QUV®

The world's most widely-used weathering tester

Q-LAB

Weathering Basics

Sunlight, heat, and moisture cause millions of dollars of material damage every year. The QUV accelerated weathering tester reproduces the damage caused by sunlight, rain and dew. In a few days or weeks, the QUV can generate the same degradation that occurs over months or years outdoors. The QUV tests materials by exposing them to alternating cycles of ultraviolet (UV) light and moisture at controlled, elevated temperatures. The QUV simulates the effects of sunlight with fluorescent UV lamps, and it simulates dew and rain using condensing humidity and/or water spray.

Will your product last outdoors? Don't guess when you can test!


Adhesion loss


Cracking


Fading


Hazing


Yellowing


Embrittlement

Chalking


Gloss Loss


Strength Loss

WHY QUV?

Realistic

QUV testers with UVA-340 lamps produces the most realistic simulation of sunlight in the short wavelength portion of the ultraviolet spectrum. This region of the solar spectrum is most damaging to durable materials like plastic and paints. The result is a tester that provides excellent correlation with outdoor tests.

Affordable

QUV testers are economical to purchase and to operate. This is a result of its efficient design, which incorporates low-cost fluorescent UV lamps for sunlight simulation and ordinary tap water for condensation.

Easy to Operate

The QUV tester's simple yet sophisticated design makes it easy to install, easy to use, and almost maintenance-free.

- Simple user interface with dual touchscreen displays for easy programming
- Exposure conditions displayed continuously
- Self-diagnostic warnings and service reminders
- Quick calibration with patented AUTOCAL™ system
- Multicolored LED for viewing tester status from a distance

Reliability and Ease of Repair

QUV testers are legendary for their reliability. Q-Lab's innovative REPAIRPEDIA™ online troubleshooting guide allows users to quickly diagnose and correct tester performance issues. And it's free to all Q-Lab customers.

The World Standard In Weathering

With thousands of testers in service worldwide, the QUV is the world's most widely-used weathering tester.

Q-Lab's Experience

Q-Lab provides the highest-quality weathering test chambers and testing services. Our scientists and engineers participate and offer leadership in ISO, ASTM, IEC, GB, and numerous other professional organizations in creating standardized weathering test methods and procedures.

QUV Models

QUV/se

The most popular QUV model features SOLAR EYE Irradiance Control for precise maintenance of UV light intensity. The QUV/se uses a proven condensation mechanism to simulate outdoor moisture attack. It allows faster, more reproducible testing, longer lamp life, and calibration according to international standards.

QUV/spray

The QUV/spray is the same as a standard QUV/se, but also includes a water spray system for enhanced water delivery. Short periods of spray can be used to create a thermal shock. Longer periods can be used to achieve mechanical erosion. The QUV/spray can be set to generate UV light, condensation, water spray, and even combinations of light and moisture.

QUV/cw

Some industries have test methods that specify the use of cool white lamps for indoor photostability testing. To reproduce indoor light conditions, the QUV/cw has a SOLAR EYE Irradiance Control system which has been modified to monitor and control the light output of cool white fluorescent lamps. See Q-Lab Bulletin LU-0823, *QUV/cw Cool White Photostability Tester* for more information.

QUV/uvc

UV light is used widely in ultraviolet germicidal irradiation (UVGI), a technique used to eliminate harmful viruses and bacteria. This short-wavelength, high-energy UVC light can also degrade the materials and surfaces it disinfects. The QUV/uvc model uses UVC lamps to deliver light concentrated at 254 nm to test for material durability against photodegradation effects resulting from exposure to UVC light. The QUV/uvc tester has multiple safety features to prevent stray UVC light from escaping; it is not equipped with condensation or water spray.

QUV/basic

This is a simplified version of the QUV for the lab where economy is critical. Irradiance is controlled by periodic lamp replacement and repositioning. The QUV/basic has a condensation system for moisture simulation. It does not have water spray. The QUV/basic uses a single touchscreen display with the same functionality as the other models.

