

Q-FOG Cyclic Corrosion Testers Operation and Maintenance

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Q-Lab



[View Recorded Presentation](#)

Q-Lab's Operator Training Series

- Today is the last of a three-part webinar series on basic operation of our weathering and corrosion testers
- All upcoming and archived webinars can be accessed at: q-lab.com/webinars

Date	Topic
06 Oct	QUV
13 Oct	Q-SUN
20 Oct	Q-FOG

Administrative Notes

You'll receive a follow-up email from info@email.q-lab.com with links to a survey, registration for future webinars, and to download the slides

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 webinar on *Q-FOG Cyclic Corrosion Tester Operation and Maintenance* to be helpful and insightful. The link below will give you access to the slides and recorded webinar.

Q-FOG testers

Q-FOG cyclic corrosion testers deliver heat, humidity, and electrolyte solution to specimens to perform traditional salt spray, Prohesion, and nearly all cyclic automotive tests



Topics

- Safety
- Tester Components
- Functions of the Tester
- Running a Test
- Calibration and Maintenance



Topics

- Safety
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Safety Systems

Q-FOG Lid



Interlock

Do not open lid when chamber is in use!

Safety

Lid Lifter



Newer Q-FOG models have a gas spring mechanism that is more user-friendly than the older cam lifters, but the lid is still heavy, so keep your fingers clear when closing the lid!

Safety

Hazardous Gases



- Do not use gases such as SO₂ in Q-FOG testers
- Do not use hazardous or petroleum-based organics (solvents)
- Purge the chamber of airborne mist or fog before opening the chamber lid.

Safety

Chamber Heaters



Flat Plate Heaters



Tubular *Rapid Ramp* Heaters

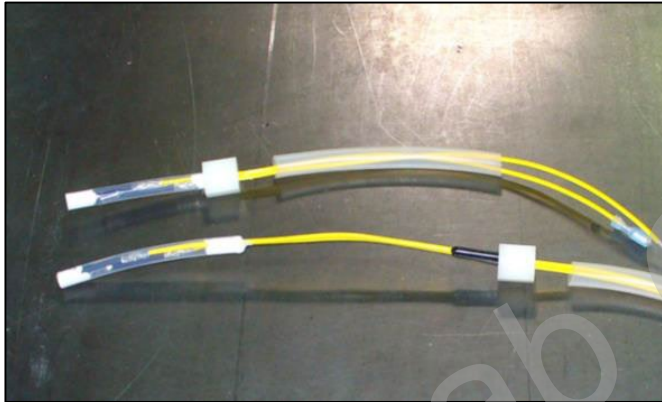
*Do not touch heaters until they have been off for **at least 30 mins***

Safety Systems

- Lid Interlocks and Clamps
- Thermal Fuses
- Circuit Breakers and Electrical Fuses
- Chamber Overtemperature Switch
- Overpressure Devices
- Thermal Monitoring

Safety Systems

Thermal Fuses



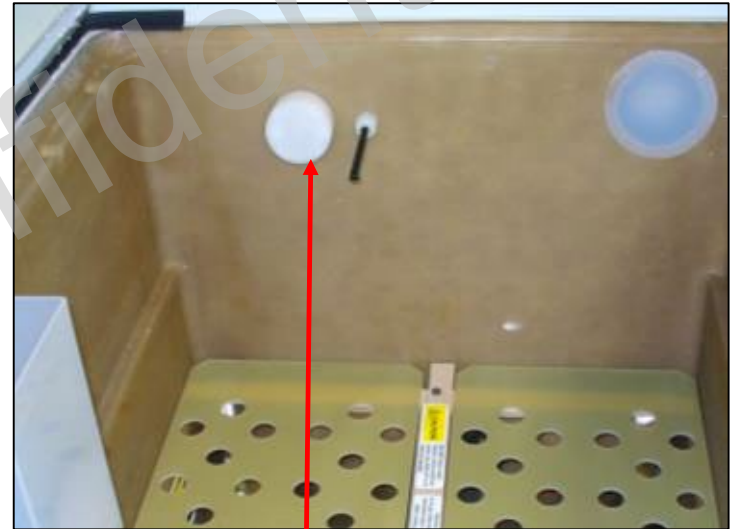
- Protect from low or no water condition for Boiler (CCT) and Bubble Tower and temperature runaway on air preconditioner heater (CRH)
- Open circuit when temperature exceeds limit
- One-time use; not resettable or repairable

Safety Systems

Overtemperature and Overpressure



High Pressure Relief Valve



Overtemp Switch Cover

Safety Systems

Airflow Switch (SSP/CCT)



Airflow Switch

Safety Systems

Thermal Monitoring via Main Controller

- Chamber Temperature Sensor
- Boiler Temperature Sensor (CCT)
- Bubble Tower Temperature Sensor
- Purge Air Temperature Sensor (SSP/CCT)
- Evaporator Temp Sensor

Topics

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- Tester Components
- Functions of the Tester
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Q-FOG models



Q-FOG SSP
Continuous salt spray
and Prohesion



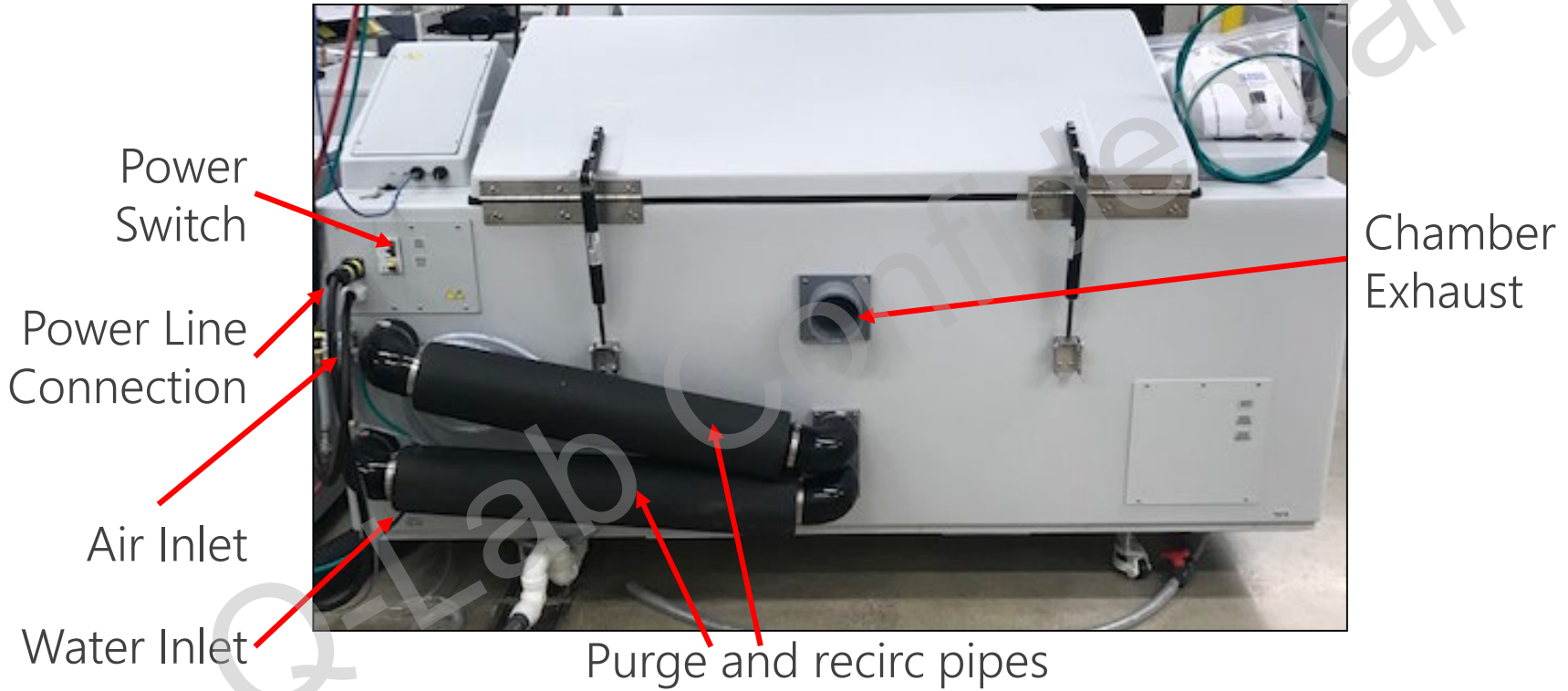
Q-FOG CCT
SSP capability plus
full humidity

