EQUILAM NORTH AMERICA LLC

EQNA-UV

Accelerated Weathering Tester - UV



48
Standard specimens 75 x 150 mm

6,000 cm²
Total exposure area

4
Fixed UV sensors
EQNA UV CONTROL included

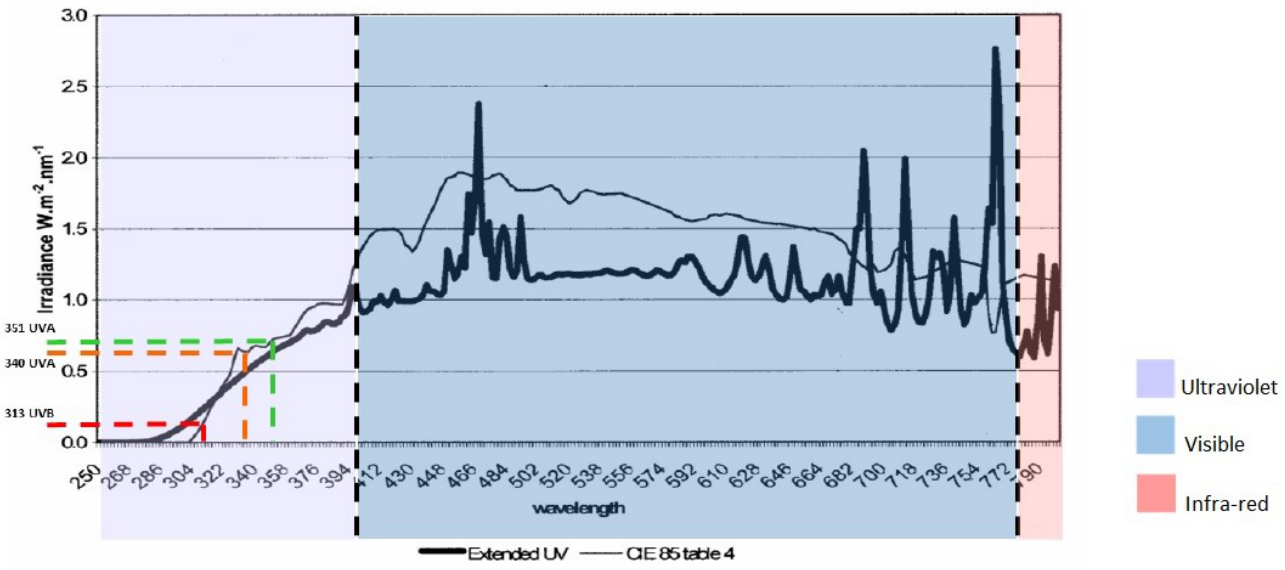
Accelerated weathering testing simulates sunlight (UV mode), dew (Condensation mode), rain (thermal shock or Spray) and UV/thermal shock (UV/Spray). In a few days or weeks, the EQNA-UV chamber can reproduce damage that occurs over months or years in outdoor environments or indoor environments exposed to sunlight. It helps predict damage to non-metallic materials, including color loss, deterioration, aging, erosion, mechanical and physical changes, moisture effects and gloss loss, reducing material losses. Test results are reliable, fast and comply with ASTM D4329, ASTM G154, ASTM G151, SAE J2020, ISO 4892-3 and other technical standards.

EQNA UV CONTROL is included with the chamber and automatically controls irradiance throughout the test, maintaining the programmed level. This control minimizes lamp deterioration and reduces replacement costs.

01 / FUNDAMENTALS

Accelerated weathering

UVa and UVb radiation, together with weather conditions, is a major cause of physical and chemical damage, depending on light intensity and wavelength in the solar spectrum. According to SAE J2412, the CIE 85 solar spectrum measured under natural climatic conditions, shown below, includes UV radiation from 250 to 400 nm, visible light from 400 to 780 nm and infrared radiation above 780 nm. To accelerate the aging of non-metallic materials, ultraviolet fluorescent lamps with wavelengths between 290 and 400 nm are used. This wavelength range is particularly damaging to non-metallic materials; xenon weathering test standards therefore recommend calibrating xenon equipment within the damaging 250 to 400 nm spectral range. Analysis of solar spectral irradiance under natural climatic conditions gives approximately 0.15 W/(m²·nm) at 313 nm, 0.6 W/(m²·nm) at 340 nm and 0.8 W/(m²·nm) at 351 nm. To accelerate exposure for a range of non-metallic materials, Equilam supplies UVa and UVb fluorescent lamps with intensities exceeding the natural solar spectrum, optimizing laboratory test time while meeting accelerated weathering test standards. Laboratory test results and comparisons with actual exposure are validated through longer tests under natural climatic conditions to demonstrate the reliability of the collected results.



