# STANDARD: VCS STD 1027 149 Cyclic Corrosion Method Statement EQUIPMENT: AtmosfärLite

## 1. Scope

**1.1** This methodology is to be used to perform the VCS STD 1027,149 Cyclic Corrosion test standard in an Ascott corrosion chamber.

This should be used in conjunction with the VCS STD 1027,149 standard document. The test standard takes precedence over this method statement and this method may need to be altered to follow/comply with the standard.

**1.2** This method is based on VCS STD 1027,149, which is a 7-day cycle that consists of the repetition of a sub program (S1) that is replaced once on Monday and once on Friday with a second sub program (S2):

#### S1 to create:

- 4hrs Constant conditions at 35°C, 95%RH followed by 2hrs Linear change to 45°C, 50%RH.
- 4hrs Constant conditions at 45°C, 50%RH followed by 2hrs Linear change to 35°C, 95%RH.

#### S2 to create:

- 15 minutes of Oscillating vertical salt spray (35°C) followed by 1hr 45min 'condensation humidity' at 35°C, 95-99%RH - Repeated twice (3 cycles) to give a total of 6 hours.
- 2hr linear change to 45°C, 50%RH followed by 2hrs constant conditions at 45°C, 50%RH.
- 2hr Linear change to 35°C, 95%RH.
- **1.3** The chamber will be loaded with test samples as required by the customer or in accordance VCS STD 1027,149.

### 2. Instrumentation

**2.1** All measuring equipment must be calibrated. The recalibration renewal date must not fall within the test duration.

2.1.1 The Ascott corrosion chamber should be calibrated for chamber air temperature and relative humidity as a minimum.

If required, the following 'chamber' items may also be calibrated:

- Chamber air saturator temperature.
- Chamber air pressure gauge (atomiser pressure).
- Relative humidity display (Capacitive system).
- Relative humidity display (Psychrometric system

   Only required if the Refrigeration system is
   used to control relative humidity).
- **2.2** Peripheral devices also should be calibrated prior to use and may include the following:
  - Hand Held pH Meter is calibrated using buffer solutions and following manufacturers' instructions. The first solution pH 4.01 and second solution pH 7.01. Tolerance acceptable is +/- 0.01.

Once completed the electrode is rinsed using Electrode Rinse solution. The buffer solution is certified to NIST Standard Reference material.

#### Hand Held pH Meter (Ascott Accessory No: ACC11)

Digital pH meter, for measuring the pH of salt solution fallout over range 0-14 pH with a resolution of 0.01 pH. Supplied complete with buffers for calibration.

<u>View all our accessories at www.ascott-analytical.com</u>

• **Salinity Refractometer** is calibrated using Refractometer calibration liquid calibration solution (3.5%).

#### Salinty Refractometer (Ascott Accessory No: ACC100)

A salinity refractometer optimized to give a direct reading of percentage sodium chloride in the range 0 to 28%, with automatic temperature compensation.

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• **Conductivity meter** is calibrated using standard solution, used for checking the conductivity of the water used for the salt solution.





**2.3** The chamber temperature may be continuously monitored if required, using an independently calibrated data logger. For salt spray testing, it may be satisfactory to record the chamber temperature manually using the Ascott chamber display on a daily basis.

#### 2.4 Exposure to Salt Solution

Collection rates are monitored manually using collection vessels placed at sample height. The collection rates are to be within the range of range of 1-2ml/hr/80cm<sup>2</sup>.

**2.5** The salt solution exposure is by means of atomisation using compressed air. The air delivered to the spray nozzle must be 'heated and moistened' by passing the air through an air saturator, the temperature of the chamber air saturator is set according to the pressure at the atomiser gauge. (See ISO 9227-2017(E) table for reference).

### 3. Salt Solution Preparation

#### CorroSalt for Salt Spray Testing (Accessory No: SALA530)

Highest purity salt for fully compliant testing. For all salt spray testing including the stringent ASTM B117. Available in 25Kg (55Ib) drums or bags.



<u>View all our accessories at www.ascott-analytical.com</u>

- **3.1** Salt solution to be prepared in accordance with VCS STD 1027,149 (NaCl 1,0 % ±0,1% (by weight), acidified by the addition of sulphuric acid 1 ml of 0,5 M H2S04 to 10 litres of salt solution, gives a pH of approximately 4,2.
  - Check that the water conductivity is measured and monitored and is within the requirements of the standard using a conductivity meter.
  - Salt solution concentration is measured & monitored and is within the requirements of the standard using a calibrated Salinity Refractometer.

• Salt solution pH is measured & monitored and is within the requirements of the standard using a calibrated pH Meter.

### 4. Sample Preparation

**4.1** Samples are prepared to customer requirements or in accordance with VCS STD 1027,149.

Latex gloves must be worn at all times when handling samples.

Photographs should be taken of each sample prior to starting the test.

### 5. **Operation**

#### 5.1 Pre-test evaluation.

- Run a test of 15 minutes of Oscillating vertical salt spray with the chamber empty and collection funnels positioned. (Test with DI water initially).
- Ensure the salt spray collection rates are within the expected range of 15mm/hr (±5mm) = (20-40ml/80cm<sup>2</sup> funnel/15min). Record all results.
- Adjust the spray pressure and oscillation speed and repeat the test to improve results if required.
- Check that the salt solution pH falls within the requirement of the standard. Record all results. (Approximately pH 4.2).
- Create and run a test cycle that incorporates the two sub cycles with the chamber empty.
- Record the profile using an independent data logger or Ascott's logging software (ACC120).
- Verify that the chamber can follow the example test profile and that the transition times and values for temperature and relative humidity are within tolerance of the standard. (RH max ±5% with average value of ±%RH. Temperature ±0.6°C).



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#### 5.2 Starting the test cycle

#### 5.2.1 Test Exposure Conditions.

- Position samples within the chamber in accordance of the test standard or to customer requirements. For flat test objects the angle at which the test surface is inclined shall preferably be 15 ±5 from the vertical, for other samples, this angle should apply to the surface being tested as best possible.
- Ensure that no samples 'shadow' other samples and that droplets from one sample cannot fall onto other samples.
- Photographs to be taken prior to starting the test and at customer specified times.
- Start the test cycle and record test parameters at start.
- Record the profile using an independent data logger or Ascott's logging software (ACC120).

#### 5.3 Quality Control

- 5.3.1 Daily checks to ensure the standard is being followed with variable parameters within limits Record all parameters.
  - Check that the chamber temperature is within acceptable limits.
  - Check that the chamber relative humidity is within acceptable limits.
  - Record the conductivity of the DI water when used.
  - Check the reservoir salt solution concentration is within (NaCl 1,0 % ±0,1%).
  - Record the reservoir salt solution pH.
  - Monitor the level of salt solution in the reservoir and ensure that there is enough for the next 24/48 hours. (Allow extra for weekends).

#### 5.4 After Exposure

5.4.1 At the end of the test period the samples should be removed from the chamber and evaluated. Any method of cleaning or storing should be agreed with the customer in advance.

Photographs of the samples should be taken.

#### 5.5 Deviation Handling

5.5.1 General deviations such as downtime, out of tolerance recordings should be noted in the test report, including details of any alterations made.

For futher information, please contact us.

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#### **Typical Daily Checks**

Hours	Chamber Temp °C	Air Sat Temp °C	Collected ml/hr (2 vessels per atomiser)		Collected Solution	Reservoir Salinity	Pump Speed	Atomiser Air Pressure	Initials	Photos Taken
			1	2	рН	%		PSI		



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