SMI, Inc.
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Attn: Steve Palauskas
Detailer Supply
Bradley International Airport
Windsor Lock, CT 06096

Date: 07-Aug-2013

SMI/REF: 1305-688

Product: **BRIGHT WORK AVIATION METAL POLISH** *(received 06-Jun-2013)*

Dilution: As received

BOEING D6-17487 REVISION R
Exterior and General Cleaners and Liquid Waxes, Polishes and Polishing Compounds

Sandwich Corrosion Test	Conforms
Acrylic Crazing Test	Conforms
Paint Softening Test	Conforms
Hydrogen Embrittlement Test	Conforms

Respectfully submitted,

Patricia D. Viani, SMI, Inc.

Sandwich Corrosion Test : Specimen preparation, testing, and interpretation shall be in accordance with ASTM F1110 using the following materials and with the following exceptions:

1. Reagents and materials exception:
   (1). Clad 7075-T6 aluminum alloy in accordance with QQ-A-250/13 (AMS 4049 or AMS-QQ-A-250/13 optional) (2024-T3 Alclad specimens are neither required nor optional.)
   (2) Bare 7075-T6 aluminum alloy in accordance with QQ-A-250/12 (AMS 4045 or AMS-Q-A-250/12 optional) anodized in accordance with BAC 5019 or MIL-A-8625, Type I. Anodize shall be sealed. (2024-T3 nonclad specimens are neither required nor optional).
   (3) Distilled or deionized water may be used in place of ASTM F1193, Type IV reagent grade water for control specimens.
   (4) The filter paper may be Whatman No. 5 or equivalent in place of Whatman GFA glass fiber paper.
2. Procedure exceptions:
   (1) The filter paper strips shall be 1 by 3 inches and shall be placed in the center of the sandwiched specimens.
   (2) Each sandwich specimen shall be held together with waterproof tape, with no more than 1 piece of tape (maximum width 0.75 inch) on each of two opposite edges.
3. Interpretation of result exceptions:
   (1) Leaching or lightening of the chromate sealed anodize coating shall not be cause for rejection.
   (2) Deposits or residues from the material being tested that are not products of corrosion of the test panel surface shall not be cause for rejection.
   (3) Special procedure for evaluation of fire extinguishing foams and liquids.
   (4) Panels shall have a rating of 1 (no more than 5 percent of the surface area shall be corroded) or better in accordance with ASTM F 1110. The preferred method of determining the corroded area is by using image analysis. Other means approved by the purchaser may be substituted.
   (5) Any corrosion in excess of that shown by the control group shall be cause for rejection.

	Bare 7075-T6 (AMS 4045) Anodized per BAC 5019 (Type 3 chromate seal)	Clad 7075-T6 Aluminum (AMS 4049)
PRODUCT	**1**	**1**
Control	1	1

Result Conforms

Acrylic Crazing Test:

The material being tested shall not craze, crack, or etch acrylic test specimens when tested in accordance with ASTM F 484 using Type C (stretched acrylic plastic in accordance with MIL-P-25690) stressed to an outer fiber stress of 4500 psi.

Type C (MIL-P-25690): No crazing, cracking, or etching

Result Conforms

Paint Softening Test Procedure:

a. Testing shall be in accordance with ASTM F502 using the following coating systems.
   (1) BMS 10-79, Type II primer applied in accordance with BAC 5882 plus BMS 10-60, Type II enamel in accordance with BAC 5845.
   (2) BMS 10-79, Type III primer applied in accordance with BAC 5882, plus BMS 10-100 coating in accordance with BAC 5795.

b. Three specimens conforming to Section 13a.(1) and three specimens conforming to Section 13a(2) shall be used for each test condition.

c. The material being tested shall not produce a decrease in film hardness greater than two pencils, or any discoloration or staining.
   NOTE: Slight darkening of the BMS 10-100 surface is acceptable.

As received:

Paint system 1: 0 pencil hardness change after 24 hour post-exposure dry time. No discoloration or staining.