Source: Image modified from SAE J2412 EN, 2005.

02 / APPLICATIONS

Materials, industries and models

The EQNA-UV chamber accelerates the degradation and aging of certain non-metallic materials, causing loss of gloss, color and mechanical strength, blistering, disintegration and oxidation. It supports the development of new materials and the improvement of existing materials, and is regularly used in industries such as:

Industries served

- Automotive
- Coatings and paints
- Textiles
- Wood
- Cosmetics
- Research centers
- Universities
- Petrochemicals
- Plastics and rubber



Actual control panel and front door.

In the automotive industry, accelerated weathering chambers with UV lamps emitting between 290 and 400 nm help verify and validate materials by identifying their maximum deterioration.

EQNA-UV models

The EQNA-UV series comprises 4 different models to meet accelerated weathering reference standards:

1. EQNA-UV + Condensation + Spray (thermal shock)
2. EQNA-UV/Spray (thermal shock)
3. EQNA-UV + Condensation
4. EQNA-UV

The EQNA-UV + Condensation + UV/Spray/Spray (thermal shock) model meets Cycle 7 of ASTM G154 and other cycles, combining advanced technology with excellent performance through controlled, automatic operation.

UV • Condensation • Spray • UV/Spray

03 / TECHNOLOGY

Irradiance control and calibration

EQNA UV CONTROL

EQNA-UV chambers include EQNA UV CONTROL software and one irradiance sensor for each pair of lamps. The system controls and monitors irradiance intensity throughout the test, maintaining consistent irradiance uniformity. It extends lamp life and optimizes lamp costs. All functions are available through a touch screen with intuitive software.

EQNA UV CAL

Many irradiance calibration technologies rely on sensors installed in the chamber close to the exposure area. Over several years of use, sensor aging can cause differences in recorded results. Equilam therefore supplies EQNA UV CAL software (included with the chamber). Through the radiometer integrated with the control panel, it enables communication between the installed chamber sensors and the radiometer reference sensor, providing immediate, automatic calibration of the chamber sensors.

UV sensors and Black Panel



1. UV sensors

2. Black Panel temperature sensor

3. Specimens

Technical illustration: UV sensors, Black Panel and specimens.

Benefits of the integrated radiometer

• Consistent results;

• Easy calibration without moving the chamber;

• Irradiance accuracy;

• Safe and fast system;

• Direct communication between the reference sensor (radiometer) and the touch screen;

• Reference sensor calibration: ISO/IEC 17025, which specifies requirements for testing and calibration laboratories.

Maintaining the reference

The reference sensor must be recalibrated and, when necessary, adjusted to compensate for aging and reference drift. Using this reference, the software performs immediate, automatic calibration of the chamber sensors.

04 / LIGHT SOURCES

UV lamps

The EQNA-UV series uses lamps with nominal peak emission wavelengths of 340, 351 and 313 nm, within the irradiance ranges required by ASTM G154, ASTM G151, SAE J2020, ISO 4892-3 and other standards. Germicidal 254 nm (UVc) lamps and UV 421 lamps approximating sunlight over the 290 to 450 nm wavelength range are also available. Germicidal lamp: UV light is widely used in ultraviolet germicidal irradiation (UVGI), a technique for eliminating harmful viruses and bacteria. Short-wavelength, high-energy UVc radiation can also degrade the materials and surfaces being disinfected. The UVc 254 nm lamp provides concentrated radiation at 254 nm to test material durability against photodegradation caused by exposure to UVc light.

UV 421 lamp: These lamps offer the same excellent match to the light source provided by UVa-340 lamps and approximate sunlight from 290 to 450 nm. They also emit long-wavelength UV and short-wavelength visible light. This extended spectrum can reproduce color changes in materials sensitive to these wavelengths, providing a more comprehensive test.

