

TECHNICAL SUMMARY – BOEING D6-7127 PROTOCOL

Aquaox Disinfectant 275 | Aquaox Disinfectant 525

- I. Protocol: Boeing D6-7127 Rev P incorporating PDD 6-8 –
Cleaning Interiors of Commercial Transport Aircraft
Category: Disinfectants

- II. Test Liquids / Properties (as shown on Certificate of Analysis):

Aquaox Disinfectant 275

TEST	ANALYSIS	UNITS
Free Available Chlorine	302	ppm
pH	6.72	n/a
Conductivity	2544	µS/cm
ORP	878	mV

Aquaox Disinfectant 525

TEST	ANALYSIS	UNITS
Free Available Chlorine	546	ppm
pH	6.86	n/a
Conductivity	2099	µS/cm
ORP	913	mV

- III. Summary of Test Protocol

The above mentioned liquids have been evaluated according to the Boeing D6-7127 Test Protocol. The test protocol includes 11 different tests as mentioned in a) – k), and each test will be summarized in the subsequent paragraphs. The chemicals, Aquaox Disinfectants 275 and 525, tested for each test are stated under the result table and conclusion of each section.

- a) Sandwich Corrosion Test
- b) Immersion Corrosion Test
- c) Rubber Test
- d) Sealant Test
- e) Painted Surface Test
- f) Tedlar Surface Test
- g) Viyle Surface Test
- h) Fabric and Carpet Test
- i) Leather and Naugahude Test
- j) Polycarbonate Crazing Test
- k) Flash Point Test

a) SANDWICH CORROSION TEST (Reference: ASTM F1110)

This test method is intended to be used to qualify and approve chemicals employed in aircraft maintenance operations. The method determines whether aircraft structural aluminum alloys are liable to be corroded or damaged by application of the test chemicals during routine maintenance operations. It evaluates the corrosiveness of test chemicals when present between faying surfaces of aluminum alloys commonly used for aircraft structures. Clad 7075-T6 Aluminum Alloy (AMS 4049) and

Bare 7075-T6 Aluminum Alloy (AMS 4045) anodized per MILA-8625 Type I are used as the test surfaces for this test.

Interpretation of the test results is based on a comparison of the appearance of faying surfaces of three sets of coupons. One set of test coupons is exposed with reagent water only in the faying surfaces to establish the baseline controls. The surfaces exposed to the test chemicals are compared with those exposed to reagent water only. Any corrosion in excess of that shown by the control group is considered as non-conformed.

The relative corrosion severity rating system below is used to allow for a numerical classification of the test results.

Relative corrosion severity rating system:

0—No visible corrosion and no discoloration present

1—Very slight corrosion or very slight discoloration, and/or up to 5 % of area corroded

2—Discoloration and/or up to 10 % of area corroded

3—Discoloration and/or up to 25 % of area corroded

4—Discoloration and/or more than 25 % of area corroded, and/or pitting present

(A) “Area” refers to area where the test material was applied.

Aquaox Test Results:

Test Chemical	Clad 7075-T6 Aluminum Alloy	Bare 7075-T6 Aluminum Alloy	Test Result
Aquaox Disinfectant 275	1	1	Conforms
Test Control	1	1	

Conclusion:

Test result of Aquaox Disinfectant 525 does not conform on the Clad 7075 T6 Aluminum Alloy surface because corrosion caused by the test chemical is in excess of that caused by the test control.

Test results of Aquaox Disinfectant 275 conform for all test surfaces on all test criteria.

b) IMMERSION CORROSION TEST (Reference: ASTM F483)

This method determines the corrosiveness of chemicals on aircraft metals with time under conditions of total immersion through determining the weight change of the test metals after they are immersed with the test chemicals. This method screens test chemicals to ensure compliance with specified weight change criteria. Test chemicals are evaluated on the following panels, 1) Clad 2024-T3 Aluminum (QQ-A-250/5), 2) Bare 2024-T3 Aluminum (QQ-A-250/4) alodined per MIL-C-5541, 3) Bare 2024-T3 Aluminum (QQ-A-250/4) anodized per MIL-A-8625 Type I, and 4) Bare 7178-T6 Aluminum (QQ-A-250/14) anodized per MIL-A-8625 Type I.

Small sections of the above materials are exposed to the test chemical and dried. The weight of the test panel is measured before and after the exposure and drying times. The test chemical shall neither show evidence of corrosion of the test panels nor cause a weight change of the test panels greater than ± 10mg in a 24-hour immersion period per each 1” x 2” test panel.

