Q-SUN

Xenon Light Stability & Weathering Testers

Q-LAB

The Most Trusted Name In Weathering

Light Stability & Weathering

Sunlight, heat and moisture cause millions of dollars in material damage every year. Product damage – including cracking, crazing, hazing, fading and yellowing – can occur indoors or outdoors, depending on how sensitive the material is to light, temperature and moisture. With the Q-Sun Xenon Test Chamber, you can simulate and accelerate various service conditions using the latest xenon arc technology.

The Q-Sun is the ultimate Research & Development and Quality Control tool for testing materials that are exposed to direct sunlight, sunlight through window glass or even harsh indoor lighting from fluorescent or halogen lamps. With a variety of models and options, you can customize your Q-Sun to fit your testing needs.

The Q-Sun is used by companies worldwide to aid in the selection of new materials, the improvement of existing materials or the evaluation of how changes in formulation affect product durability. When the fade resistance and light stability of your product are in question, don't guess when you can test.

Xenon Light Stability Testing

Test duration will depend on the type of material tested and the durability level required for the specific application. Exposures for textiles or inks may take only a few hours, while exposures for building materials may take weeks or months.

A More Realistic Xenon

The Q-Sun's xenon arc lamps provide the best match to the full spectrum of sunlight. The Q-Sun's water spray, near-horizontal specimen mounting and controlled humidity systems combine to provide the most realistic moisture simulation available in a xenon arc tester.

Easy To Use

Q-Sun Xenon Test Chambers are easy to install, easy to use and practically maintenance-free. Specimen mounting and evaluation are fast and hassle-free with the unique slide-out specimen tray. The Q-Sun is completely automated and can operate continuously, 24 hours per day, 7 days per week.

- Microprocessor for easy programming
- Built-in Ethernet connection for data logging
- Self-diagnostic warnings and service reminders
- Quick and easy calibration with AutoCal

Fast Results

A product exposed outdoors to direct sunlight experiences maximum light intensity for only a few hours each day. The Q-Sun can be programmed to accelerate results by subjecting test specimens to the equivalent of noon, summer sunlight for 24 hours a day, every day. The resulting exposure is much higher in both average light intensity and in hours per day of light exposure. Consequently, the test result can be highly accelerated.

Now You Can Afford Xenon Testing

If you have been putting off buying a xenon tester because of high prices, it's time to look again. The Q-Sun's low purchase price, low lamp prices and low operating costs create a breakthrough in the price/performance equation. Now even the smallest lab can afford xenon arc testing.

Simplicity is the Ultimate Sophistication

Q-Lab's design philosophy is simple. We believe that, just because a product is technical, it doesn't have to be hard to understand or difficult to use. Instead of complicating our designs by building one subsystem on top of another, we put our engineering effort into keeping things simple. Our goal is to provide affordable test equipment that is technically accurate, yet easy to understand, easy to operate and easy to maintain. It's that simple.