Reliable test results depend on operating within the lamp spectral range developed by Equilam. When this range is observed, accelerated test results are consistent with the applicable technical standards. Contact us for further details.

UVa and UVb fluorescent lamp types according to ASTM G154

Lamp type	UVa				UVb	
Irradiance	340 (40 W)	340 +	351 (40 W)	351 +	313 (40 W)	313 +
Maximum lamp irradiance (W/(m²·nm))	1.05	2.02	1.73	2.35	1.25	1.70
Higher irradiance reference* ASTM G154 (W/(m²·nm))	1.55	1.55	1.55	1.55	0.71	0.71
Typical irradiance* ASTM G154 (W/(m²·nm))	0.89	0.89	0.89	0.89	0.49	0.49

Reference values correspond to selected ASTM G154 exposure cycles and do not represent a universal maximum. The UVa-340 (40 W) lamp reaches 1.05 W/(m²·nm) and supports the 0.89 W/(m²·nm) setpoint. Use UVa-340+ for the 1.55 W/(m²·nm) setpoint.

04 / LIGHT SOURCES

Lamp life and spectral range

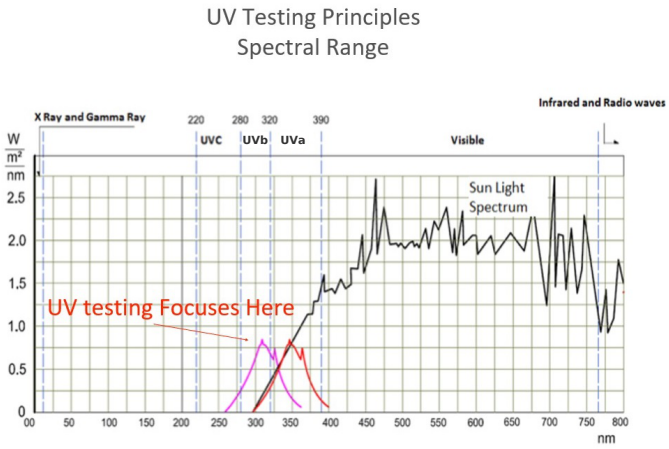
Lamp life for 340+, 351+ and 313+ lamps:

With EQNA UV CONTROL monitoring and the setpoint at the maximum irradiance supported by the lamps in continuous use, approximate lamp life is 750 hours.

At the ASTM G154 maximum irradiance setpoint in continuous use, approximate lamp life is 1,500 hours.

At the ASTM G154 typical irradiance setpoint in continuous use, approximate lamp life is 8,000 hours.

These values are not guaranteed, as external factors may affect lamp life.

