle
- China Airlines
- Compass Airlines
- United
- Copa Airlines
- Dassault Aviation
- Delta
- Embraer
- FedEx
- Gulfstream
- Jet Aviation
- Lufthansa
- Malaysia Airlines
- Mooney
- Southwest
- spirit airlines
- UPS
- Virgin

Paint Houses & MROs:

- AeroPro, LLC
- Bombardier
- Duncan Aviation
- EVA Air
- HAECO
- Jet Midwest Technik
- Leading Edge Aviation Services
- PremierAviation
- ST Aerospace
- StarPort
- THRUSH
- UNI AIR
- U.S. Air Force
- West Star Aviation

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PreKote® Case Studies | Delta Airlines and the USAF

PreKote has helped commercial airlines (such as Delta) and the US Air Force (USAF) save time and money while improving working conditions.

DELTA

"With PreKote®, exterior inspections have shown that we are getting better and more consistent adhesion, especially in the erosion areas.

Including the process time savings of 8% to 10% (with PreKote®), we estimate that Delta will earn over $1 million dollars annually in added revenue by returning these aircraft back to service one flight day earlier."

—Russell Ragsdale,
Principle Engineer, Delta Airlines

$

Savings

ROBINS AFB
Warner Robins, Georgia

Saved $100,000 per C-5.

"In evaluating the overall re-coating process and comparing our previous process (using chromate conversion coatings) to what we're doing now, we are realizing a savings in material costs of approximately $40,000 per year. In terms of the man hours required to prepare a plane to accept the paint , we're saving at least $60,000 per year in labor costs because masking and rinsing time is reduced."

—Clay Elliott , C-5 corrosion manager for the 730th Aircraft Sustainment Group at Robins AFB

Awards

The U.S. Environmental Protection Agency's (EPA) Design for the Environment (DfE) program honors individuals and groups who have made exceptional contributions to the protection of human health and the environment.

Delta Airlines Receives Prestigious EPA Recognition for Use of PreKote

Warner Robins Air Force Base Receives Prestigious EPA Recognition for Use of PreKote Pretreatment on the C-5 and C-130 Aircraft

In 2009 the United States Department of Defense (DoD) agencies and defense contractors were ordered to minimize the use of hexavalent chromium because of it's toxicity.

Warner Robins Air Force base began using PreKote in order to eliminate chromate conversion coatings (CCC) in the pre-treatment of C-5 and C-130 aircraft painting.

PreKote® & the U.S. Air Force:
The History of our Partnership

The U.S. Air Force has been using PreKote successfully for many years. Use of PreKote has resulted in substantial savings of tax payer dollars, improved working conditions for our military servicemen and women, the reduction of hazardous waste and water usage.

1993

Pollution Prevention (P2) office is created within the Air Force

1994

PreKote is invented
The PreKote trial test at Edwards Air Force Base (AFB) on the C-130 tail shows good results.

1996

P2 funds test of chromate conversion coatings (CCC) alternatives. Hill AFB tests four (4) alternative products. **Only PreKote passes.** *(February)*

1997

Hill AFB scuff sands and uses PreKote on a F-16 for a field test. *(March)*

Phase II testing begins at the AETC. Three T-38s are treated with two different products: PreKote and a CCC. One side is treated with PreKote and the other side with a CCC. *(May-July)*

Phase I AETC Report concludes PreKote is effective in adhesion & corrosion protection. PreKote moves to Phase II of testing. *(July)*

2 F-16 wings are painted with PreKote at Hill AFB. *(November)*

Dept. of Defense authorizes AETC at Columbus AFB to test PreKote in two phases. *(June)*

AETC paints an entire T-37 using PreKote. *(August)*

AETC paints an entire T-38 using PreKote. *(November)*

1998

Hill AFB publishes final report: PreKote is recommended for expanded use. *(April)*

1999

Phase II AETC Report concludes PreKote exceeds CCC performance in both adhesion and corrosion prevention. *(July)*

2000

PreKote F-16 implementation at Hill AFB. *(October)*

2001

PreKote T-37 & T-38 implementation.

Boeing helicopter begins lab testing PreKote *(June)*

Six year comparison study commissioned by Air Force Corrosion Program Office at Warner Robins AFB. Two (2) C-130s and two (2) A-10s are painted with ½ PreKote and ½ CCC. *(September)*

2002

Boeing Helicopter begins field testing PreKote on Apache Helicopter. *(August)*

Columbus AFB tests PreKote for use on magnesium airplane wheels. *(August)*

C-130 & A-10 five year field study results in: **PreKote either matched or outperformed CCC on all aircraft**.

2003

AETC mandates the use of PreKote.

PreKote proves effective on magnesium wheels at Columbus AFB. *(February)*

PreKote effective in missile silo at FE Warren AFB. *(April)*

Tinker AFB begins hangar trials on KC-135 and B-52. *(June)*

USAF 1-1-8 Technical Order approval. *(September)*

Sheppard AFB receives White House Closing the Circle Award for using PreKote, with reported savings of $58,000 per year.

2004

Sheppard AFB nominated for Texas Environmental Excellence Award for implementing PreKote.

Sheppard AFB nominated for White House Closing the Circle Award for implementing PreKote. *(January)*

Sheppard AFB becomes the first USAF base invited to join the EPA Waste Minimization Program. *(February)*

PreKote A-10 implementation at Hill AFB. *(May)*

Hill AFB receives EPA Environmental Achievement Recognition, honored by Utah Governor Olene Walker for using PreKote. *(June)*

2007

Tinker AFB receives **General Thomas D. White Environmental Award from the Pentagon** for using PreKote.

Tinker also receives the Department of Defense environmental award, reporting $120,000 in annual savings.

