SPECIFICATION BULLETIN LU-0819

QUV Accelerated Weathering Tester

QUV Overview

Sunlight and moisture cause millions of dollars of material damage every year. The QUV® accelerated weathering tester tests materials by exposing them to alternating cycles of UV light and moisture at controlled, elevated temperatures. In a few days or weeks, the QUV tester can reproduce the damage that occurs over months or years outdoors. With thousands of testers in service worldwide, the QUV tester is the world's most widely used weathering tester.

Features

QUV testers are available in four different models: QUV/basic, QUV/se, QUV/spray, and QUV/cw. Each air-cooled tester featured Q-Lab's renowned reliability and ease of maintenance. All testers have standard datalogging via ethernet and/or USB, a variety of standard sample holders, automatic fault recognition and alarms, automatic shut-down timer, and a remarkably simple user interface available in five languages.

	QUV/basic	QUV/se	QUV/spray	QUV/cw
Specimen Capacity (75 x 150 mm)	50	48	48	48
Specimen Orientation	75° (measured from horizontal)			
UV Fluorescent Lamps - 40W	Quantity: 8 (T12 x 121 cm long)			
SOLAR EYE Irradiance Control (340 nm)	—	●	●	●
Irradiance in Accordance with ISO 17025	—	●	●	●
Water Spray	—	—	●	—
Condensation	●	●	●	●[1]
Stackable with Optional Space Saver Frame[2]	●	●	●	●

1 The QUV/cw model is able to perform condensation cycles; however, this is not usually applicable for testing indoor materials.
2 See LU-0820 for more information on Space Saver Frames.

Lamps & Irradiance Control

The SOLAR EYE® irradiance controller (used in all models except QUV/basic) continuously monitors and precisely maintains irradiance by adjusting power to the lamps. This compensates for variations such as lot-to-lot differences in lamps, ambient temperature changes and lamp aging. Irradiance control is very important because changes in intensity may affect both speed and type of material degradation. Note: the QUV/basic model relies on lamp rotation to approximate controlled irradiance levels.

Models with the SOLAR EYE irradiance controller feature programmable irradiance set-points. For example, with UVA-340 lamps, an irradiance of 0.73 W/m^2@340nm is a good match with noon summer sunlight. For faster results, the QUV tester can operate at an irradiance that is double that of noon summer sunlight. See below for maximum and some common irradiance set points, based upon different lamp types. See LU-8160 for more information about choosing lamps for your application.

	UVA-340 & UVA-351	UVB-313EL	QFS-40	Cool White
Common Irradiance Set Points[1] W/(m^2·nm) or LUX	0.89	0.80	0.48	6,000
Maximum Irradiance Set Points[1] W/(m^2·nm) or LUX	1.55	1.23	0.86	20,000
Lamp Life[1] at Common Irradiance Set Points (hours)	8,000	8,000	8,000	8,000

1 Values shown are only for testers equipped with SOLAR EYE irradiance control. QUV/basic lamp life warranted for 1600 hours.

ISO Calibrations

SOLAR EYE irradiance controller calibrations with the UC10 Universal Calibrator system through its patented AUTOCAL® system are traceable to the U.S. National Institute of Standards and Technology and comply with ISO 17025 requirements. Each UC10/UV Smart Sensor is set at the factory to measure both UVA and UVB lamps. A separate Smart Sensor is required for cool white lamps.

To ensure ISO compliance, the UC10 Smart Sensor must be replaced or recalibrated every year. Q-Lab's Calibration Labs are ISO 17025 accredited.

Q-LAB

QUV Tester Operating Specifications:

