

# EYE SUPER UV TESTER

Accelerated weather durability tester

# EYE SUPER XENON TESTER



# High Acceleration UV Tester High Correlation Xenon Tester

Every product used outdoors and must endure the harsh treatment of Mother Nature. They are exposed to the light from the sun, rain and wind. Plastics gradually crack, and paint colors fade. This phenomenon is referred to as deterioration. An accelerated weather-durability test artificially recreates outdoor conditions such as light, heat, rain and wind providing a rapid observation of the deterioration process to determine the life expectancy of a product. While Xenon based test systems are used predominately for standards development and finish testing, highly accelerated UV testing is preferred for R&D and product durability testing.

Since manufacturers in many industries are looking to design products to last 30 years or more in the field, it is essential to find ways to dramatically shorten the time it takes to simulate long life cycles of UV exposure. The EYE Super UV Tester can compresses years of detrimental UV radiation effects into just weeks of testing, allowing customers to quickly verify designs and significantly shorten product development time. The EYE Super Xenon Tester provides exceptional correlation with outdoor exposure testing along with the added flexibility of variable irradiation intensity.

These systems combine superior performance and quality for research and development, product durability testing, and standards development. They are used extensively for testing automobile parts, building materials, home furnishings, pigment/paint development, printed publications, and materials such as plastics and artificial stone. Regardless of the product, Iwasaki's systems can dramatically reduce testing time and improve quality and profitability.



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Metal Halide Lamp **EYE SUPER UV TESTER SUV-W161**

# FEATURES

## 1 Automated UV Irradiation Control

The desired UV irradiation intensity is easily set on the touch panel and then controlled by an electronic feedback system. This ensures constant irradiation intensity on the target material to deliver reliable long duration test results, even as the lamp ages.

## 2 Easy to Maintain

The SUV design makes lamp replacement very easy. The SUV-W161 does not require the removal of irradiator, water pipes, or wires. A service door on the side of the chamber provides access to the lamp allowing simpler operation and reduced maintenance time.

## 3 Simple Form, Intuitive Operation

Programming functions are performed through an intuitive touch panel for improved operability. The display allows easy monitoring for trouble. The chamber form factor fits well into any installation site.

## 4 Reduces Running Costs

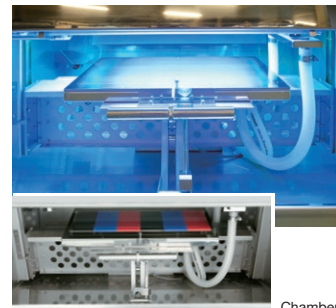
The newly adopted optical filter achieves running costs that are approximately 30% lower than the former system (SUV-W151).

## 5 Environmentally Safe Filter

The new optical filter uses a safe and clean filter without any harmful substances such as lead (Pb). The long life cycle of this filter helps reduce waste.

## 6 Supports Diverse Irradiation Conditions

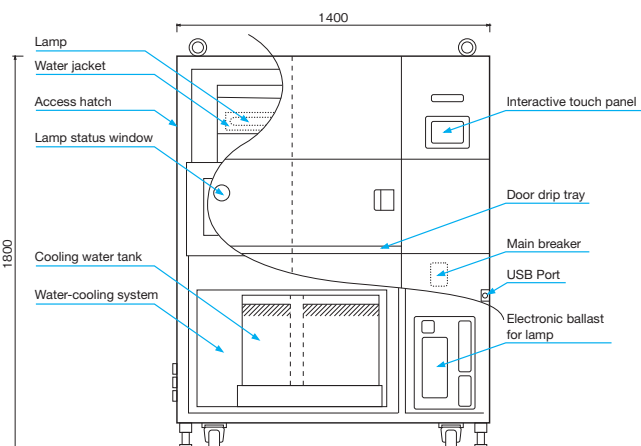
The touch-screen operating panel allows flexible setting of test conditions.



