



STANDARD OVERHAUL PRACTICES MANUAL

CHEMICAL CONVERSION COATINGS FOR ALUMINUM

**PART NUMBER
NONE**

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STANDARD OVERHAUL PRACTICES MANUAL

Revision No. 16
Jul 01/2009

To: All holders of CHEMICAL CONVERSION COATINGS FOR ALUMINUM 20-43-03.

Attached is the current revision to this STANDARD OVERHAUL PRACTICES MANUAL

The STANDARD OVERHAUL PRACTICES MANUAL is furnished either as a printed manual, on microfilm, or digital products, or any combination of the three. This revision replaces all previous microfilm cartridges or digital products. All microfilm and digital products are reissued with all obsolete data deleted and all updated pages added.

For printed manuals, changes are indicated on the List of Effective Pages (LEP). The pages which are revised will be identified on the LEP by an R (Revised), A (Added), O (Overflow, i.e. changes to the document structure and/or page layout), or D (Deleted). Each page in the LEP is identified by Chapter-Section-Subject number, page number and page date.

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TRANSMITTAL LETTER

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Location of Change

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HIGHLIGHTS

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All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

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INTRODUCTION

1. General

- A. The instructions in this manual tell how to do standard shop procedures during maintenance functions from simple checks and replacement to complete shop-type repair.
- B. This manual is divided into separate sections:
 - (1) Title Page
 - (2) Transmittal Letter
 - (3) Highlights
 - (4) Effective Pages
 - (5) Contents
 - (6) Revision Record
 - (7) Record of Temporary Revisions
 - (8) Introduction
 - (9) Procedures
- C. Refer to SOPM 20-00-00 for a definition of standard industry practices, vendor names and addresses, and an explanation of the True Position Dimensioning symbols used.
- D. The data is general. It is not about all situations or specific installations. Use it as a guide to help you write minimum standards.
- E. If the component overhaul instructions are different from the data in this subject, use the component overhaul instructions.

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INTRODUCTION

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CHEMICAL CONVERSION COATINGS FOR ALUMINUM

1. INTRODUCTION

- A. The data in this subject comes from Boeing Process Specifications BAC5719. The airline has a copy of the Boeing Process Specification Manual.
- B. The data is general. It is not about all situations or specific installations. Use this data as a guide to help you write minimum standards.
- C. If the instructions in the finish code refers to BAC5719, use only this procedure. If the instructions refer to MIL-C-5541, you can use procedures that agree with MIL-C-5541.
- D. Refer to SOPM 20-00-00 for a list of all the vendor names and addresses.

2. SCOPE

- A. This chemical conversion coating is used on aluminum to increase corrosion resistance, to be a paint base, and to give an electrically conductive finish.
- B. The coatings applied by these procedures agree with the requirements of MIL-C-5541. But the paint adhesion tests of MIL-C-5541 are not included. For parts to be painted, use the paint adhesion tests of the applicable paint application specification.

3. CLASSIFICATION

- A. This procedure has these types and classes:

CLASSIFICATION	DESCRIPTION	OBSOLETE CLASSIFICATION
Type 1	Immersion Application	Method 1
Type 2	Manual Application. For parts too large for immersion tank, for parts with areas that could catch liquids, or for touchup or for minor rework	Method 2
Type 3	Spray Application. For parts with no areas that could catch liquids.	Method 3
Type 4	Automatic coat (flow, roll or spray) application. For Class E material only, on rolls or foil or flat sheets.	(None)
Type 5	Manual pen application. For Class F material only, for small repairs (scratches, small bare areas)	(None)
Class A	Alodine 600, Alodine (Alocrom) 1200, Alodine 1200S, Alodine 1201 (Type 2 only), Alumibond 1200, Turcoat Alumigold B or 4178-6, Chromicoat L25 or Iridite 14-2 (colored fim) (meets MIL-C-5541 Class 1A), Alodine 1600 or 1660	(None)
Class B	Alodine 1000, 1000L, 1001, or 1500 (clear film) (meets MIL-C-5541, Class 3)	(None)
Class C	Alodine 600, Alodine (Alocrom) 1200, Alodine 1200S, Alumibond 1200, or Chromicoat L25 applied over alkaline etch cleaning (meets MIL-C-5541 Class 1A), Alodine 1600 or 1660. (Use immersion application [Type 1] only)	(None)

