

# How to Run ASTM B117

## *Standard Practice for Operating Salt Spray (Fog) Apparatus*

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Today is the first of a three-part webinar variety series on weathering and corrosion testing topics.

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This on-demand content includes more comprehensive information on Q-FOG operation and maintenance – both [slide presentation](#) and [live demo](#) formats.

Date	Topic
03 Aug	ASTM B117
10 Aug	Evaluations in Weathering Testing
24 Aug	Ask Q-Lab's Technical Experts

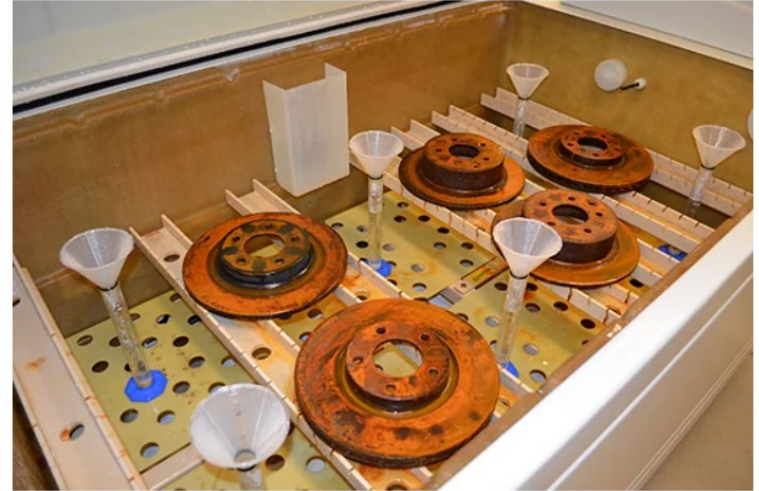
# Administrative Notes

You'll receive a follow-up email from [info@email.q-lab.com](mailto:info@email.q-lab.com) with links to a survey, registration for future webinars, and to download the slides and watch the recorded video

Use the Q&A feature in Zoom to ask us questions today!



We make testing simple.



**Thank you for attending our webinar!**

We hope you found our live video demonstration webinar on *ASTM B117: Standard Practice for Operating Salt Spray (Fog) Apparatus* to be helpful and insightful. The link below will give you access to the slides and recorded webinar.

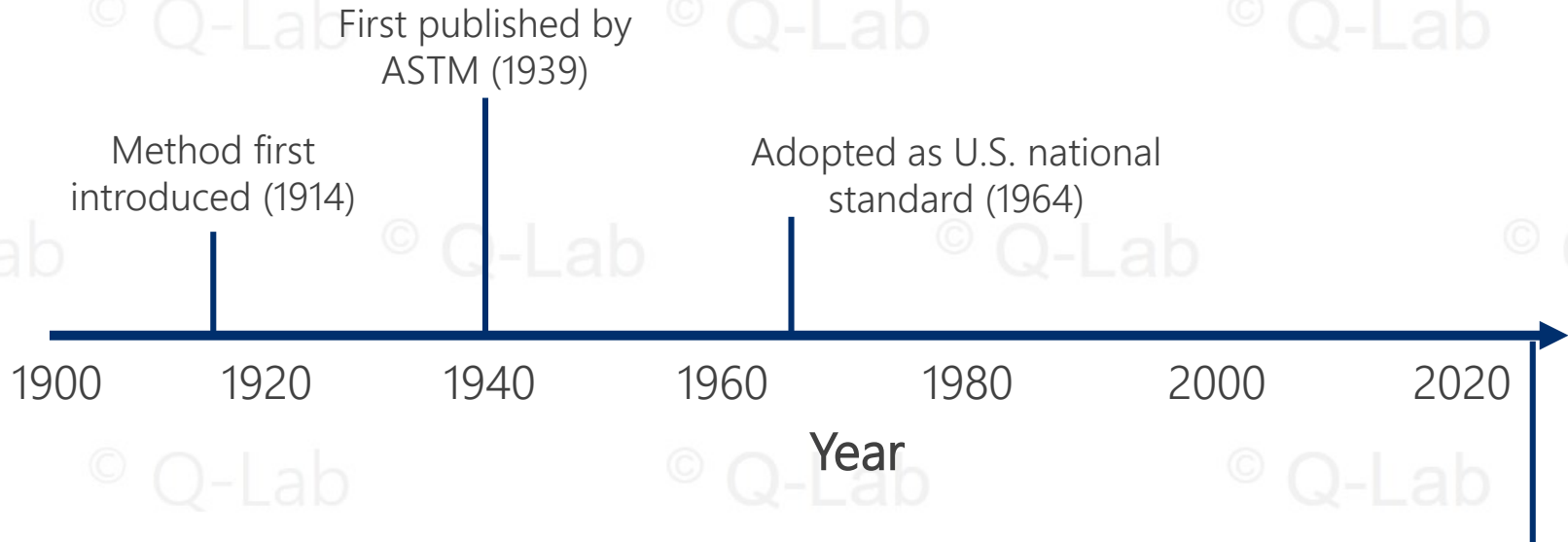
You can help us continue to provide valuable and high quality content by completing our [3-question survey](#) about your webinar experience. Every piece of feedback is carefully reviewed by a member of our team.



