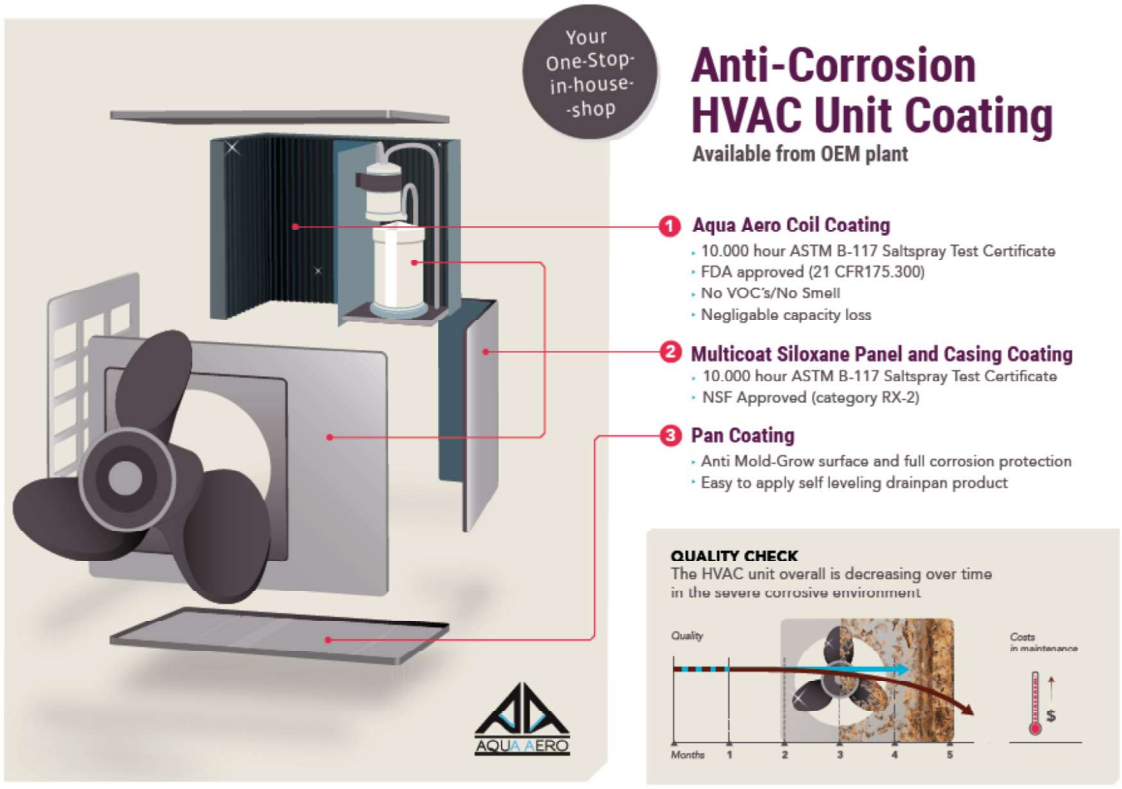
Aqua Aero Coatings to prevent corrosion in swimming pool AC installation

Aqua Aero Coatings are applied to the coils, headers, enclosures and drain-pans of AC installations, in case of exposure to high concentrations of chemicals in the air.

Swimming pool AC and especially dehumidification equipment are exposed to high levels of chlorine. Coils should be protected on the fins and the headers to neutralize this chlorine attack. This chlorine easily converts to hydrochloric acids or other acids.



Regardless of how frequently or what system you use to add chlorine to the water, the chlorine level normally stays between 1.0 and 3.0 parts per million (ppm) to maintain a healthy pool. This means that the chlorine concentration in the condense water is normally not exceeding 5 ppm.

The **chemical resistance** of a material or surface can be determined in compliance with *"ISO 2812 Paints and varnishes – Determination of resistance to dissolved chemicals"*. With these methods, a material or surface is exposed to the relevant chemical for a longer, defined period of time and the relevant area then inspected microscopically.

Possible changes which could occur include:

- Discoloration
- Alteration in the degree of shine
- Softening
- Swelling
- Detachment of coatings
- Blistering

On completion of the defined test period, any residues of test liquid are removed and the material surface assessed and analyzed for visible alterations in accordance with DIN EN ISO 4628-1 to -5. To ascertain a possible regeneration time, the assessment is made once immediately after removal of the test liquid and again a defined later.

A coating surface regenerates to its original structure once the chlorine evaporates from the surface.

Conclusion on resistance AA Black S Coil Coating

The ISO spotting test was conducted with high concentrations of chlorines, until 5000 ppm. The black AA coil coating shows an excellent resistance to chlorine concentrations in water.