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CLASSIFICATION	DESCRIPTION	OBSOLETE CLASSIFICATION
Class D	Alodine 600 (Type 1, 2 or 3), Alodine (Alocrom) 1200, Alodine 1200S (Type 1, 2 or 3) Chromicoat L25, or Iridite 14-2 (Type 1) (colored film) (meets MIL-C-5541 Class 3). Makes a coating with low electrical resistance	(None)
Class E	Permatreat 684. For laminated aluminum shims, shim stock, and shim components (foil and sheet stock) only	(None)
Class F	Alodine 1132 (Touch-N-Prep pen) (Type 5). For scratches and small bare areas on the aluminum substrate only	(None)

- B. If the overhaul instructions do not give the type or method and the parts have no areas that could catch solutions, use Type 1, 2, 3 or 4. If the parts do have areas that could catch solutions, use Type 2.
- C. If the overhaul instructions do not give the class or color, use Class A or C. If the overhaul instructions specify Class A, you can use Class C as an alternative. But use Class C only on bare (non-clad) detail parts. On shim stock or components, use Class E. If the overhaul instructions specify colorless or clear coating, use Class B.
- D. If the parts have BMS 10-20 primer, use only Alodine 600. Other coating materials, such as Alodine 1132, 1200 or 1200S, can cause a powdery coating if applied on cured BMS 10-20 primer.
- E. Do not use the Alodine 1132 pen on surfaces to be sealed with BMS 5-45 sealant.

4. MATERIALS

- A. Alocrome 1200, VK0008
- B. Alodine 600, V84063
- C. Alodine 1000L, liquid concentrate, V84063
- D. Alodine 1000, powder, V84063
- E. Alodine 1001, liquid concentrate, V84063
- F. Alodine 1132 Touch-N-Prep pen, V84063
- G. Alodine 1200, V84063
- H. Alodine 1200S, V84063
- I. Alodine 1201, V84063
- J. Alodine 1500, V84063
- K. Alodine 1600, V84063
- L. Alodine 1660, V84063
- M. Alumibond 1200, V1DZU6
- N. Chromicoat L25, V44389
- O. Chromicoat T3, V44389
- P. Iridite 14-2, V0PX54
- Q. Permatreat 684, V24774
- R. Toner 22, V84063

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- S. Turcoat Alumigold B, V61102
- T. Turcoat Alumigold 4178-6, V61102
- U. Ammonium Hydroxide, 28%, technical grade
- V. Nitric Acid – Technical, A-A-59105 (Replaces O-E-350) or JIS-K-1308, 40 or 42° Baume'
- W. Hydrofluoric Acid – 70% recommended; other concentrations are acceptable
- X. Sodium hydroxide, 50% liquid, ASTM E 1098
- Y. Sandpaper – aluminum or garnet abrasive, 600 grit
- Z. Brush – fiber or nylon
- AA. Sponge – cellulose
- AB. Wipers – cheesecloth, gauze, or new laundered rags
- AC. Mop – cotton
- AD. Maskants (Ref SOPM 20-44-02)
- AE. Gloves – cotton, nylon, or equivalent
- AF. Perchloroethylene – O-T-236
- AG. Betz Kleen 147, V24774
- AH. Cleaning solvent, presealing – BMS 11-7 (Ref SOPM 20-60-01)
- AI. Solvent – Freon TA, V18873
- AJ. Abrasive Pads – Scotch-Brite aluminum oxide, Type A, very fine, V76381 or non-metallic abrasive fiber pads

5. APPLICATION PROCEDURE**A. General**

WARNING: SOME OF THESE MATERIALS ARE FLAMMABLE AND TOXIC. CHEMICAL CONVERSION COATING POWDERS THAT TOUCH ORGANIC SOLVENT CAN CAUSE A FIRE.