Models	QUV/basic	QUV/se	QUV/spray	QUV/cw
Black Panel Temp (°C) Light Cycle Temp.[1] Condensation Cycle Temp.	45-80 40-60	45-80 40-60	45-80 40-60	35-80 —[2]
Specimen Exposure Area	20 x 50 cm (2x front side) 20 x 108 cm (1x rear side) 4160 cm^2 total	20 x 50 cm (2x each side) 4000 cm^2 total	20 x 50 cm (2x each side) 4000 cm^2 total	20 x 50 cm (2x each side) 4000 cm^2 total
Specimen Capacity[3]	50 Specimens (75 x 150 mm)	48 Specimens (75 x 150 mm)	48 Specimens (75 x 150 mm)	48 Specimens (75 x 150 mm)
Inlet Water Pressure	0.2-5.5 bar (2-80 psi)	0.2-5.5 bar (2-80 psi)	2.8-5.5 bar (40-80 psi)[4]	0.2-5.5 bar (2-80 psi)
Inlet Water Purity[5]	Tap Water	Tap Water	> 200 kΩ·cm < 5 µS/cm < 2.5 ppm TDS 6-8 pH	—[2]
Water Consumption[6] Condensation Spray	8 liters/day —	8 liters/day —	8 liters/day 7 liters/minute	—[2] —
External Dimensions (w x h x d)	137 x 135 x 53 cm (54 x 53 x 21 in)			
Weight[7]	136 kg (300 lbs)			
Electrical Requirements[8]	120V ± 10%, 1-Φ, 60 Hz, 14A 230V ± 10%, 1-Φ, 50/60 Hz, 7A	120V ± 10%, 1-Φ, 60 Hz, 16A 230V ± 10%, 1-Φ, 50/60 Hz, 8A	120V ± 10%, 1-Φ, 60 Hz, 16A 230V ± 10%, 1-Φ, 50/60 Hz, 8A	120V ± 10%, 1-Φ, 60 Hz, 16A 230V ± 10%, 1-Φ, 50/60 Hz, 8A

1 Minimum and maximum black panel temperatures are dependent on irradiance settings and ambient temperatures.
2 The QUV/cw model is able to perform condensation cycles; however, this is not usually applicable for testing indoor materials.
3 Other specimen sizes and shapes (including three-dimensonal specimens) are readily accommodated in standard or custom specimen holders (see LU-8001).
4 Optional booster pump (X-10570-K) is available.
5 Water purity requirements can be met by most reverse osmosis, deionization, or distillation systems.
6 Water consumption values are dependant upon test and lab conditions. Values shown are maximum for many common standards. To reduce water consumption, consider an optional water repurification system (see LW-6048 for more information).
7 Actual shipping weights will be higher and depend upon whether the shipment is domestic, ocean, or air.
8 Transformer kits available for 100V (part number V-149-K-INST) or 200V (part number V-149.1-K-INST) operation.

Warranty

The QUV accelerated weathering tester is guaranteed against defects in workmanship or materials for one year. Liability is limited to replacing or repairing any part or parts which are defective in materials or workmanship and are returned to our factory, shipping costs prepaid. Liability in all events is limited to the purchase price paid. Damage due to accident or abuse is not covered. Labor and travel costs are not covered. Q-Lab Corporation makes no other warranties, including implied warranties of merchantability or fitness for a particular purpose, except as may be expressly provided by Q-Lab Corporation in writing. Q-Lab Corporation shall not be liable for any incidental, consequential, special, or contingent damages arising out of the sale or use of any product.

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The QUV is the world's most widely used weathering tester.

QUV

Weathering Testers

Reproducible and reliable weathering data can be generated in just a few weeks or months using the QUV Accelerated Weathering Tester. Its short wavelength ultraviolet light and moisture cycles realistically simulate the damaging effects of sunlight, dew and rain.

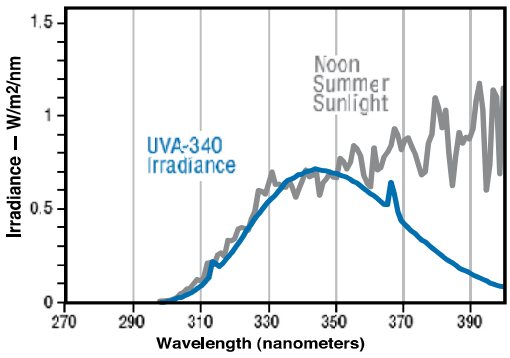
QUV Features

- **Solar Eye® Irradiance Control**
- **Condensation System Uses Tap Water**
- **Quick & Easy Calibration with AutoCal**
- **Small Footprint / Large Capacity**
- **Ethernet Connection**
- **User Serviceable**
- **Self Diagnostics**
- **Automatic Shut-down Timer**

Ultraviolet Sunlight

The QUV uses fluorescent UV lamps to reproduce the damaging effects of sunlight. Although ultraviolet (UV) light makes up only about 5% of sunlight, it is responsible for most of the sunlight damage to polymer materials exposed outdoors. Therefore, it is only necessary to reproduce the short wavelength UV for testing polymer degradation.

Several types of UV lamps are available for the QUV. Each lamp type differs in the total amount of UV energy emitted and in wavelength spectrum. For example, UVA-340 offers the best correlation to outdoor exposures because it is the best simulation of sunlight from 295 nm to 365 nm. The UVB-313 offers maximum acceleration by utilizing short-wave UV that is more severe than normally found on the earth's surface. The exposure application dictates which lamp type should be used. *(Request LU-8016 Choice of Lamps for more information.)*



UVA-340 is the best available simulation of sunlight from 365 nm to 295 nm (solar cut-on).

