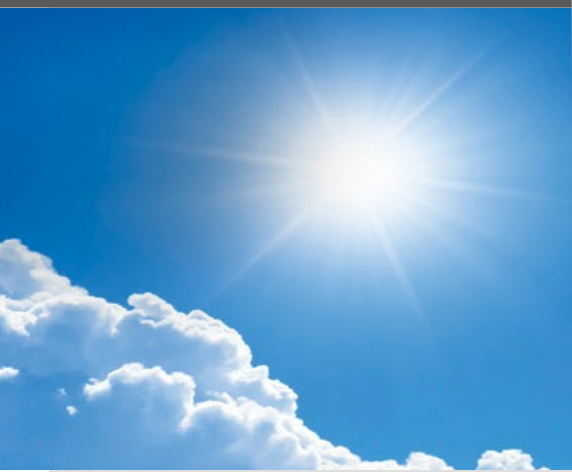




## Xenon Test Chambers



We make testing simple.



# Weathering Basics

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Sunlight, heat and moisture cause millions of dollars in product damage every year. Cracking, crazing, hazing, fading and yellowing can occur indoors or outdoors. With Q-SUN® xenon test chambers, you can simulate the damage caused by full-spectrum sunlight, temperature and moisture. In just a few days or weeks, a Q-SUN tester can reproduce the damage that occurs over months or years outdoors.

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## Xenon Testers

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Q-SUN xenon test chambers are the ultimate research & development and quality control tool for testing materials that are exposed to direct sunlight, sunlight through window glass or indoor lighting. With a variety of models and options, you can customize your Q-SUN chamber to fit your testing needs.

Three basic models suit the xenon testing needs of any lab: the tabletop Q-SUN Xe-1, the rotating rack Q-SUN Xe-2, and the large-capacity Q-SUN Xe-3. All models are full-featured weathering, lightfastness and photostability chambers and meet all major industry standards.

Q-SUN test chambers are used by companies worldwide in dozens of different industries and applications to aid in the selection of new materials, the improvement of existing materials or the evaluation of how changes in formulation affect product durability.



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

# Why Q-SUN?

## Simple to Afford

Q-SUN xenon arc testers were specifically designed to have the lowest total cost of ownership in the industry. Their low purchase price, low lamp price, and low operating costs set a new standard for lightfastness testing. Now even the smallest lab can afford xenon arc weathering and lightstability testing.

## Simple to Use

Q-SUN xenon test chambers are easy to install, easy to program and easy to operate. Specimen mounting and evaluations are simplified with specially designed specimen holders. All models are completely automated and can operate continuously, 24 hours per day, 7 days per week, without supervision. The testers are smart enough to alert you to problems they may encounter during testing.

## Simple to Maintain

We believe that just because a product is technical, it doesn't have to be hard to understand or difficult to maintain and repair. Instead of complicating our tester designs by loading them with extra or unnecessary features, we put our engineering effort into keeping things simple. Subsystems are modular, easy to troubleshoot and even easier to replace. This makes typical maintenance and repair of Q-SUN testers simple enough that it doesn't require a field technician (but we're here if you need us).



*Every feature of a Q-SUN tester was designed with simplicity in mind.*

# Q-SUN Models

## Flat Array



### Q-SUN Xe-1

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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 tester's slide-out specimen tray is 251 mm x 457 mm (9.88" x 18"). Installation is simple and you can exhaust the Xe-1 directly into the room.



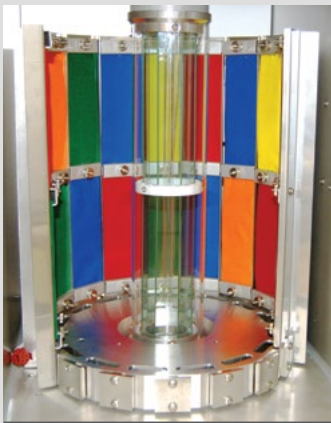
### Q-SUN Xe-3

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



# Rotating Rack



## Q-SUN Xe-2

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The Q-SUN Xe-2 xenon tester offers a large-capacity rotating rack. It is often selected to meet some of the few remaining hardware-specific testing standards. It supports 31 specimens of 46 mm x 122 mm (1.8" x 4.8") each. Its single air-cooled lamp is more economical than water-cooled lamps, highly efficient and very low maintenance. The versatile Q-SUN Xe-2 tester is the simplest, most reliable, and easiest to use rotating rack xenon arc tester available.