Paint system 2: 0 pencil hardness change after 24 hour post-exposure dry time. Very slight discoloration / staining.

Result Conforms

Hydrogen Embrittlement Test:

Hydrogen Embrittlement testing shall be in accordance with ASTM F 519-93, using cadmium plated Type 1a, 1c, or 2a specimens. All requirements of ASTM F519-93 for specimens, preparation, testing, and reporting shall apply. Type 1a specimens shall meet the requirements of D6-4307.

Specimens: Type 1c, cadmium plated per MIL-STD-870.
(45% load, 150 hours, notched immersed for the duration, room temp.)

As received:
#1: No failure occurred within 150 hours.
#2: No failure occurred within 150 hours.
#3: No failure occurred within 150 hours.
#4: No failure occurred within 150 hours.

Result Conforms

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Dilution: As received

British Aerospace
AIRBUS AIMS09-00-002 (Issue 3, July 2011)
EVALUATION OF MAINTENANCE MATERIALS

Waxes, Polishing Compounds and Protective Surface Coatings

5.3.1	Sandwich Corrosion Test	Conforms
5.3.2	Total Immersion Test	Conforms
5.3.3	Hydrogen Embrittlement Test	Conforms
5.3.4	Paint Softening Test	Conforms

Respectively Submitted,

Patricia D. Viani, SMI Inc.

5.3.1 Sandwich Corrosion Test: Testing shall be in accordance with ASTM-F-1110 using:

- aluminium alloy 2024 T3 clad against
- anodised aluminium alloy 2024 T3 unclad and
- anodised aluminium alloy 7075 T6 unclad.

After the test the aluminium alloy specimens shall show a rating less than or equal to 1 or no worse than a control sample prepared with distilled water.

	Aluminium alloy 2024 T3 clad against Anodised alum. 2024 T3 unclad	Aluminium alloy 2024 T3 clad against Anodised alum. 7075 T6 unclad
AS RECEIVED	**2024 T3 clad: 1 2024 T3 unclad anodised: 1**	**2024 T3 clad: 1 7075 T6 unclad anodised: 1**
CONTROL	2024 T3 clad: 1 2024 T3 unclad anodised: 1	2024 T3 clad: 1 7075 T6 unclad anodised: 1

Result Conforms

5.3.2 Total Immersion Test: Testing shall be in accordance with ASTM-F-483 using:

- aluminium alloys as per 5.3.1. above
- low carbon steel, e.g. AMS 5045, XC18 or equivalent
- cadmium plated steel, e.g. AMS 5045, XC18 (or equivalent), plated in accordance with AMS QQ-P-416 Type I Class 1 (or equivalent)

The immersion time shall be (24 ± 0.5) h. The immersion temperature shall be (23 ± 2)°C.
No significant visual change shall be evident. The max. permitted weight changes are as follows:

Aluminum alloy = **0.02 mg/cm^2** maximum.
Low carbon steel = **0.8 mg/cm^2** maximum
Cadmium plated steel = **0.3 mg/cm^2** maximum

ALLOY	WEIGHT CHANGE
Aluminum alloy 2024-T3 clad	0.01 mg/cm^2/24 hrs
Anodized aluminum alloy 2024-T3 unclad	+ 0.01 mg/cm^2/24 hrs
Anodized aluminum alloy 7075-T6 unclad	+ 0.02 mg/cm^2/24 hrs
Low carbon steel AMS 5045	+ 0.01 mg/cm^2/24 hrs
Cadmium plated steel AMS 5045 plated i.a.w. AMS-QQ-P-416 Type I Class 1	0.08 mg/cm^2/24 hrs

Result Conforms

5.3.3 Hydrogen Embrittlement Test: The product shall be non-embrittling as determined in accordance with ASTM F 519, using type 1a, 1c, or 2a specimens, cadmium plated in accordance with MIL-STD-870, Class 1, Type I. Type 1a and Type 1c specimens shall be loaded to 45% of the predetermined notch fracture strength and Type 2a specimens loaded to 80% of the yield strength. The entire 2a stressed specimen, or just the notched area of the 1a and 1c stressed specimen, shall be immersed continuously in the solution under test for 150 hours at a temperature between 20-30°C (68-86°F).
The maintenance material being tested shall not cause embrittlement of the test specimens.