Q-FOG CRH
CCT capability plus
full Relative Humidity control

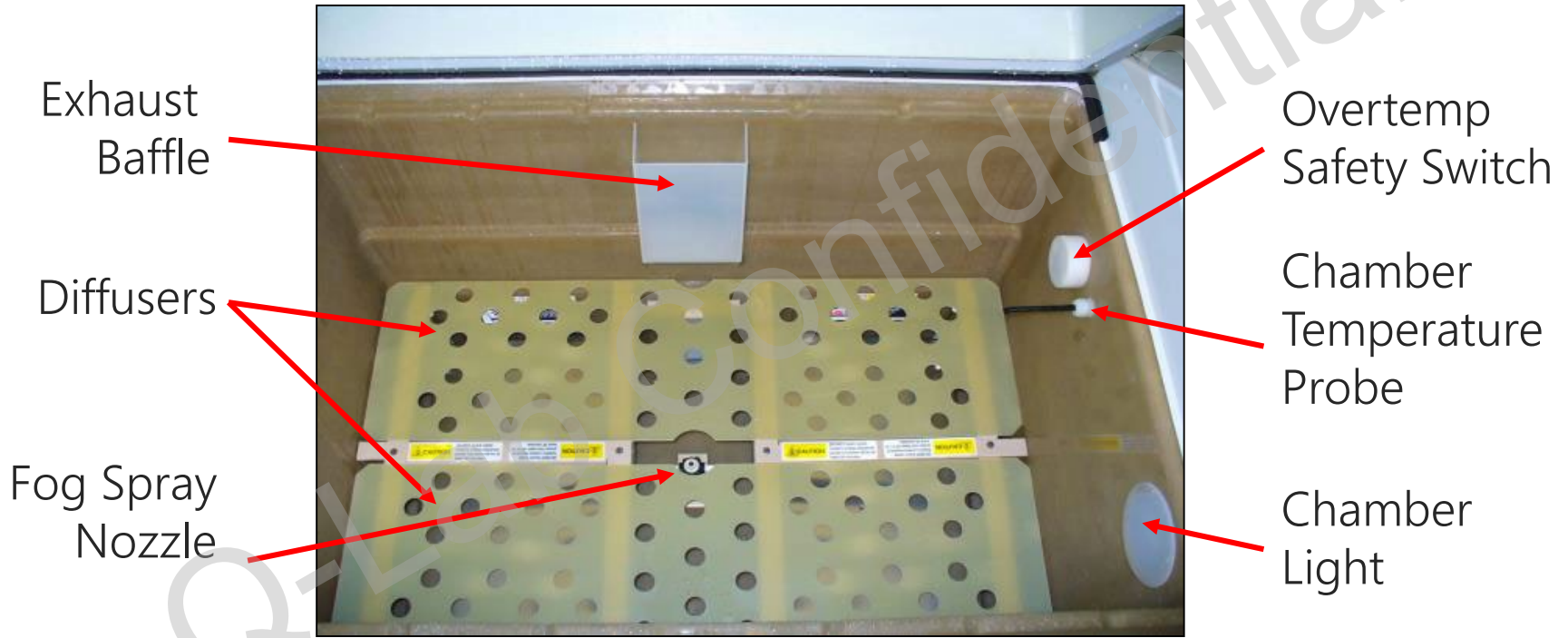
Utilities (SSP, CCT)



Utilities (CRH)



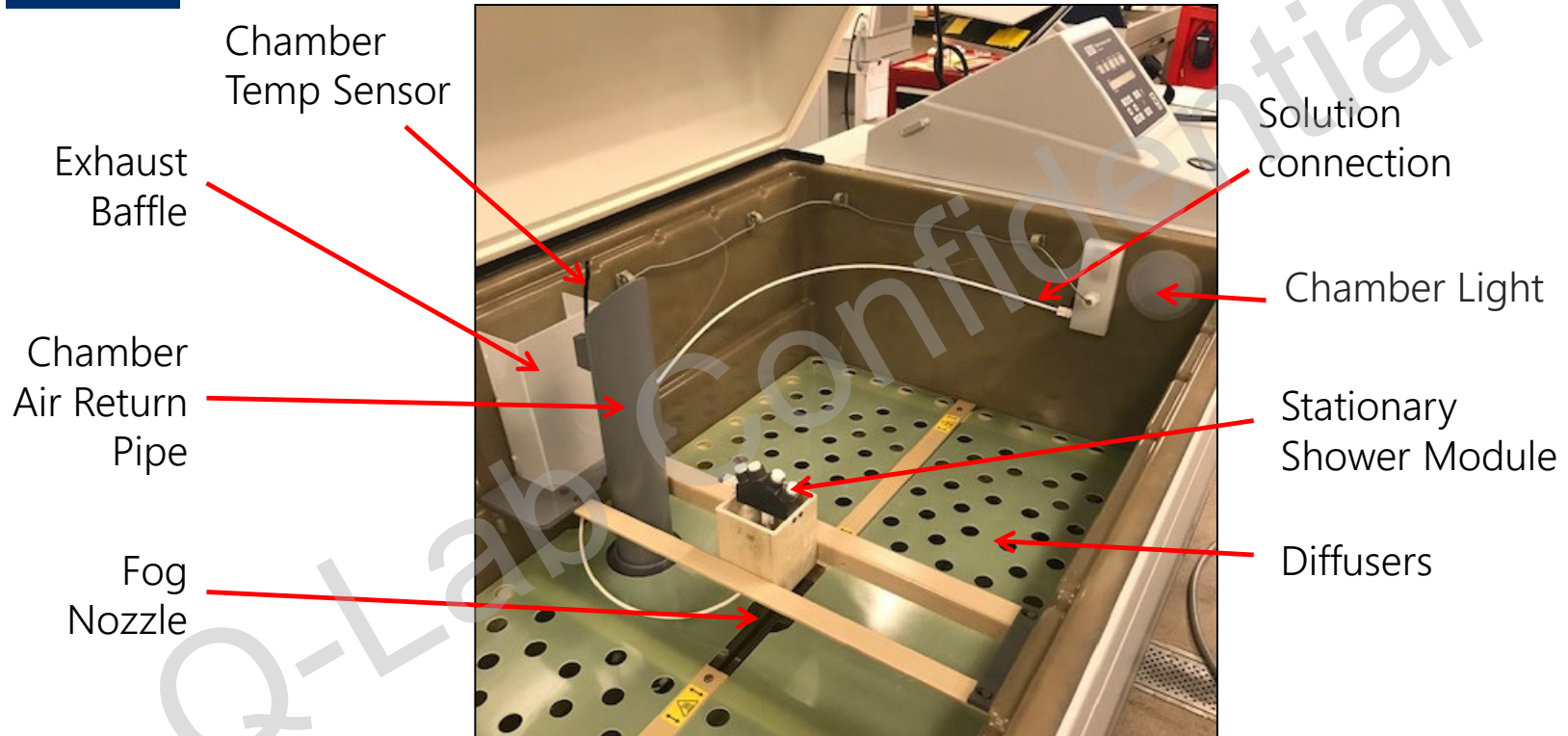
Tester Components (SSP, CCT)