*The Xe-2 tester's rotating rack*

# Key Features

## 1 Remarkably Simple User Interface

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The Q-SUN tester's user interface is designed to be functional, highly reliable and easy to use. The controller allows for complete self-diagnostic error checking and can be programmed in 5 languages.

**More on page 12**

## 2 AUTOCAL Calibration

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Q-Lab's patented AUTOCAL® technology makes user calibration of the Q-SUN tester's on-board irradiance sensor fast and error-free. The hand-held Universal Calibrator system's UC20 Smart Sensor requires a yearly, inexpensive recalibration. **More on page 13**

## 3 Full Spectrum Xenon Lamps

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Xenon arc lamps produce the most realistic reproduction of full spectrum sunlight, including ultraviolet, visible light and infrared radiation. They are air-cooled, to maximize life while minimizing operating costs.

**More on page 8**

## 4 Long-Life Optical Filters

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A choice of optical filters is available to simulate a variety of service environments. Unlike many competing systems, Q-SUN optical filters last indefinitely under normal use.

**More on page 9**

## 5 Programmable Water Spray

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Outdoor moisture attack is simulated via a pure water spray, an optional feature in all Q-SUN models. Spray can be programmed to operate during either the dark or light cycle.

**More on page 10**

## 6 SOLAR EYE Irradiance Control

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The Q-SUN tester's SOLAR EYE® irradiance control system constantly monitors and controls lamp output to assure precise light exposure and to maximize repeatability and reproducibility of test results.

**More on page 9**

## 7 Precision Temperature Control

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All Q-SUN models control specimen temperature with a black panel (uninsulated) or a black standard (insulated) sensor. In the Xe-2 and Xe-3 models, chamber air temperature can be simultaneously controlled.

**More on page 11**

## 8 Versatile Specimen Mounting

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In the Xe-1 and Xe-3, the flat specimen mounting tray accommodates different shapes, sizes and types of three-dimensional specimens. The Xe-2 typically utilizes flat specimens.