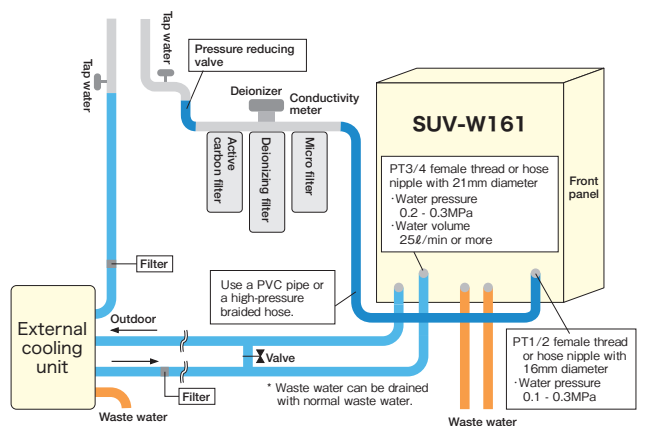
Operation area of the touch panel

Chamber interior and specimen plate

### ■ Main parts



### ■ Sample coolant and electrical connection



Contact our company when using the external cooling unit indoors as the exhaust heat must be handled properly.

# TEST DATA

Material quality is steadily improving, but the demand for products to survive prolonged outdoor exposure continues to grow. Artificially accelerated weather-durability testing is essential to enable the development of new materials within a reasonable time frame. The phenomenal performance of the EYE Super UV Tester from Iwasaki Electric provides faster, more accurate, exposure testing making it an indispensable tool for material development and research.

**1** Providing correlated acceleration factors more than 10 times typical weatherometer systems, the EYE Super UV Tester greatly increases the efficiency of research and development, quality control, and process control in the development and manufacture of plastic, paint, ink, pigment, textiles and other materials. Uniform irradiation of high intensity ultraviolet light ensures accurate and fast weather durability assessment.

**2** Programmable temperature, humidity, rainfall, UV power, rest (night time), and cycle/duration timing.

**3** An electronic feedback system provides flexible control of UV irradiation intensity and ensures constant energy to target material and uniform distribution of irradiation.

**4** Custom spectral filtering cuts UV irradiation below 295nm to eliminate the negative effect from UV irradiation not present in natural sunlight.

Example of color differences in paint  
(time required until reaching an identical value)

	Hours	Days
Outdoor exposure	10000	420
Sunshine weather meter	1000	42
Xenon	1000	42
EYE SUPER UV TESTER	100	4

## High UV irradiation intensity speeds up weather durability testing

The system concentrates the high deteriorating power of UV irradiation. The EYE Super UV Tester enables weather durability testing at an unprecedented speed. It dramatically reduces testing time that required months or years of outdoor exposure, or thousands of hours of laboratory testing, and speeds up quality verification during research and development.

### UV rays are the greatest cause of product deterioration.

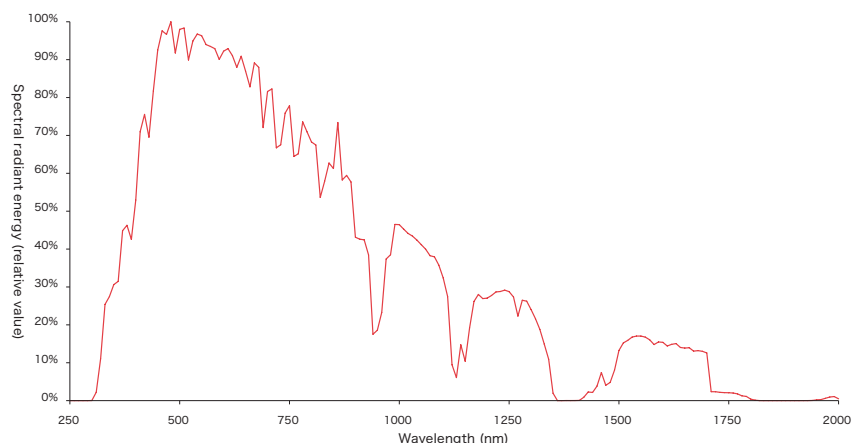
Whether it's the prolonged hot dry sun of Arizona, or the humid wet irregular sun of England, the EYE Super UV Tester can recreate these environmental conditions for repeatable testing. The system highly accelerates UV irradiation deterioration while generating the same physical changes that occur during outdoor exposure and conventional weatherometer testing. The EYE Super UV Tester, an ultra-accelerated weather durability test system, delivers capabilities that greatly exceed what is capable with common Xenon test systems.

