

SMI, Inc.

12219 SW 131 Avenue
Miami, Florida 33186-6401 USA

Phone: (305) 971-7047
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Attn: Chad Parson
ChemFree Corporation
8 Meca Way
Norcross, GA 30093

Date: 29-Sep-2017
SMI/REF: 1707-098

Product: **SW-6/8 (Sample ID: SW608022017)** (received 04-Aug-2017)

Dilution: As received

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

5.3.1 Sandwich Corrosion Test	<u>Conforms</u>
5.3.2 Total Immersion Test	<u>Conforms</u>
5.3.3 Hydrogen Embrittlement Test	<u>Conforms</u>
5.3.4 Paint Softening Test	<u>Conforms</u>
5.3.5 Acrylic Crazing Test	<u>Conforms</u>
5.3.6 Polycarbonate Crazing Test	<u>Conforms</u>

Respectfully submitted,



Patricia D. Viani, SMI Inc.

Client: ChemFree Corporation
 Product: **SW-6/8 (Sample ID: SW608022017)**
 Dilution: As received
 AIMS 09-00-002 (Issue 3)

Date: 29-Sep-2017
 SMI/REF: 1707-098
 Page 2 of 4

- 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/cm²** maximum.
- Low carbon steel = **0.8 mg/cm²** maximum
- Cadmium plated steel = **0.3 mg/cm²** maximum

ALLOY	WEIGHT CHANGE
	AS RECEIVED
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	< 0.01 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	0.01 mg/cm ² /24 hrs

Result Conforms

Client: ChemFree Corporation
Product: **SW-6/8 (Sample ID: SW608022017)**
Dilution: As received
AIMS 09-00-002 (Issue 3)

Date: 29-Sep-2017
SMI/REF: 1707-098

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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 or 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 1 hour 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.

Client: ChemFree Corporation
 Product: **SW-6/8 (Sample ID: SW608022017)**
 Dilution: As received
 AIMS 09-00-002 (Issue 3)

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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.*

Result *Conforms

55.3.5 Acrylic Crazing Test: Material conforming to MIL-P-25690 Type C shall be tested in accordance with ASTM-F-484. The maintenance materials shall not craze, crack, stain or discolor the test specimens.

As received: No evidence of craze, crack, stain or discolor.

Result Conforms

5.3.6 Polycarbonate Crazing Test: Material conforming to ASTM-D-3935 or AMS-P-83310 shall be tested in accordance with the method for the determination of stress crazing detailed in ASTM F 484.

Specimens shall be stressed for (30 ± 2) minutes to an outer stress of 21MPa (3000 psi) at a temperature of (23 ± 2)°C.

As received: No evidence of craze, crack, stain or discolor.

Result Conforms

SMI, Inc.

12219 SW 131 Avenue
Miami, Florida 33186-6401 USA

Phone: (305) 971-7047
Fax: (305) 971-7048

Attn: Chad Parson
ChemFree Corporation
8 Meca Way
Norcross, GA 30093

Date: 03-Aug-2016

SMI/REF: 1606-003_R

Report re-issued 15-Jun-2017 to include Storage Stability results

Product: **SW-6/8** (received 14-Jun-2016)

Dilution: As received

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AMS 1526C
Cleaner for Aircraft Exterior Surfaces
Water-Miscible, Pressure-Spraying Type

3.2.1.1	Sandwich Corrosion	<u>Conforms</u>
3.2.1.2	Total Immersion Corrosion	<u>Conforms</u>
3.2.1.3	Low-Embrittling Cadmium Plate	<u>Conforms</u>
3.2.2	Hydrogen Embrittlement	<u>Conforms</u>
3.2.3	Flash Point	<u>Conforms</u>
3.2.4	Effect on Transparent Acrylic Plastics	<u>Conforms</u>
3.2.5	Effect on Painted Surfaces	<u>Conforms</u>
3.2.6	Effect on Unpainted Surfaces	<u>Conforms</u>
3.2.7	Storage Stability	<u>Conforms</u>

Respectfully submitted,



Patricia D. Viani, SMI Inc.