BLACK PANEL TEMPERATURE CONTROL
Uninsulated or Insulated

SOLAR EYE IRRADIANCE CONTROL
Repeatable delivery of UV light

SPECIMEN HOLDER OPTIONS
A variety for flat or 3D specimens

LARGE SPECIMEN CAPACITY
Up to 48 at a time (75 × 150 mm ea)

DUAL FULL-COLOR TOUCH SCREEN DISPLAYS
In multiple languages

USB PORT
Easy data transfer and software updates

MULTI-COLOR LED LIGHT
Conveniently indicates tester status at a glance

DURABLE CONSTRUCTION
Anodized and painted aluminum construction won't rust

WATER FEED BOX
Adjusts water level automatically for models with spray or condensation

ADJUSTABLE FLOW CONTROL
Allows for fine adjustment of water spray volume delivered to specimens

STANDARD CASTER WHEELS
Increases mobility when lab space is at a premium

UV & Sunlight Simulation

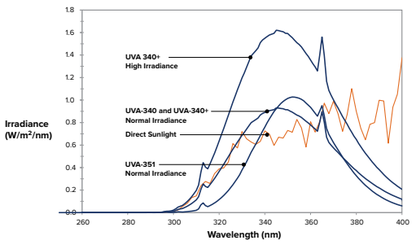
UV light is responsible for almost all photodegradation of durable materials exposed outdoors. The QUV tester's fluorescent lamps simulate the critical short-wave UV and reproduce the physical property damage caused by sunlight. Several different types of UV lamps are available for different applications.

QUV LAMPS

Q-Lab supplies the highest-quality UV fluorescent lamps available. The technology behind the lamps produces a spectrum that is inherently stable throughout their use. Each manufacturing lot is required to pass a stringent series of tests before it is approved for sale. The result is that the QUV provides a consistent, stable spectrum, year after year.

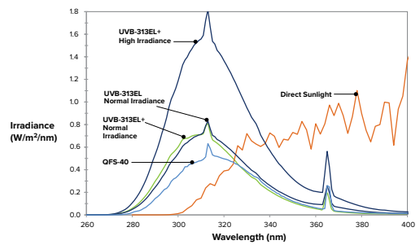
UVA LAMPS

UVA-340 lamps give an excellent simulation of sunlight in the critical short wavelength region from 365 nm down to the solar cut-on of 295 nm. UVA-340+ "plus" lamps enable testing at elevated irradiances that meet or exceed the highest irradiance values called for in major test standards. UVA-351 lamps simulate the UV portion of sunlight filtered through window glass. Cool White lamps are also available to simulate office environments.



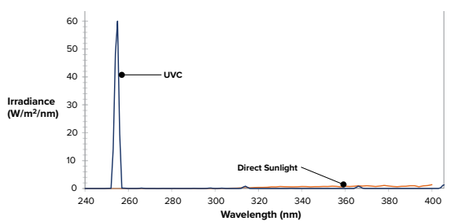
UVB LAMPS

UVB-313EL+ (and legacy QFS-40) lamps deliver short-wave UV more severe than the UV normally found at the earth's surface. UVB-313 lamps are most useful for QC and R&D applications or for testing exceptionally durable materials. UVB-313-EL+ lamps also provide high irradiance levels for the harshest fluorescent UV tests. Care should be taken to ensure failure mechanisms are realistic when using UVB lamps.



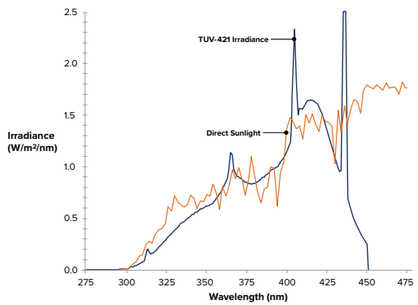
UVC LAMPS

UVC lamps deliver high-intensity short-wave UV light at 254 nm, which is well below the solar cut-on. This represents the most common UVC emission used for disinfection of surfaces exposed to harmful bacteria and viruses. While it can kill these pathogens effectively, UVC light can also cause degradation of plastics, coatings, and fabrics. UVC lamps reproduce this damaging irradiance, in order to evaluate durability of materials exposed to UVC light.