- (1) Class A, C, D, E or F coatings have an easy-to-see color that could be from light golden iridescent to gold-brown. Class B coatings have no color. You can use the color to help identify the coating, but clad parts with an Alodine 600 coating could have little or no color.
- (2) For tubing to get a complete, smooth coating on the interior surface, we recommend this forced-solution-movement procedure:
 - (a) Pump the chemical conversion coating at a rate of up to 60 feet/minute to fill the tubes.
 - (b) Stop the pump and keep the tubes below the surface of the solution in the tank for 85-95 seconds before removal.
 - (c) Pump cold water at a rate of up to 60 feet/minute to fill the tubes.
 - (d) Stop the pump and keep the tubes below the surface of the water in the rinse tank for a minimum of 4 minutes.
 - (e) Pump water through the tubes again, for 25-35 more seconds, before removal.
- (3) For straight tubing smaller than 0.75-inch OD, use the forced-solution-movement procedure or as an alternative, this multiple-immersion procedure.

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- (a) Do a minimum of four immersions in each procedure step, but not in the chemical conversion coating solution. More than four immersions in the chemical conversion coating solution could cause powdery coatings.
 - (b) During each immersion, let the tubing completely fill with the treatment liquid before you remove it. Then let the liquid drain from the tubing. Do not put the tubing back into the liquid until the continuous flow from the tube becomes intermittent.
- B. Type 1 (Immersion Application), Class A, B and C.
- (1) Alkaline clean and rinse per BAC5749 (Ref SOPM 20-30-03) to get a water-break-free surface, unless the parts:
 - (a) have a thermal spray coating.
 - (b) are heat treated aluminum with heavy scale. Then you can alkaline etch per BAC5786, Type 2.
 - (c) could catch solutions, as by open faying surfaces, swaged anodized fittings on tubes or ducts, or spot welded joints. Then use this procedure to get a water-break-free surface:
 - 1) Rinse in cold water for 2 minutes minimum and examine for water breaks.
 - 2) If there are water breaks, do one of these three steps until there are no water breaks:
 - a) Manually clean per BAC5765, Method 3, or
 - b) Abrasive clean the surface with very fine Scotch-Brite pads and water. Rub only to scratch the surface. Be careful not to remove the clad surface, if the part has it. Then wipe with clean wipers or sponges wet with water. Wipe the area a minimum of two times until all sand and unwanted matter is gone.
 - c) Manually clean per BAC5744 or manually deoxidize per BAC5765 with Solutions 16, 20, 42, or 43. Wipe or spray rinse to remove all cleaning or deoxidizing solutions, especially from areas which could catch solutions. Use only Solution 43 on BMS 8-289 aluminum foil.
 - (d) are Class C parts. Then alkaline etch per BAC5786.
 - (e) are tubing. Then as an alternative, alkaline etch per BAC5786 Type 2 with TEA etchant, pumped through the tubing at a maximum flow rate of 60 feet per minute.
 - (2) Deoxidize and rinse per BAC5765, Method 1, unless the parts:
 - (a) are Class B parts.
 - (b) have thermal spray coating. Then abrasive clean the oxide from the aluminum surfaces per BAC5748, Type 2 Class 1. Do not use wet methods to remove the grit and unwanted matter. Use a vacuum or blow the parts clean with clean compressed air.
 - (c) are aluminum tubing which was alkaline etch cleaned per BAC5876. Then deoxidize per BAC5786 for 10 minutes minimum, with the solution pumped through the tubing at a maximum flow rate of 60 feet per minute.
 - (d) are cast or welded parts. Then deoxidize per BAC5765 with Solutions 27A, 37, 38, or 39. Immediately rinse in water.
 - (3) Put the parts in the applicable chemical conversion treatment solution for the time necessary to get a satisfactory coating. For tubing, use the forced-solution-movement or multiple-immersion procedures, as applicable. If air pockets cannot be prevented, turn parts only as necessary. Drain the parts up to 1 minute over the tank to minimize carry-over.