Full Spectrum Xenon Lamps

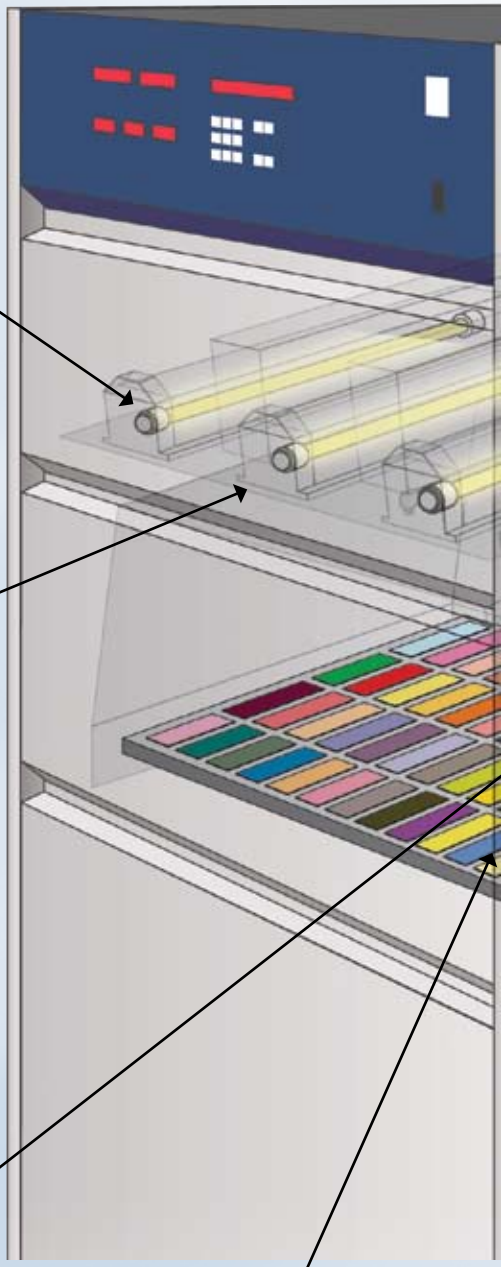
Xenon arc lamps give the ultimate correlation to the full spectrum of natural sunlight. Air-cooling makes them economical, efficient and low maintenance. Lamps last for 1500 hours.

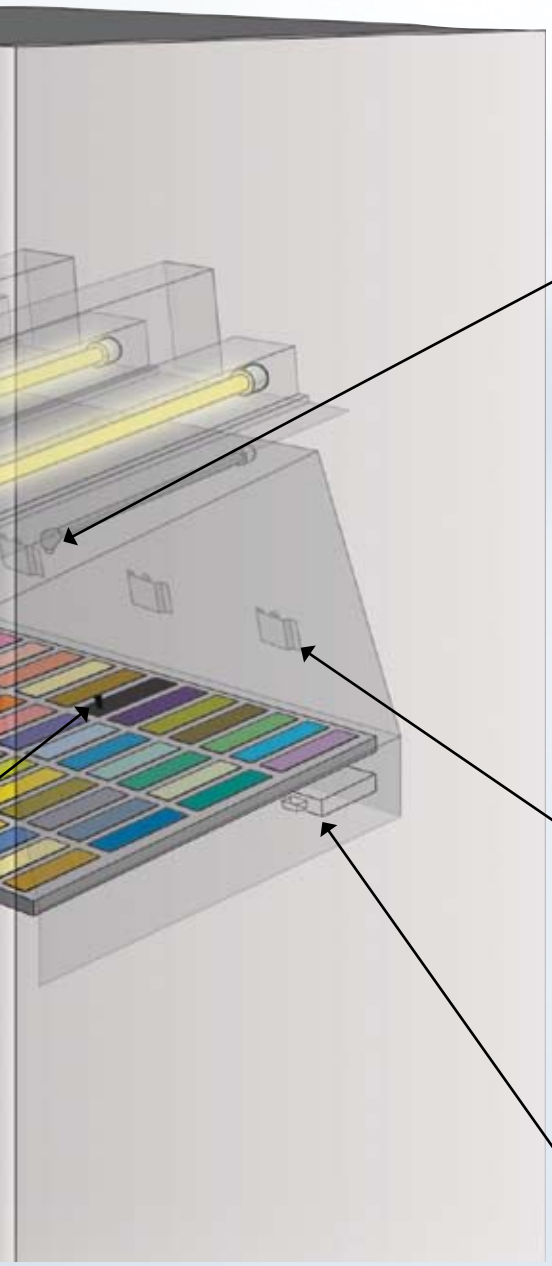
Optical Filters

A choice of optical filters is available to simulate a variety of service environments including direct sunlight and sunlight through window glass. Filter performance does not decline with age; therefore, filters do not need to be replaced unless the glass is broken.

Precision Temperature Control

All Q-Sun models control specimen temperature with a Black Panel or a Black Standard sensor. In some models, Chamber Air Temperature can be simultaneously controlled to maximize control of the exposure environment.