TUV-421 LAMPS

TUV-421 lamps provide the same excellent match to shortwave UV light as UVA-340 lamps, but also deliver long-wavelength UV and short-wavelength visible light. This extended spectrum may reproduce color change effects in materials susceptible to these wavelengths and provide a more complete test.



"PLUS" LAMPS
UVA-340+ and UVB-313EL+ lamps provide a consistent, stable spectrum plus extended lifetime at high irradiance

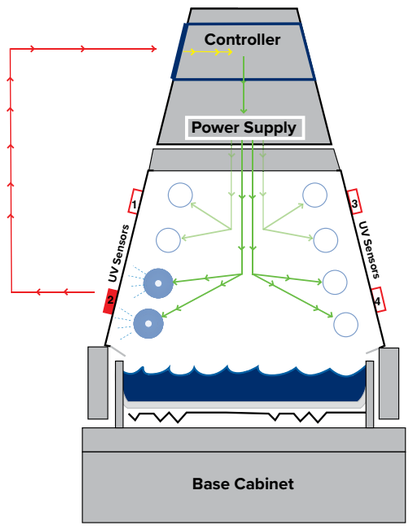
SOLAR EYE® IRRADIANCE CONTROL

Changes in light intensity may affect the speed of material degradation. Changes in spectrum may affect both speed and type of degradation. Therefore, a weathering tester must control irradiance to achieve reproducible test results. Most QUV models are equipped with SOLAR EYE irradiance control, a precision system that automatically maintains light intensity through a feedback loop. The controller monitors UV intensity and compensates for lamp aging or any other variability by adjusting power to the lamps. The SOLAR EYE system allows better reproducibility and repeatability than manual systems.

SOLAR EYE:

- Monitors and maintains programmed light intensity
- Operates lamps until set point can't be maintained
- Maximizes effects with high irradiance
- Operates at higher irradiance than noon summer sunlight
- Extends lamp lifetime

1. During the UV cycle, built-in sensors measure the light from each pair of lamps and transmit this data to the controller.