The coating can be safely applied to coils, and we recommend to protect the copper tubing to apply MC siloxane to the headers, to prevent leaks at the brazes.

Wouter Scheffer
Utrecht February 1st 2019

Test Report

Determination of resistance to liquids by spotting method

Report:	17-42A005
Issued by:	Niels van Zwam
Date:	16-10-2017
Client:	Aqua Aero Coatings B.V.
Product:	Aqua Aero Coil Coating Black S
Article no.:	2028
Batch no.:	128861
Test no.:	2017420001

Test Method according to

ISO 2812-4

Principle: a coated test panel is exposed to a test substance using the spotting method. The effects of the exposures are assessed in accordance with agreed criteria.

Test panels:		
Material:	Aluminum panel	
Material thickness:	1.2	mm
Surface pretreatment:	Degreased + DET-X + AA Black S	
Application method:	Sprayed/Cupgun with 1.3 nozzle	
Drying conditions:	24 hours at 20°C	temp. and time
Ageing conditions:	25 days at 20°C	temp. and time
DFT of coating:	42.7	µm

Method using A or B:	A
Specification test liquid:	50 ppm ClO^- ($Ca(ClO)_2$ in Demi-Water)
PH of the liquid:	6.23
Temperature:	19.5°C

On a scale from 0 to 5 (0 perfect/no change)(5 worst/biggest change)

Contact time:	5 min	15 min	30 min	60 min	120 min
Regeneration time:	0 min	0 min	0 min	0 min	0 min
Discolouration:	0	0	0	0	0
Hardness:	0	0	0	0	0
Adhesion:	0	0	1	1	1
Pores/cracking:	0	0	0	0	0
Blistering:	0	0	0	0	0
Gloss reduction:	0	0	0	0	0

Any deviations from the procedure: -

Any unusual features observed during the test: -

Approved by:

Fred Derks
Laboratory R&D management

Test Report

Determination of resistance to liquids by spotting method

Report:	17-42A006
Issued by:	Niels van Zwam
Date:	16-10-2017
Client:	Aqua Aero Coatings B.V.
Product:	Aqua Aero Coil Coating Black S
Article no.:	2028
Batch no.:	128861
Test no.:	2017420002

Test Method according to

ISO 2812-4

Principle: a coated test panel is exposed to a test substance using the spotting method. The effects of the exposures are assessed in accordance with agreed criteria.

Test panels:		
Material:	Aluminum panel	
Material thickness:	1.2	mm
Surface pretreatment:	Degreased + DET-X + AA Black S	
Application method:	Sprayed/Cupgun with 1.3 nozzle	
Drying conditions:	24 hours at 20°C	temp. and time
Ageing conditions:	25 days at 20°C	temp. and time
DFT of coating:	42.7	µm

Method using A or B:	A
Specification test liquid:	500 ppm ClO^- ($Ca(ClO)_2$ in Demi-Water)
PH of the liquid:	10.31
Temperature:	19.5°C

On a scale from 0 to 5 (0 perfect/no change)(5 worst/biggest change)

Contact time:	5 min	15 min	30 min	60 min	120 min
Regeneration time:	0 min	0 min	0 min	0 min	0 min
Discolouration:	0	0	0	0	0
Hardness:	0	0	0	0	0
Adhesion:	0	0	1	1	1
Pores/cracking:	0	0	0	0	0
Blistering:	0	0	0	0	0
Gloss reduction:	0	0	0	0	0

Any deviations from the procedure: -

Any unusual features observed during the test: -

Approved by:

Fred Derks
Laboratory R&D management

Test Report

Determination of resistance to liquids by spotting method

Report:	17-42A007
Issued by:	Niels van Zwam
Date:	16-10-2017
Client:	Aqua Aero Coatings B.V.
Product:	Aqua Aero Coil Coating Black S
Article no.:	2028
Batch no.:	128861
Test no.:	2017420003

Test Method according to

ISO 2812-4

Principle: a coated test panel is exposed to a test substance using the spotting method. The effects of the exposures are assessed in accordance with agreed criteria.

