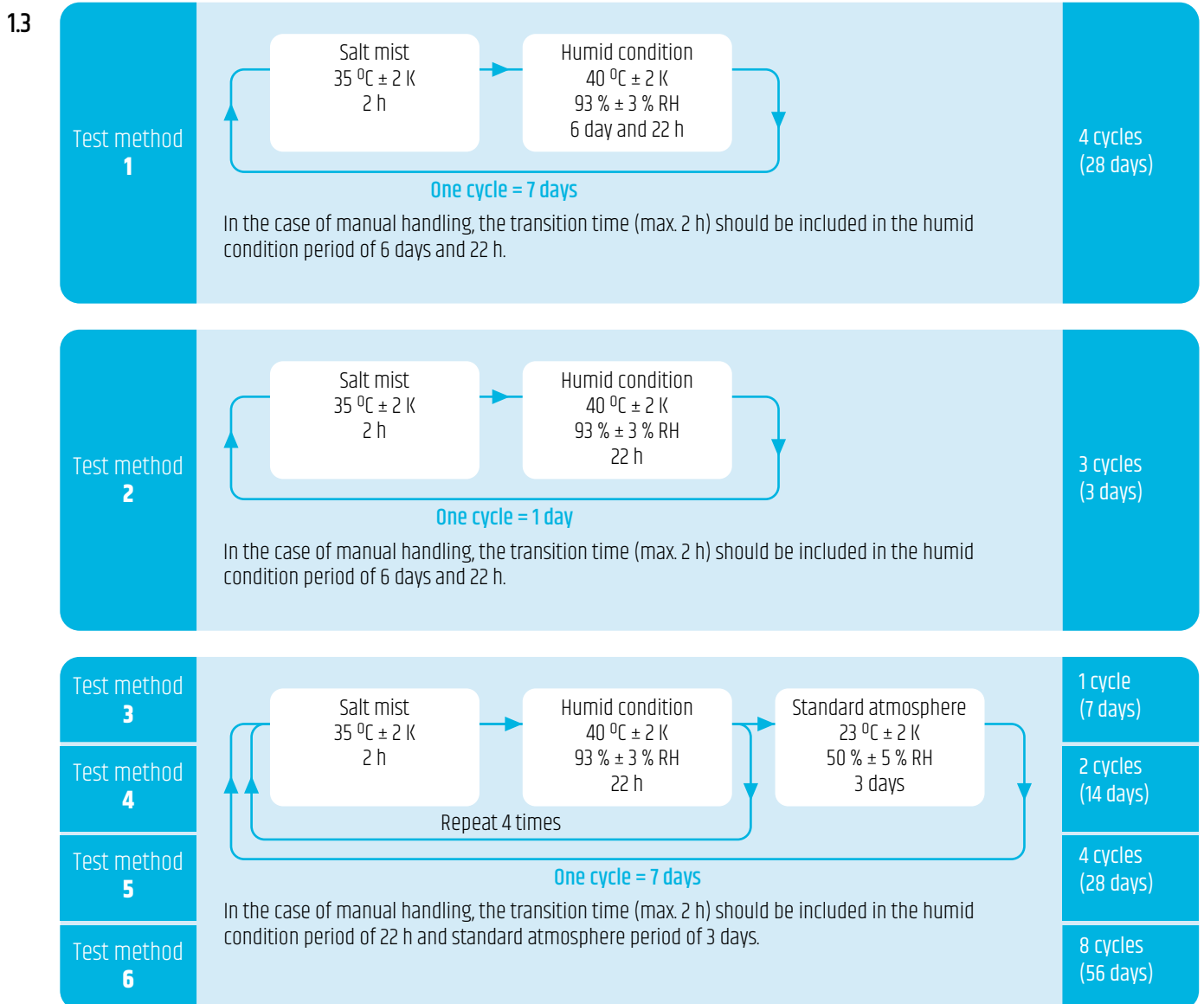


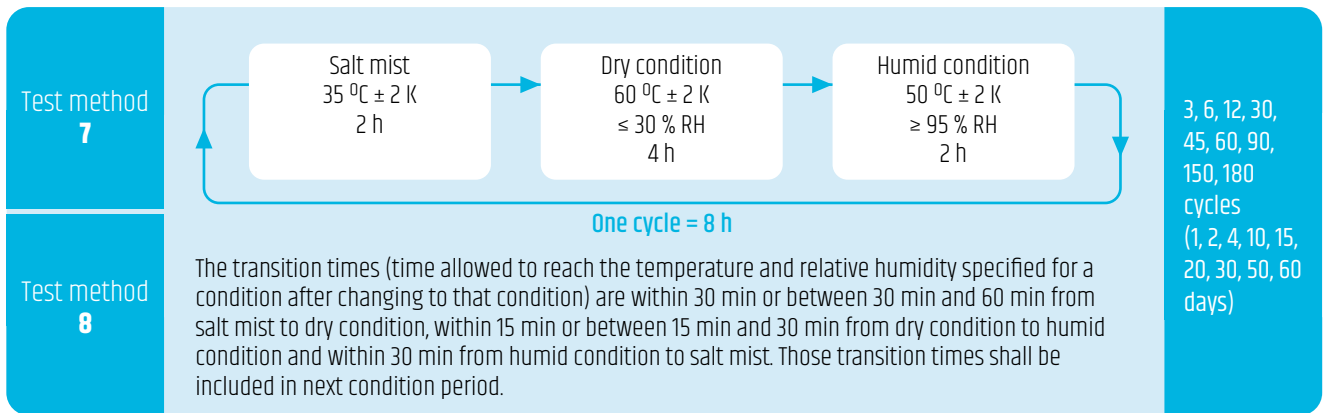
STANDARD: IEC 60068-2-52 Testing Method Statement