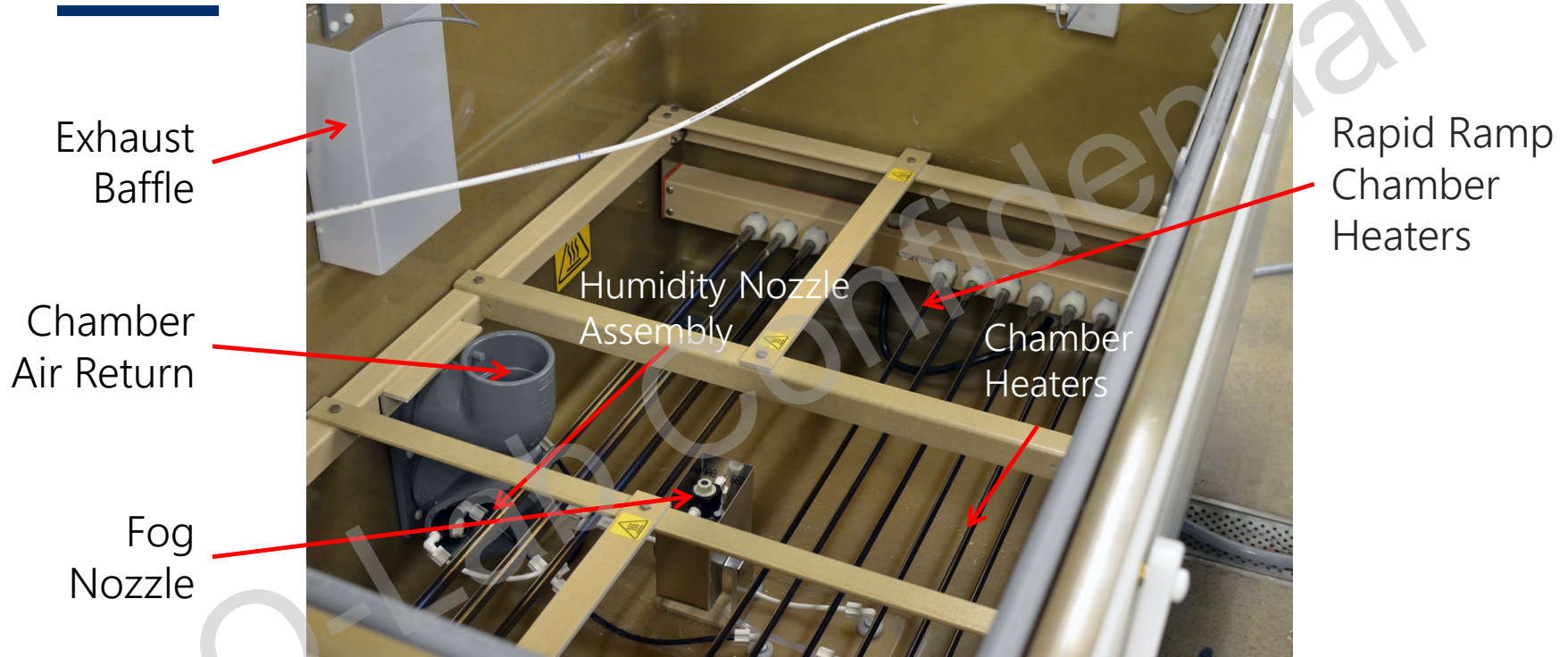
Tester Components (SSP, CCT)



Tester Components (CRH, Stationary Shower)



Tester Components (CRH Rapid Ramp)



Tester Components

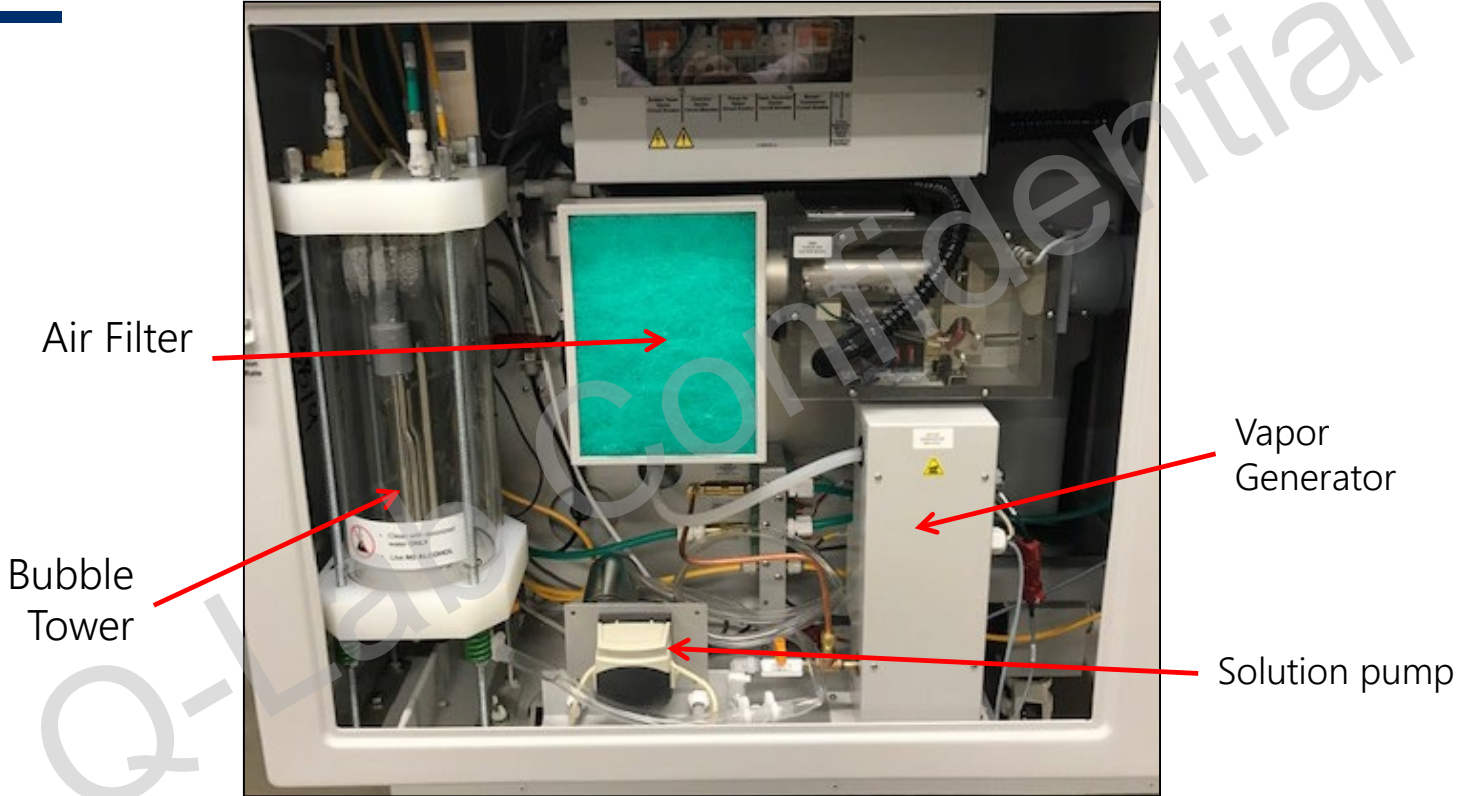
(CRH Gen 4, Top-Mounted Swaying Shower Bar)

Top-Mounted
Swaying
Shower Bar



Dual
touchscreens

Tester Components (CCT Side Access)