2. The controller compares the measured irradiance to the set point.

3. The controller instructs the power supply to adjust the current to the lamps to maintain the set point.

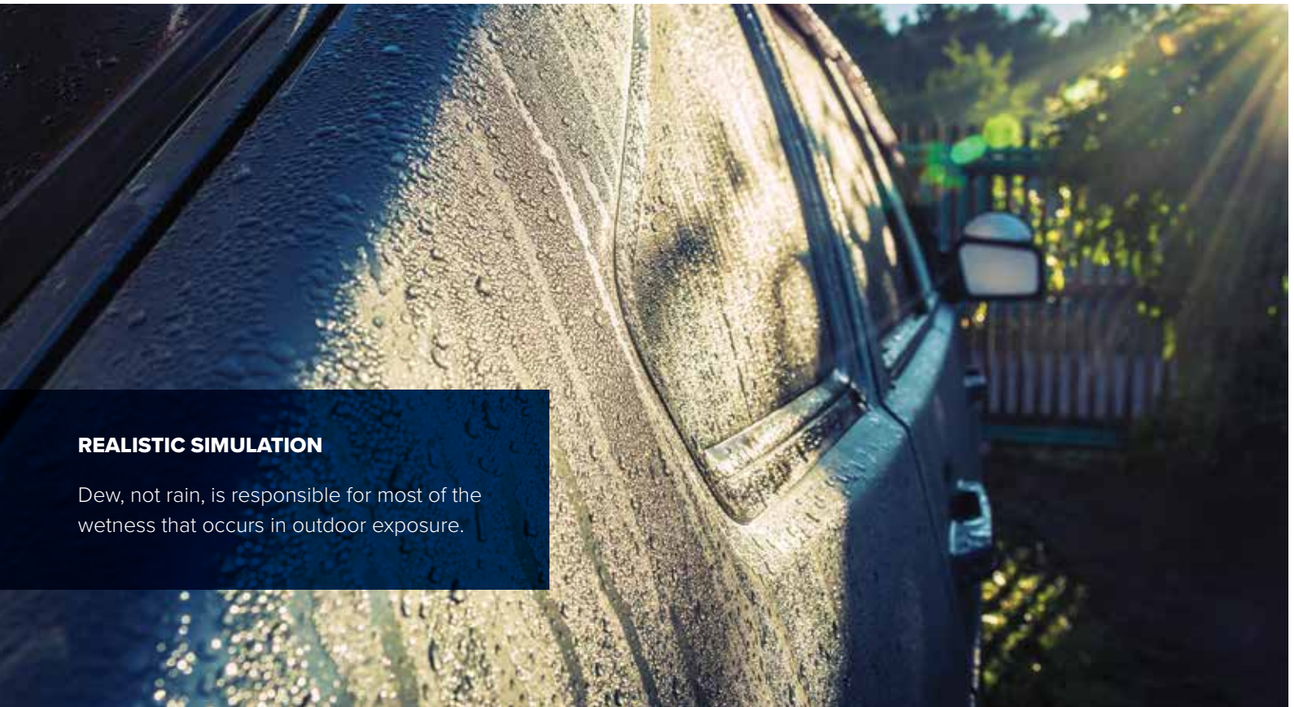
Moisture Simulation

The QUV allows two approaches to moisture simulation. For most applications, condensing humidity is the best way to simulate outdoor moisture attack. All QUV models except QUV/uvc allow a programmed condensation cycle. Because certain applications also require water spray to achieve realistic results, some QUV models can produce both condensation and water spray.

CONDENSATION

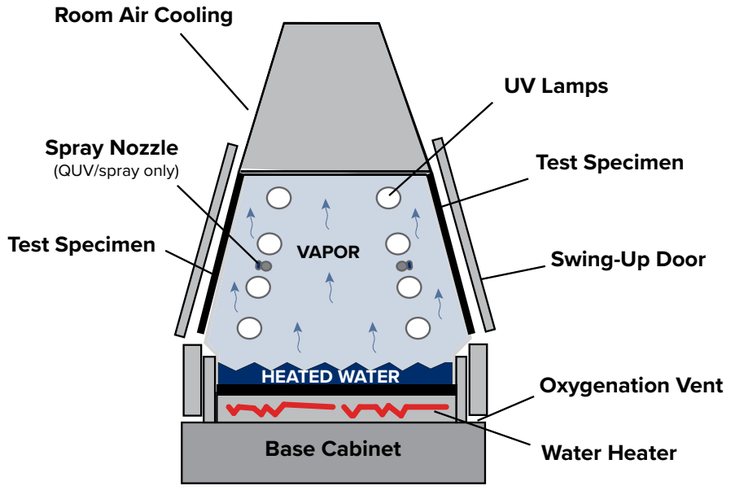
In many outdoor environments, materials are wet more than 12 hours each day. Research indicates that the main cause of this outdoor wetness is dew, not rain. The QUV simulates this using a unique condensation mechanism. During the condensation cycle, a water reservoir in the bottom of the test chamber is heated to produce vapor. The hot vapor maintains the chamber at 100% relative humidity, at an elevated temperature.

The QUV is designed so that test specimens form the external walls of the chamber. Thus, the reverse side of the specimens is exposed to ambient room air. Cooling from laboratory air causes the test surface to drop a few degrees below the interior vapor temperature, ensuring that water continually condenses on the specimen surface. The evaporation process naturally distills the water, resulting in only pure water collection on specimens even when ordinary tap water is used.



REALISTIC SIMULATION

Dew, not rain, is responsible for most of the wetness that occurs in outdoor exposure.