# ASTM B117


## History and Overview

# History of ASTM B117



ASTM B117 is the most widely-used corrosion standard today, primarily for quality control and metallic/conversion coatings

# Test Overview

- 5% NaCl salt fog at 35°C, applied continuously
- Neutral pH (~7), not acidified
- Fine mist (atomized with compressed air) sprayed indirectly onto specimens
- ISO 9227 contains the same test, plus other acidic ones
  - Referred to as “NSS” in ISO 9227
  - We’ll highlight a few minor differences today 

# Why run ASTM B117?

## Advantages

- Very easy to set up and run
- Good **repeatability** and **reproducibility**

## Disadvantages

- Not a good simulation of most service environments
- Produces different corrosion products than natural exposure
- Poor rank-order correlation with outdoor corrosion

*ASTM B117 can be an effective screening or quality control test, but it is not realistic*

# ASTM B117

Specifications and Requirements



Designation: B117 – 19

**Standard Practice for  
Operating Salt Spray (Fog) Apparatus<sup>1</sup>**



# §1 Scope

- ASTM B117 is a Practice
  - *“a set of instructions for performing one or more specific operations that **does not produce a test result**”*
- ASTM B117 tells you exactly how to set up and operate a salt spray corrosion test apparatus and expose specimens
  - It doesn't tell you for how long
  - It doesn't tell you what evaluations to perform
  - It doesn't tell you how to interpret results

## §2 References

- **ASTM B368** *Test Method for Copper-Accelerated Acetic Acid-Salt Spray (Fog) Testing (CASS Test) and G85 Practice for Modified Salt Spray (Fog) Testing*
  - *“Run these instead for super-durable coatings (Zn, Ni, Cd)”*
- **ASTM D609** *Practice for Preparation of Cold-Rolled Steel Panels for Testing Paint, Varnish, Conversion Coatings, and Related Coating Products*
  - *“You might like to test with these kinds of panels”*
- **ASTM D1193** *Specification for Reagent Water*
  - *“Use decent water”* (Q-Lab can help guide you)

## §2 References

- *ASTM D1654 Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments*
  - *"Here's how to scribe a panel before exposure"*
- *ASTM E70 Test Method for pH of Aqueous Solutions With the Glass Electrode*
  - *"Measure pH like this"*
- *ASTM E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method*
  - *"This is how we did our mass loss coupon statistics"*

# §3 Significance and Use

- Intended for **metals** and **coated metals**
- Correlation of B117 exposures to data from outdoor corrosive environments is rare. If you want to correlate, you need to have outdoor data
- Reproducibility is good, but not perfect, even chamber to chamber

# §4 Apparatus

## All Q-FOG models



**Q-FOG SSP**  
Continuous salt spray  
and Prohesion



**Q-FOG CRH**  
CCT capability plus  
full Relative Humidity control

# §4 Apparatus

## ASTM B117-capable Q-FOG models



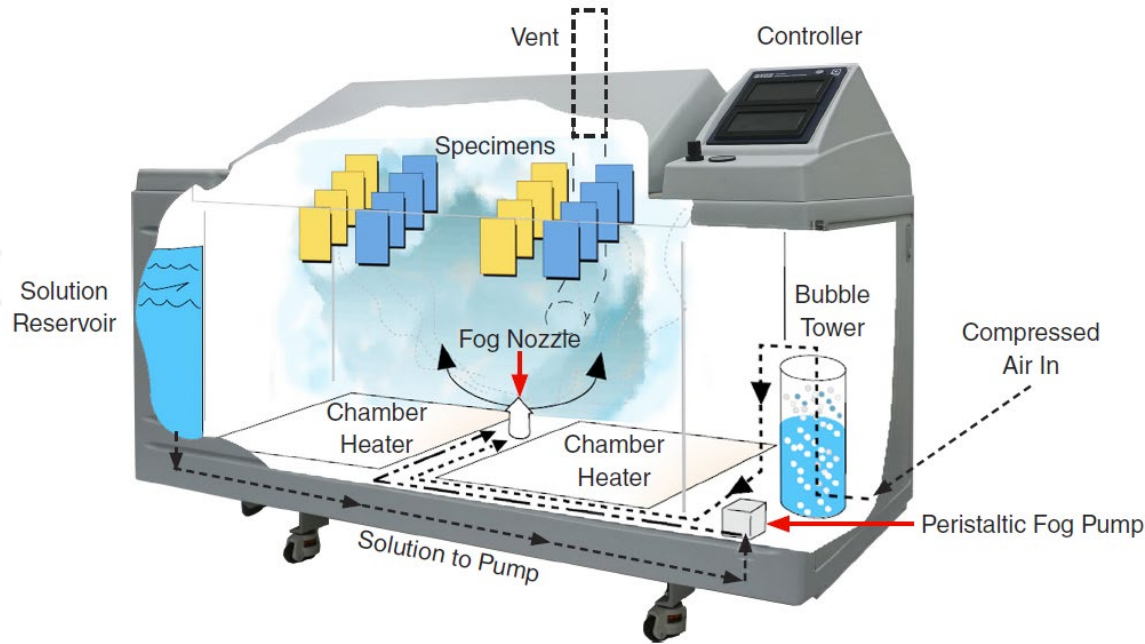
**Q-FOG SSP**  
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# §4 Apparatus