Client: ChemFree Corporation
 Product: **SW-6/8**
 Dilution: As received

Date: 03-Aug-2016
 SMI/REF: 1606-003_R
 Report re-issued 15-Jun-2017 to include Storage Stability results

AMS 1526C

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2.1.1 Sandwich Corrosion: Specimens, after test, shall show a rating not worse than 1 determined in accordance with ASTM F 1110.

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

Result Conforms

3.2.1.2 Total Immersion Corrosion: The product shall neither show evidence of corrosion of the panels nor cause a weight change of any test panel greater than the following, determined in accordance with ASTM F 483:

PANEL	Allowable Weight Change mg/cm ² /24hrs	RESULTS
		PRODUCT
AMS 4037 Aluminum Alloy, anodized per AMS 2470	0.3	0.02
AMS 4041 Aluminum Alloy	0.3	< 0.01
AMS 4049 Aluminum Alloy	0.3	< 0.01
AMS 4376 Magnesium Alloy, dichromate treated as in AMS 2475	0.2	0.05
AMS 4911 Titanium Alloy	0.1	< 0.01
AMS 5045 Carbon Steel	0.8	+ 0.02

Result Conforms

Client: ChemFree Corporation
Product: **SW-6/8**
Dilution: As received

Date: 03-Aug-2016
SMI/REF: 1606-003_R
Report re-issued 15-Jun-2017 to include Storage Stability results

AMS 1526C

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3.2.1.3 Low-Embrittling Cadmium Plate: Panels coated with low-embrittling cadmium plate shall not show a weight change greater than 0.3 mg/cm² per 24 hours, determined in accordance with ASTM F 1111.

As received: + 0.03 mg/cm²

Result Conforms

3.2.2 Hydrogen Embrittlement: The product shall be non-embrittling, determined in accordance with ASTM F 519, utilizing Type 1a, 1c or 2a specimens, cadmium plated in accordance with MIL-STD-870. 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°C - 30°C (68°F - 86°F)

As received: No failures within 150 hours

Result Conforms

3.2.3 Flash Point: The flash point shall not be lower than 60°C (140°F), determined in accordance with ASTM D 56.

As received: No flash to 61°C (142°F)

Result Conforms

3.2.4 Effect on Transparent Acrylic Plastics: There shall be no crazing or staining of stretched MIL-P-25690 plastic, determined in accordance with ASTM F 484.

As received: No crazing or staining

Result Conforms

Client: ChemFree Corporation
Product: **SW-6/8**
Dilution: As received

Date: 03-Aug-2016
SMI/REF: 1606-003_R
Report re-issued 15-Jun-2017 to include Storage Stability results

AMS 1526C

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3.2.5 Effect on Painted Surfaces: The product shall neither decrease the hardness of the paint film by more than 2 pencil hardness levels nor shall it produce any streaking, discoloration or blistering of the paint film, determined in accordance with ASTM F 502.

As received: No hardness change; no streaking, discoloration, or blistering

Result Conforms

3.2.6 Effect on Unpainted Surfaces: The product, tested in accordance with ASTM F 485, shall neither produce streaking nor leave any stains requiring polishing to remove.

As received:

AMS 4049 (aluminum): No streaking nor staining
AMS 4911 (titanium): No streaking nor staining

Result Conforms

3.2.7 Storage Stability: The product shall neither show separation from exposure to heat or cold nor show an increase in turbidity greater than a control sample equally diluted to use concentration with ASTM D 1193, Type IV water, determined in accordance with ASTM D 1104.

Storage began 14-June-2016
Storage ended 14-June-2017

After storage in accordance with ASTM D 1104 the sample exhibited no separation or turbidity.

Result Conforms

SMI, Inc.