Water Spray

Outdoor moisture attack is simulated via a pure water spray. Two nozzles are located in the top of the chamber. Spray can be programmed to operate during either the dark or light cycle.

Solar Eye Irradiance Control

The Solar Eye system constantly monitors and controls lamp output to assure precise light exposure and to maximize repeatability and reproducibility of test results. Irradiance control is available at 340 nm, 420 nm or TUV.

Versatile Specimen Mounting

The flat specimen mounting tray accommodates different shapes, sizes and types of specimens. A variety of specimen holders are available.

Relative Humidity Control

Many Q-Sun models are available with precise control of relative humidity. These may be useful for testing interior materials like textiles, papers and inks.

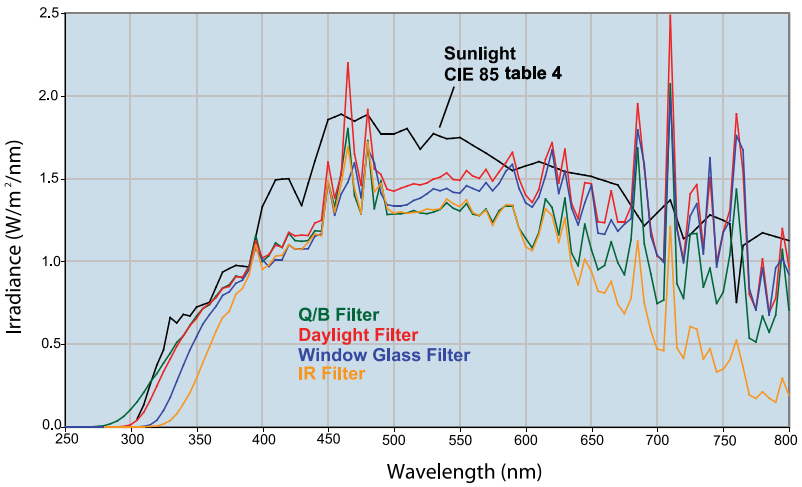
Sunlight Simulation

The Q-Sun's xenon arc lamps produce the most realistic reproduction of full spectrum sunlight including ultraviolet, visible light and infrared radiation. For many materials, exposure to the full spectrum is necessary to provide an accurate simulation, especially when testing for color change and lightfastness.

A Choice of Optical Filters To Simulate a Variety of Environments

Xenon light must be properly filtered to achieve the appropriate spectrum for each particular application. Differences in spectra may affect both the speed and the type of degradation. Three categories of filters are available to simulate a variety of service environments. The application or test method dictates which filters should be used.

The Q-Sun's long-life filters are exceptionally durable and maintain the required spectrum indefinitely. After many years of use, Q-Sun filters have yet to show any signs of aging.



Different filters are used to achieve different spectra for various applications. For maximum acceleration, test materials can be exposed to the equivalent of noon, summer sunlight for 24 hours a day. See Q-Lab Technical Bulletin LX-5060 for a detailed discussion.

The Q-Sun's 1800 Watt air-cooled xenon lamps maximize economy and ease of use. The Xe-1 uses one lamp, the Xe-3 uses three.

Daylight Filters

Daylight filters are used to simulate direct, noon summer sunlight. They provide the best correlation to natural exposures for most applications. Materials that are typically used outdoors like roofing or exterior coatings should be tested using Daylight Filters. Two different types of Daylight Filters are available for the Q-Sun: *Daylight - Q* and *Daylight - B/B.*

Window Glass Filters

Window Glass Filters produce spectra equivalent to sunlight coming through window glass. This spectrum can also simulate other indoor lighting such as the harsh lighting found in a typical commercial or office environment. Window Glass Filters are used for indoor materials such as printing materials or textiles. Three different Window Glass Filters are available for the Q-Sun: *Window - Q*, *Window - B/SL* and *Window - IR.*

Extended UV Filters

Extended UV Filters allow excess UV, below the normal cut-on of natural sunlight. They are used to produce faster or more severe test results. Extended UV Filters are specified in some automotive test methods and are sometimes used for aerospace applications. The most common Q-Sun filter of this type is the *Extended UV - Q/B.*

Long Lasting Lamps

The Q-Sun uses air-cooled xenon arc lamps to significantly reduce operating and maintenance expenses. Typical lamp life is 1500 hours. Q-Sun model Xe-1 uses one lamp and model Xe-3 uses three.