Specimens: Type 1c, cadmium plated

As received: ***Specimen #1: No failures occurred within 150 hours.***
Specimen #2: No failures occurred within 150 hours.
Specimen #3: No failures occurred within 150 hours.
Specimen #4: No failures occurred within 150 hours.

Result Conforms

5.3.4 Paint Softening Test: Maintenance material compatibility shall be tested with Airbus approved paints and/or customer specific systems. Testing shall consist of three specimens for each of the following combinations. The substrate shall be clad aluminium alloy 2024 suitably pre-treated:

- Epoxy primer of polyurethane primer with or without polyurethane topcoat (interior paint scheme according to TN A.007.10050 or epoxy primer to MIL-PRF-23377 Type I with or without polyurethane topcoat to MIL-PRF-85285 Type I or customer specific system).
- Basic primer plus relevant exterior paint scheme according to TN A.007.10050 OR epoxy primer to MIL-PRF-23377 Type I with polyurethane topcoat to MIL-PRF-85285 Type I OR external paint scheme conforming to AMS 3095 OR customer specific system.

The thickness and drying times of individual coats shall be in accordance with the manufacturer's instruction sheets. Testing shall be in accordance with ISO 1518 "Scratch Test" using the following test sequence: one hour immersion in the maintenance material at an ambient temperature (23 ± 2)°C, rinsing with water immediately after the immersion and drying for 1hour at room temperature. The material shall not soften the paint coat and the Scratch Test shall have 90% of the original value after the immersion.

The agent being tested shall not produce any blistering, discoloration or staining.

5.3.4 Paint Softening Test: continued

Paint System		Weight required to produce scratch	
		Before exposure	After exposure
AS RECEIVED	Epoxy Primer without topcoat: Primer: MIL-PRF-23377 Type I, Epoxy, High Solids	Pass*	Pass*
	Epoxy primer with polyurethane topcoat: Primer: MIL-PRF-23377 Type I, Epoxy, High Solids Topcoat: MIL-PRF-85285 Type I, Polyurethane, High solids	Pass*	Pass*

**** Using a 2,000 gram load (maximum load of the scratch apparatus)***

**Conformance ("Pass") if no scratch occurs using a load equal to or greater than 1,800 grams (90% of 2,000 = 1,800), and there is no evidence of blistering, discoloration or staining.*

***Non-conformance ("Fail") is indicated if scratch occurs using a load less than 1,800 grams, or if there is evidence of blistering, discoloration or staining.*

Result *Conforms

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Dilution: As received

AMS 1650C
Polish, Aircraft Metal
Type 2: Paste

3.2 Properties

3.2.1	Flash Point	Conforms
3.2.2	Viscosity (Type I only)	Not applicable
3.2.3	Corrosion of Metal Surfaces	
	Sandwich Corrosion	Conforms
	Total Immersion Corrosion	Conforms
3.2.4	Effect on Plastic	Conforms
3.2.5	Effect on Painted Surfaces	Conforms
3.2.6	Effect on Unpainted Surfaces	Conforms
3.2.7	Settling Number (Type I only)	Not applicable
3.2.8	Low-Temperature Stability	Conforms
3.2.9	Abrasive Number	Conforms
3.3	Quality	Conforms

Respectfully submitted,

Patricia D. Viani, SMI Inc.

3.2.1 Flash Point: Shall be not lower than 60°C (140°F), determined in accordance with ASTM D 56.

Flash point: None to 141°F

Result Conforms

3.2.2 Viscosity (Type 1 Only): Shall be 50 to 70 Krebs units, determined in accordance with ASTM D 562 at 24°C ±3 (75°F ±5).

Result Not applicable

3.2.3 Corrosion of Metal Surfaces:

3.2.3.1 Sandwich Corrosion: Specimens shall produce a rating not worse than 1, determined in accordance with ASTM F 1110.