### EYE SUPER UV TESTER test example (blue hardened PVC)

Cycle of three hours irradiation and two hours condensation



### Flat plane energy distribution of standard sunlight (IEC 60904-3)



\* Relative to 250 - 2,500nm peak wavelength = 100%

Source: Standard sunlight (IEC 60904-3), International Electrotechnical Commission IEC 60904-3 Ed. 2

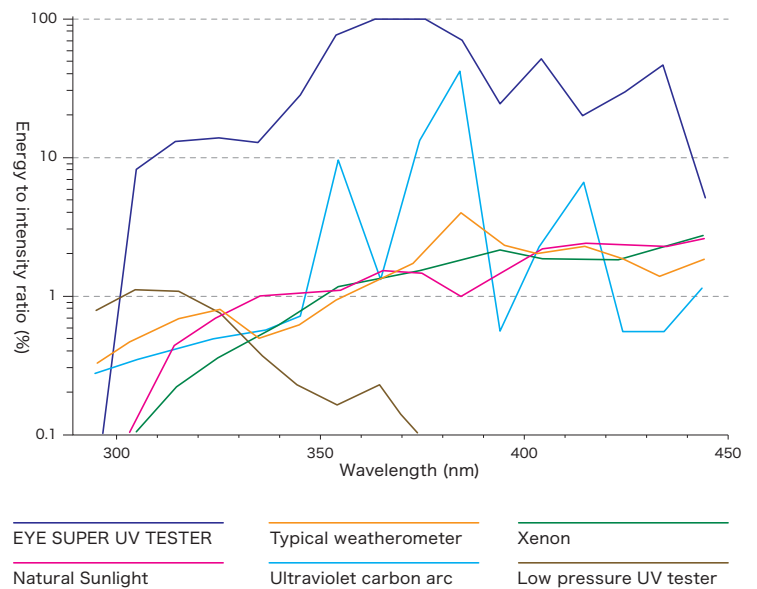
## Test data for metal halide lamp type EYE SUPER UV TESTER

### 30 times or greater UV irradiation intensity than conventional weatherometers. Unprecedented test speeds.

The EYE Super UV Tester uses a proprietary high output UV lamp that generates ultraviolet light very efficiently. Its UV irradiation intensity is 30 or more times greater than that of sunlight and conventional weatherometers. For even greater solar correlation, UV radiation below 295nm is removed from the light source by a custom filter.

Removing this radiation below 295nm, that in natural sunlight does not reach earth, produces an acceleration in deterioration that more closely resembles outdoor exposure. There is no risk that light of a wavelength not present in sunlight will bias the test results.