Test panels:		
Material:	Aluminum panel	
Material thickness:	1.2	mm
Surface pretreatment:	Degreased + DET-X + AA Black S	
Application method:	Sprayed/Cupgun with 1.3 nozzle	
Drying conditions:	24 hours at 20°C	temp. and time
Ageing conditions:	25 days at 20°C	temp. and time
DFT of coating:	46.8	µm

Method using A or B:	A
Specification test liquid:	5000 ppm ClO- (Ca(ClO)2 in Demi-Water)
PH of the liquid:	12.19
Temperature:	19.5°C

On a scale from 0 to 5 (0 perfect/no change)(5 worst/biggest change)

Contact time:	5 min	15 min	30 min	60 min	120 min
Regeneration time:	0 min	0 min	0 min	0 min	0 min
Discolouration:	0	0	0	0	0
Hardness:	0	0	0	0	0
Adhesion:	1	1	1	1	2
Pores/cracking:	0	0	0	0	0
Blistering:	0	0	0	0	0
Gloss reduction:	0	0	0	0	0

Any deviations from the procedure: -

Any unusual features observed during the test: -

Approved by:

Fred Derks
Laboratory R&D management

REPORT

Neutral salt spray test	Aqua Aero Coil Coating Multi AA Aqua Aero Pan Coating

Beuningen, 6 july 2018

Client	Aqua Aero Coatings B.V. Mariaplaats 4G 3511 LH Utrecht
Project number	20162004
Report number	DERCAA1830
Handled by	Mr. F. Derks

CONTENTS

1 INTRODUCTION

1.1 ORDER

By order of Mr. W. Scheffer of Aqua Aero Coatings B.V. in Utrecht, the Netherlands, Dercom B.V. located in Beuningen, the Netherlands, has performed a neutral salt spray test on 9 coated test panels. Dercom B.V. has developed these coatings for Aqua Aero Coatings B.V. for application on heat exchanger surfaces in highly corrosive environments.

The order to perform the test was given by e-mail dated 11 December 2016 and confirmed by Dercom dated 5 January 2017.

1.2 GENERAL DATA

Samples	:	3 coated aluminium test panels Aqua Aero Coil Coating, DTF approx 25 microns 3 coated aluminium test panels Multi AA, DTF approx 48 microns 3 coated aluminium test panels Aqua Aero Pan Coating, DTF approx 1000 microns
Dercom sample no.	:	050115-2004
Received	:	5 January 2017

2 TEST METHOD

The backside and edges of the panels have been sealed with an inert tape. Then, the panels have been placed in a salt spray ca binet according to ISO 9227, equivalent to ASTM B 117. In the cabinet a 5% NaCI solution is sprayed at a temperature of 35 ± 1°C. The amount of the collected spray is between 1 and 2mI per hour per 80cm², the pH of the collected spray is 6.5-7.2 and the salt concentration of the collected spray is 5.0 ±0.5% (m/m).
The test time was 12.000 hours with inspections every 1000 hours.
The test has been carried our from 7 January 2017 till June 2018.

3 RESULTS FOR ALL PANELS

1000 hours exposition	:	no defects
2000 hours exposition	:	no defects
3000 hours exposition	:	no defects
4000 hours exposition	:	no defects
5000 hours exposition	:	no defects
6000 hours exposition	:	no defects
7000 hours exposition	:	no defects
8000 hours exposition	:	no defects
9000 hours exposition	:	no defects
10000 hours exposition	:	no defects
11000 hours exposition	:	no defects
12000 hours exposition	:	no defects

4 ACETIC SALT SPRAY TEST

ASTM G85 Annex A1 is a corrosion test which uses acetic acid to achieve the specified pH range.
COT, independent research and advisory organization, has done this corrosion test with test panels Aqua Aero Coil Coating, Multi AA, Aqua Aero Pan Coating

The confirmed results:

1000 hours exposition	:	no defects
2000 hours exposition	:	no defects
3000 hours exposition	:	no defects
4000 hours exposition	:	no defects

5 TESTING WATER RESISTANCE OF PANEL GUARD IN 100% RELATIVE HUMIDITY

ASTM D2247 evaluates the coating water resistance by exposing coated test panels in an atmosphere maintained at 100% relative humidity.
Test panels with Aqua Aero Pan Coating are placed in an enclosed cabinet containing a heated, saturated mixture of air and water vapor. The temperature of the chamber is maintained at 38°C (100°F). At 100% relative humidity (RH), a very small temperature difference between the panels and the surrounding vapor causes the formation of condensation on the panels.

Results:

1000 hours exposition	:	no defects
2000 hours exposition	:	no defects
3000 hours exposition	:	no defects
4000 hours exposition	:	no defects
5000 hours exposition	:	no defects
6000 hours exposition	:	no defects

6 CONCLUSION

Aqua Aero Coil Coating, Multi AA, Aqua Aero Pan Coating show an excellent resistance in a corrosive environment.

6 July 2018,

Approved by:

Fred Derks
Laboratory R&D management
Dercom B.V.