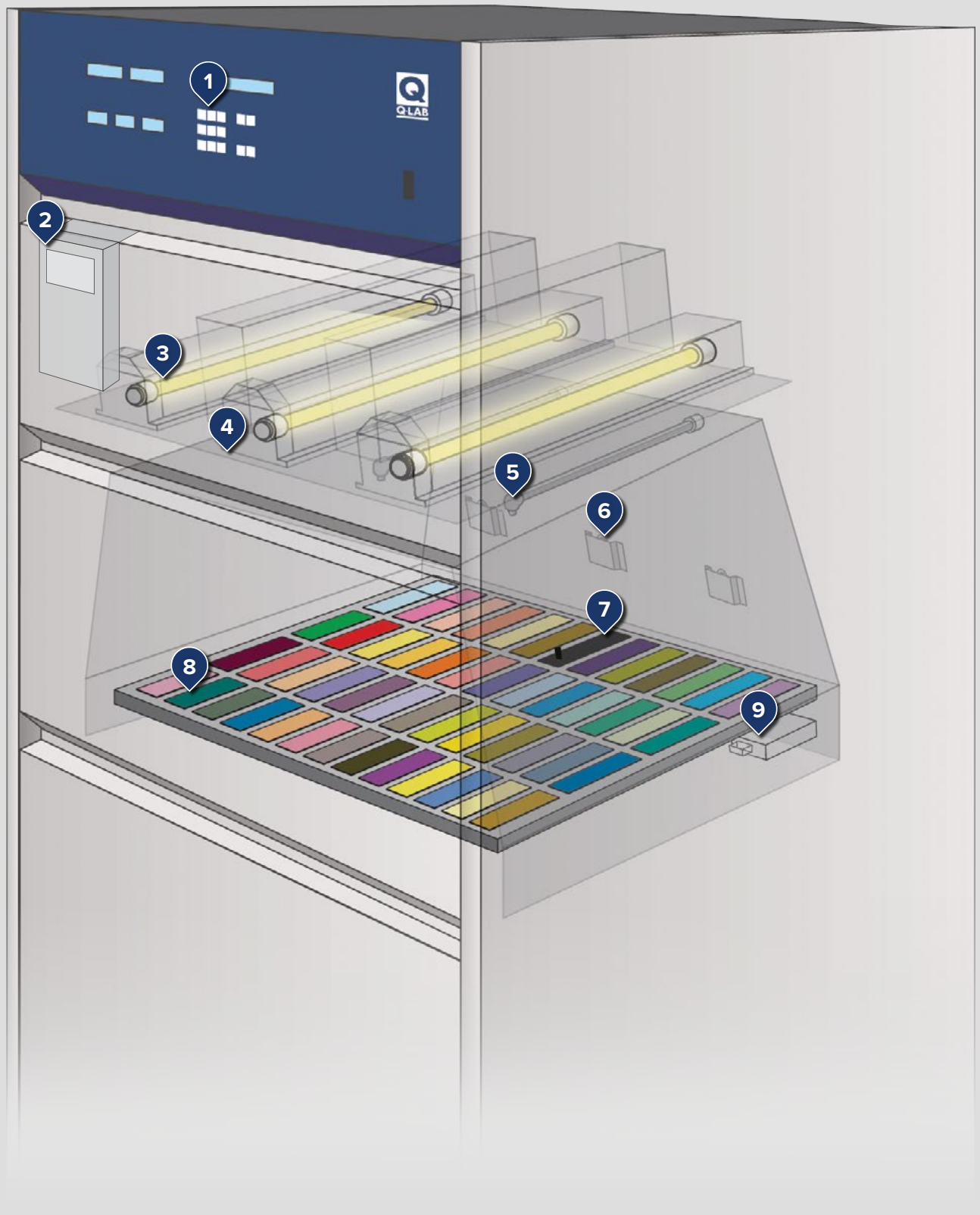
**More on page 12**

## 9 Relative Humidity Control

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Q-SUN Xe-2 and Xe-3 models feature precise control of relative humidity. This is often useful for testing interior materials, such as textiles, papers and inks.

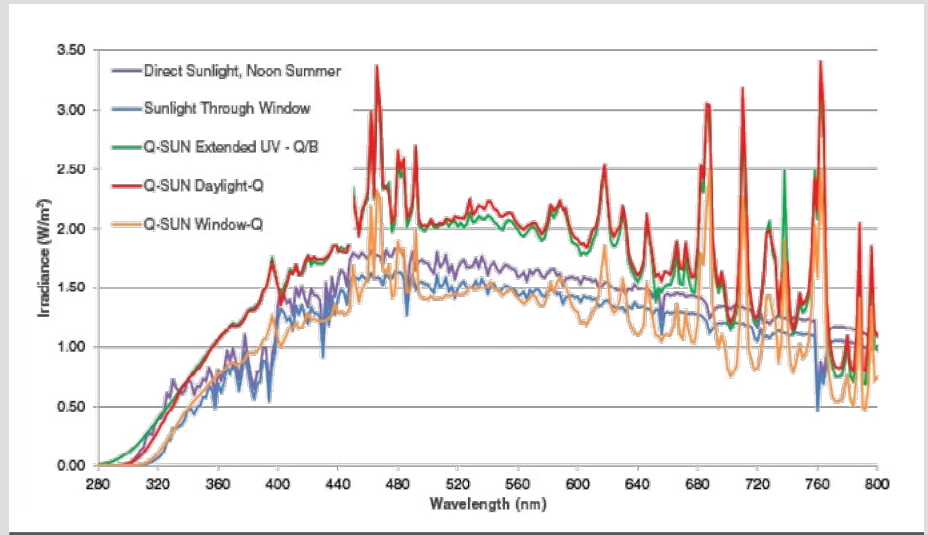
**More on page 10**



*Q-SUN testers aren't loaded with unnecessary features — just the ones you need.*

# Sunlight Simulation

The Q-SUN testers' 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.