Ratio of energy to intensity by wavelength for different testers



### Uniform distribution of irradiation intensity ensures the reliability of weather durability test assessment

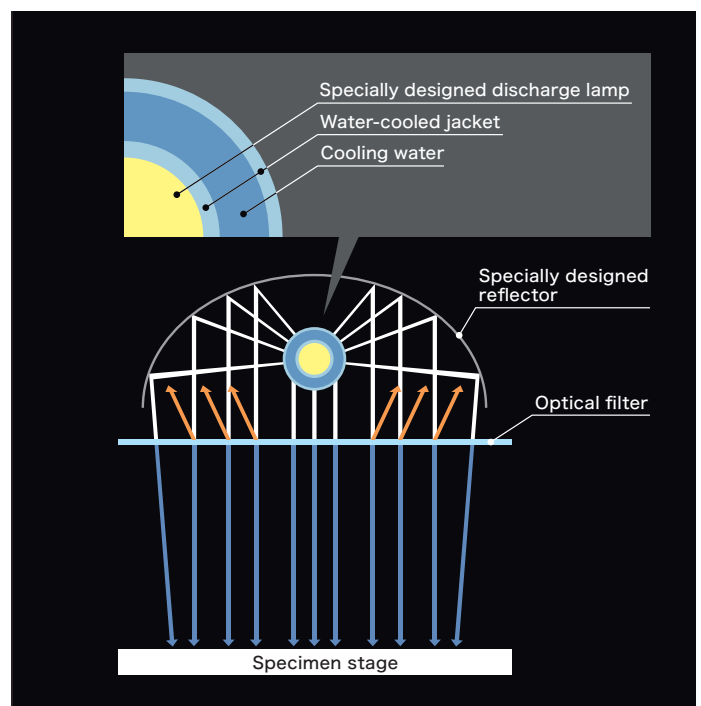
Specially designed reflectors ensure uniformity of UV irradiation distribution on the sampling plate. In addition, the automatic feedback control system guarantees that the UV intensity remains constant for unrivalled uniformity. This highly accurate and reliable UV power distribution design makes this an ideal test system for ultra-accelerated weather deterioration testing.

**The new UV irradiator system features an updated optical configuration designed to simplify the lamp replacement procedure without compromising performance characteristics.**

The SUV-W161 incorporates a newly designed optical system configuration that enables faster and easier lamp replacement. The lamp is easily accessed from a service door on the side of the system. It is not required to move or detach any cooling or filter system components. This expedites the lamp replacement while reducing the chance of damaging or displacing any system components that may affect performance.

The new optical filter is extremely durable and virtually impervious to the effects of heat and light. This new optical filter, in combination with the redesigned irradiation unit, significantly improves ease of maintenance without compromising operational performance.

Cross-section of irradiation field



# EYE SUPER XENON TESTER XER-W83

## FEATURES

### 1 Complies with a Variety of Test Standards

The light source employs xenon lamps that replicate natural sunlight. A variety of key standards such as JIS K5600-7-7: Testing Method for Paints—Part 7: Long-period Performance of Film—Section 7: Accelerated Weathering and Exposure to Artificial Radiation (Exposure to Filtered Xenon-arc Radiation) are supported. Available options also allow the system to comply with JASO high-intensity irradiation testing. Also compliant with international standards from ASTM, ISO and other entities.

### 2 Natural Sunlight Correlation

The Xenon lamp and filter assembly create testing conditions that closely approximate the spectral distribution of sunlight. Water fall “showers” and dark (day/night) cycle features further increase the system correlation with true outdoor exposure conditions.

### 3 Stable Testing without Influence from Ambient Air

The test environment (temperature, humidity, etc.) is controlled without introducing room air, allowing stable accelerated testing without any influence from the installation environment.

### 4 Outstanding Reproducibility

This integrated system ensures the target samples are exposed to an extremely uniform level of UV light to guarantee test reproducibility.

### 5 Easy Operation and Monitoring

The large touch panel allows easy setting of test conditions and operation status checks for improved test efficiency.

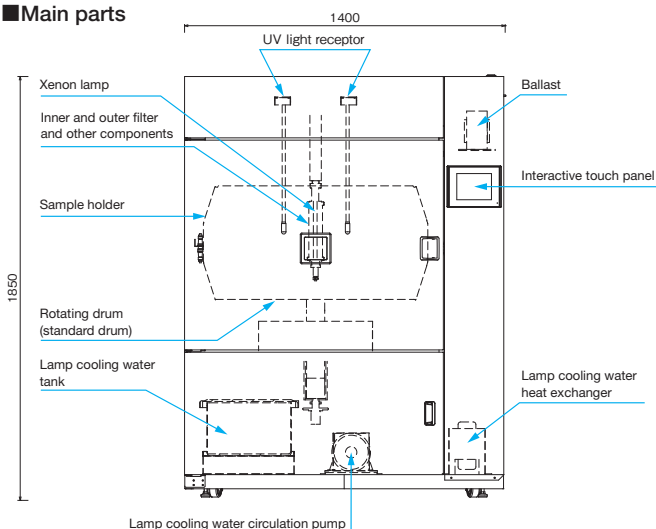
### 6 Capable of Batch Tests

This system can be used to test up to 108 samples for standard irradiation tests (30W/m<sup>2</sup> to 70W/m<sup>2</sup>) and 54 samples for high-intensity irradiation tests (60W/m<sup>2</sup> to 180W/m<sup>2</sup>).