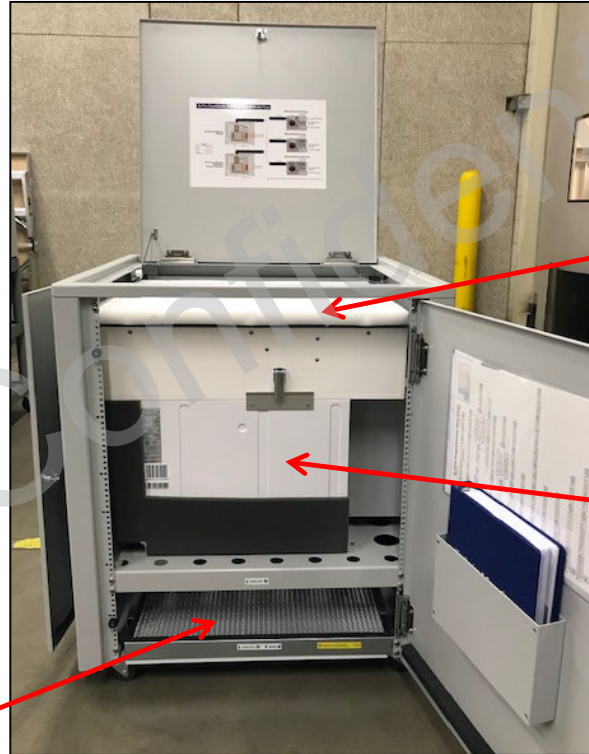
Tester Components (CRH Side Access)



Air Preconditioner (CRH)



Preconditioner Air Filter



Preconditioner
Damper Box

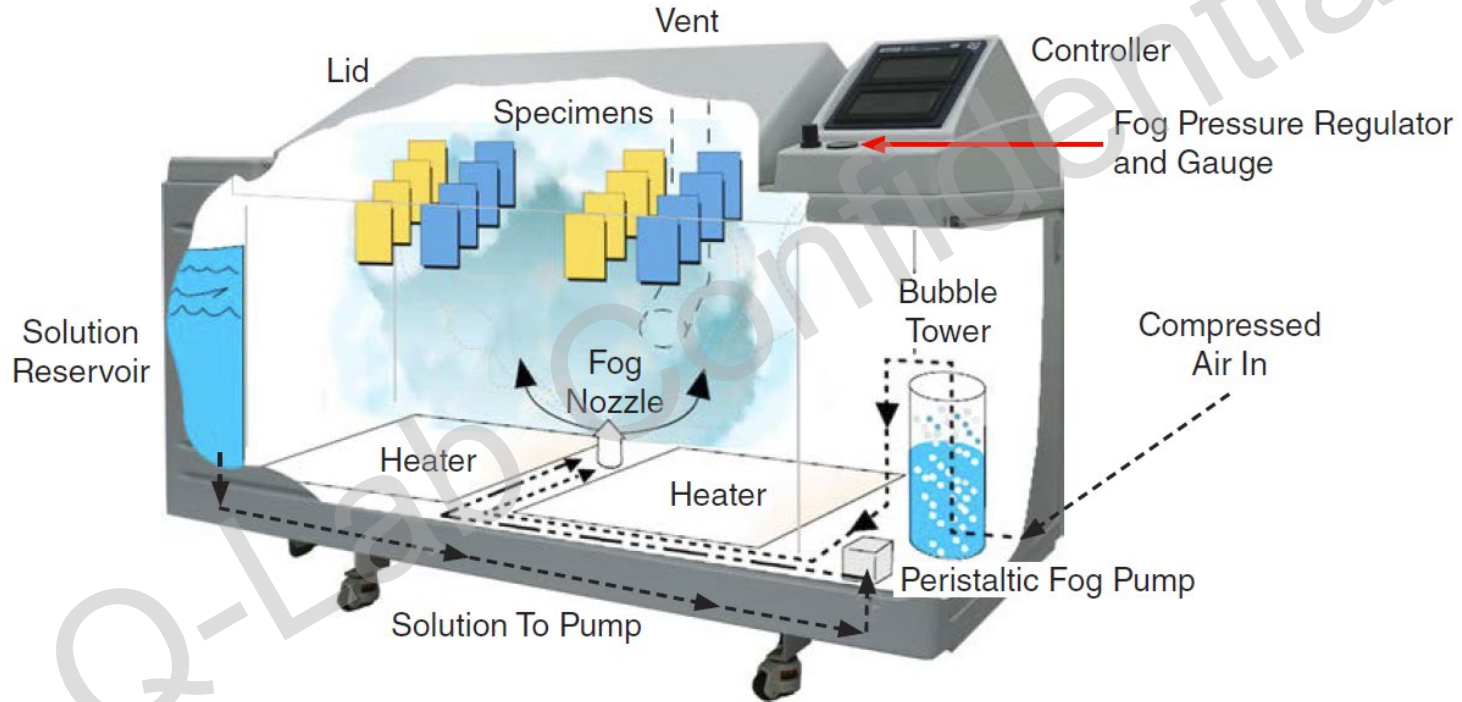
Preconditioner
Chiller

Topics

- Safety
- Tester Components
- Functions of the Tester
- Running a Test
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FOG Function



Fog Environment

- Salt or other solution type is pumped to an atomizing nozzle
- Compressed air combines with solution at nozzle to create a fine mist
- Compressed air is usually humidified through the saturation/bubble tower
- Chamber lid acts as the spray diffuser

Fog System

Major Components



Fog Nozzle

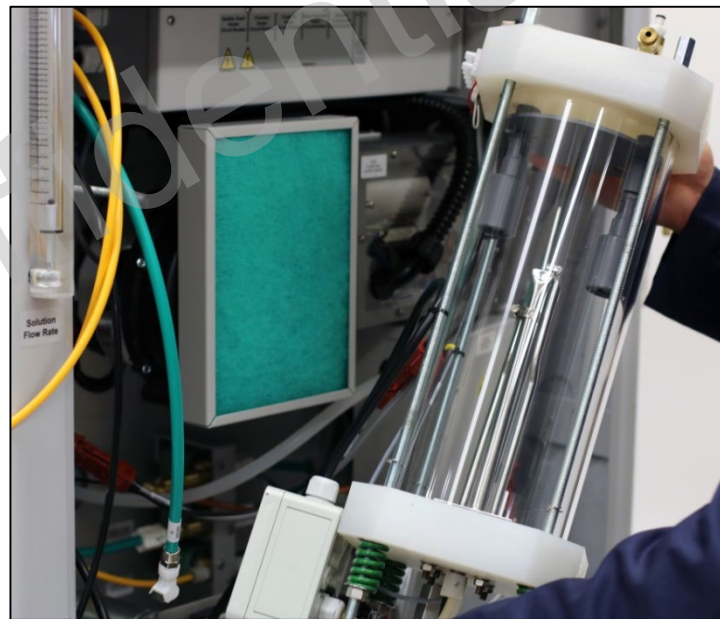
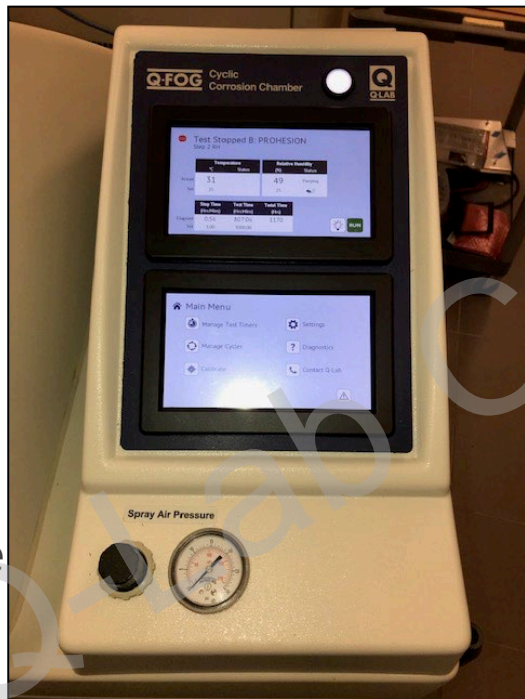