## Full-Spectrum Xenon Lamps

Q-SUN xenon arc test chambers use air-cooled xenon arc lamps to significantly reduce operating and maintenance expenses. Lamp life is guaranteed at 1500 hours. Q-SUN models Xe-1 and Xe-2 use one lamp and model Xe-3 uses three.

Changing lamps is quick and easy and does not interfere with the specimen exposure. In the Xe-1 and Xe-3, simply disconnect the plug, release one set screw and slide out the lamp housing. In the Xe-2, the lamp is easily accessible from the top of the tester. Replacement only requires the user to open an access door, release a set screw, and remove the trigger finger. The lamp and lamp housing can then be easily lifted out of the tester.



*The Q-SUN tester's air-cooled xenon lamps maximize economy and ease of use.*



## Long-Life Optical Filters

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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 optical filters are available to simulate a variety of service environments. The application or test method dictates which filters should be used.

Q-SUN optical filters are exceptionally durable and maintain the required spectrum indefinitely under normal use.

For the Q-SUN Xe-1 and Xe-3, filters consist of a single pane of specially formulated glass. The Q-SUN Xe-2 tester's optical lanterns consist of an outer borosilicate or quartz glass cylinder and two sets of 7 durable inner filters, arranged in a two-tier heptagon.



*The Xe-2 optical filter lantern*

### Daylight Filters

Daylight filters are used to simulate direct sunlight. They provide the best correlation to natural outdoor exposures for most applications. Materials that are typically used outdoors like roofing or exterior coatings should be tested using daylight filters. Three different types of daylight filters are available for Q-SUN xenon test chambers: Daylight – F, 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. Four different window glass filters are available: Window - Q, Window - B/SL, Window SF-5 and Window - IR.

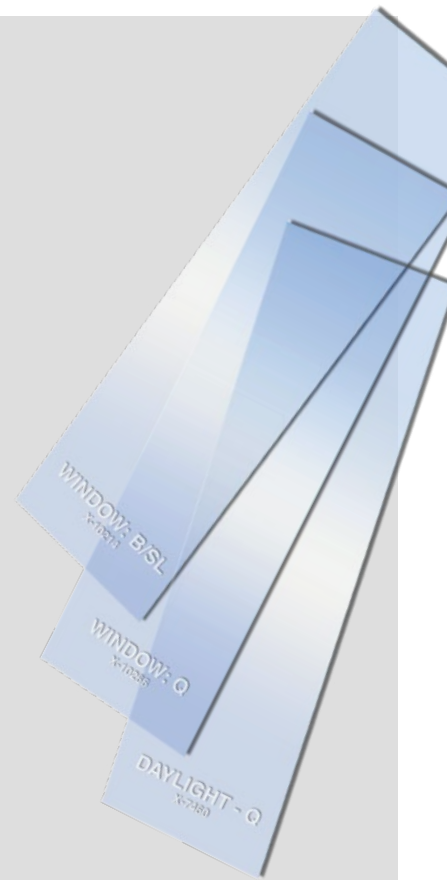
### Extended UV Filters

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. There are two available Q-SUN filters of this type: Extended UV - Q/B and Extended UV - Quartz.

## SOLAR EYE Irradiance Control

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All Q-SUN xenon test chambers are equipped with SOLAR EYE irradiance control, a patented, precision light control system. The SOLAR EYE system 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.