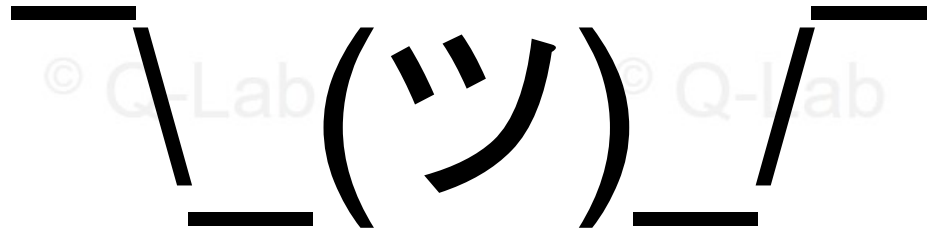
## Salt Fog



## Requirements

- Drops may not drip from lid onto specimens
- Drops falling from specimens may not be re-used in solution
- Significant freedom on chamber geometry
- *No guidance given on droplet / mist size*

# §5 Test Specimens





# §6 Test Specimens

- Clean them
- Don't get fingerprints on them
- Scribe them (if you like)
- Protect cut edges from contacting supports

# §7 Specimen Positioning



- Angle panels 15-30° from vertical
- Space them apart from each other
  - No dripping
  - No blocking from fog exposure
  - No touching!
- That said ... you can expose any product any way you like as long as everyone is in agreement

# §8 Salt Solution



- **Composition:**  $5 \pm 1$  parts by mass of sodium chloride (NaCl) in 95 parts of water (53 g/L H<sub>2</sub>O) ★
- **Purity:** requirements for overall purity and halide content must be met:

Impurity Description	Allowable Amount
Total Impurities	≤ 0.3 %
Halides (Bromide, Fluoride and Iodide) excluding Chloride	< 0.1 %
Copper	< 0.3 ppm
Anti-caking Agents	None Added


# §8 Salt Solution



- pH: Collected solution must be between 6.5 – 7.2
  - Measure daily, or at least every 4 days
  - Can adjust with HCl or NaOH
- pH of collected solution from 35 °C fog is *higher* than room temp solution
  - Prepared solution may need to be <6.5

# §9 Air Supply



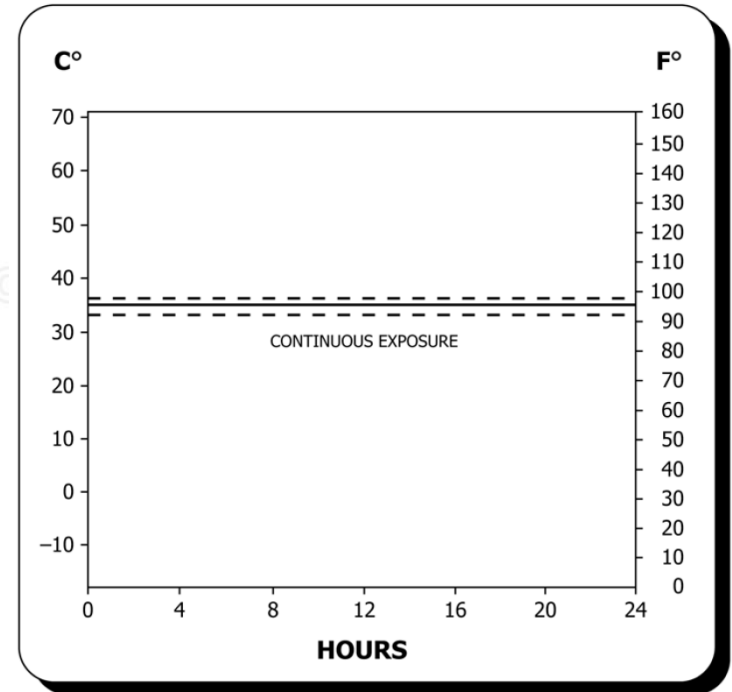
- Clean incoming compressed air of dirt and grease
- Pass air through “air saturator tower” (or “bubble tower”) 
- Bubble tower maintained at higher temp than chamber (46-49 °C) because air cools upon expanding