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Attn: Chad Parson
CRC Industries, Inc.
8 Meca Way
Norcross, GA 30093

Date: 12-Apr-2023

SMI/REF: 2301-960

Product: **SW-8 OZZY JUICE (1000416)** (received 01-Feb-2023)

Dilution: As received

Page 1 of 4

BOEING SPECIFICATION SUPPORT STANDARD

BSS7432

EVALUATION OF AIRPLANE MAINTENANCE MATERIALS

(Version: Original issue, 28-May-2019 / supersedes Boeing D6-17487)

(Note: Boeing D6-17487 was cancelled and superseded by BSS7432 on 28-May-2019)

Category: Exterior and General Cleaners and Liquid Waxes, Polishes and Polishing Compounds

Sandwich Corrosion Test

Conforms

Acrylic Crazeing Test

Conforms

Paint Softening Test

Conforms

Hydrogen Embrittlement Test

Conforms

Respectfully submitted,



Jeff Nottebaum
Director, SMI Inc.



Rae-anne Nottebaum
Chemist, SMI Inc.

Client: CRC Industries, Inc.
Product: **SW-8 OZZY JUICE (1000416)**
Dilution: As received
BSS7432 (*Exterior & General*)

Date: 12-Apr-2023
SMI/REF: 2301-960

Page 2 of 4

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

a. Reagents and materials exception:

- (1). Clad 7075-T6 aluminum alloy in accordance with AMS-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 AMS-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.
- (3) Anodize must be sealed. (2024-T3 nonclad specimens are neither required nor optional).
- (4) Distilled or deionized water may be used in place of ASTM F1193, Type IV reagent grade water for control specimens.
- (5) The filter paper may be Whatman No. 5 or equivalent in place of Whatman GFA glass fiber paper.

b. Procedure exceptions:

- (1) The filter paper strips must be 1 by 3 inches and must be placed in the center of the sandwiched specimens.
- (2) Each sandwich specimen must 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.

c. Interpretation of result exceptions:

- (1) Leaching or lightening of the chromate sealed anodize coating must 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 must not be cause for rejection.
- (3) Special procedure for evaluation of fire extinguishing foams and liquids. Panels with very light darkening or staining, which have no obvious metal attack or pitting, may be swabbed (cotton-tipped swabs or cotton gauze) with a 0.26 mole/liter sulfuric acid solution and re-examined. If the coloration is substantially removed and there is no evidence of metal attack or pitting, the condition must not be cause for rejection. (The 0.26 mole/liter sulfuric acid solution can be prepared by adding 1.5 cc of concentrated sulfuric acid (SG = 1.84) to 100 cc of distilled or deionized water.
- (4) Panels must have a rating of 1 (no more than 5 percent of the surface area must 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 must be cause for rejection.

Client: CRC Industries, Inc.
 Product: **SW-8 OZZY JUICE (1000416)**
 Dilution: As received
 BSS7432 (*Exterior & General*)

Date: 12-Apr-2023
 SMI/REF: 2301-960

Sandwich Corrosion Test: continued

	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 Crazeing Test:

The material being tested must 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.

PRODUCT: No crazing, cracking, or etching

Result Conforms

Paint Softening Test Procedure:

- a. Testing must be in accordance with ASTM F502 using the following coating systems.
 - (1) BMS 10-79, Type II primer applied in accordance with BAC5882 plus BMS 10-60, Type II enamel in accordance with BAC5845.
 - (2) BMS 10-79, Type III primer applied in accordance with BAC5882, plus BMS 10-100 coating in accordance with BAC5797.
- b. Three specimens conforming to Section 7.7.a.(1) and three specimens conforming to Section 7.7.a.(2) must be used for each test condition.
- c. The material being tested must 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.
Paint system2: 0 pencil hardness change after 24 hour post-exposure dry time.
No staining / discoloration

Result Conforms

Client: CRC Industries, Inc.
Product: **SW-8 OZZY JUICE (1000416)**
Dilution: As received
BSS7432 (*Exterior & General*)

Date: 12-Apr-2023
SMI/REF: 2301-960

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Hydrogen Embrittlement Test:

Hydrogen Embrittlement testing must be in accordance with ASTM F 519 using cadmium plated Type 1a.2, Type 1c, or Type 2a specimens. All requirements of ASTM F519 for specimens, preparation, testing, and reporting must apply. Type 1a.2 specimens must 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

SMI, Inc.