Solution Pump

Fog System

Major Components

Air Pressure
Regulator



Bubble Tower

Fog System

Major Components



Chamber Heaters



Solution Tank

Fog System

Spray Nozzle

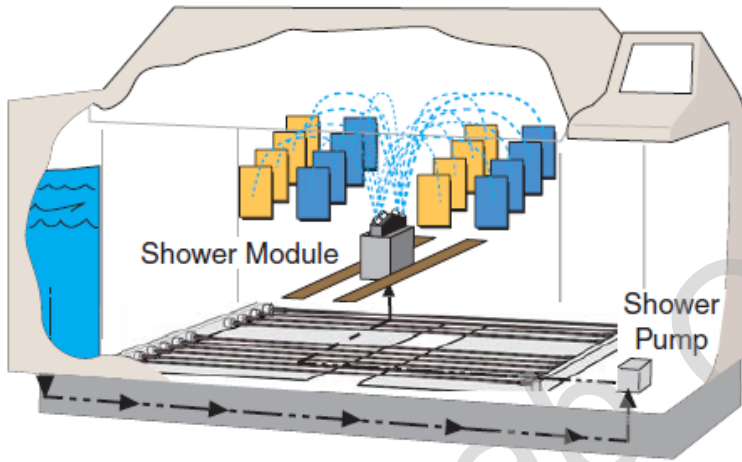


Nozzle Cap

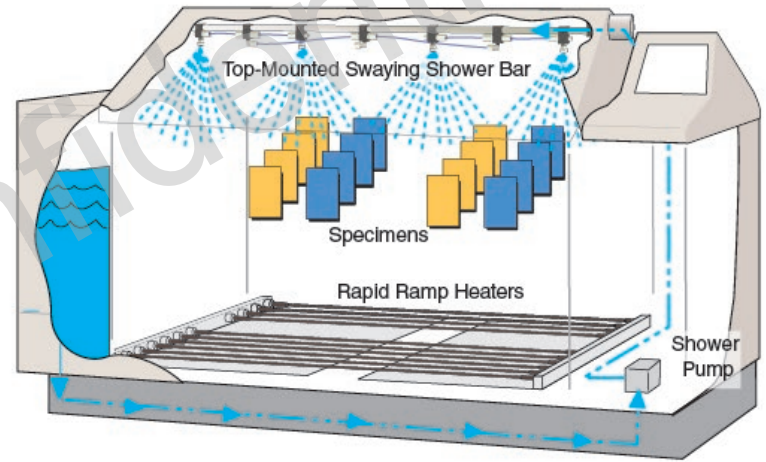
Nozzle Orifice Tube

Nozzle Body

Shower Function (CRH Only)



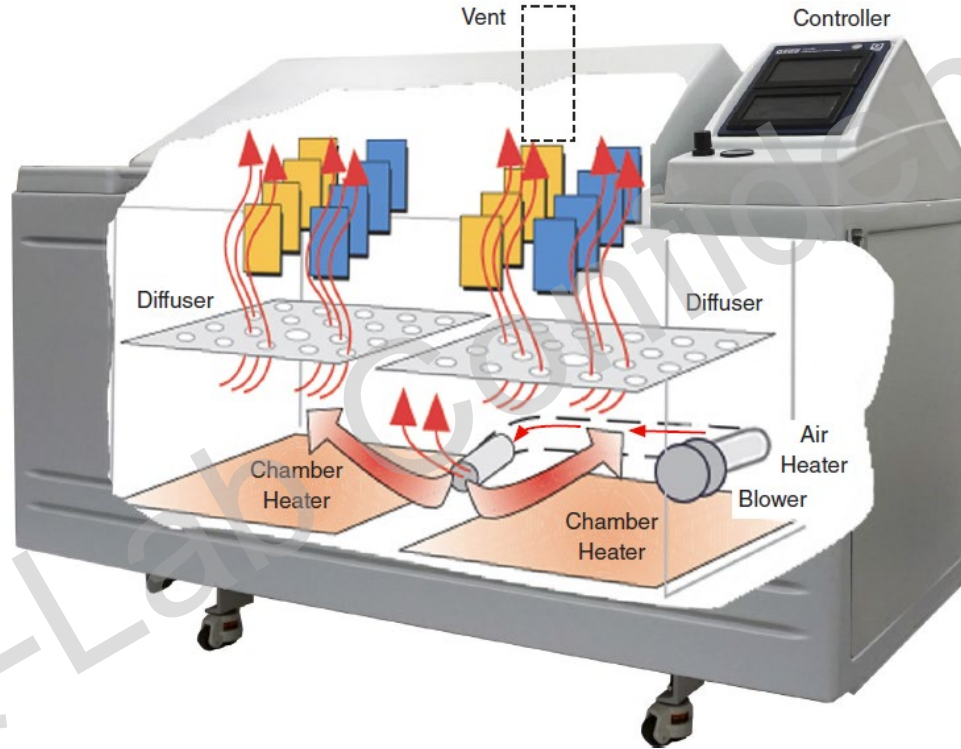
Stationary shower module



Top-Mounted swaying shower bar (TSSB)

Faster application of salt solution

DRY Function (SSP, CCT)



DRY Function (SSP, CCT)

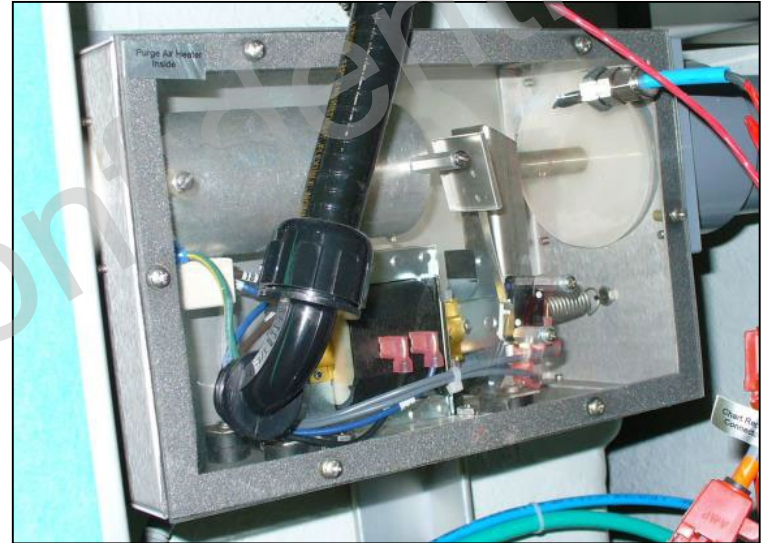
- Room air blown into the chamber, circulated over samples, and sent out of an exhaust
- Air can be heated for higher temperatures and faster drying
- Replaced by RH function in CRH model