2009

Warner Robins AFB recognized by the U.S. Environmental Protection Agency 's Design for the Environment program for converting the C-5 and C-130 aircraft fleets to PreKote.

2012

Robins AFB recognized by the U.S. Environmental Protection Agency 's Design for the Environment program for converting the C-17 aircraft group to PreKot0e.

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Understanding the History, Usage, and Regulation of Hexavalent Chromium [Cr(VI)]

PreKote® Surface Pretreatment

Employees in the painting and coating industries are exposed to many toxic and hazardous chemicals. Unfortunately, in some circumstances, workers are not even aware of the dangers present in their places of work.

As recently as February 16, 2016, OSHA fined a company in Berlin, Connecticut over $46,000 for not adequately protecting employees from the risks associated with working with Cr(VI), a toxic chemical found in many paints, primers, and coatings.

For your protection, here are some things you should be aware of regarding Cr(VI).

Understanding Hexavalent Chromium

Chromium is an odorless and tasteless metallic element found in nature. However, the mineral can be changed into other forms either chemically or mechanically. One man-made derivative or compound made from chromium is Cr(VI).

Hex Chrome is hazardous, toxic and causes cancer.

Cr(VI) is added to **paints, primers, and surface** coatings to increase durability and provide corrosion resistance.

Those who work with spray paints and coatings are at high risk of exposure and associated health problems. Cr(VI) is aerosolized during the paint or coating spray application and enters the body through Inhalation. It also enters the body if eyes or open skin comes into contact with the liquid or dust.

Cr(VI) is a toxic air contaminant (TAC) that causes a wide-range of both acute and chronic problems such as yellow teeth, shortness of breath, coughing, wheezing, bronchitis, pneumonia, skin ulcers, dermatitis, and lung, nasal, and sinus cancer. Cr(VI) also is hazardous in that it pollutes air and water.

Both the potential environmental and human impact of Cr(VI) is of great concern. Because of the serious health risks associated with Cr(VI), federal and state governmental agencies have developed regulations and guidelines to protect the public. In the United States, federal work safety limits as determined by The Occupational Safety and Health Administration (OSHA) are set at 5 micrograms per cubic meter (µg/m3) of air during an 8-hour period.

OSHA requires employers to monitor employee exposure, provide respiratory protection and PPE, have a medical surveillance program in place, and keep strict records of all those working with Cr(VI).

The European Union's agency for monitoring and regulating chemicals is called REACH. It stands for Registration, Evaluation, Authorization and Restriction of Chemicals. They have banned Cr(VI) and are in the process of phasing usage out. As of **September 21, 2017** use of Cr(VI) must be "sunsetted" or completely stopped.

It's important to know that cancer risk from Cr(VI) at the current permissible exposure limit (PEL) is higher than the associated risks of working with asbestos and benzene at their PELs.

- **Asbestos:** 6.7 deaths per 1000 workers
- **Benzene:** 10 deaths per 1000 workers
- **Cr(VI):** 10-45 excess lung cancer deaths per 1000 workers for 45 years of exposure at new PEL of 5 ug/m3

Key Legislative Dates

1980

1980: The First Annual Report on Carcinogens is published by the National Toxicology Program and the Department of Health and Human Services.

Cr(VI) is listed as a human carcinogen.

1986

1986: The California EPA Air Resources Board (CARB) identifies Cr(VI) as a toxic air contaminant (TAC).

2001

2001: The California Air Resources Board (CARB) approves banning the use of hexavalent chromium coatings for motor vehicles and mobile equipment by Jan. 1, 2003.

2006

2006: OSHA mandates the aerospace industry reduce the use of Cr(VI) by 52% or face stiff fines.

The European Union's organization that oversees use of chemicals (REACH) bans the use of Cr(VI) in electronics. Use of Cr(VI) in other industries must be phased out over the course of the next few years.

2009

2009: OSHA reduces the permissible exposure limits again.

2010

2010: The US Department of Defense directs all branches of the military to "explore methods to minimize the use of and exposure to Cr(VI) and seek and evaluate less toxic alternatives.

2017

2017: Use of Cr(VI) is no longer permitted in Europe after September 21, 2017 per REACH regulations.

PreKote® Approval List

OEM Maintenance Approvals

- SAE AMS 3095A for Airline Exterior Paint
- Boeing Approval HMS20-1267QPL
- Boeing Designation:
  - HMS20-1267/2366 PreKote
  - HMS20-1267/1892 A/D, Nickel/NI Alloy, Preprocess, Immerse
  - HMS20-1267/1910 A/D, Titanium, General, Immerse
  - HMS20-1267/1912 A/D, Titanium, Preprocess, Immerse
  - HMS20-1267/2053 A/D, General, Immerse
  - HMS20-1267/2054 A/D, Preprocess, Immerse

- Dassault Aviation: Approved for all Falcon Aircraft
- Bell Helicopter: Approved for Edwards & Associates Inc.
- Gulfstream GMS 5008

OEM Production Approvals

- SAE AMS 3095A for Airline Exterior Paint
- Boeing Mesa: US Army Apache Helicopter
- Freightliner
- Dassault Aviation: Approved for all Falcon Aircraft
- Keystone Helicopters (Sikorsky Owned Finishing Center)
- Mooney Aircraft
- Gulfstream GMS 5008

Commercial Airline Approvals

- Air Canada
- American Airlines
- Delta
- FedEx Airbus Aircraft (Paint Line)
- Southwest
- United Airlines
- UPS

Military Approvals

- US Air Force TO 1-1-8 (All US Air Force Airframes)
- US Air Force Airframes (A-10, B1B, B-52, C-130, C-5, C-17, E-3, F-4, F-5, F-16, KC-135, T-1, T-6, T-37, T-38)

No Technical Objections & Reference Instruction Letter

- Bombardier
- Embraer
- Saab