EQUIPMENT: Ascott Cyclic Corrosion Chambers & Accessories

1. Scope

- 1.1 This methodology is to be used to perform all methods of IEC 60068-2-52 Cyclic Corrosion Test standard in an Ascott corrosion chamber. This document should be used in conjunction with the IEC 60068-2-52 test 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 IEC 60068-2-52 which has 8 methods and consists of:





Note: The \pm tolerances given for temperature and relative humidity are the allowable fluctuations which are defined as the positive and negative deviations from the setting of the sensor at the operational control set point during equilibrium conditions. This does not mean that the set value can vary by plus/minus the amount indicated from the given value.

Test method 1 should be used to test products which are exposed to the environment for much of their operational life (e.g. ship radar, deck equipment).

Test method 2 should be used to test products which may be exposed to the marine environment from time to time but will normally be protected by an enclosure (e.g. navigational equipment which will normally be used on the bridge or in a control room).

Test methods 3 to 6 can be used for products where, under normal use, there is a frequent change between salt-laden and dry atmosphere, for example automobiles and their parts.

Test method 7 defines a specific number of test cycles that include spraying salt mist, followed by dry conditions and humid conditions. The process can be used as a general corrosion test for many materials including automobiles and their parts.

Test method 8 contains the same cyclic exposure as test method 7, but utilizes an acidified salt solution instead of a neutral salt solution to induce a corrosion that occurs in acidified salt environment.

- 14 The chamber will be loaded with test samples as required by the customer or in accordance with IEC 60068-2-52.

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).
- 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.

[View all our accessories at www.ascott-analytical.com](http://www.ascott-analytical.com)

- **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** The test can be ran in multiple chambers, or in a single test chamber capable of meeting the following requirements:
- 2.4.1 Salt mist chamber to the requirements of ISO 9227. It shall maintain a temperature of 35 °C ($\pm 2^\circ\text{C}$).
- 2.4.2 Humidity chamber which conforms to the requirements of IEC 60068-2-78. It shall maintain a relative humidity of 93 % ($\pm 3\%$) at a temperature of 40 °C ($\pm 2^\circ\text{C}$) or a relative humidity of over 95 % at a temperature of 50 °C ($\pm 2^\circ\text{C}$).
- 2.4.3 Standard atmosphere chamber which conforms to the requirements of IEC 60068-1. It shall maintain a relative humidity of 50 % ($\pm 5\%$) at a temperature of 23 °C ($\pm 2^\circ\text{C}$).
- 2.4.4 Dry chamber which can maintain a relative humidity of less than 30 % at a temperature of 60 °C ($\pm 2^\circ\text{C}$).

This test can be ran in its entirety in an Ascott Cyclic Corrosion chamber fitted with Dehumidification Unit (Ref ACC112), heater blower system (ref ACC47) and wall wash facility (ref ACC42).

2.5 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/80cm².

- 2.6** 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).

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. Salt Solution Preparation

- 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 $\pm 2^\circ\text{C}$)

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.

- 3.1.1 Test Methods 1-7 = 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 (NA2CO3) to reduce the acidity. Record all results.

3.12 **Test Method 8 = 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 (NA2CO3) 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 salt spray test with the chamber empty and collection funnels positioned. Record the temperature and ensure it remains in tolerance of 35°C (±2°C).
- Ensure the salt fog collection rates are within the expected range of 1-2ml/hr/80cm². Record all results.
- Check that the collected salt solution has a concentration of 50(±5) g/L.
- 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 to offset any change to the pH when collected; so that the collected solution is within requirements of the standard. This may require additional testing to prove results before testing with samples commences.

- Create and run a complete 24-hour cycle of the controlled humidity (E.g. 6 hours of Condensation humidity at 40°C (±2°C) 93%RH (±3%) followed by 6 hours Controlled humidity at 23°C (±2°C) 50% RH (±5 % RH) – Applicable to Test Methods 3 to 8 only.
- Record the profile using an independent data logger or Ascott's logging software (ACC121).
- 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.

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°C (±2°C).
- 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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