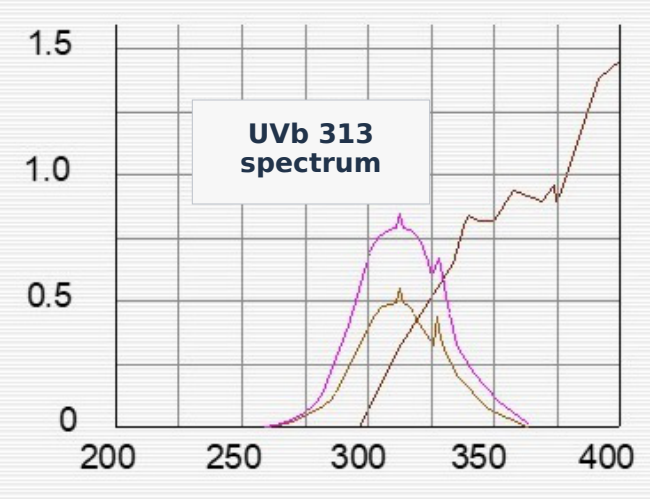




04 / LIGHT SOURCES

Lamp spectra

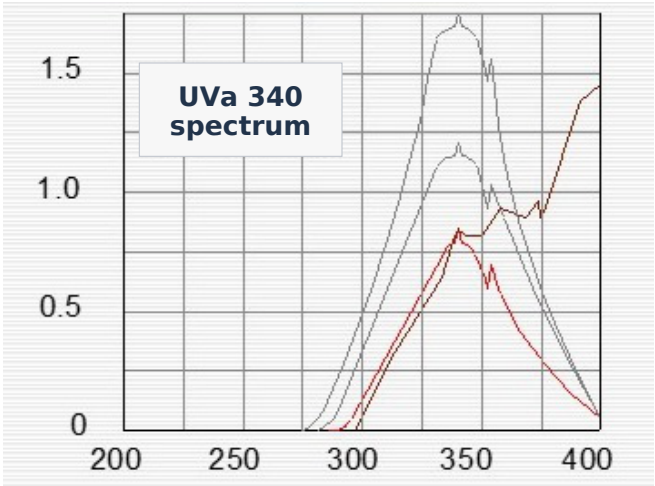
UVa / UVb / UVa+ / UVb+ lamps



UVb 313 / UVb 313+

Solar spectrum (brown curve)

UVb 313 lamp - 40 Watts.
UVb 313+ lamp - High irradiance.

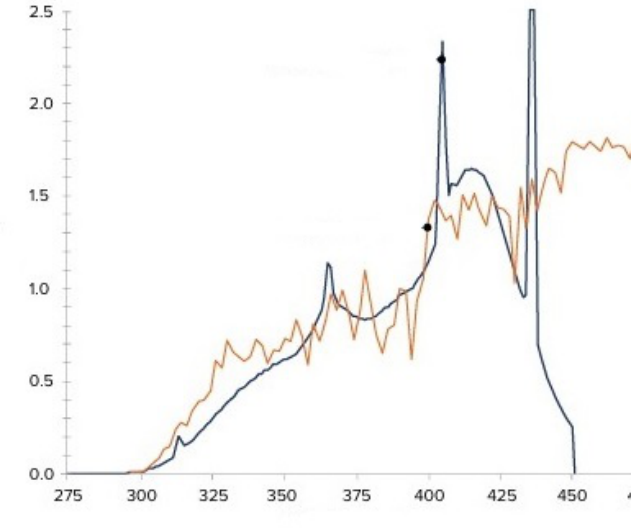


UVa 340 / UVa 340+

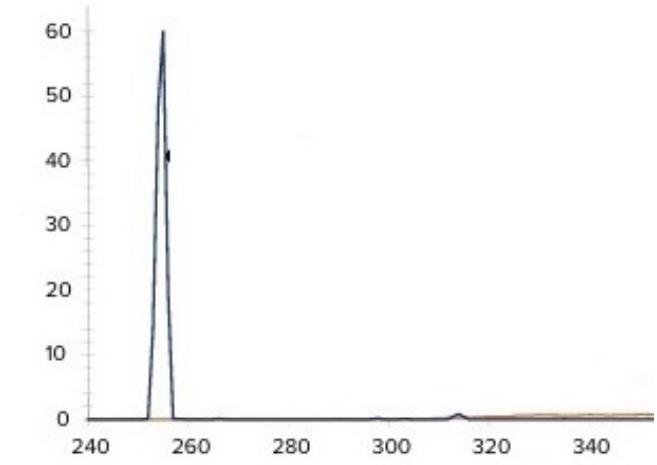
Solar spectrum (brown curve)

UVa 340 lamp - 40 Watts.
UVa 340+ lamp - High irradiance.

UV 421 / UVc lamps



UV 421 lamp. Sunlight / UV 421 spectrum.



Germicidal UVc lamp. UVc spectrum.

05 / MOISTURE AND CYCLES

Deionized water and spray system

TABLE X2.1 Some Historical Exposure Conditions

Cycle	Lamp	Typical irradiance	Approximate wavelength	Exposure cycle
1	UVa-340	0.89 W/(m²·nm)	340 nm	8 h UV at 60 (±3) °C Black Panel Temperature; 4 h Condensation at 50 (±3) °C Black Panel Temperature
2	UVb-313	0.71 W/(m²·nm)	310 nm	4 h UV at 60 (±3) °C Black Panel Temperature; 4 h Condensation at 50 (±3) °C Black Panel Temperature
3	UVb-313	0.49 W/(m²·nm)	310 nm	8 h UV at 60 (±3) °C Black Panel Temperature; 4 h Condensation at 50 (±3) °C Black Panel Temperature
4	UVa-340	1.55 W/(m²·nm)	340 nm	8 h UV at 70 (±3) °C Black Panel Temperature; 4 h Condensation at 50 (±3) °C Black Panel Temperature
5	UVb-313	0.62 W/(m²·nm)	310 nm	20 h UV at 80 (±3) °C Black Panel Temperature; 4 h Condensation at 50 (±3) °C Black Panel Temperature
6	UVa-340	1.55 W/(m²·nm)	340 nm	8 h UV at 60 (±3) °C Black Panel Temperature

Source: ASTM G154.