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Miami, Florida 33186-6401 USA

Phone: (305) 971-7047
Fax: (305) 971-7048

Attn: Chad Parson
ChemFree Corporation
8 Meca Way
Norcross, GA 30093

Date: 03-Aug-2016

SMI/REF: 1606-003

Product: **SW-6/8** (received 14-Jun-2016)

Dilution: As received

Page 1 of 4

Douglas Aircraft Company Customer Service Document CSD No. 1

Type I: Materials and Procedures for General Exterior
Cleaning of Painted and Unpainted Surfaces
(General Purpose Cleaner)

Effect on Painted Surfaces	<u>Conforms</u>
Residue	<u>Conforms</u>
Sandwich Corrosion	<u>Conforms</u>
Stress Cracking Test on Acrylic Plastics	<u>Conforms</u>
Immersion Corrosion, Aluminum	<u>Conforms</u>
Cadmium Removal	<u>Conforms</u>
Hydrogen Embrittlement	<u>Conforms</u>

Respectfully submitted,



Patricia D. Viani, SMI Inc.

Client: ChemFree Corporation

Date: 03-Aug-2016

Product: **SW-6/8**

SMI/REF: 1606-003

Dilution: As received

Douglas CSD #1, Type I General Purpose Cleaner

Page 2 of 4

1. Effect on Painted Surfaces Test: The material shall not produce a decrease in paint film hardness greater than one pencil; that is the number of the next softer pencil, or any discoloration or staining when tested in accordance with ASTM F 502. At least two panels shall be used per test.

As received: No softening or discoloration of polyurethane topcoat when examined 24 hours after exposure per ASTM F 502.

Result Conforms

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

AMS 4911: (As received): PASS

AMS 4049: (As received): PASS

Result Conforms

3. 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 $100^{\circ} \pm 2^{\circ}\text{F}$ ($37.8^{\circ} \pm 1.1^{\circ}\text{C}$) and 98 to 100 percent relative humidity.
- * The oven shall be maintained at $100^{\circ} \pm 5^{\circ}\text{F}$ ($37.8^{\circ} \pm 2.8^{\circ}\text{C}$)

Corrosion Rating:

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

Client: ChemFree Corporation

Date: 03-Aug-2016

Product: **SW-6/8**

SMI/REF: 1606-003

Dilution: As received

Douglas CSD #1, Type I General Purpose Cleaner

Page 3 of 4

3. Sandwich Corrosion Test: continued

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

ALLOY	PRODUCT (AS RECEIVED)	CONTROL
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

4. Stress Cracking 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 visible crazing.

Result Conforms

5. 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

Result Conforms

Client: ChemFree Corporation

Date: 03-Aug-2016

Product: **SW-6/8**

SMI/REF: 1606-003

Dilution: As received

Douglas CSD #1, Type I General Purpose Cleaner

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6. **Cadmium Removal Test:** The average weight loss of cadmium from low hydrogen embrittlement cadmium plated steel shall not exceed 10 milligrams per coupon when tested per ASTM F 483. The test duration shall be 24 hours. The test specimens shall be 1 x 2 x 0.040 inch 4130 steel panels (MIL-S-18729) with corners and edges smoothed and then plated with 0.003 to 0.006 inch of low hydrogen embrittlement cadmium plating (P/N 7452876-23)

Note: Specimens were cadmium plated in accordance with ASTM F1111.

As received: + 0.8 mg after 24 hours

Result Conforms

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

*Specimens: Type 1c, cadmium plated per MIL-STD-870.
45% load, room temperature, immersed for duration*

As received:

- #1: No failure within 150 hours.**
- #2: No failure within 150 hours.**
- #3: No failure within 150 hours.**
- #4: No failure within 150 hours.**

Result Conforms

SMI, Inc.