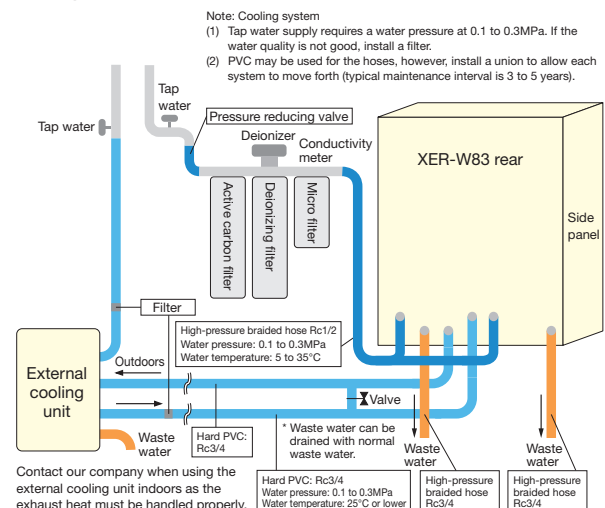


Touch-screen operating panel

### Main parts



### Sample coolant and electrical connection



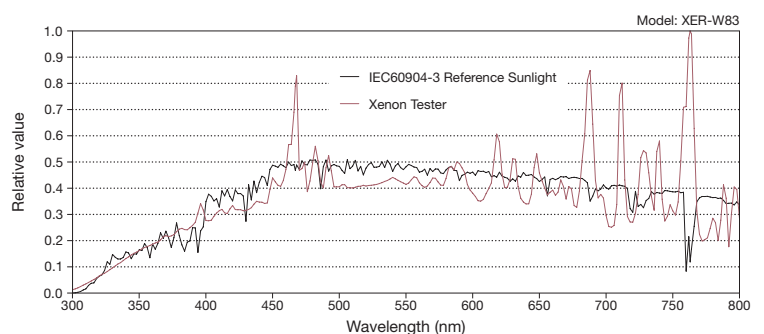
# TEST DATA

For many years weather durability testing in Japan has been performed using a variety of technologies including carbon arc (UV carbon arc lamps or sunshine carbon arc lamps). Considerable data has been accumulated using these testers in many application areas, resulting reluctance to change these testers and risk not being able to use historical data. However, due to the reasons below, migration to xenon lamp systems has started.

- 1 JIS standards have been increasingly adopting xenon lamp tests. The majority of the tests used internationally require the xenon lamp system.
- 2 Performing maintenance once a month is sufficient for a xenon lamp system.
- 3 It has been said that acceleration of a carbon system is better than that of a xenon lamp system, however, with the launch of xenon lamp system weather durability testers with higher irradiations levels, xenon lamp systems now have the same or better acceleration.  
(It depends on the irradiation level of the xenon lamp system and the filter of the carbon system.)

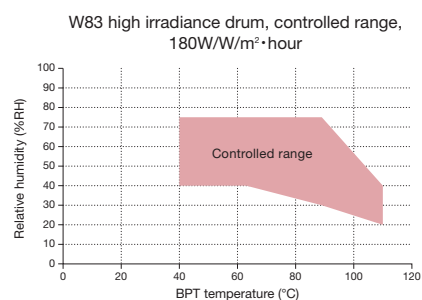
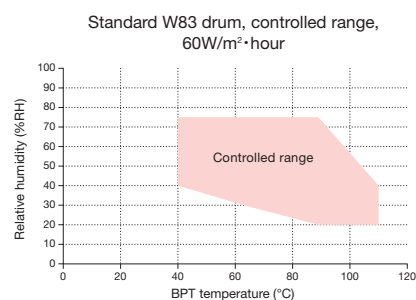
The JIS standards for paints, plastics, building materials, and textile industries have adopted the xenon lamp system. Xenon Tester XER-W83 supports these standards. With options installed, it also complies with JASO (Japanese Automotive Standards Organization), and many international standards from entities such as ASTM, ISO and others.