THE EQUILAM ADVANTAGE

Single-use deionized spray water

EQNA-UV uses deionized water (not simply filtered water) in Spray and UV/Spray modes, discarding it after contact with the specimens. This prevents recirculation of potential contaminants and reduces the risk of interference with test results.

Water quality and system integration

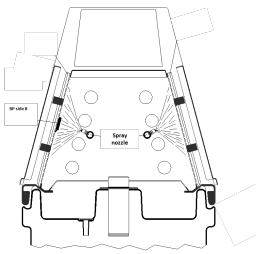
ASTM G154 Section 6.6.1.1 addresses spray water quality: conductivity below 5 µS/cm, solids below 1 ppm and no observable stains or deposits on specimens. Deionization removes dissolved ions; conventional filtration alone does not ensure compliance with these requirements.

The 350-liter tank receives deionized water and is integrated with the chamber software, with operation through the touch screen. Used water is discarded, ensuring fresh water is applied to the specimens.

Reference: ASTM G154-23, Section 6.6.1.1. Verify supply water quality and the requirements of the applicable test method.



350-liter deionized water tank.



Spray system operating diagram.

06 / OPERATION

Validation, data and 3D specimens

EQNA BP CAL SOFTWARE

EQNA-UV chambers include EQNA BP CAL software and a reference temperature sensor coupled to the Black Panel. The system validates and adjusts the two chamber temperature sensors (side A and side B), providing excellent uniformity and safe test operation.

Data acquisition - included

CorroSW software is included. CSV files containing temperature and UV irradiance data recorded during UV, Condensation, Spray and UV/Spray modes can be exported to a laptop to generate charts for test performance analysis.

System overview - optional

A simplified system flow diagram displays how the chamber operates.

Remote access - optional

The EasyAccess 2.0 app provides remote access to the chamber HMI with a license and access account.

3D specimen holder

EQOP.0064

Two 3D specimen holder models are available:
Specimens up to 70 mm deep
Specimens up to 150 mm deep

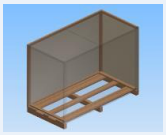
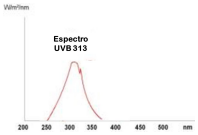
The 3D holder enables testing of parts up to 70 mm or 150 mm deep, simplifying handling and analysis of three-dimensional specimens.



Original technical illustration of the 3D holder.

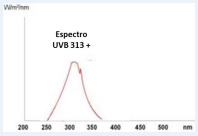
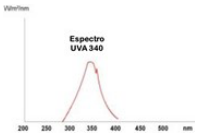
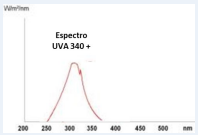
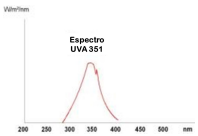
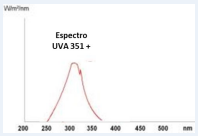
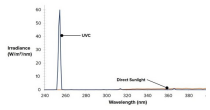
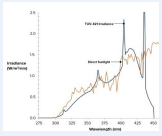
07 / OPTIONS

Accessories

Code	Description	Reference
EQOP.0005	Special holder for custom specimens.	
EQOP.0013	Water deionizer	
EQOP.0014	Spare column for water deionizer	
EQOP.0015	Activated carbon filter to remove chlorine from drinking water.	
EQOP.0027	Export wooden crate.	
EQOP.0036	Temperature and UV irradiance certificate.	
EQOP.0037	System overview and EasyAccess 2.0 app	
EQOP.0048	UVb 313 lamp - 40 W. Box of 12 lamps.	