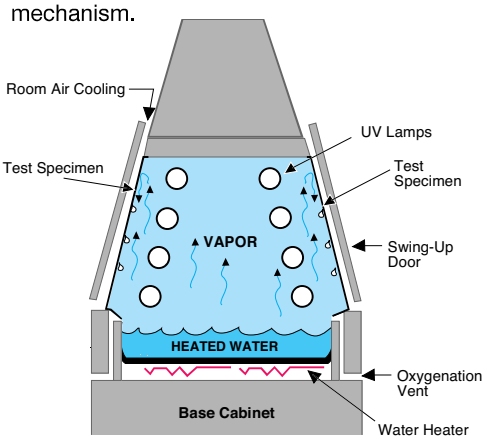
Moisture

The user can program the QUV to produce cycles of wetness alternating with UV, a situation that is identical to natural weathering.

Studies have shown that condensation in the form of dew is responsible for most outdoor wetness. Dew is more damaging than rain because it remains on the material for a long time, allowing significant moisture absorption.

The QUV's long, hot condensation cycle reproduces the outdoor moisture phenomenon far better than other methods such as water spray, immersion, or high humidity.

To simulate damage caused by rain, such as thermal shock or mechanical erosion, the QUV can be fitted with a water spray system in addition to the standard condensation mechanism.



The QUV uses a unique condensation mechanism to reproduce outdoor moisture.

Temperature

The destructive effects of light and moisture exposures are typically accelerated when temperature is increased. The QUV provides accurate control of temperature and provides a means to elevate the temperature to produce acceleration.

QUV

Irradiance Control & Calibration

In the QUV, control of irradiance is simplified by the inherent spectral stability of its fluorescent UV Lamps. All light sources decline in output as they age. However, unlike most other lamp types, the QUV's fluorescent lamp spectra does not change over time. This enhances the reproducibility of test results and is a major advantage of testing with QUV.

The Solar Eye Irradiance Controller continuously monitors the UV intensity using four sensors at the same plane. The feed-back loop systems allows it to automatically compensate for lamp aging or any other variability by adjusting power to the lamps. The Solar Eye allows better reproducibility and repeatability than manual irradiance control systems used in the old-style QUVs and in the QUV/basic.

In addition to its other advantages, the patented Solar Eye system allows for easy calibration and traceability for ISO compliance.

Calibrations with the CR10 Radiometer take only minutes and comply with ISO 9000 requirements.

Test specimens are mounted in convenient snap-ring holders.

QUV Models

Model QUV/se features the Solar Eye Irradiance Controller for precise control of UV light intensity. This assures more reproducible test results and allows compliance with ISO calibration requirements. With Solar Eye, you can increase the irradiance to 1.75 times noon summer sunlight.

Model QUV/spray is the same as the QUV/se, except it also is equipped with direct water spray for thermal shock and mechanical erosion.

Model QUV/basic provides UV light and moisture testing, but does not feature control of light intensity. The QUV/basic is the ideal choice for labs where economy is critical.

Model QUV/cw is similar to the QUV/se, but is modified to use fluorescent cool white lamps for reproducing indoor commercial and retail environments.

QUV Meets The Standards

The QUV, the world's most widely used weathering tester, complies with numerous standard test methods around the world. Below is a partial list.

General
- ASTM G151
- ASTM G154
- JIS D 0205
- SAE J2020

Coatings
- ASTM D3794
- ASTM D4587
- FED-STD-141B
- GM 9125P
- JIS K 5600-7-8
- ISO 11507
- ISO 20340
- M598-1990
- NACE TM-01-84
- NISSAN M0007
- PrEN 927-6

Adhesives
- ASTM C1184
- ASTM C1442
- ASTM D904
- ASTM D5215
- UNE 104-281-88

Plastics
- ANSI C57.12.28
- ANSI, A14.5
- ASTM D4329
- ASTM D4674
- ASTM D5208
- ASTM D6662
- DIN 53 384
- ISO 4892-3
- JIS K 3750
- UNE 53.104

Roofing
- ANSI/RMA IPR-1-1990
- ASTM D4799
- ASTM D4811
- ASTM D3105
- ASTM D4434
- ASTM D5019
- BS 903: Part A54
- CGSB-37.54-M
- DIN EN 534

Printing Inks/Artists' Materials
- ASTM D3424
- ASTM F1945

Textiles
- AATCC TM 186
- ACFFA Guideline

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