12219 SW 131 Avenue
Miami, Florida 33186-6401 USA

Phone: (305) 971-7047
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Attn: Chad Parson
ChemFree Corporation
8 Meca Way
Norcross, GA 30093

Date: 17-Mar-2017

SMI/REF: 1603-752_{R2}
Including Biodegradability / Storage results

Page 1 of 7

Product: **SW-6/8** (received 08-Mar-2016)

Dilution: As received (pre-diluted)

Modified testing in accordance with
MIL-PRF-29602A (31 January 2005)
CLEANING COMPOUNDS, PARTS WASHER AND SPRAY CABINET
Type I: Water Soluble Liquid Concentrate
(Product was supplied as a ready to use solution and was tested "as received")

3.5.1	Biodegradability	<u>Conforms</u>
3.5.2	Non-Volatile Content (Type I)	<u>Informational</u>
3.5.3	Flash Point	<u>Conforms</u>
3.5.4	pH	<u>Informational</u>
3.5.5	Foaming Characteristics	<u>Does not conform</u>
3.5.6	Corrosivity	
	3.5.6.1 Titanium Stress Corrosion	<u>Conforms</u>
	3.5.6.2 Total Immersion Corrosion	<u>Conforms</u>
	3.5.6.3 Hydrogen Embrittlement	<u>Conforms</u>
3.5.7	Stability	
	3.5.7.1 Hard Water Stability	<u>Conforms</u>
	3.5.7.2 Storage Stability	<u>Conforms</u>
	3.5.7.3 Accelerated Storage Stability	<u>Conforms</u>
3.5.8	Cleaning Efficiency	<u>Conforms</u>
3.5.9	Oil Separation	<u>Conforms</u>
3.5.10	Workmanship	<u>Conforms</u>
3.5.11	Service Evaluation	<u>Not performed</u>

Respectfully submitted,



Patricia D. Viani, SMI Inc.

Client: ChemFree Corporation
Product: **SW-6/8**
Dilution: As received
MIL-PRF-29602A

Date: 17-Mar-2017
SMI/REF: 1603-752_{R2}
Including Biodegradability / Storage results

3.5.1 Biodegradability: The supplier of the cleaning compounds shall ensure that the surfactants used in the cleaning compound are biodegradable in accordance with 40 CFR, Part 796, Subpart D. Testing for biodegradability shall be in accordance with 4.5.1. The cleaning compounds shall meet the requirement of not less than 85 percent biodegradable at the end of the 28-day period specified in 4.5.1.

As received:

91.1% Biodegradable in 28 days.

Result Conforms

3.5.2 Nonvolatile content: The cleaning compound qualification sample shall be tested for nonvolatile content in accordance with 4.3 and table II.

As received:

Nonvolatile content: 0.9%

Result Informational

3.5.3 Flash Point: The Pensky-Martens flash point of the concentrated liquid cleaning compound shall be greater than 212°F (100°C) when tested in accordance with 4.3.

As received:

No flash observed to 212°F

Result Conforms

3.5.4 pH: The pH of the cleaning compounds shall be tested using the manufacturer's recommended cleaning concentration in accordance with 4.3. Conformance inspection results shall not differ from the qualification values by more the ± 0.5 units.

As received: pH = 7.5

Result Informational

3.5.5 Foaming characteristics: At the manufacturer's recommended concentration, the cleaning compounds shall produce a foam volume of not more than 100ml, when tested at 120°F (49°C) and 160°F (71°C) in accordance 4.5.2.

As received:

120°F: Greater than 200 mls foam

160°F: Greater than 200 mls foam

Result Does not conform

Client: ChemFree Corporation
 Product: **SW-6/8**
 Dilution: As received
 MIL-PRF-29602A

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3.5.6 Corrosivity:

3.5.6.1 Titanium stress corrosion: The cleaning compounds shall not produce any microscopic cracking when tested at the manufacturer's recommended concentration and examined metallographically at 500X magnification (see 4.3).

As received:

AMS 4911: No evidence of cracking

AMS 4916: No evidence of cracking

Result _____ Conforms

3.5.6.2 Total immersion corrosion: The cleaning compounds shall cause neither visual corrosion nor a weight change of any specimen greater than that shown in table I, when tested at the manufacturer's recommended concentration and in accordance with 4.5.3.