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CAUTION: TOO STRONG A WATER SPRAY COULD DAMAGE THE SOFT COATING.

- (4) Rinse with cold water for 2-5 minutes. As an alternative for Alodine 1200 coatings, you can use a warm water rinse at 130°F maximum for 1-3 minutes.
 - (5) Air dry fully at room temperature to 130°F maximum. For better corrosion resistance, air dry fully at 110-130°F for 20-35 minutes.
 - (6) Touch parts only with clean gloves. The coating is soft and easily damaged. Give it protection from abrasion, damage, and contamination.
- C. Type 2 (Manual Application) - Classes A, B, C, D.
- (1) Manual clean-deoxidize per BAC5765, Method 3, or use an alternate procedure from step (2), unless the parts:
 - (a) are made of bonded pieces, unsealed or only partially sealed, and thus could catch solutions. Then alkaline clean per BAC5744, without the step that deoxidizes.
 - (b) are fiberglass with aluminum thermal coating. Then, after removal of the parting agent, alkaline clean per BAC5744, then abrasive clean with very fine Scotch-Brite pads and water. Make sure the surfaces are water-break-free.
 - (c) were deoxidized, and with new material removal or abraded surfaces. Then clean them per BAC5744 Method 2 without the steps that deoxidize.
 - (d) have polished, skin-quality surfaces to get a Class B chemical coating. Then solvent clean them per BAC5750, or manual clean them per BAC5744, Method 1. Make sure the surfaces are water-break-free.
 - (e) were trimmed, sanded, drilled or machined in the last 2 hours. Then solvent clean them per BAC5750 or BAC5744 Method 2. It is not necessary to clean the surfaces with Scotch-Brite or abrasives.
 - (2) Alternate surface preparation procedures
 - (a) Abrasive clean with Scotch-Brite pads
 - 1) Abrasive clean the area with very fine Scotch-Brite pads and water. Be careful not to remove the clad surface, if the part has it.
 - 2) Rinse with water, or if the parts could catch water, wipe them with clean wipers or sponges wet with water. Wipe the area a minimum of two times until all sand and unwanted matter is gone. Make sure the surfaces are water-break-free, or do step (a) again.
 - (b) Removal of shot-peen contamination from assemblies only
 - 1) Method 1 – Scotch-Brite pads and deionized water
 - a) Solvent wipe per BAC5750.
 - b) Manually alkaline clean per BAC5744.
 - c) Abrasive clean with fine-grit Scotch-Brite pads and deionized water per BAC5748. Do this three more times with a new Scotch-Brite pad each time.
 - d) Rinse with water or, if the parts could catch water, wipe them with clean wipers or sponges wet with water. Wipe the area a minimum of two times until all sand and unwanted matter is gone. Make sure the surfaces are water-break-free or do step 1) again.
 - 2) Method 2 – Aluminum oxide blast

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- a) Abrasive clean per BAC5748, Type 2 Class 1 with clean aluminum oxide grit.
- b) Rinse with water or, if the parts could catch water, wipe them with clean wipers or sponges wet with water. Wipe the area a minimum of two times until all sand and unwanted matter is gone. Make sure the surfaces are water-break-free, or do step 2) again.
- (c) For Class E parts, prepare the surface per BAC5744 Method 1, or solvent clean them per BAC5750.
- (d) For Class F parts, solvent clean them per BAC5750.

CAUTION: DO NOT LET ITEMS WET WITH COATING SOLUTION DRY WITH SOLUTION IN THEM, BECAUSE SPONTANEOUS COMBUSTION COULD OCCUR. FULLY WASH ALL SOLUTION-WET CLOTHS, OR WRING THEM OUT AND PUT THEM IN A FIREPROOF CONTAINER.

