

STANDARD: **MIL-STD-810H**EQUIPMENT: **Ascott Cyclic Corrosion Chambers & Accessories****1. Scope**

- 1.1** This methodology is to be used to perform MIL-STD-810H Cyclic corrosion testing of materials in an Ascott corrosion chamber. This document should be used in conjunction with the MIL-STD-810H 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.

This method is based on MIL-STD-810H w/Change 1 May 2022 edition Procedure I which consists of 4 steps:

Step 1: With the samples in the chamber, the test chamber temperature is set to 35 °C and the samples are conditioned for at least two hours before introducing the salt fog.

Step 2: The samples are exposed to a 24-hour period of 5% salt spray at a rate of 1 to 3.0ml/80cm²/hour, in a chamber temperature of +35C, the pH of salt spray should be between 6.5 -7.2.

Step 3: The samples are dried at standard ambient temperatures and a relative humidity of less than 50% for 24 hours, generally accepted ambient conditions are laboratory environment 23C/<50%RH.

Step 4: Repeat steps 1 to 3 at least once.

The table opposite can be modified as experience has shown that alternating 24-hour periods of salt fog exposure and drying conditions for a minimum of four 24-hour periods (two wet and two dry), provides more realistic exposure and a higher damage potential than does continuous exposure to a salt atmosphere.

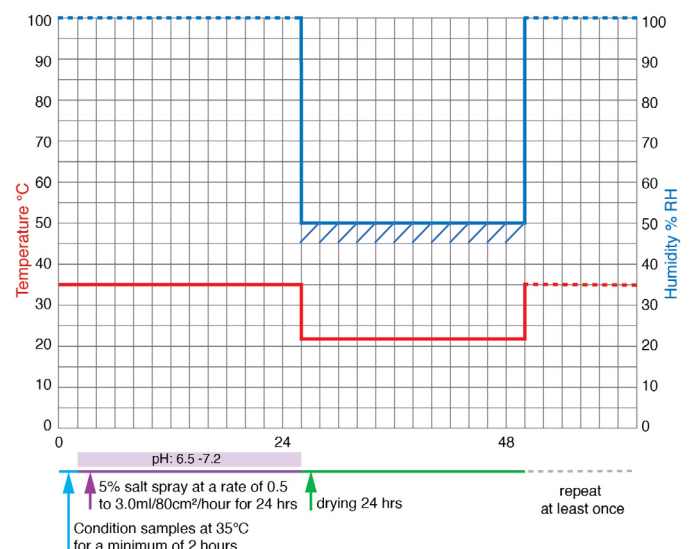
If this option is not acceptable perform 48 hours of salt spray exposure followed by 48 hours of drying. Increase the number of cycles to provide a higher degree of confidence in the ability of the materials involved to withstand a corrosive environment.

Step	Chamber function	Chamber temperature	Duration	Air saturator temperature	Humidity set point
1	Temperature only	35°C	2 hours	N/A	N/A
2	Salt spray (moist)	35°C	24 hours	47°C	N/A
3	Controlled Humidity	25°C	24 hours	N/A	<50%RH

- 1.2** The tolerances around the set values are as follows:

- Temperature Tolerance $\pm 2^{\circ}\text{C}$.
- Relative Humidity $\pm$ no tolerance required.

- 1.3** The chamber will be loaded with test samples in accordance with MIL-STD-810H.



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.

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- **Salinity Refractometer** is calibrated using Refractometer calibration liquid calibration solution.

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 is continuously monitored, using an independently calibrated data logger

2.3.1 Required equipment to run the test as follows:

- Programmable corrosion test chamber.
- Temperature & humidity equipment allowing 23°C & <50%RH control.
- Temperature and relative humidity monitoring using a data logger.
- Measuring cylinder plus funnel.
- pH meter.
- Salinity Refractometer.
- Suitable inert corrosion resistant racks to hold DUT.

2.4 Exposure to Salt Solution

Collection rates are monitored manually using collection vessels placed at sample height. The collection of fog should result in 1 to 3 millilitres of solution per hour for each 80 square centimetres of horizontal collecting area, measured over at least a 16-hour period

- 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.

This test can be run in its entirety in an Ascott Cyclic Corrosion chamber fitted with an **external midi temperature and humidity climate control unit (ACC112)**.



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 ASTM B117.

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 (6.5 - 7.2) using a calibrated pH Meter.

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.

4.1.2 Unless otherwise specified, configure the test item and orient it as would be expected during its storage, shipment, or use.

5. Operation

5.1 Pre-test evaluation.

Refer to the test standard document to create a test profile for the chamber.

- 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 35C (+/-2C).

- Ensure the salt fog collection rates are within the expected range of 1-3ml/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. (pH 6.5-7.2).
- 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 salt spray as specified in the test.
- Record the profile using an independent data logger
- 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 with the test standard.
- 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.
- Start the test cycle and record test parameters at start.

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 (for each part of the cycle if applicable).
- Record the conductivity of the DI water when used.
- Check that atomiser air pressure is within acceptable limits.
- Check the reservoir salt solution concentration is within (50 (+/-5) g/L).
- 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 rinsed with clean water if required, before immediate examination. 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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