Dry-Off System

Major Components



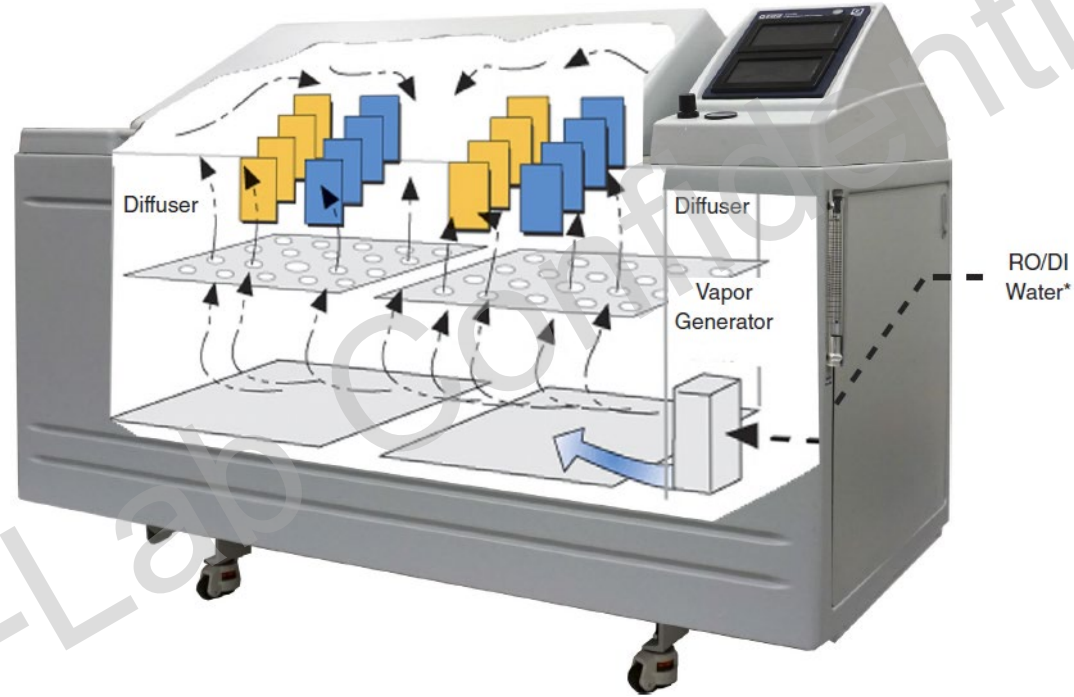
Purge Air Blower



Purge Air Box

** Air filter removed for photo to show blower clearly. Do not operate tester without air filter!*

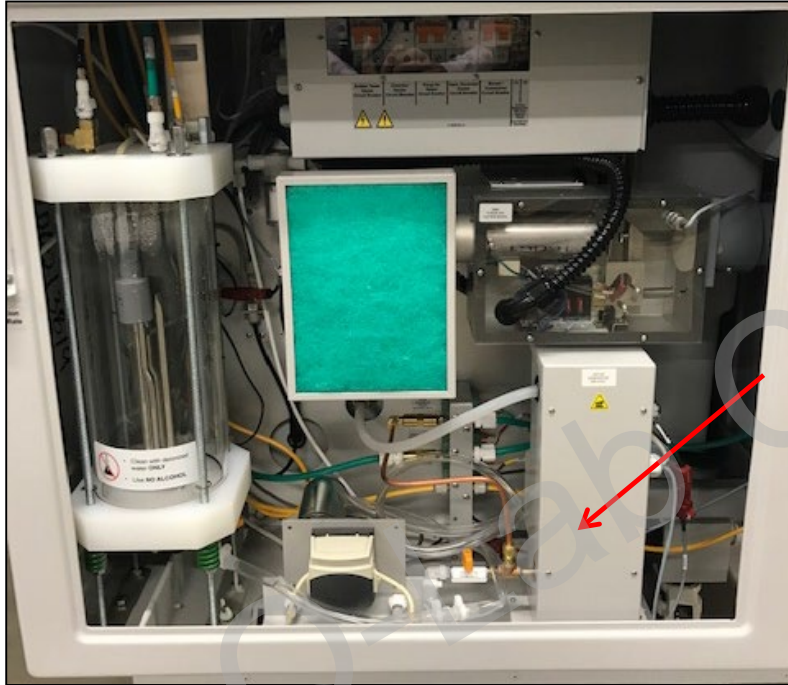
HUMID Function (CCT)



HUMID Function (CCT)

- Humidity added by boiling water
- Temperature controlled by increasing the heating duration in the boiler
- Humidity level is NOT controlled, but will be >95% after a short transition period
- Some test methods substitute water immersion for saturated humidity
- Replaced by RH function in CRH model

Humidity Generation (CCT)

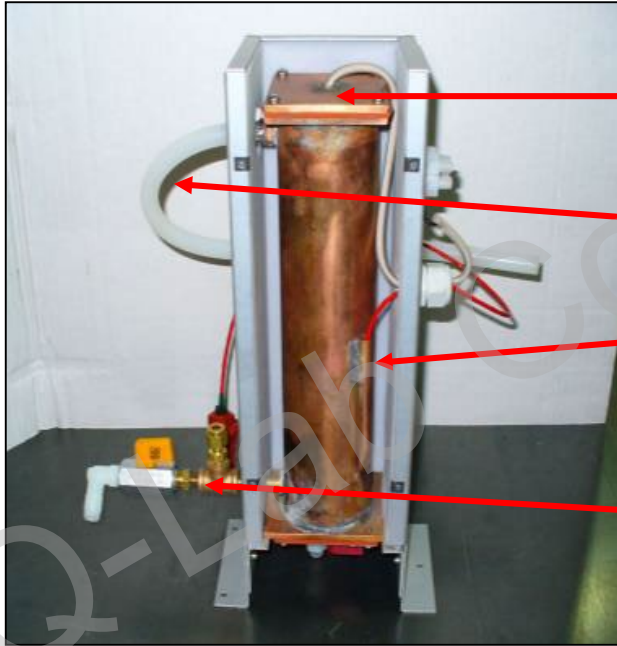


Humidifier /
Vapor Gen. /
Boiler



Humidity System

Boiler AKA Vapor Generator AKA Humidifier



Float Assembly

Steam Hose

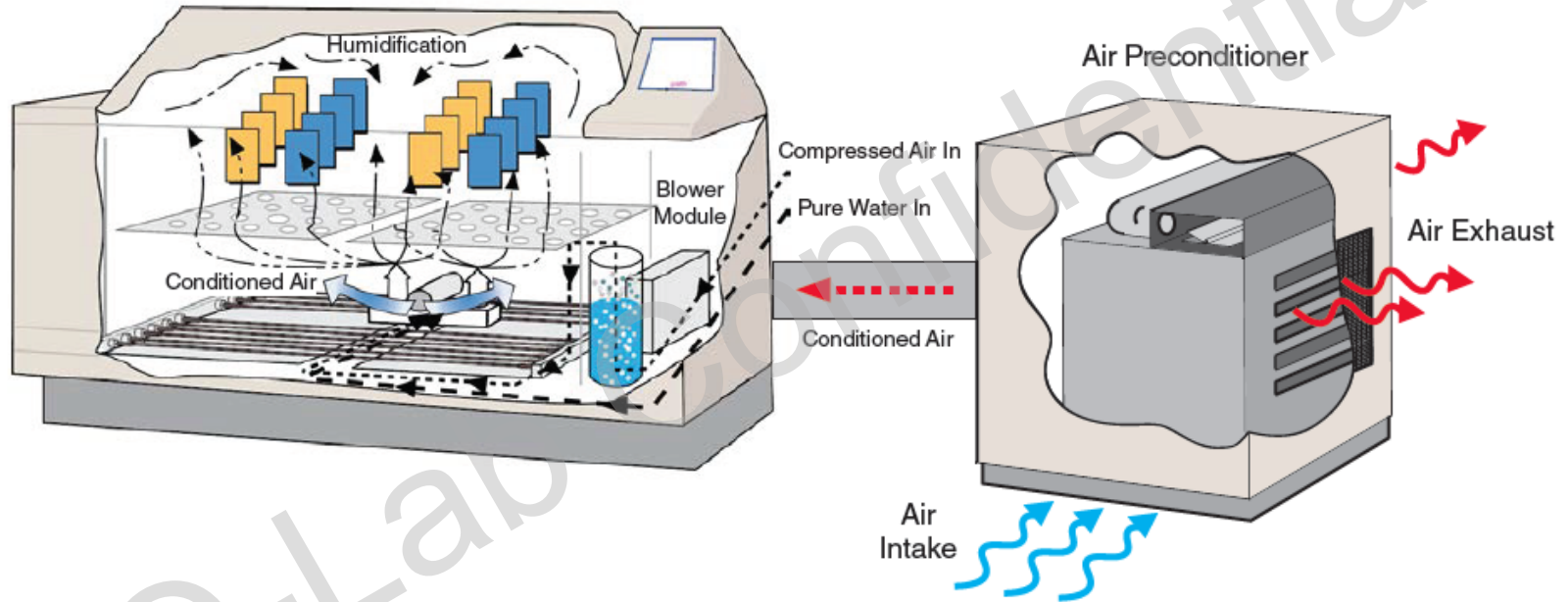
Temperature Sensor

Water Inlet/Drain

DWELL Function (SSP, CCT)

- Designed to allow slow drying of samples
- No air flow
- Temperature can be ambient or higher

RH Function (CRH Only)