- (3) For Class A, C, and D coatings, apply the solution to the part with a cloth, brush, cellulose sponge or mop, or spray it on. Keep the surface wet until you can see color. The color will come in 2-3 minutes. If the color does not come, if the solution breaks up into beads, or if a powdery layer occurs, lightly sand area with 600-grit paper and apply the coating again.
 - (4) For Class B coatings, apply the solution on the part with cloth, brush, cellulose sponge or mop or spray it on. Keep the surface wet for 30 seconds less than the time necessary to cause color. If the coating solution breaks up into beads, or if a powdery coating occurs, lightly sand the area with 600-grit paper and apply the solution again. Do not apply this coating in direct sunlight.
 - (5) If the parts have surfaces with primer BMS 10-11, BMS 10-20, or BMS 10-79, and the bare metal surfaces have no water breaks, you can let the chemical conversion treatment solution touch the primer. If the primer is BMS 10-20, use only Alodine 600 as the chemical conversion treatment solution.
 - (6) Flush with water, or, if parts could catch water, use a cloth or sponge wet with water. Be careful, because the coating is soft and easily damaged.
 - (7) Fully air dry with the air at 130°F maximum. For better corrosion resistance, air dry fully at 110-130°F for 20-35 minutes.
 - (8) Touch parts only with clean gloves. The coating is soft. Give it protection from abrasion, handling damage, and contamination.
 - (9) For Class E coatings, apply the solution with clean wipers, brush, cellulose sponge or mop, or spray it on. Then dry the coating sufficiently to evaporate the water. Do not let the metal get hotter than 200°F.
- D. Type 3 (Spray Application) - Classes A and B

NOTE: This procedure must not be used for conveyORIZED flow coat priming. For chemical conversion treatment flow coat operations, use only the Type 4 procedure per par. F.

- (1) Mask off metal inserts of different metal, unless the inserts are CRES or titanium, or are plated with chromium, nickel, or cobalt.
- (2) Spray alkaline clean per BAC5749 (Ref SOPM 20-30-03).
- (3) Spray deoxidize 30-60 seconds with one of BAC5765 solutions 1 thru 5. Use solutions at room temperatures up to 110°F. This step is optional if parts have no scale or corrosion.
- (4) Spray water rinse for 30-60 seconds at 90°F maximum.
- (5) Apply the coating solution.

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- (a) For Class A coating, spray the Class A solution 25-35 seconds at 75-95°F.
- (b) For Class B coating, spray the Class B solution 30-90 seconds at 140-160°F.
- (6) Spray water rinse for 30-60 seconds at 130°F maximum.
- (7) Dry with clean air at a maximum temperature of 130°F for 3-6 minutes. There is no time limit for long drying periods below 100°F. Use a sufficient volume and flow of air for complete removal of water from the parts.
- (8) If applicable, apply primer and other coatings per overhaul instructions.
- E. Type 4 (Automatic Coat Application) - Class E
 - (1) Spray alkaline clean with Betz Kleen 147, or clean per BAC5749.
 - (2) Spray deoxidize 30-60 seconds with one of the BAC5765 solutions 1 thru 5. Use the solutions at room temperatures up to 110°F. This step is optional if the parts have no scale or corrosion.
 - (3) Spray water rinse for 30-60 seconds at 90°F maximum.
 - (4) Apply a smooth layer on all of the surface.
 - (5) Dry the layer with a heat source which will make the material sufficiently warm to evaporate the water. A metal temperature of 120°F is preferred. Do not let the metal become hotter than 200°F.
- F. Type 5 (Alodine 1132 Touch-N-Prep Pen Application)
 - (1) Shake the pen a minimum of 30 seconds.
 - (2) Remove the cap. Hold the pen with the applicator tip down.
 - (3) Push the tip against a hard surface. This will open the valve inside the pen and let the liquid get to the tip. For a new pen, this could be 30-45 seconds. When the tip is wet with the liquid, release the pressure.
 - (4) Make sure the part surface is dry. Apply the pen to the part surface to put the liquid on in smooth strokes. Strokes with overlaps usually give the best coating weight. Do not let the liquid collect in puddles because the time to dry will increase.
 - (5) Do not rinse with water. Let the applied material dry in air, or dry it with a flow of air at 130°F maximum.