07 / OPTIONS

Lamps and accessories

Code	Description	Reference
EQOP.0162	UVb 313+ high irradiance lamp. Box of 12 lamps.	
EQOP.0049	UVa lamp - 40 W. Box of 12 lamps.	
EQOP.0057	UVa 340+ high irradiance lamp. Box of 12 lamps.	
EQOP.0050	UVa 351 lamp - 40 W. Box of 12 lamps.	
EQOP.0058	UVa 351+ high irradiance lamp. Box of 12 lamps.	
EQOP.0061	Germicidal UVc lamp. Box of 12 lamps.	
EQOP.0062	UV 421 lamp. Box of 12 lamps.	
EQOP.0051	Pressurized DI water tank for Spray mode - Software and pump included. External L x W x H: 173.5 x 89.9 x 95.5 cm. Tank volume: 350 L (92.5 gal). Net weight: 80 kg (176 lbs).	
EQOP.0087	Black Panel calibration instrument - with traceable calibration	

08 / TECHNICAL SPECIFICATIONS

Models and test modes

Feature	EQNA-UV	EQNA-UV -COND	EQNA-UV -SPRAY	EQNA-UV-COND -SPRAY-UV/Spray
UV mode	Included	Included	Included	Included
Condensation mode	-	Included	-	Included
Spray mode	-	-	Included	Included
UV/Spray mode	-	-	Included	Included
Technical standards	ASTM G154, ASTM G151, SAE J2020, ISO 4892. Contact us for others.			
Temperature setting - UV mode	Laboratory temperature +5°C (+9°F) up to 80°C (176°F)			
Temperature setting - Condensation mode	Laboratory temperature +5°C (+9°F) up to 60°C (140°F). Models with Condensation mode only.			
Temperature - Spray mode	Laboratory ambient temperature. Models with Spray mode only.			
Temperature - UV/Spray mode	Laboratory temperature +5°C (+9°F) up to 80°C (176°F) in UV mode. Deionized water from the tank used in Spray mode is always at laboratory ambient temperature. Models with UV/Spray mode only.			
Irradiance units available on the control panel	W/(m²·nm) - W/m² - J/m² - kJ/m²/nm			
Temperature units available on the control panel	°C / °F			
Irradiance uniformity in UV mode	+/- 4% across the specimen surface			

08 / TECHNICAL SPECIFICATIONS

Water and operation

Feature	EQNA-UV	EQNA-UV -COND	EQNA-UV -SPRAY	EQNA-UV-COND -SPRAY-UV/Spray
Complete deionized water tank integrated with chamber software. Capacity: 350 liters (92.5 gal), Spray mode or UV/Spray mode.	-	-	Optional	Optional
Deionized water supply - Spray mode	-	-	Ø = ¾” Flow: 0.23 CFM (6.5 L/min) / 0.25 CFM (7.0 L/min). Pressure: 0.5 ~ 1.0 bar. Drain: Ø = 1”	Ø = ¾” Flow: 0.23 CFM (6.5 L/min) / 0.25 CFM (7.0 L/min). Pressure: 0.5 ~ 1.0 bar. Drain: Ø = 1”
Deionized water supply - Condensation mode	-	Ø = ¼” Flow: 0.035 CFH (1.0 L/h). Pressure: 0.5 ~ 1.0 bar. Drain: Ø = 1/2”	-	Ø = ¼” Flow: 0.035 CFH (1.0 L/h). Pressure: 0.5 ~ 1.0 bar. Drain: Ø = 1/2”
Sheathed 316 stainless steel tray heater (Condensation mode).	-	Included	-	Included
Tray water level control, Condensation mode.	-	Included	-	Included
Control panel	7” color touch screen			
Test specimen capacity (ASTM G154)	48 standard specimens, 75 x 150 mm, up to 20 mm thick + 2 Black Panels			