CONDENSATION:

- Best simulation of natural wetness
- Elevated temperatures for acceleration
- Ordinary tap water input
- Pure water output - no spotting or contamination of specimens
- Minimal maintenance

WATER SPRAY

In some service environments, material temperatures can suddenly decrease when heat builds up over the course of a sunny day and a sudden rain shower rapidly dissipates the heat. The resulting thermal shock is a challenge for many materials. Additionally, some materials are susceptible to mechanical erosion from rainfall. The QUV with water spray is useful for simulating both environments.

Unlike the condensation system that works effectively with ordinary tap water, the water spray system requires laboratory grade pure water. See page 14 for information on a water re-purification system for the QUV/spray.

Specimen Mounting

Coatings, plastics, and films are easily accommodated in the QUV tester using standard flat panel specimen holders. Other specimens can be mounted using specialty holders. Q-Lab also offers custom specimen holders for unique needs. All of Q-Lab's panel holders are designed to meet the requirements of ASTM G154, ISO 4892-3, and other international standards.

TESTING 3D SPECIMENS
Quadrant boxes or panel temperature sensor relocation can help accommodate deep and wide specimens

FLAT SPECIMEN HOLDERS

Q-Lab offers flat specimen holders in three sizes. All sizes include an individual holder for two specimens, aluminum panels, and circular retaining rings. For thicker specimens, the use of thick panel retaining clips is recommended.

SPECIALTY SPECIMEN HOLDERS

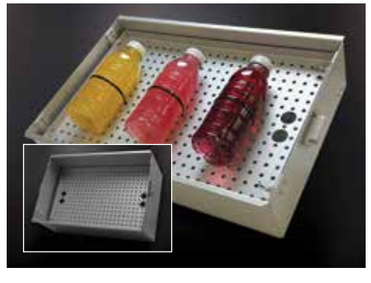
All Q-Lab specialty specimen holders are designed to test a variety of materials while retaining chamber heat and moisture for proper temperature control. Options include tensile bar holders, wood or artificial lumber holders, and large and small three-dimensional (3D) part holders. Speciality specimen holders are in stock and ready to ship.

TENSILE BAR SPECIMEN HOLDERS

This popular specimen shape allows for evaluation of physical strength retention of materials after exposure to sunlight, heat, and water. Similar to a flat panel holder, tensile bar holders include multiple clips for exposing "dog bone" shaped polymer specimens prior to tensile strength testing. Use one, two, or all three clips to test your materials.

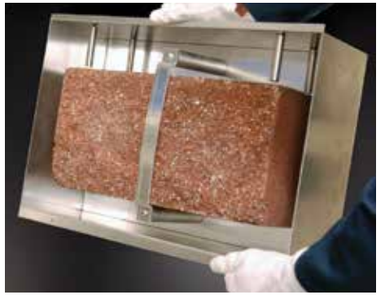
CUSTOM SPECIMEN HOLDERS

For unique applications or for specimens that cannot fit in the standard or specialty holders, Q-Lab can make custom specimen holders for nearly any application. Custom specimen holders can include brackets and other modifications to hold heavy or unusual-shaped specimens, such as concrete blocks. Three-dimensional holders with customized dimensions can also be made to accommodate products like fuel tanks, beverages, shoes, and hardware.



ADJUSTABLE 3D QUADRANT BOXES

These three-dimensional part holders include a perforated plate to allow for easy specimen positioning and mounting. The plate can be adjusted forward or backward in 3 mm (0.125 in) increments. The Adjustable 3D Holders are available in two depths, 100 mm (4 in) or 200 mm (8 in). No matter what is being exposed, it is critical that the front surface of the specimen is at the same distance from the lamps as the flat panel holder.



Operation

QUV accelerated weathering testers are simple to operate. Programming is intuitive. All models are completely automated and can operate continuously, 24 hours per day, 7 days per week.

Designed to be both functional and easy to use, the QUV controller can be programmed in 17 user-selectable languages (English, French, Spanish, Italian, German, Chinese, Japanese, Korean, Czech, Dutch, Polish, Portuguese, Russian, Swedish, Thai, Turkish, and Vietnamese). Additional languages are being added on an ongoing basis. Users can program and store up to 13 tests in memory, which has a battery back-up feature.