6. SOLUTION MAKEUP AND CONTROL

- A. For all solutions but Alodine 1000 or 1000L, use stainless steel tanks or tanks lined with acid-resistant plastic or rubber. For Alodine 1000 and 1000L solutions, you can also use mild steel tanks.
- B. Make sure the tank is clean. Then fill it half-full with makeup water. Sprinkle the powder chemicals smoothly over the surface, or pour the liquid chemicals along the length of the tank. Stir the solution until the chemicals are completely dissolved or the liquids are completely mixed, then add water to volume.
- C. For large, long tanks, longitudinal agitation is recommended to keep solution concentrations uniform.
- D. For Types 1, 3, 4 coatings (Class A, C, D and E solutions), prepare and control the solutions per Table 1.
- E. For Type 1 and Type 3 coatings (Class B solutions), prepare and control the solutions per Table 2.
- F. Immersion Application (Type 1) solutions collect sludge. Do not let the sludge rise to a level where it touches the work. Remove the sludge as necessary to keep it away from the parts.
- G. Manual Application (Type 2) Solutions

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- (1) Prepare and use solutions only in containers of stainless steel or acid-resistant plastic or rubber (polyethylene preferred). Put covers on containers which will be put into storage.
- (2) Alodine 600: Add 3 ounces of powder to water for each gallon of final solution. Stir until the powder is dissolved. Then add 2% by volume of Alodine Toner 22 or ammonium hydroxide and stir to adjust the pH to 1.5-2.0. Ignore small quantities of material which do not dissolve. Let the solution stand at least 1 hour before you use it.
- (3) Alodine 1000: Add 0.35-0.44 ounce of powder to water for each gallon of final solution. Stir until the powder is dissolved. Ignore small quantities of material which do not dissolve. Allow to stand at least 1 hour before you use it.
- (4) Alodine 1000L: Dilute 4 volumes of the Alodine 1000L with 6 volumes of water and stir to get a final concentration of 0.4 ounce of Alodine 1000 per gallon of solution.
- (5) Alodine 1001: This is a pre-mixed liquid. Make-up is not applicable.
- (6) Alodine 1132: This is a pre-mixed liquid which comes in a pen. Make-up is not applicable.
- (7) Alodine (Alocrom) 1200: Add 3 ounces of powder to water for each gallon of final solution. Stir until the powder is dissolved. Ignore small quantities of material which do not dissolve. Let the solution stand at least 1 hour before you use it. Keep the pH in the range of 1.50-1.90. Adjust the pH down with nitric acid or ammonium hydroxide.
- (8) Alodine 1200S: Add 1.9-2.1 ounces of powder to water for each gallon of final solution. Stir until the powder is dissolved. Ignore small quantities of material which do not dissolve. Let the solution stand at least 1 hour before you use it.
- (9) Alodine 1200: This is a pre-mixed liquid. Make-up is not applicable.
- (10) Alumibond 1200: Add 2 ounces of power to water for each gallon of final solution. Stir until the power is dissolved. Ignore small quantities of material which do not dissolve. Let the solution stand at least 1 hour before you use it.
- (11) Alodine 1500: Add 8 fluid ounces of Alodine 1500 to water for each gallon of final solution. Stir to completely mix.
- (12) Permatreat 684: See Table 1.
- (13) Put out approximately the amount of solution necessary for the work on hand. Discard the solution after you use it, if a brush, sponge, or wiper was put into it or if contamination gets into the solution.