As received, Temperature: 160°F Immersion time 24 hours

Test Panel Material	Former Designation	Allowable weight change (mg/cm ² / 24hours)	Results
Aluminum (SAE-AMS-A-250/4)	Alloy 2024; QQ-A-250/4-T3	0.04	0.01
Aluminum (SAE-AMS-A-250/4) anodized per MIL-A-8625 Type I	Alloy 2024; QQ-A-250/4-T3 anodized per MIL-A-8625, Type I	0.04	0.01
Carbon steel (SAE-AMS 5046)	SAE 1020	0.04	0.01
Copper (ASTM-B152)	NA	0.10	0.01
Magnesium (SAE-AMS 4375), bare	AZ31B-0	0.20	0.11
Nickel (SAE-AMS 5536)	Hastelloy X	0.04	0.01
Stainless steel (ASTM-A240, Class 410)	NA	0.04	0.01
Carbon steel (SAE-AMS 5046) plated per SAE-AMS-QQ-P-416 Type I Class III	SAE 1020 plated per SAE-AMS-QQ-P-416	0.20	0.01
Titanium (SAE-AMS-T-9046, Type III, Comp. C)	Type I, 6Al 4V	0.04	0.01

Result _____ Conforms

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3.5.6.3 Hydrogen Embrittlement: When tested at the manufacturer's recommended concentration in accordance with 4.5.4, neither cadmium plated AISI 4340 steel specimens nor IVD aluminum coated AISI 4340 steel specimens shall exhibit embrittlement. Four specimens of each coating shall be tested using either the sustained load procedure or the step load procedure. For the sustained load procedure, embrittlement is indicated if a specimen fractures in less than 200 hours when loaded to 75 percent notched fracture strength. If only one of the four specimens fractures, step load the remaining three specimens at 5 percent of the notched fracture strength per hour to failure. If these 3 specimens achieve 90 percent for 1 hour, the chemical shall be considered non-embrittling. For the step load procedure, embrittlement is indicated if a specimen fractures at less than 90 percent of notched fracture strength.

Cadmium-plated specimens shall be prepared as specified using ASTM-F519, treatment B, without conversion coating. Ion vapor deposited (IVD) aluminum specimens shall be prepared in accordance with MIL-DTL-83488, class 2, type II. IVD specimens shall be burnished following deposition prior to supplementary chromate treatment. The coatings shall cover the notch and surfaces within 0.5 inch of the notch; threaded surfaces shall not be coated. Cadmium-plated specimens shall be baked in accordance with ASTM-F519.

Four specimens for each coating shall be individually exposed, immediately dried, then immediately tested for embrittlement. Exposure shall consist of immersion in a glass beaker containing fresh cleaning solution per product (at the manufacturer's recommended concentration) at 160 ± 2 °F (71 ± 1 °C) for 30 minutes. Specimens shall be dried without rinsing at ambient conditions for five minutes. Embrittlement testing shall consist of applying a load equivalent to 75 percent of notch fracture strength for 200 hours.

As received:

Specimens: Type 1a, Cadmium plated per Treatment B of ASTM F 519

Specimen #1: No failure within 200 hours.
Specimen #2: No failure within 200 hours.
Specimen #3: No failure within 200 hours.
Specimen #4: No failure within 200 hours.

Specimens: Type 1a, IVD Aluminum plated per MIL-DTL-83488, CI 2, Ty II.

Specimen #1: No failure within 200 hours.
Specimen #2: No failure within 200 hours.
Specimen #3: No failure within 200 hours.
Specimen #4: No failure within 200 hours.

Result Conforms

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3.5.7 Stability

3.5.7.1 Hard water stability: When tested at the manufacturer's recommended concentration and as specified in 4.5.5, the cleaning compound shall not cause any corrosion of SAE-AMS-A-250/4 aluminum in excess of that allowed in table I.

