

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: 17-Mar-2017

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

Page 1 of 7

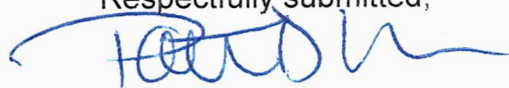
Product: **SW-6/8** (received 08-Mar-2016)

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 than ± 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

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

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 _____

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

Page 4 of 7

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

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

3.5.7 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

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

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

Page 7 of 7

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