Table 1: Preparation and Control for Class A, C, D and E Coatings

MATERIAL	APPLICATION TYPE	VARIABLE	MAKEUP ^{*[1]}	CONTROL
Alodine 600	Type 1	Concentration pH Temperature Sulfates plus Chlorides	1.4 oz/gal — — —	1.3-3.0 oz gal ^{*[2]} 1.5-2.2 ^{*[3]} 60-100°F 400 ppm max
Alodine 1200, Alochrome 1200	Type 1	Concentration pH Temperature	1.2 oz/gal — —	1.0-3.0 oz/gal 1.5-2.1 ^{*[4]*[5]} 60-100°F
Alodine 1200S	Type 1	Concentration	1.2 oz/gal	1.0-3.0 oz/gal

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Table 1: Preparation and Control for Class A, C, D and E Coatings (Continued)

MATERIAL	APPLICATION TYPE	VARIABLE	MAKEUP ^{*[1]}	CONTROL
	Type 3	pH	—	1.3-1.8 ^{*[4]*[6]}
		Temperature	—	60-100°F
		Concentration	0.7 oz/gal	0.6-1.0 oz/gal
		pH	—	1.3-1.7 ^{*[4]*[6]}
Alumibond 1200	Type 1	Temperature	—	75-95°F
		Concentration	1.0 oz/gal	0.8-3.0 oz/gal
		pH	—	1.3-1.8 ^{*[4]}
		Temperature	—	70-100°F
Alodine 1600/1660 A-1600 A-1660	Type 1	Concentration	0.832 fl.oz./gal	0.65-1.01 fl.oz./gal
		Concentration	2.56 fl.oz./gal	1.30-2.02 fl.oz./gal ^{*[7]}
		pH	—	1.5-2.0 ^{*[8]}
		Temperature	—	60-130°F
		Sulfates plus Chlorides	—	400 ppm max
		Temperature	—	80-120°F
Chromicoat L25	Type 1	Concentration	4.0 oz/gal	3.8-6.4 oz/gal ^{*[9]}
		pH	—	1.6-2.0 ^{*[10]}
		Temperature	—	80-120°F
Iridite 14-2	Type 1	Concentration	1.0 oz/gal	0.8-2.0 oz/gal
		pH	—	1.1-1.9 ^{*[4]}
		Temperature	—	60-100°F
Permatreat 684	Type 4	Concentration	50 volume percent	50-100 volume percent
		Temperature	—	60-100°F
Turcoat Alumi-gold B or 4178-6	Type 1	Concentration	1.44 oz/gal	1.0-1.5 oz/gal
		pH	—	1.6-1.9 ^{*[4]}
		Temperature	—	70-95°F

^{*[1]} Where powder is used, let the solution stay with no movement for 24 hours before you use it. The small amount of precipitate that occurs will not be a problem for the coating procedure.

^{*[2]} Dissolve Alodine 600 in water before you add it to the tank.

^{*[3]} Adjust pH to 1.8-2.0 with Alodine Toner 22 (approximately 1% by volume) on makeup. Operation near the upper limit is recommended. Adjust pH down with nitric acid and up with sodium hydroxide.

^{*[4]} Higher concentrations will usually have a lower pH that will subsequently increase, but generally will stay in the ranges indicated. Adjust the pH down with chemical conversion coating chemical or powder, nitric acid, or both. Where soft water is used, small additions of Alodine 22 toner can be used with Alodine or Alochrome solutions. Ammonium hydroxide can be used to increase the pH of Alumibond, Turcoat or Iridite solutions.