	2024-T3 Bare Anodized	2024-T3 Alclad	7075-T6 Bare Anodized	7075-T6 Alclad
PRODUCT	**1**	**1**	**1**	**1**
CONTROL	1	1	1	1

Result Conforms

3.2.3.2 Total Immersion Corrosion: Polish shall not cause a weight change greater than 0.3 mg/cm^2 per 24 hours for any panel of AMS 4045 and AMS 4049 aluminum alloy, determined in accordance with ASTM F 483. The product shall cause no evidence of etching, selective attack, or presence of corrosion products after any time period and only a slight dulling at the end of the test.

AMS 4045: 0.04 mg/cm^2/24hrs ***AMS 4049: 0.01 mg/cm^2/24hrs***

Result Conforms

3.2.4 Effect on Plastic: Polish shall not craze, stain, or discolor stretched Mil-P-25690 plastic, determined in accordance with ASTM F 484.

No crazing, staining or discoloration evident

Result Conforms

3.2.5 Effect on Painted Surfaces: Polish shall neither decrease the hardness of the paint film by more than two pencil hardness levels nor shall it produce any staining or blistering of the paint film, determined in accordance with ASTM F 502.

No decrease in hardness; No staining or blistering of the film

Result Conforms

3.2.6 Effect on Unpainted Surfaces: Polish, tested in accordance with ASTM F 485, shall neither produce streaking nor leave any stains on AMS 4045 and AMS 4049 aluminum alloys which require polishing to remove.

Residue evident after rinse; product did not rinse clean from the substrate; conformance based on absence of streaks and stains.

Result Conforms

3.2.7 Settling Number (Type 1 Only): Shall be not greater than 20, determined as in 3.2.7.1.

Result Not applicable

3.2.8 Low-Temperature Stability: The polish shall be restorable to its original appearance by vigorous shaking or by stirring after being temperature cycled as in 3.2.8.1.

3.2.8.1 Place approximately 100 mL of Type 1 polish or 100 grams of Type 2 polish in each of two 125 mL wide-mouth Pyrex jars and stopper the jars. Set aside one of the jars at 20 to 25 degrees C (68 to 77 degrees F) for the duration of the test period as a control sample. Place the second jar containing the test sample in a cold box maintained at -10 degrees C ±2 (-14 degrees F ±4) for 2 hours ±0.1. At the end of the two hour period, remove the jar containing the test sample and immerse in a water bath maintained at 47 degrees C ±1 (117 degrees F ±2) for 1 hour ±0.1. Remove the jar from the water bath, dry, and again place in the cold box at -10 degrees C ±2 (-14 degrees F ±4) for 2 hours ±0.1.

3.2.8 Low-Temperature Stability (continued):

At the end of the second 2-hour period, remove the jar from the cold box and immerse in the water bath maintained at 47 degrees C ±1 (117 degrees F ±2) for 1 hour ±0.1. Remove the jar from the water bath, dry, and again place the jar in the cold box at -10 degrees C ±2 (-14 degrees F ±4) for a third 2-hour period. At the end of this period, remove the jar from the cold box and allow the jar to remain at room temperature for 16 hours ±0.5. For Type 1 polish, shake the jar containing the test sample vigorously by hand; for Type 2, stir the contents of the jar. Compare the appearance of the test sample with the control sample.

No change in appearance after exposure.

Result Conforms

3.2.9 Abrasive Number: Shall not exceed 5, determined as in 3.2.9.1.

3.2.9.1 Weigh two 0.04 x 3 x 6 inch (1 x 76 x 152 mm) AMS 4049 aluminum alloy panels after washing the panels thoroughly with a non-abrasive detergent, thoroughly rinsing with deionized water, and drying. Cover one of the panels with a thin coating of the polish. Place the second panel on the coated panel and rotate twenty-five times in moderate circular motion. Separate the panels and wipe clean with a soft cloth saturated with acetone. Reweigh and determine the weight loss. Report the weight loss in milligrams as the abrasive number and examine the surfaces of the panels for any evidence of scratching.