Temperature: 160°F

As received:

Test Panel Material	Former Designation	Allowable weight change (mg / cm ² / 24 hours)	Results
Aluminum (SAE-AMS-A-250/4)	Alloy 2024; QQ-A-250/4-T3	0.04	< 0.01

No visible corrosion

Result Conforms

3.5.7.2 Storage stability: When tested as specified in 4.5.6, and after a 12 month storage period, the type I cleaning compound shall not exhibit any separation, crystallization, or other deterioration of the cleaning compound or container. The type II cleaning compound shall not exhibit any deterioration of the cleaning compound or container. Stored cleaning compounds shall not fail the total immersion corrosion (3.5.6.2) or cleaning efficiency (3.5.8) requirements. For total immersion corrosion only aluminum alloys shall be tested. For cleaning efficiency, only the MIL-G-21164 soil shall be tested.

Product stored in plastic: No separation, crystallization or deterioration.

Plastic container: No leakage, cracking, crazing or softening.

Results of testing: See below.

Result Conforms

3.5.6.2 Total immersion corrosion: The cleaning compounds shall cause neither visual corrosion nor a weight change of any specimen greater than that shown in Table I, when tested at the manufacturer's recommended concentration and in accordance with 4.5.3

Table I Total Immersion Corrosion Weight Changes

Testing performed using sample stored for 1 year (160°F / 24 hours)

Alloy	Weight Loss (mg/cm ² /24hrs)	
	Max. allowed	As received (pre-diluted)
Aluminum (SAE-AMS-A-250/4)	0.04	< 0.01
Aluminum, SAE AMS-A-250/4, anodized per MIL-A-8625, type I	0.04	< 0.01

No visible corrosion on any of the panels; compound did not layer or separate for the duration of the test.

Result Conforms

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3.5.7.2 Storage stability: continued

3.5.8 Cleaning Efficiency: The cleaning compound shall remove not less than 80 percent of unbaked grease in accordance with MIL-G-21164, when tested at the manufacturer's recommended concentration as specified in 4.5.8

Testing performed using sample stored for 1 year

As received (pre-diluted):

Cleaning Efficiency (MIL-G-21164 soil): 90 %

Result Conforms

3.5.7.3 Accelerated storage stability: After being tested for accelerated storage as specified in 4.5.7, the test sample shall show no marked change in color or uniformity when compared to the control and shall meet the cleaning efficiency requirement for the MIL-G-21164 soil specified in 3.5.8

As received:

After 6 cycles: No marked change in color or uniformity

Cleaning Efficiency: MIL-G-21164: 98%

Cleaning Efficiency: Alox 2028: 100%

Result Conforms

3.5.8 Cleaning Efficiency: The cleaning compound shall remove not less than 80 percent of unbaked grease in accordance with MIL-G-21164 and not less than 95 percent of baked Alox 2028, when tested at the manufacturer's recommended concentration as specified in 4.5.8.

As received:

Cleaning Efficiency: MIL-G-21164: 98%

Cleaning Efficiency: Alox 2028: 100%

Result Conforms

3.5.9 Oil separation: The oil layer shall be not less than 9 and be not greater than 13 milliliters, when tested as specified in 4.5.9.

As received:

Oil Layer: 13 mls

Result Conforms

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3.5.10 Workmanship: When examined visually at room temperature, the type I cleaning compound shall be a homogeneous liquid free of foreign matter. A faint turbidity shall not be cause for rejection. When examined visually at room temperature, the type II cleaning compound shall be free flowing, lump free, and free from foreign materials. Upon mixing, the cleaner shall form a liquid with no solid sediment.

As received:

Homogeneous liquid, free of foreign matter.

Result Conforms

3.5.11 Service Evaluation: Upon completion of all other tests herein, with the exception of storage stability (see 3.5.7.2), the qualifying activity may request a full evaluation of the cleaning compounds by an aircraft depot maintenance facility (Navy, Air Force, Army, or commercial) in accordance with 4.5.10. The cleaning compounds performance shall be equal to or better than an existing qualified product chosen by the maintenance facility.

Not performed by SMI, Inc.

Result Not performed