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Table 1: Preparation and Control for Class A, C, D and E Coatings (Continued)

- *[5] For a smoother coating, hydrofluoric acid can be added in small amounts, no more than 50 ppm fluoride at a time. Adjust the frequency of additions for best coating appearance and corrosion test results.
- *[6] Alodine 1200S contains two times the chromium that Alodine 1200 has, and can be operated at a lower pH and faster rate than Alodine 1200.
- *[7] When you add more Alodine powder, use the same ratio of Alodine 1600 and Alodine 1660 as shown for initial solution. For troubleshooting and adjustments, you can monitor the fluoride with a fluoride ion electrode. The vendor recommends a range of -70 to -85 millivolts.
- *[8] Adjust pH to 1.65-1.85 with Alodine Toner 22 (approximately 1.0-1.5% by volume) on makeup. Adjust pH down with nitric acid and up with sodium hydroxide.
- *[9] Adjust the tank concentration with Chromicoat T3 replenishing solution.
- *[10] Adjust the pH down with nitric acid, and up with sodium hydroxide.

Table 2: Preparation and Control For Class B Coatings

MATERIAL	APPLICATION TYPE	VARIABLE	MAKEUP ^{*[1]}	CONTROL ^{*[2]}
Alodine 1000 power	Type 1	Concentration	0.15 oz/gal	0.14-0.18 oz/gal
		pH	—	below 4.5 ^{*[3]}
		Temperature	—	140-150°F
	Type 3	Concentration	0.15 oz/gal	0.14-0.24 oz/gal
		pH	—	below 4.5 ^{*[3]}
		Temperature	—	140-160°F
Alodine 1000L liquid ^{*[4]}	Type 1	Concentration	19.20 fl oz/gal as Alodine 1000L	0.14-0.18 oz/gal as Alodine 1000
		pH	—	below 4.5 ^{*[3]}
		Temperature	—	140-150°F
	Type 3	Concentration	19.20 fl oz/gal as Alodine 1000L	0.14-0.24 oz/gal as Alodine 1000
		pH	—	below 4.5 ^{*[3]}
		Temperature	—	140-160°F
Alodine 1500	Type 1	Concentration	1.28 fl oz/gal	1.10-1.46 fl oz/gal
		pH	—	below 4.0
		Temperature	—	150-160°F
	Type 3	Concentration	1.28 fl oz/gal	1.10-1.46 fl oz/gal
		pH	—	below 4.0
		Temperature	—	140-160°F

*[1] Where powder is used, let the solution stay with no movement for 24 hours before you use it. The small amount of precipitation that occurs will not be a problem for the coating procedure.

*[2] Adjust the pH down with Alodine until the concentration comes to the upper limit shown. Then discard the solution when the pH comes to the upper limit shown. Do not try to adjust the pH down with acid.

*[3] For best results, keep the pH below 4.0.

*[4] Alodine 1000L is a liquid concentrate that contains 1 ounce of Alodine 1000 per gallon.

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7. QUALITY CONTROL

A. Appearance

- (1) When examined without magnification, coatings must have no streaks, and must be continuous and have no powder or loose areas. The coating must have no breaks or scratches which go through to the base metal, or other defects which will make the part less serviceable. The size and number of contact marks must be kept to a minimum that agrees with good practice. Touchup of bare spots that occur at contact points is not necessary if the longest dimension of each spot is 0.1 inch or less. One bare spot can be up to 0.125 inch.
- (2) Color differences can occur because of the base metal, how it is examined and with different conditions of light. Differences in color on a part, or between different batches, are satisfactory.
- (3) Class B: When examined without magnification, coatings must be without color.
- (4) Class D: The coating color can be between a light golden iridescent to a gold brown, but must not be dark brown. Clad parts with Alodine 600 coating could possibly have no color, which is satisfactory.

- B. All classes of unpainted chemical coating on aluminum and aluminum alloy parts must give the base metal protection from corrosion when given the 5% salt spray test specified in BAC5719.
- C. Use only Alodine 600 for touchup and rework of parts or assemblies painted with BMS 10-20 primer. Other coating materials, such as Alodine 1132, 1200 or 1200S, can cause a powdery coating if used on BMS 10-20 primer.
- D. Do not use the Alodine 1132 pen on surfaces which will get BMS 5-45 sealant.

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