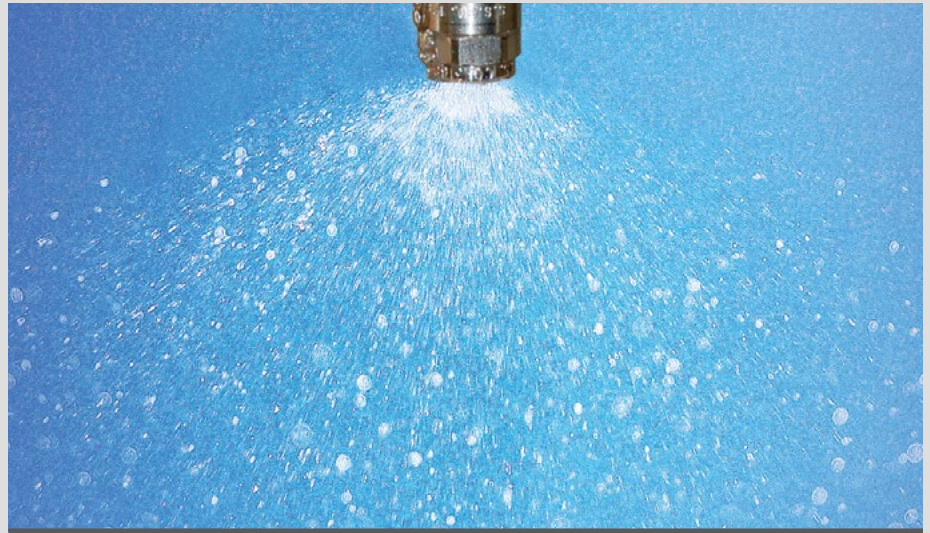
# Environmental Simulation

## Moisture

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Moisture, such as water spray, condensation and humidity is critical for testing many materials. All Q-SUN models are available with optional water spray and both the Xe-2 and Xe-3 models offer standard control of relative humidity.

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## Water Spray

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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 and can be useful for creating thermal shock and/or mechanical erosion.

## Relative Humidity

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The Q-SUN Xe-2 and Xe-3 models 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.

## Water Purity

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In Q-SUN testers with water spray, highly purified deionized water is necessary to prevent water spotting. Suspended silica is the major cause of specimen spotting. Recommended specifications are  $<0.1 \mu\text{S}$  and  $<0.2 \text{ ppm}$  silica. To conserve expensive purified water, an advanced water repurification system is an available option. **See page 14**



## Exceptional Realism

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Specimens exposed in a Q-SUN Xe-1 and Xe-3 are mounted in a near horizontal orientation. During and after a water spray cycle, a significant amount of water can remain on the surface of the specimen for an extended period of time. This mimics the natural service condition for many products such as automotive coatings and components, wood coatings, plastic lumber and some roofing materials.

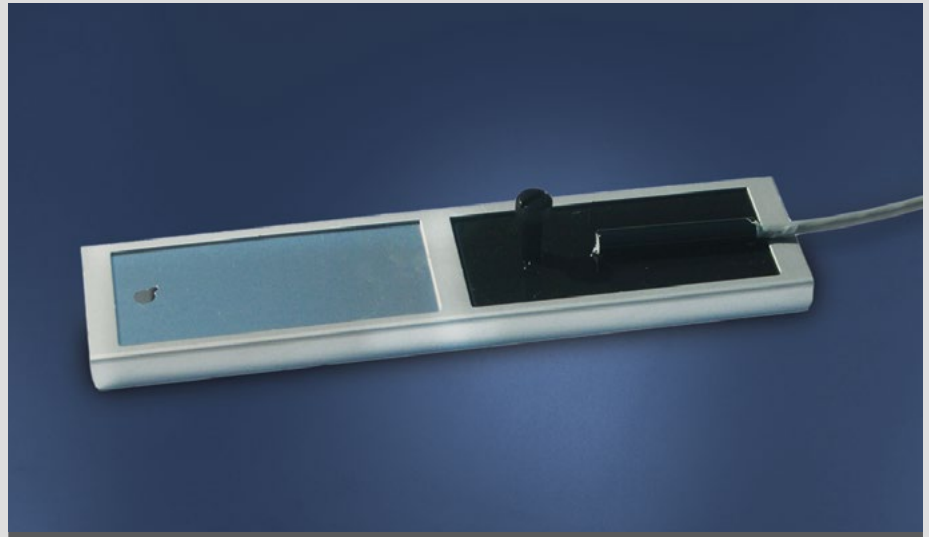
# Temperature

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Control of temperature is important because it significantly influences the rate of degradation.