Aquaox Test Results:

Test Chemical	Test Panel	Weight Loss in mg (per 1" x 2" panel)	Test Result
Aquaox Disinfectant 525	Clad 2024-T3 Aluminum (QQ-A-250/5)	0.1	Conforms
	Bare 2024-T3 Aluminum (QQ-A-250/4) alodined per MIL-C-5541	2.3	Conforms
	Bare 2024-T3 Aluminum (QQ-A-250/4) anodized per MIL-A-8625 Type I	0.3	Conforms
	Bare 7178-T6 Aluminum (QQ-A-250/14) anodized per MIL-A-8625 Type I	2.9	Conforms

Conclusion: Test results of the Aquaox Disinfectant 525 conform on all test panels for all test criteria.

c) RUBBER TEST (Reference: ASTM D471)

This test method evaluates the comparative ability of rubber and rubber-like compositions to withstand the effect of test liquids. It is designed for testing: (1) specimens of vulcanized rubber cut from standard sheets, (2) specimens cut from fabric coated with vulcanized rubber, or (3) finished articles of commerce. Rubber specimens are immersed in the test chemical for 24 hours and are evaluated on the following property changes. Changes in properties shall not exceed the following criteria.

Aquaox Test Results:

Test Chemical	Property	Maximum Change Allowed	Test Result
Aquaox Disinfectant 525	Tensile Strength	25 % Loss	< 5 %
	Elongation	25 % Loss	< 5 %
	Volume	± 15 % Loss	< 5 %

Conclusion: Test results of Aquaox Disinfectant 525 conform on all test specimens for all test criteria.

d) SEALANT TEST

This test method evaluates a sealed surface to withstand the effect of the test liquids. An Aluminum surface primed with paint (that is normally used in Boeing aircrafts) is smeared with the BMS 5-95 Sealant, a sealant commonly used in aircraft materials. The aircraft surface is sealed with 4" x 1" x 0.25" (length x width x thickness) sealant strips, and is immersed in the test liquid for 70 ± 2 hours for 120 ± 5 °F. No lifting or loss of adhesion shall be observed on the test surface after immersion.

Aquaox Test Results:

Test Chemical	Test Result
Aquaox Disinfectant 525	Sealant did not lift at edges or lose adhesion.
Test Control	No lifting or loss of adhesion when pried away from edge.

Conclusion: Test result of Aquaox Disinfectant 525 conforms on all test surfaces for all test criteria.

e) PAINTED SURFACE TEST (Reference: ASTM F502)

This test method covers the determination of the effects of cleaning solutions and chemical maintenance materials on painted aircraft surfaces. Plate and sheet specimens of aluminum alloy are examined under the test liquids. This test method is applicable to any painted film that is exposed to cleaning materials. Test liquid is heated to 149 ± 4 °F and applied to a painted surface having an initial surface temperature of 72 ± 2 °F. Following exposure, streaking, discoloration, and blistering will be determined visually on the test surface. Softening will also be determined with a series of specially prepared pencils wherein determination of the softest pencil to rupture the paint film on the test surface is made. Test liquid shall not produce any color change and shall not decrease the paint film hardness for more than 2 pencil hardnesses.

Aquaox Test Results:

Test Chemical	Property	Test Result
Aquaox Disinfectant 525	Pencil Hardness Change	0
	Color Change	None

Conclusion: Test results of Aquaox Disinfectant 525 conform on all test specimens for all test criteria.

f) TEDLAR SURFACE TEST

This method is used to ensure that test liquids do not leave any scratching, color change or staining on the test tedlar surfaces after exposure to the test liquids. Visual observation is used to determine any scratching or permanent stains which require polishing to remove. Test surfaces are exposed to the test liquid for a specific amount of time in room temperature and then rinsed. Exposed surfaces shall not show any scratching, any greater-than-minimal color change or any staining.

Aquaox Test Results:

Test Chemical	Test Result
Aquaox Disinfectant 525	No Scratching, Color Change or Staining of specimens is observed.

Conclusion: Test results of Aquaox Disinfectant 525 conform on all test specimens for all test criteria.

g) VINYL SURFACE TEST

This method is used to ensure that test liquids do not leave any cracking, brittleness, color change or staining on the test vinyl surfaces after exposure to the test liquids. Test surfaces are exposed to the test liquid for a specific amount of time in room temperature and then rinsed. Exposed surfaces then are visually examined and shall not show any of this above mentioned signs.