Abrasive number: less than 1.0 No scratching evident.

Result Conforms

3.3 Quality: The polish, as received by purchaser, shall be uniform in texture, homogeneous, and free from foreign materials detrimental to usage of the polish.

Result Conforms

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Douglas Aircraft Company Customer Service Document
CSD #1, Revised July 1997
Type V: Materials and Procedures for Polishing Aluminum Surfaces

Residue	Does not conform
Sandwich Corrosion	Conforms
Stress Crazing Test on Acrylic Plastics	Conforms
Immersion Corrosion, Aluminum	Conforms
Hydrogen Embrittlement	Conforms

Respectfully submitted,

Patricia D. Viani, SMI Inc.

Residue Test: The material shall leave no residue or stain when tested in accordance with ASTM F 485.

Note: This test method, ASTM F485, is used to ensure that candidate aircraft surface cleaners do not leave a residue which, on drying, would leave a permanent stain requiring polishing to remove. Polishes sometimes leave a residue that does not rinse off with water, but can be wiped off without leaving a stain, but this condition will be reported as non conformance based on the wording of the requirement, "...shall leave no residue...".

Alloy	*Visible residue after water-rinsing?*	*Visible residue after wiping?*	*Visible stain after rinsing or wiping?*
AMS 4911	****Yes (Does not conform)***	***None***	***None***
AMS 4049	****Yes (Does not conform)***	***None***	***None***

Result *Does not conform

Sandwich Corrosion Test: The compound shall not cause significant corrosion of aluminum alloy faying surfaces when tested in accordance with the following conditions of temperature and humidity:

* Alternate intervals of 16 hours in the humidity cabinet and eight hours in an oven. Beginning with the humidity cabinet exposure, the cycling test shall be continued for a total of seven days.
* The humidity cabinet shall be maintained at 100° ±2°F (37.8° ± 1.1°C) and 98 to 100 percent relative humidity.
* The oven shall be maintained at 100° ± 5°F (37.8° ± 2.8°C)

Corrosion Rating:

0 = No visible corrosion
1 = Very slight corrosion or discoloration
2 = Slight corrosion
3 = Moderate corrosion
4 = Extensive corrosion

Corrosion on any panel exceeding that obtained using tap water shall be considered excessive.

ALLOY	Tap Water Control	**PRODUCT**
2024-T3 Bare/Alodined per MIL-C-5541	1	**1**
2024-T3 Bare/Anodized per MIL-A-8625	1	**1**
2024-T3 Clad/Alodined per MIL-C-5541	1	**1**
2024-T3 Clad/Anodized per MIL-A-8625	1	**1**
7075-T6 Clad/Alodined per MIL-C-5541	1	**1**
7075-T6 Clad/Anodized per MIL-A-8625	1	**1**

Result Conforms

Stress Crazing Test on Acrylic Plastics: The compound shall not cause crazing, cracking, or other attack on acrylic based plastics when tested in accordance with ASTM F 484, using Type C material at a stress level of 4500 psi.

As received: No crazing, cracking, or other attack.

Result Conforms

Immersion Corrosion Test: The average weight loss of aluminum alloy specimens shall not exceed 10 milligrams per coupon when tested per ASTM F 483. The aluminum alloy 7075-T6 alclad coupons shall conform to Federal Specification QQ-A-250/13 Temp-T6, with corners and edges smoothed.

As received: 0.3 mg after 168 hours (no visible corrosion)

Result Conforms

Hydrogen Embrittlement: Hydrogen Embrittlement testing shall be in accordance with ASTM F 519, Type 1c.

Specimens: Type 1C, cadmium plated per MIL-STD-870

Load: 45%, 23°C, notch immersed in product for 150 hours

As received:

Specimen 1: No failure within 150 hours.
Specimen 2: No failure within 150 hours.
Specimen 3: No failure within 150 hours.
Specimen 4: No failure within 150 hours.

Result Conforms