Replaces DRY, HUMID and DWELL steps of CCT tester

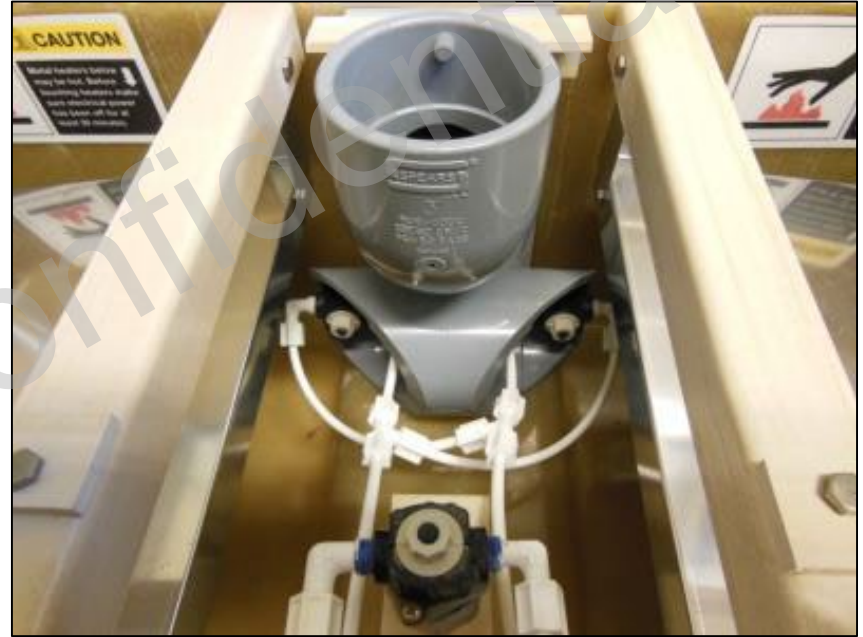
RH Environment

- Dry air supplied by Air Preconditioner
- Humid air supplied by two fog nozzles fed by DI water and compressed air
- Measured by Wet Bulb/Dry Bulb
- Air Control Module controls mixing
- Time to reach setpoint controlled by operator
 - Auto, Linear, and Less Than ramp types

RH Control System



Bubble Tower



RH Generator Nozzles

RH Control System



Water Feed Box (supply for wet bulb/dry bulb)



Wet bulb/Dry bulb (RH sensor)

RH Control System

CRH Air Control Module



RH Control System

CRH Air Preconditioner



- Provides cold or hot **dry** air to the chamber
- Achieves low RH conditions after FOG or SHOWER steps.
- Enables controlled RH and Temperature ramping

Topics

- Safety
- Tester Components
- Functions of the Tester
- Running a Test
- Calibration and Maintenance



Running a Test

Step 1: Specimen Mounting



Panels (SSP, CCT)



Panels (CRH)

Running a Test

Step 1: Specimen Mounting



Hanging Rods



Grates

Running a Test

Step 1: Specimen Mounting



Optional Access Port (100 mm) to power devices under test

Running a Test

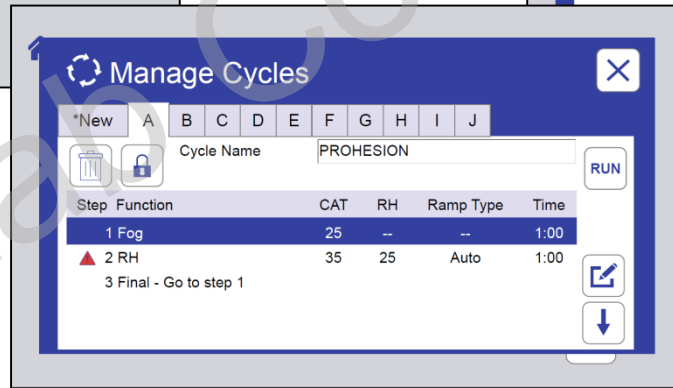
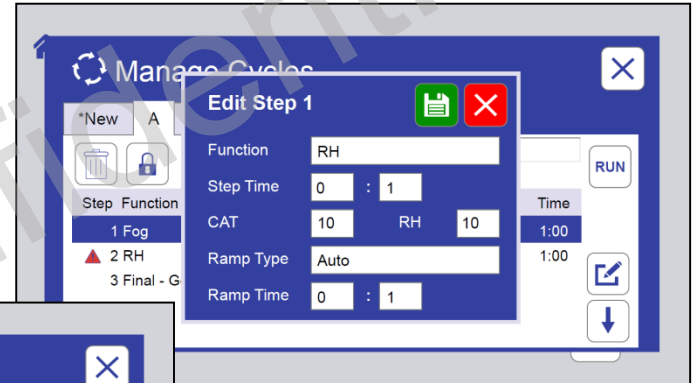
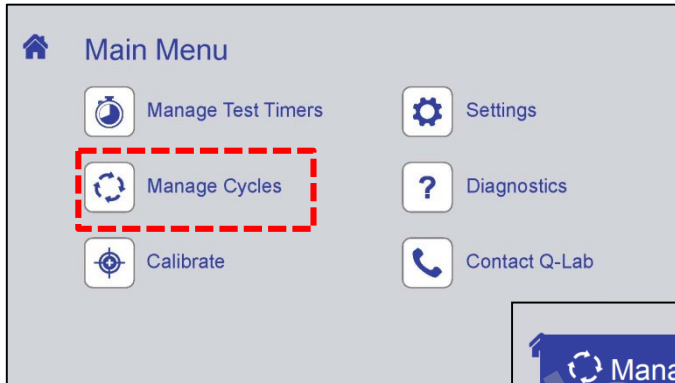
Step 2: Programming



Gen 4 Dual Touchscreens

Running a Test

Step 2: Programming

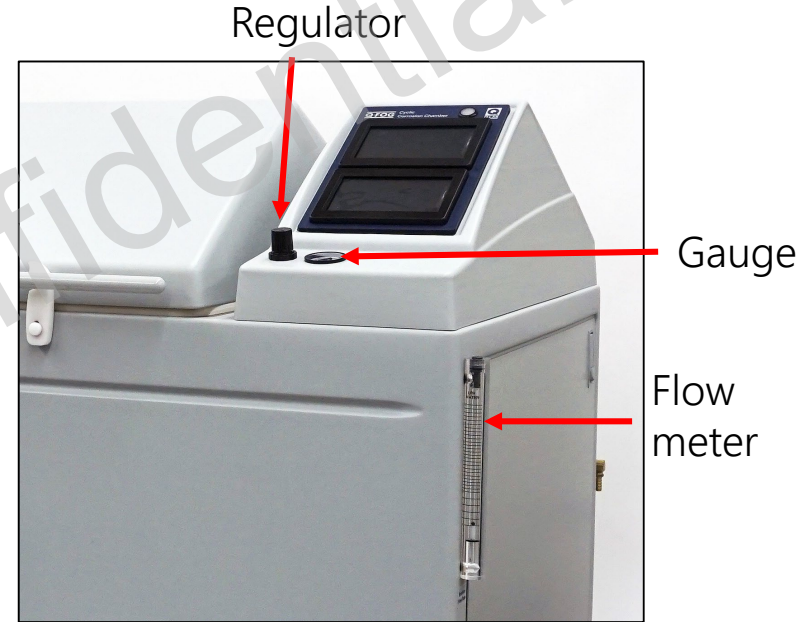


Step 3a: Fog Adjustments

General Guidelines



Solution Pump Speed
30-40%



Fog Spray Air pressure
12-16 psi

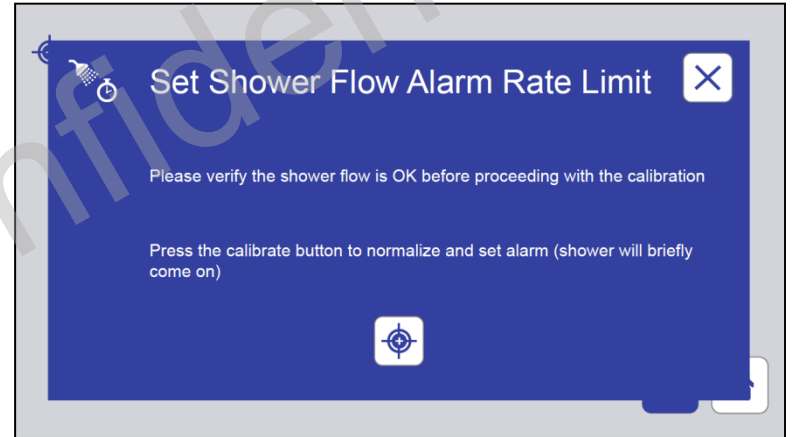
Step 3b: Shower Adjustments

General Guidelines



Shower Pressure


Set to 30-80 psi (see tech manual)