Aquaox Test Results:

Test Chemical	Test Result
Aquaox Disinfectant 525	No Scratching, Color Change or Staining of specimens is observed.

Conclusion: Test results of Aquaox Disinfectant 525 conform on all test specimens for all test criteria.

h) FABRIC AND CARPET TEST

This method is used to ensure that test liquids do not cause any color change or staining on the test fabric and carpet surfaces after exposure to the test liquids. Test surfaces are exposed to the test liquid for a specific amount of time in room temperature and then rinsed. Exposed surfaces are then visually evaluated to check for any color change or staining after exposure to the test liquid.

The test fabric and carpet surfaces are also evaluated on its flammability after being immersed into the test liquid and dried. Test surfaces are completely coated with the test liquid, let soaked for a specific amount of time and then allowed to dry. The dried surfaces are then hung, applied with a flame and allowed for a vertical burn for 12 seconds. Self-Extinguishing time, Burn Length and Drip Extinguish Time will then be determined on the test surfaces. Each of these parameters shall not exceed the maximum value as stated in the table below.

Aquaox Test Results:

Test Chemical	Test Surface	Property	Maximum Value	Test Result	
Aquaox Disinfectant 525	Upholstery	Color Change	N/A	None	
		Staining	N/A	None	
		Flammability	Extinguishing Time	15 seconds	< 3 seconds
			Burn Length	8 inches	7 inches
			Drip Extinguish Time	5 seconds	< 3 seconds
	Carpet	Color Change	N/A	None	
		Staining	N/A	None	
		Flammability	Extinguishing Time	15 seconds	< 3 seconds
			Burn Length	8 inches	4 inches
			Drip Extinguish Time	5 seconds	< 3 seconds

Conclusion: Test results of Aquaox Disinfectant 525 conform on all test specimens for all test criteria.

i) LEATHER AND NAUGAHYDE TEST

This practice is used to evaluate the compatibility of the test liquids with the test surfaces, i.e. lather and naugahyde surfaces. Test surfaces are exposed to the test liquid for a specific amount of time in room temperature and then rinsed. Visual observation is used for determining any signs of crackling or brittleness, as well as any color change or staining of exposed surfaces. Exposed surfaces shall not show any of the above mentioned signs after exposure to the test liquid.

Aquaox Test Results:

Test Chemical	Property	Test Result
Aquaox Disinfectant 525	Cracking or Brittleness	None
	Color Change or Staining	None

Conclusion: Test results of Aquaox Disinfectant 525 conform on all test specimens for all test criteria.

j) POLYCARBONATE CRAZING TEST (Reference: ASTM F484)

This test method covers the procedure for determining the crazing effect caused by test liquids on the test materials under bending stress. The materials to be tested include Lexan 9600 and BMS8-400 BAC 70913 plastics, which are commonly used in aircraft structures. Each test surface is bent under a strain of 0.008 and the stressed materials are then exposed to the test liquid for 10 minutes. Exposed surfaces are then visually examined on any signs of cracking or crazing after exposure to test liquids.

Aquaox Test Result / Conclusion:

Test Chemical	Test Surface	Test Result
Aquaox Disinfectant 525	Lexan 9600	No cracking or crazing
	BMS8-400 BAC 70913	No cracking or crazing

Conclusion: Test results of Aquaox Disinfectant 525 conform on all test specimens for all test criteria.

k) FLASH POINT TEST (Reference: ASTM D93)

This test is done for information only. The flash point of the test liquid is determined following the ASTM D93 method, all cleaning candidates having a flash point not lower than 212°F shall be approved by the Fire Protection Engineering before they can be evaluated to be used.

Aquaox Test Result / Conclusion: No flash point is observed to 212°F for the test liquid.

IV. Summary of all Test Results

Test results of Aquaox Disinfectant 525 conform for all test criteria on all the tests included in the Boeing D6-7127 Protocol except for the Clad 7075 T6 Aluminum Alloy surface of the Sandwich Corrosion Test. This test was later repeated with the Aquaox Disinfectant 275, with a passing test result.

V. References

- SMI Test Report, Boeing D6-7127 Protocol, Aquaox Disinfectant 525, SMI/REF # 1412-370
- SMI Test Report, Boeing D6-7127 Protocol, Aquaox Disinfectant 275, SMI/REF # 1503-629
- Aquaox Certificate of Analysis, Aquaox Disinfectant 525, dated 011415
- Aquaox Certificate of Analysis, Aquaox Disinfectant 275, dated 032715