

# STANDARD: ISO 9227-2017(E) Salt Spray Method Statement

## EQUIPMENT: All Ascott Corrosion Chambers

### 1. Scope

1.1 This methodology is to be used to perform the ISO 9227-2017(E) Salt Spray test standard in an Ascott corrosion chamber.

This should be used in conjunction with the ISO 9227-2017(E) 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 ISO 9227-2017(E) which consists of: Continuous salt spray test exposure at 35C +/-2°C with a salt concentration of 5% NaCl +/-1%.

Three variations within the standard give three options:

- **NSS** – Neutral Salt Spray
- **AASS** – Acetic Acid Salt Spray
- **CASS** – Copper-accelerated Acetic acid Salt Spray (50°C +/-2°C).

1.3 The chamber will be loaded with test samples as required by the customer (Or in accordance with ISO 9227-2017(E)).

### 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 as a minimum.

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

- Chamber air saturator temperature.
- Chamber air pressure gauge (atomiser pressure).

Ascott corrosion chambers may be fitted with a relative humidity sensor. Calibration is not required for as this is not in use during salt spray testing.

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.

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

#### Salinity 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 (55lb) drums or bags.



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- 3.1 Salt solution to be prepared in accordance with ISO 9227-2017(E).
- Check that the water conductivity is measured and monitored and is within the requirements of the standard using a conductivity meter. (Less than 20  $\mu\text{S}/\text{cm}$  at 25 °C  $\pm$  2 °C)
- 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.
- 3.11 NSS - After allowing the solution to stabilise for several hours, the salinity and pH is measured and recorded. Any adjustments to the pH can be made using reagent grade hydrochloric acid (HCL) to increase the acidity or reagent grade Sodium hydroxide (NaOH) or Sodium Bicarbonate (NA<sub>2</sub>CO<sub>3</sub>) to reduce the acidity. Record all results.
- 3.12 AASS - Glacial Acetic acid Salt Spray is added to the salt solution so that the pH meets the required limits stipulated within the standard. Any adjustments to the pH can be made using Glacial

Acetic Acid to increase the acidity or reagent grade Sodium hydroxide (NaOH) or Sodium Bicarbonate (NA<sub>2</sub>CO<sub>3</sub>) to reduce the acidity. Record all results.

- 3.13 CASS - Copper (II) Chloride Dihydrate (CuCl<sub>2</sub> 2H<sub>2</sub>O) is added to the salt solution to give a concentration of 0.26g/L (+/- 0.01g/L)

Any adjustments to the pH should be made using Glacial Acetic Acid to increase the acidity or reagent grade Sodium hydroxide (NaOH) or reagent grade Sodium Bicarbonate (NA<sub>2</sub>CO<sub>3</sub>) to reduce the acidity. Record all results

### 4. Sample Preparation

- 4.1 The test samples should be thoroughly cleaned before testing commences. This should not include the use of abrasives or solvents. This process should be agreed with the customer.

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 24 hour cycle of the test with the chamber empty and collection funnels positioned, record the temperature and ensure it remains in tolerance of 35°C +/- 2°C (50°C +/- 2°C for CASS).

Ensure the salt fog collection rates are within the expected range of 1-2ml/hr/80cm<sup>2</sup>. Record all results.

Check that the collected solution pH falls within the requirement of the standard. Record all results.

If required, adjust the pH of the salt solution within the solution reservoir in order to offset any change to the pH when collected; so that the collected, the solution is within requirements of the standard.

This may require additional testing to prove results before testing with samples commences.

It may be required to evaluate the chamber corrosivity before commencing a test. Refer to the test standard for full details.

## 5.2 Starting the test cycle

### 5.2.1 Test Exposure Conditions.

- Position samples within the chamber in accordance of the test standard.
- Set the chamber air saturator temperature according to the table within the test standard
- Ensure that no samples 'shadow' other samples and that droplets from one sample cannot fall onto other samples.
- Insert clean and empty salt spray collection vessels around the samples within the chamber, preferably at sample height, and never underneath samples or anything else that may drip into them from above.
- Start the test cycle and record test parameters at start.
- Spray continuously with atomised salt solution at a constant chamber temperature of  $35^{\circ}\text{C} \pm 2^{\circ}\text{C}$  ( $50^{\circ}\text{C} \pm 2^{\circ}\text{C}$  for CASS).
- Exceptions to continuous testing are permitted to record fallout collection rates and PH of collected solution daily. Typically, this would be at the same time daily and omitted at weekends. Chamber open time must be minimal and no more than 1hr/24hr.
- Photographs to be taken prior to starting the test and at customer specified times.

## 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 air saturator temperature is within acceptable limits.
- Check that atomiser air pressure is within acceptable limits.
- Check that collected solution is within acceptable limits for fallout rates.
- Check the reservoir salt solution is within 5.0%  $\pm$  1.0% NaCl.
- Record the reservoir salt solution pH.
- Check that collected salt solution pH is within acceptable limits.
- Record the conductivity of the DI water when used.
- 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 The handling of the tested specimens varies depending upon their material. Refer to the test standard and agree the correct procedure with the customer.

Latex gloves must always be worn when handling samples.

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 further 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 pH	Reservoir Salinity %	Pump Speed	Atomiser Air Pressure PSI	Initials	Photos Taken
			1	2						