08 / TECHNICAL SPECIFICATIONS

Control and safety

Feature	EQNA-UV	EQNA-UV -COND	EQNA-UV -SPRAY	EQNA-UV-COND -SPRAY-UV/Spray
“EQNA UV CONTROL SOFTWARE”. UV fluorescent lamps are monitored for consistent irradiance throughout the test. Automatic power compensation offsets lamp aging without user intervention, extending lamp life.	Included: four (4) fixed UV sensors and one (1) reference UV sensor for calibration.			
“EQNA UV CAL SOFTWARE”. Radiometer integrated with the chamber control panel. Calibration/adjustment of fixed sensors and sensor failure indication.	Included: one (1) reference UV sensor for calibration/verification.			
“EQNA BP CAL SOFTWARE”. Validation and calibration of the two integrated Black Panel temperature sensors. Two Black Panels (side A and side B) ensure temperature uniformity and safe operation.	Included			
Alarm/service messages available with a single touch.	Included			
Self-diagnostics: high/low temperature alarms and error details; low tray water level alarms; pressurized water supply failure alarms; lamp aging and irradiance control alarms. Records the date and time of alarms and preventive maintenance. End-of-test alarm.	Included			
Construction standard	Control panel built in accordance with UL 508A. NRTL certification optional.			

08 / TECHNICAL SPECIFICATIONS

Programming and exposure

Feature	Specification
20 test programs with 100 segments (4 unlocked programs + 16 password-protected programs).	Included
Timer for each programmed mode	UV, Condensation, Spray and UV/Spray modes
Compatible UV fluorescent lamps	UVa, UVa+, UVb, UVb+, UVc, UV421
Data acquisition (CSV export)	Included - CorroSW software
Total specimen exposure area	6,000 cm² (4 quadrants of 1,500 cm²)
UV irradiance uniformity area	21 x 90 cm / Total area = 1,890 cm² according to SAE J2020 (Fig. 3)
Maximum irradiance, UVa-340+	2.02 W/(m²·nm)
Maximum irradiance, UVa-351+	2.35 W/(m²·nm)
Maximum irradiance, 313 nm (UVb)	1.70 W/(m²·nm)
Condensation tray made of polymeric material protected against UVa and UVb radiation. Eliminates contamination from mineral scaling in the tray and prevents corrosion from leaks. No sacrificial anode is required.	Included
Lid opening safety system	Opening the lid automatically switches off heating and UV irradiation and pauses the program, protecting the operator during specimen inspections and simplifying maintenance.

08 / TECHNICAL SPECIFICATIONS

Installation and dimensions

Feature	Specification
Electrical supply	208 ~ 240 Volts - 60 Hz - 20 Amps
Automatic restart after a power failure	The customer may enable this function on the chamber control panel under their responsibility.
Deionized (or reverse osmosis) water quality	ASTM D1193 Type IV
Independent timer for each mode displaying elapsed time (S.V) and set value (S.P).	Included
Total test timer displaying elapsed time (S.V) and total set value (S.P).	Included
5 (five) partial test timers for specimens added while the test is running.	Included
Wooden crate dimensions (L x W x H) / Weight	59.0”x 29.5”x 57.1” (1,500 x 750 x 1,450 mm) 321.9 lbs (146 kg)
External dimensions / Weight	55.9”x 26.4”x 53.5” (1,420 x 670 x 1,360 mm) 222.7 lbs (101 kg)
Required clearance	Approximately 39” (1 m) around the chamber
Installation ambient temperature and relative humidity for best performance	63°F - 82°F (17°C - 28°C); 40% - 85% RH (non-condensing)

09 / REFERENCES

Main test standards

Application	Standards
General	ASTM G151 • ASTM G154 • JIS D0205 • SAE J2020 • ISO 4892-3 • ABNT NBR 9512 • ISO 11507 • DIN 53384 • BS 2782 • GM 9125P • ASTM D6662
Paints	ASTM D3794 • ASTM D4587 • M598 • Nissan M007
Adhesives	ASTM C24.35.31 • ASTM C1442 • ASTM D904 • ASTM D5215 • UNE 104.281.8 8
Plastics	ASTM D4329 • ASTM D4674 • ASTM D5208 • ISO 4892-3 • UNF 53104 • ANSI C57.12.28 • ANSI A14.5
Textiles	AATCC TM186 • CFFA
Photovoltaics	ASTM E3006
Rubber	ASTM D1148 • ASTM D4811 • ASTM D750 • ASTM D925
Sealants	ASTM C1257 • ASTM C1442 • ASTM C732 • ASTM C734

EQUILAM NORTH AMERICA

Technology for accelerated weathering testing.
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