Changing lamps is quick and easy and does not interfere with the specimen exposure. Simply disconnect the plug, release two set screws and slide out the lamp housing.

Q-Sun air-cooled lamps are easily accessible from the front of the tester.

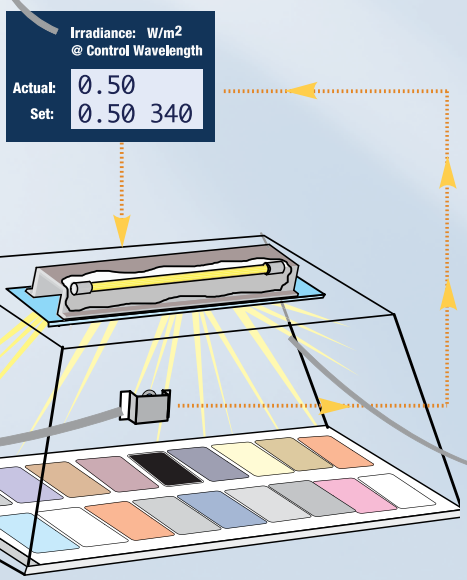
Solar Eye Irradiance Control

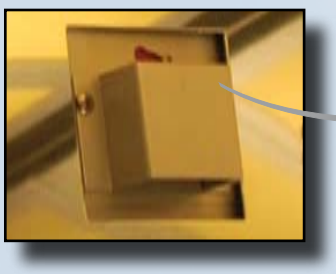
The Q-Sun is equipped with Solar Eye Irradiance Control, a patented, precision light control system. The Solar Eye allows the user to choose the desired level of irradiance. It automatically monitors and maintains the programmed light intensity. Irradiance is monitored and controlled at 340 nm, 420 nm or TUV.

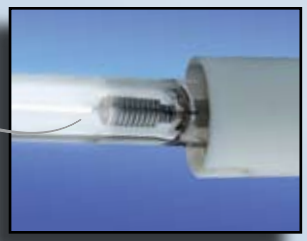
How it Works

Step 1: The operator selects the desired irradiance level (set point). The Solar Eye irradiance display shows the "Set" and "Actual" irradiance of the lamp.

Step 2: The built-in Solar Eye irradiance sensor measures the light intensity and transmits it to the controller.





