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Attn: Dan Reid
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Date: 22-Mar-2012

SMI/REF: 1201-227

Product: **TOUGHGUARD "STEP 1 POLARIZING WASH"** *(received 02-Feb-2012)*

Dilution: Concentrate (neat) and 2 ounces per gallon

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

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
5.3.5	Acrylic Crazing Test	Conforms
5.3.6	Polycarbonate Crazing 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**
DILUTE	**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	
	AS RECEIVED	DILUTE
Aluminum alloy 2024-T3 clad	0.01 mg/cm^2/24 hrs	< 0.01 mg/cm^2/24 hrs
Anodized aluminum alloy 2024-T3 unclad	+ 0.02 mg/cm^2/24 hrs	< 0.01 mg/cm^2/24 hrs
Anodized aluminum alloy 7075-T6 unclad	+ 0.01 mg/cm^2/24 hrs *	< 0.01 mg/cm^2/24 hrs
Low carbon steel AMS 5045	0.01 mg/cm^2/24 hrs	< 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	< 0.01 mg/cm^2/24 hrs

Result Conforms

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**
DILUTE	**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	**DILUTE**
Aluminum alloy 2024-T3 clad	0.01 mg/cm²/24 hrs	< 0.01 mg/cm²/24 hrs
Anodized aluminum alloy 2024-T3 unclad	+ 0.02 mg/cm²/24 hrs	< 0.01 mg/cm²/24 hrs
Anodized aluminum alloy 7075-T6 unclad	+ 0.01 mg/cm²/24 hrs *	< 0.01 mg/cm²/24 hrs
Low carbon steel AMS 5045	0.01 mg/cm²/24 hrs	< 0.01 mg/cm²/24 hrs
Cadmium plated steel AMS 5045 plated i.a.w. AMS-QQ-P-416 Type I Class 1	< 0.01 mg/cm²/24 hrs	< 0.01 mg/cm²/24 hrs

Result Conforms

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	No scratch*	No scratch*
	Epoxy primer with polyurethane topcoat: Primer : MIL-PRF-23377 Type I, Epoxy, High Solids Topcoat: MIL-PRF-85285 Type I, Polyurethane, High solids	No scratch*	No scratch*
DILUTE	Epoxy Primer without topcoat: Primer: MIL-PRF-23377 Type I, Epoxy, High Solids	No scratch*	No scratch*
	Epoxy primer with polyurethane topcoat: Primer : MIL-PRF-23377 Type I, Epoxy, High Solids Topcoat: MIL-PRF-85285 Type I, Polyurethane, High solids	No scratch*	No scratch*

**** utilizing a 2-kg weight***
No blistering, discoloration or softening of any panel; scratch of exposed portion occurred within 90% of the original value, or was over the 2000 gram threshold of testing.

Result Conforms

5.3.5 Acrylic Crazing Test: Material confirming 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.
Dilute: No evidence of craze, crack, stain or discolor.

Result Conforms

5.3.6 Polycarbonate Crazing Test: Material confirming 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.
Dilute: No evidence of craze, crack, stain or discolor.

Result Conforms