Specimen exposure temperature is precisely controlled in all Q-SUN xenon chambers using a black panel temperature sensor.

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## Black Panel

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A black panel thermometer is used to control temperature in the Q-SUN test chamber. Due to its black coating which absorbs all wavelengths uniformly, it provides an estimate of the maximum temperature of specimens in the chamber. Black panel temperature can be set at any point between 25°C and 120°C (77°F to 248°F) depending upon the irradiance level, lamp age, ambient room temperature, black panel sensor and specific tester model. Both insulated or uninsulated sensors (black standard or black panel) are available.

## Chamber Air

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In both the Q-SUN Xe-2 and Xe-3 models, chamber air can also be controlled simultaneously with black panel to give the ultimate control of specimen temperature. The low-cost, disposable sensor also monitors and controls relative humidity. In the Xe-1, chamber air or black panel temperature must be selected.

## Lower Temperatures

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For some interior products such as pharmaceuticals and cosmetics, lower exposure temperatures are necessary to prevent unnatural degradation. An optional chiller is available for these applications.

**See page 14**



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*An optional chiller is available for applications requiring low exposure temperatures.*

# Operation

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Q-SUN xenon test chambers are extremely simple to operate. Specimen mounting and evaluations are simplified with specially designed specimen holders. Programming is intuitive. All models are completely automated and can operate continuously, 24 hours per day, 7 days per week.

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## Specimen Mounting

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Specimens exposed in a Q-SUN Xe-1 and Xe-3 are mounted in a nearly horizontal orientation. This flat specimen mounting system offers the flexibility to test many sizes, shapes and types of specimens.

The Q-SUN Xe-2 rotating rack positions specimens vertically. This configuration is ideal for testing thin, flat specimens such as textiles, paints and coatings.

Standard holders are available in a number of sizes to accommodate a variety of different specimens. Bottle holders, textile holders and special mountings are also available.

## Programming

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Designed to be both functional and easy to use, the Q-SUN controller can be programmed in five user-selectable languages (English, French, Spanish, Italian or German). Users can program and store up to 10 tests in memory, which has a battery back-up feature.

## Standards

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Every Q-SUN tester goes through extensive acceptance testing with a test standard of your selection, which is pre-loaded into memory. This includes weathering and lightfastness standards from ISO, ASTM, SAE, AATCC, IEC, GM and VW, just to name a few.





# Calibration & Maintenance

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Q-SUN chambers are equipped with a number of on-board sensors to monitor and control the environment inside the chamber. All Q-SUN sensors need to be calibrated or replaced periodically to ensure accurate and consistent results. This process is simple and inexpensive in a Q-SUN tester.

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## Irradiance

The Q-SUN tester's on-board SOLAR EYE irradiance sensor needs to be calibrated periodically by the user to assure accurate and consistent results. Calibrating the Q-SUN tester is simple using the Universal Calibrator system's UC20 calibration radiometer, and takes only a few minutes. UC20 devices come with a 340nm, 420nm, or 300-400nm TUV (Total UV) sensor and must match the type of sensor actually used in the Q-SUN tester.

Calibration of the UC20 radiometers needs to be performed annually. The UC20 Smart Sensors were designed to be disposable and cost-efficient, and should be replaced annually with a freshly-calibrated UC20. UC20 units may also be returned for calibration for users who prefer recalibration to replacement.

Our recalibration labs are accredited by A2LA and UKAS for ISO 17025.

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## Temperature

All Q-SUN black panel temperature sensors need to be calibrated periodically by the user to assure accurate and consistent results. Calibrating the black panel temperature sensor is simple using a the Universal Calibrator system's UC202 calibrated temperature sensor and UC1 handheld display.

Note that UC202 thermometers come with either an uninsulated black panel or insulated black panel sensor, and must match the type of sensor actually used in the Q-SUN tester. This sensor must match the type of sensor actually used in the Xe-1 tester. The chamber air temperature sensor in an Xe-2 and Xe-3 is inexpensive and requires replacement once per year.