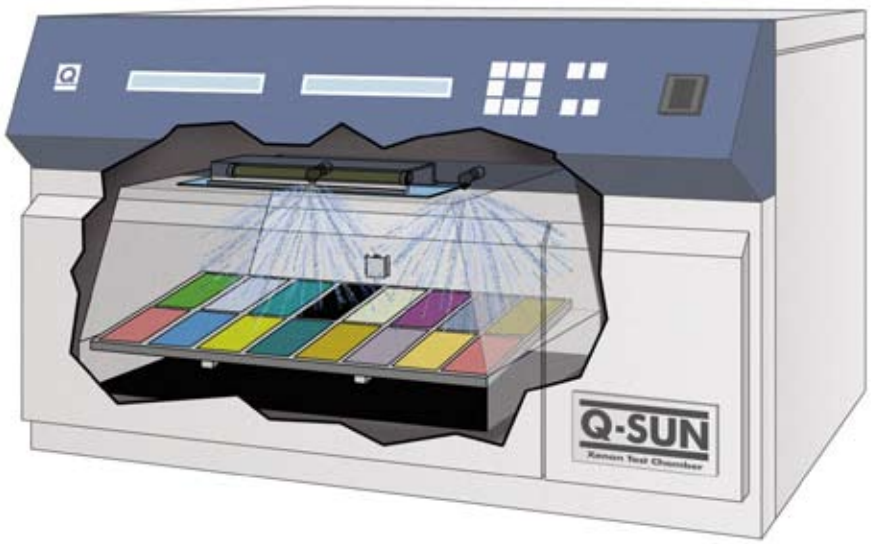


Step 3: The Solar Eye Irradiance Controller compares the "Actual" measured irradiance to the "Set" irradiance point.

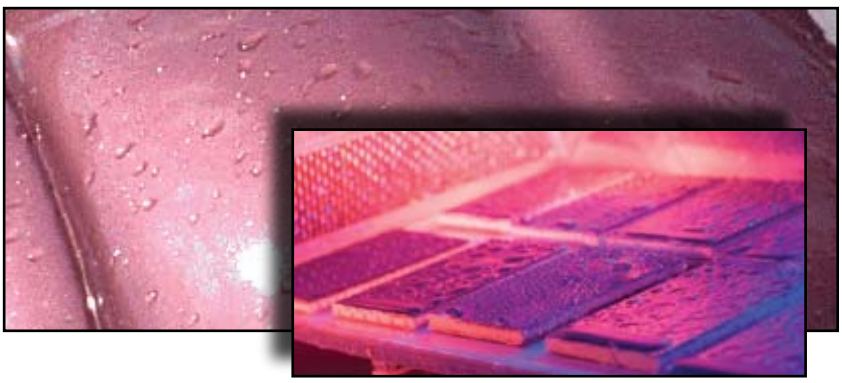
Step 4: The Solar Eye Controller adjusts power to the lamp to maintain the set-point irradiance.

Illustration of the Xe-1 chamber interior.
The Xe-3 features 3 lamps and 3 irradiance sensors.

The Q-Sun uses a pure water spray to simulate outdoor moisture attack.



Both the Q-Sun Xe-1 and Xe-3 can feature water spray. Two nozzles are located at the top of the chamber.



The Q-Sun's near-horizontal specimen orientation allows moisture to dwell on the surface of the test specimens to realistically reproduce the natural outdoor exposure conditions of many materials.

Moisture Simulation

Moisture and humidity are critical for testing many materials. Q-Sun models are available with water spray and control of relative humidity.

Water Spray

The damaging effects of outdoor moisture attack are simulated by direct, pure water spray. The spray can be programmed to operate during either the light or dark periods. In addition to oxygenation, spray can be useful for creating thermal shock and/or mechanical erosion.

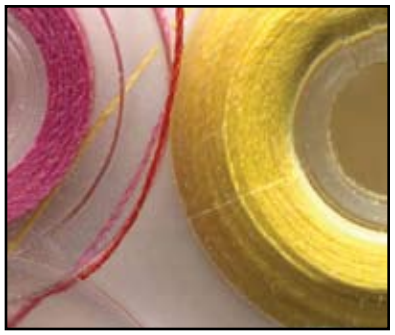
Exceptional Realism

Specimens exposed in a Q-Sun are mounted in a nearly horizontal orientation (10°). During and after a water spray cycle, a significant amount of water remains on the surface of the specimen for an extended period of time, depending on its surface tension. This mimics the natural service condition for many products such as automotive coatings and components, wood coatings, plastic lumber and some roofing materials.

Older xenon arc testers position specimens vertically and spray them with a relatively low volume of water. This causes the water to quickly run off the surface of the specimens. Research indicates that the Q-Sun's near-horizontal specimen mounting allows longer moisture dwell time and more moisture uptake – making the Q-Sun the most realistic xenon weathering tester.

Humidity Control

Many models of the Q-Sun are available with relative humidity control. Humidity can affect degradation when the material becomes physically stressed while attempting to maintain moisture equilibrium with its surroundings. Relative humidity also influences the rate at which a specimen dries. Controlled humidity is required in a number of widely used test methods.