The dual, full-color touchscreen displays on QUV testers allow for real-time viewing of test parameters and performance along with control of tester operation and settings. The multi-color LED light indicates, at a quick glance, the tester's operational status. The screens are fully redundant on most models, allowing for operation even in the unlikely event that one of them fails. Tester performance data is recorded automatically and easy to export via USB drive. Software updates can also be performed quickly using the USB port without interrupting tester operation.

GEN 4 CONTROLLER
QUV testers feature dual full-color touch screens with a simple and intuitive interface in multiple languages.

Maintenance & Calibration

The QUV controller includes complete self-diagnostic error checking. The controller constantly monitors the status and performance of all systems. It also displays simple warning messages and routine maintenance reminders and performs safety shutdown, as needed. Typical maintenance items include lamps, sensor calibrations and inexpensive air filters.

The QUV SOLAR EYE on-board irradiance sensors need to be calibrated periodically by the user to assure accurate and consistent results.

Calibration is simple using the Universal Calibrator and AUTOCAL system. It takes only minutes and virtually eliminates human error. Universal Calibrator smart sensors are disposable, inexpensive, and replaced yearly.

Standards

The QUV conforms to the specifications in nearly all major international, national and industry test standards, including those below. Refer to Technical Bulletin LU-8012 for a more comprehensive list.

- ASTM G154
- ASTM C1442
- ASTM D4799
- ASTM D6662
- ASTM D4587
- ASTM D5894
- ASTM E3006
- EN 927-6
- ISO 4892-3
- ISO 11507
- ISO 16474-3
- ISO 12944-6
- SAE J2020
- JIS K 5600-7-8
- AATCC TM186

Accessories & Options

The QUV accelerated weathering tester is available in a variety of models with different options to suit all testing needs. Additional accessories are available to best integrate the QUV weathering testers and accommodate the space and utilities available in most laboratory spaces.

SPACE SAVER FRAME

QUV space saver frames from Q-Lab help preserve space in crowded labs with multiple QUV test chambers. By allowing QUV testers to be stacked two-high, the frames efficiently make use of the same floor space in the lab. Frames are available in two different models for compatibility with all new and existing QUV testers.

WATER REPURIFICATION SYSTEM

To significantly reduce the cost of running the QUV tester's optional water spray system, Q-Lab offers a water repurification system. The system can save over 1,000 liters of expensive, purified water per day in a test cycle that calls for several hours of water spray, and can pay for itself in a matter of months.

The system is packaged inside a separate housing as a standalone system. Note the repurification system is not a primary system for purification. Purified water must still be supplied to the tester. The system maintains the proper purity level for continued use.

Summary

● Standard ◑ Optional

Feature	/se	/spray	/cw	/uvc	/basic
SOLAR EYE® Irradiance Control	●	●	●	●	–
User Interface Available in 17 Languages	●	●	●	●	●
Dual Full-Color Touch-Screen Displays (1 for QUV/basic)	●	●	●	●	●
Multi-color LED Status Indicator	●	●	●	●	●
Easy Calibration with Universal Calibrator Smart Sensors	●	●	●	●	–
Condensation	●	●	●	–	●
Water Spray	–	●	–	–	–
USB Port for Software Updates and Data Acquisition	●	●	●	●	●
Automatic Fault Recognition and Alarms	●	●	●	●	●
Automatic Shut-down Timer	●	●	●	●	●
Uninsulated Black Panel (BP) Temperature Control	●	●	●	●	●
Insulated Black Panel (IBP) Temperature Control	◑	◑	◑	◑	◑
Near-Room-Temperature BP Control	–	–	–	●	–
Adjustable 3D Specimen Holder Boxes	◑	◑	◑	◑	◑
Space Saver Frame for Stacking	◑	◑	◑	◑	◑
Water Repurification System	–	◑	–	–	–

Q-LAB

OUR GLOBAL NETWORK

We are committed to provide world-class technical, sales, and repair support in each of the 120 countries in which we operate. Visit **Q-Lab.com/support** for contact information specific to your location and inquiry type.

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