Air Pressure, kPa	Temperature, °C
83	46
96	47
110	48
124	49

# §10 Conditions in the Salt Spray Chamber

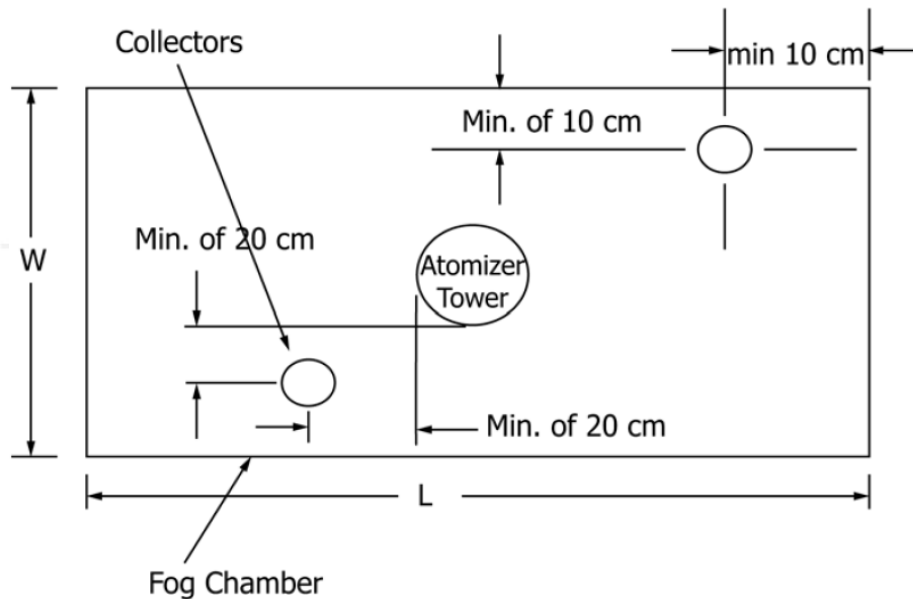
## Programming and Temperature

- Step 1: Fog, 35 °C
- Step 2: *See Step 1*
- Temperature tolerance of  $\pm 2$  °C allowed
  - Operational Fluctuation, not Uniformity



# §10 Conditions in the Salt Spray Chamber

## Collections



- Collect over 16 hr period from minimum of two (2) funnels
  - Q-Lab recommends six (6)
  - 1-2 mL/hr from 80 cm<sup>2</sup> funnels
  - NaCl concentration 5 ± 1 %, measured by **density**
  - pH 6.5-7.2
- B117 *recommends* daily, *requires* no more than 96 hours between

# §11-14 During and after Exposure

- §11 Continuity of exposure
  - *"Don't stop unless you need to"*
- §12 Duration of exposure
  - *"Totally up to you, but we suggest some multiple of 24 hours"*
- §13 Cleaning of Tested Specimens
  - *"Rinse with clean water after"*
- §14 Evaluation of Results
  - *"Evaluate the results, and be quick about it!"*
- §15 Reporting
  - Report solution, collections, specimens, cleaning, mounting, exposure, and inspections



# Appendix X1: Construction of Apparatus



- Non-mandatory info (like all Appendixes in ASTM standards)
- Allows for a variety of chamber constructions
  - Immersion heaters
  - Stone chambers
  - Central fog towers
- Q-FOG testers are in full compliance with Appendix X1

# Appendix X2: Use of Salt Spray Test in Research

*This practice is primarily used for process qualification and quality acceptance. Regarding any new applications, it is essential to correlate the results of this practice with actual field exposure results.*

# Appendix X3: Evaluation of Corrosive Conditions

- Mass-loss coupons used (optionally) to evaluate corrosive conditions
- 76 × 127 × 0.8 mm SAE 1008 cold-rolled carbon steel (like CXB-35)
- Degrease and record mass before use
- Place at least two in test chamber at 30°
- Expose to test conditions 48-168 hr (2-7 days)
- Rinse to remove salt; clean in HCl to remove rust
- Record mass to determine mass loss
- Interlaboratory comparison study mass loss results included for reference



CXB-35 Q-PANEL substrates

# ASTM B117 Summary

- Very simple test: 5% NaCl salt fog at 35°C, neutral pH, no cycling of conditions
- Simplicity helps provide optimal reproducibility
- Not designed for realism and may not correlate to real-world exposures
- Collections and mass-loss requirements add some complexity for operators ...
  - but we'll show you how to do it!

Thank you for your time.

*Questions?*  
info@q-lab.com

We make testing simple. |