Humidity-sensitive materials like textiles, papers and some inks may require control of humidity for the most accurate results.

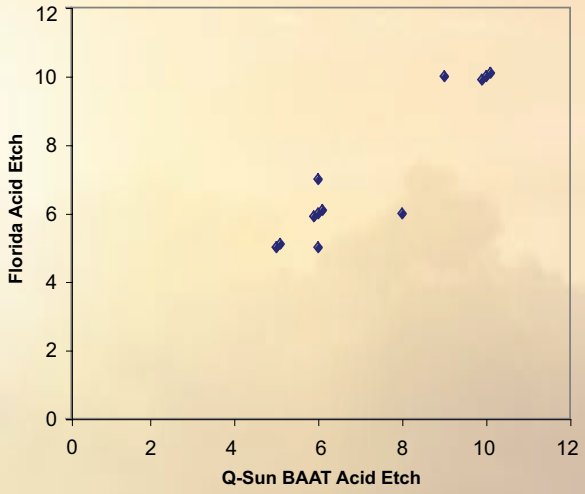
Acid Rain

To address the problem of acid etch on automotive clear coats, BASF and Q-Lab developed a new test procedure called the BASF Accelerated Acid Test (Q-Sun BAAT) that utilizes the Q-Sun Xe-3-HDS (dual spray) and an acid rain solution.

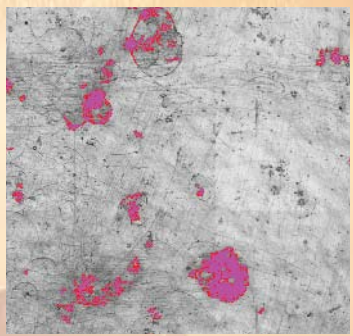
Supported by years of research, the Q-Sun BAAT test is the only proven effective acid rain test available. This test has been shown to produce excellent correlation to outdoor results in as little as 400 hours of laboratory testing.

For more information about the Q-Sun BAAT test, please refer to technical bulletin LX-5025.

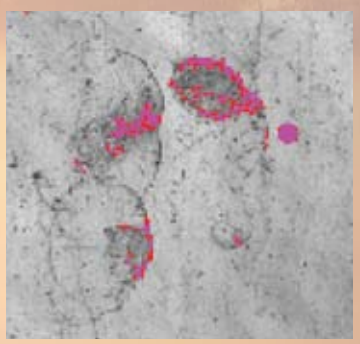
Q-Sun BAAT vs. Outdoors



Developed by BASF & Q-Lab, the Q-Sun BAAT test demonstrates excellent correlation to natural Florida acid rain exposures.

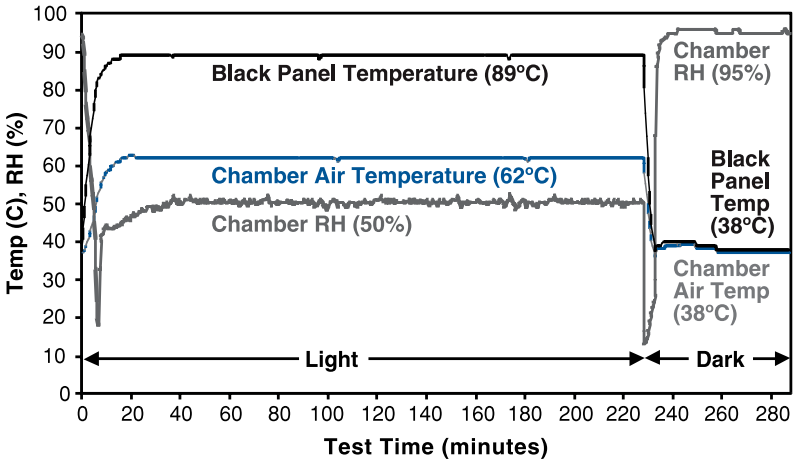


Acid etch: Q-Sun



Acid etch: Florida

The Black Panel Temperature sensor is mounted in a 2x4¨ specimen holder.