Shower Settings



Set alarm rate in Calibrate menu
Set shower pulse rate in Machine Configuration


Step 4: Monitoring the Test



 **Running Cycle A: GMW 14872**
Step 1 RH

	Temperature (°C)	Status	Relative Humidity (RH) (%)	Status	Less Than Ramp (hh:mm)
Actual	50	Setpoint achieved	95	Setpoint achieved	Ramp achieved
Set	50		95		



	Step Time (Hrs:Mins)	Test Time (Hrs:Mins)	Total Time (Hrs)
Elapsed	4:43	16:43	59
Set	8:00	168:00	


 



 **Running Cycle A: ASTM B117**
Step 2 - Fog

	Temperature (°C)	Status	Relative Humidity (RH) (%)	Status	Fog Pump Speed (%)
Actual	35	Setpoint achieved	100	Fog on	40
Set	35				



	Step Time (Hrs:Mins)	Test Time (Hrs:Mins)	Total Time (Hrs)
Elapsed	4:43	16:43	59
Set	8:00	168:00	


 



 **Running Cycle A: GMW 14872**
Step 3 - Shower

	Temperature (°C)	Status	Relative Humidity (RH) (%)	Status	Shower Timing (sec)
Actual	35	Setpoint achieved	100	Showering	10 On
Set	35				15 Off



	Step Time (Hrs:Mins)	Test Time (Hrs:Mins)	Total Time (Hrs)
Elapsed	4:43	16:43	59
Set	8:00	168:00	

 **Running Cycle A: Prohesion**
Step 7 - Humid

	Temperature (°C)	Status	Relative Humidity (RH) (%)	Status
Actual	35	Setpoint achieved	100	Vap Gen on
Set	35			

	Step Time (Hrs:Mins)	Test Time (Hrs:Mins)	Total Time (Hrs)
Elapsed	4:43	16:43	59
Set	8:00	168:00	

Post-Test: Purge Chamber

Automatic Purge: 1 hour post-test

- When End of Test Shutdown is reached OR
- When operator presses STOP



Topics

- Safety
- Tester Components
- Functions of the Tester
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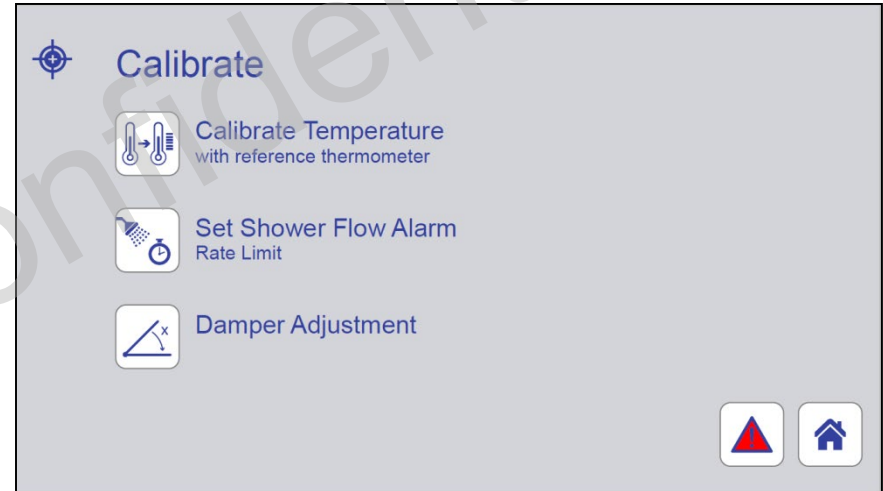
Calibration Schedule

- Temperature Sensors
 - Calibrate Chamber Temp Sensor every 6 months
 - Calibrate wet/dry bulb sensors in CRH at same time
- Collections
 - Measured every 3 months to annually (if running ASTM B117/ISO 9227)
 - External collections available
- Solution Flow Meter
 - Not calibrated; Only for indicating if solution is flowing

Calibration Menu



The Main Menu screen features a home icon at the top left. Below it, the text "Main Menu" is displayed. There are six menu items arranged in two columns: "Manage Test Timers" (alarm icon), "Settings" (gear icon), "Manage Cycles" (refresh icon), "Diagnostics" (question mark icon), "Calibrate" (target icon, highlighted with a red dashed border), and "Contact Q-Lab" (phone icon). A warning icon (triangle with exclamation mark) is located at the bottom right of the screen.



The Calibrate screen features a target icon at the top left. Below it, the text "Calibrate" is displayed. There are three menu items: "Calibrate Temperature with reference thermometer" (thermometer icon), "Set Shower Flow Alarm Rate Limit" (showerhead and clock icon), and "Damper Adjustment" (damper icon). At the bottom right, there are two icons: a red triangle and a home icon.

Calibration

Chamber Air Temp Sensor



- Attach Onboard Sensor to Calibration Sensor with rubber band
- Place both sensors in insulated container of hot water
- Allow to stabilize for several minutes

Calibration

Chamber Air Temp Sensor

The screenshot shows a 'Calibrate Temperature' window with a blue background. It contains a table of sensor readings and three calibration buttons. The table has two columns: sensor name and current reading. The current readings are 24.8 for Chamber Air Sensor, 25.2 for Wet Bulb Sensor, and 26.5 for Dry Bulb Sensor. The reference device fields are empty. To the right of the table are three buttons labeled 'CAT', 'WBT', and 'DBT', each with a target icon.

Sensor	Reading (°C)
Chamber Air Sensor	24.8
Reference Device	
Wet Bulb Sensor	25.2
Reference Device	
Dry Bulb Sensor	26.5
Reference Device	

Calibrate CAT WBT DBT

Match Reference
Thermometer reading with
Chamber Thermometer
reading

Calibration

Chamber Collections for ASTM B117

- 16 continuous Hours minimum
- Adjust Balance (uniformity) first, then adjust Quantity
- Use 6 cylinders for balancing chamber (B117 requires only 2)
- Funnels cannot touch chamber walls
- Do not use the flow meter on the side of the tester – that is only to tell you whether the pump is working on a daily basis.

Calibration

Fog / Shower Collections



Calibration

External Fog / Shower Collections



Maintenance

Every 1000 Hours

- Replace Solution Pump Tubing
- Drain and Refill Bubble Tower
- Clean Solution Filter and Water Inlet Filter
- Remove Salt Buildup on Chamber Heaters
- Drain and Refill Vapor Generator (CCT)
- Replace Wet Bulb Wick (CRH) and check water quality
- Clean or Replace Purge Air Blower (SSP/CCT) & Preconditioner Air Filters (CRH)
- Check Compressed Air Water Separator/Filter System
- Check Fog Spray Nozzle Pattern, clean if necessary

Field Calibration Audits, Tester Commissioning, and Customer Education

- This presentation was a condensed version of our Q-FOG operator training. Typical training includes hands-on sessions and further in-depth review of tester components not covered here
- Q-Lab Repair team offers tester audits and field calibrations, in addition to their on-site repair visits and troubleshooting services.
- Q-Lab offers customized training plans that can be catered to each customer's demand and may include *Tester Commissioning* as well as *Weathering 101* and *Atmospheric Corrosion* education
- Contact info@q-lab.com or Repair@q-lab.com for more info

Thank you for your attention!

Questions?

Send your inquiry to:
info@q-lab.com