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## Relative Humidity

RH control is available in Xe-2 and Xe-3 models. These models simultaneously control, monitor and display relative humidity, black panel temperature and chamber air temperature.

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## Maintenance

The Q-SUN controller includes complete self-diagnostic error checking. The controller constantly monitors the status and performance of all systems. It also displays simple warning messages, routine maintenance reminders and performs safety shutdown, as needed.

Typical maintenance items are lamps, sensor calibrations and inexpensive air filters.



# Accessories & Options

## Specimen Holders

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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 for the Q-SUN Xe-1 and Xe-3. 3-D specimens can be placed directly on the specimen tray and in most cases do not require a specimen holder.



## Chiller

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A chiller is available for both the Xe-1 and Xe-3. It is used to lower temperatures when testing temperature-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.



## Water Repurification

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Unlike competing systems that simply recirculate dirty water, Q-Lab’s repurification system repurifies water in addition to conserving it. Due to the high cost of purified water, the system can pay for itself in a matter of months.



## Dual Spray

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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. The system consists of a large external reservoir, centrifugal pump and a filter.



## Water Immersion

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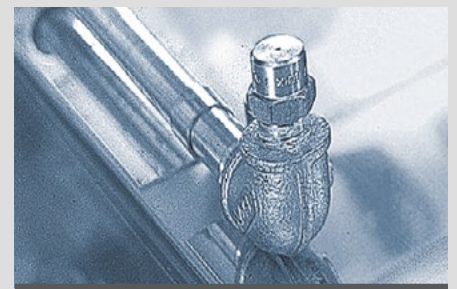
The Xe-1-W xenon test chamber performs weathering testing of specimens immersed in a temperature-controlled water bath, as required by such international standards as ISO 16474-2 and ETAG 002. This tester features an automatically-controlled water fill and drain system, precise temperature control, and an integral water repurification and monitoring system.



## Back Spray

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Back spray is required by some SAE test methods; it allows water to be sprayed on both the front and back side of specimens simultaneously. This configuration is ideal for use with a water repurification system.




# Summary

● Standard


◐ Optional

Feature	Xe-1	Xe-2	Xe-3
Chamber Type	Flat Array	Rotating Rack	Flat Array
Specimen Capacity	17	31	55
Specimen Orientation	10°	90°	10°
3D Specimen Capability	●	–	●
Full Spectrum Xenon Arc Lamps	1	1	3
Long-Life Optical Filters	●	●	●
SOLAR EYE Irradiance Control (340 nm, 420 nm or TUV)	●	●	●
Black Panel Temperature Control	●	●	●
Chamber Air Temperature Control	◐	●	●
Relative Humidity Control	–	●	●
AUTOCAL Calibration	●	●	●
Programmable Water Spray	◐	◐	◐
UC20 Calibration Radiometer	◐	◐	◐
UC202 Calibration Black Panel Thermometer	◐	◐	◐
Water Repurification System	◐	◐	◐
Chiller	◐	–	◐
Water Immersion	◐	–	–
Dual Spray	–	–	◐
Back Spray	–	◐	◐
USB Port	●	●	●


## Our Other Products and Services




**QUV**  
Accelerated Weathering Testers




**Q-FOG**  
Cyclic Corrosion Testers




**Q-PANEL**  
Standard Test Substrates




**Q-LAB**  
Outdoor Exposure Testing



**Q-TRAC**  
Sunlight Concentrator Testing



**Q-LAB**  
Laboratory Contract Testing



**Q-RACK**  
Outdoor Exposure Racks

# Our Global Network

Q-Lab headquarters are located in Westlake, Ohio USA, with sales and distribution facilities located in England, Germany, and China. Our A2LA-accredited laboratory facilities are located in Germany, Florida and Arizona. We also maintain outdoor exposure facilities in Florida, Arizona and Ohio. We support our customers through direct salespersons and distributors in over 60 countries, across 6 continents.



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