Simultaneous control of Black Panel and Chamber Air Temperature is a requirement for the control of the Chamber Relative Humidity.

Temperature Monitoring & Control

Control of temperature is important because it influences the rate of degradation. Specimen exposure temperature is precisely controlled in the Q-Sun using a black temperature sensor.

Black Panel Temperature

Black Panel Temperature can be set at any point between 50°C and 90°C (113°F to 194°F) depending upon the irradiance level, lamp age and ambient room temperature. Both insulated or uninsulated sensors (Black Standard or Black Panel) are available.

Chamber Air Temperature.

In many Q-Sun models, Chamber Air Temperature can also be controlled simultaneously with Black Panel Temperature to give the ultimate control of specimen temperature.

Low Temperature Applications

For some interior products, such as pharmaceuticals and cosmetics, lower exposure temperatures are necessary to prevent unnatural degradation. With the Q-Sun you can achieve these more realistic test conditions by using IR Filters, an external chiller, or both.

Chiller A chiller is available for both Xe-1 and Xe-3 models. With a chiller, a Q-Sun can operate at 25-32°C Black Panel Temperature or 15-20°C Chamber Air Temperature, depending on the model.

Window - IR Filter Certain textile test methods such as ISO 105 B02 for lightfastness testing call for "heat reducing filters." The Q-Sun *Window - IR Filter* reduces heat-generating IR radiation to allow lower exposure temperatures. A Q-Sun with IR filters can operate at 40°C Black Panel Temperature or 35°C Chamber Air Temperature.

The chiller for the Q-Sun Xe-3 is a separate unit that sits next to the tester. The Xe-1's chiller serves as its stand.

Calibration and Control

Easy Calibration Assures Accuracy

The Q-Sun is equipped with a number of sensors to monitor and control the environment inside the chamber. Depending on the model, sensors may include Solar Eye Irradiance, Black Panel Temperature, Chamber Air Temperature and Relative Humidity. All Q-Sun sensors are calibrated to assure accurate and consistent results. Q-Lab's Calibration Labs are accredited by the American Association of Laboratory Accreditation (A2LA) and UKAS for ISO 17025.

Calibrating your Q-Sun is simple using the CR20 Radiometer and CT202 Thermometer.

AutoCal Irradiance Calibration

Solar Eye Irradiance calibration is quick and easy. A calibration port is located on the specimen tray. Simply lift the tray and place the CR20's sensor into the port and close the chamber door. The Q-Sun's patented AutoCal system automatically transfers the data from the CR20 Calibration Radiometer to the Solar Eye Irradiance Controller.

AutoCal makes calibrating the Q-Sun's irradiance fast and practically operator error-free. Calibrations are traceable to the U.S. National Institute of Standards and Technology (NIST) to comply with ISO requirements.

The CR20's UV sensor is placed into the calibration port located in the specimen tray.

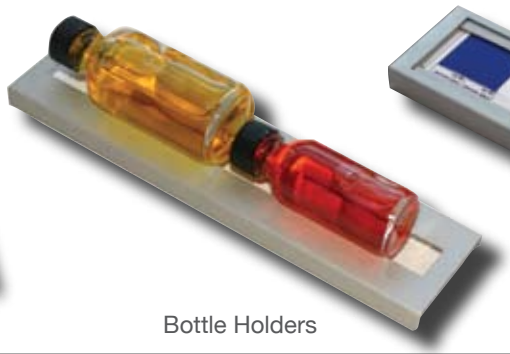
Versatile Specimen Mounting

The Q-Sun's flat specimen mounting system offers the flexibility to test many sizes, shapes and types of specimens. Three-dimensional specimens such as parts, components, bottles and test tubes can be placed directly onto the specimen tray. The near-horizontal specimen tray is also useful for testing materials that flow at elevated temperatures, for materials exposed in petri dishes and for "ponding" in roofing applications.

Holders are available in a number of sizes to accommodate traditional flat specimens, like panels and plaques. Bottle holders, textile holders and special mountings are also available.

3-D specimens can be placed directly on the specimen tray and in most cases do not require a specimen holder.

Flat Specimen Holders



Bottle Holders

Textile Holders & Masks

Q-SUN Xenon Test Chambers

Q-Sun Models

There is a Q-Sun model with the capabilities that you need. Models range from a basic tabletop tester to a full-featured tester with humidity control, water spray and chiller.

Q-Sun Xe-1. The Q-Sun Xe-1 is an economical, single lamp, tabletop tester with multiple capabilities. Its small scale is perfect for a lab with a limited budget or only an occasional need for testing. The Q-Sun Xe-1's slide out specimen tray is 9.88" x 18" (251 mm x 457 mm). Installation is simple and you can exhaust the Xe-1 directly into the room.

Q-Sun Xe-3. The Q-Sun Xe-3 is a full-feature, full-size, self-standing tester at a breakthrough price. It utilizes three separate xenon lamps for larger capacity. This 17.5" x 28" (451 x 718 mm) specimen tray is almost four times larger than the Xe-1 and is useful for exposing large, three-dimensional parts or components.

All Q-Suns Feature:

- Full spectrum xenon
- Low cost replacement lamps
- Solar Eye™ Irradiance Control
- Choice of irradiance control points
- Choice of filter systems
- 3-D specimen mounting
- ISO, ASTM & SAE compliance
- AutoCal™ for quick and easy calibration
- Black Panel or Black Standard temperature control

Q-Sun Options

Humidity Control. RH control is available in Xe-3 models only. These models simultaneously control, monitor and display Relative Humidity, Black Panel Temperature and Chamber Air Temperature.

Spray. Water spray is available in both the Xe-1 and the Xe-3. Spray can be programmed during either the light or dark cycles. Spray nozzles are located at the top of the exposure chamber.

Back Spray. Back spray is required by some SAE test methods; it allows water to be sprayed on both the front and back of specimens, simultaneously.

Dual Spray. Dual spray is available for the Xe-3 only. It allows a second liquid solution, such as an acid rain or soap solution, to be sprayed onto test specimens. A large external reservoir, centrifugal pump and filter are attached to a portable cart.

Chiller. Chiller is available for both the Xe-1 and Xe-3. It is used to lower temperatures when testing heat sensitive materials. The Xe-1 with chiller is configured so that the chiller is essentially a "permanent stand" for the tester. For an Xe-3, the chiller is a separate unit that requires additional floor space.

The Q-Sun Xe-3's large specimen capacity accommodates nearly four times as many panels as the Xe-1. The full size Xe-3 is shown with the optional dual spray reservoir; the Xe-1 bench top model is shown on top of the optional chiller.

Q-Lab Corporation — *www.q-lab.com*

Q-LAB

Q-Lab Headquarters
& Instruments Division
800 Canterbury Road
Cleveland, OH 44145
Tel. 440-835-8700
Fax: 440-835-8738

Q-Lab Europe
Express Trading Estate,
Farnworth
Bolton BL4 9TP
England
Tel. +44 (0) 1204-861616
Fax: +44 (0) 1204-861617

Q-Lab China
Room 1809/1810
Liangyou Bldg.
618 Shangcheng Rd.
Pudong District
Shanghai, China 200120
Tel. 86-21-5879-7970
Fax: 86-21-5879-7960

Weathering Research Service

Q-Lab Florida
1005 SW 18TH Ave.
Homestead, FL 33034
Tel. 305-245-5600
Fax: 305-245-5656

Q-Lab Arizona
24742 W. Durango St.
Buckeye, AZ 85326
Tel. 623-386-5140
Fax: 623-386-5143

LX-5000.4_EN