Spectral Power Distribution of the EYE SUPER XENON TESTER

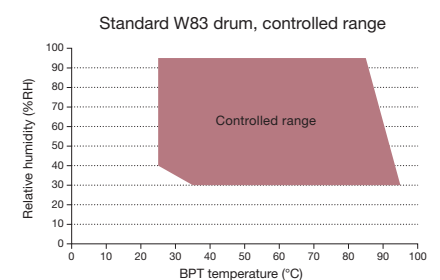


## Temperature and humidity characteristics of EYE SUPER XENON TESTER

Relationship between available black standard temperature and humidity that can be set during irradiation cycle



Relationship between available black standard temperature and humidity that can be set during dark cycle



Note: The controlled range may deviate from the range above depending on the lamp power.

## Xenon arc lamp weatherometer compliance information

The EYE SUPER XENON TESTER can be used unmodified or with optional fittings to achieve compliance with the following specifications and standards.

### 1 Paints standards

JIS K 5600-7-7 (ISO 11341)\*, JIS K 5101-09 (ISO787/15), ASTM D 4303

### 2 Plastics standards

JIS K 7350-2 (ISO 4892-2), ASTM D 2565, ASTM D 4459, ASTM D 5071

### 3 Textiles standards

JIS L 0843 (ISO 105-B02), ISO 105B-02, AATCC 169, ASTM D 4355

### 4 Automotive standards

SAE J 1885, SAE J 2412, JASO M 346, JASO M 351, ISO 3917

### 5 Other standards

JIS B 7754, ASTM C 732, ASTM D 4434, ASTM D 4637, ASTM G 26

\* The EYE Super Xenon Tester does not comply with all the standards listed above. This system does not support every test condition.

JIS: Japanese Industrial Standards  
ISO: International Organization for Standardization  
ASTM: American Society for Testing and Materials  
AATCC: American Association of Textile Chemists and Colorists  
JASO: Japanese Automotive Standards Organization  
SAE: Society of Automotive Engineers

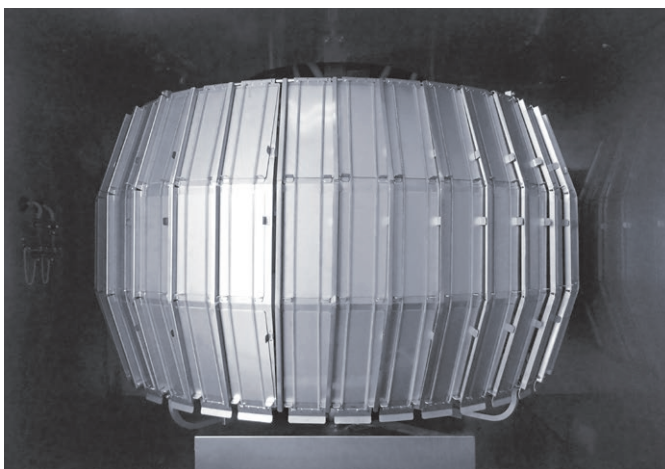
### Key standards

- JIS K5600-7-7  
Testing methods for paints  
Part 7: Long-period performance of film  
Section 7: Accelerated weathering (exposure to filtered xenon-arc radiation)
- ISO 787/15  
General methods of test for pigments and extenders  
Part 15: Comparison of resistance to light of colored pigments of similar types
- ASTM D 4303  
Standard Test Methods for Lightfastness of Colorants Used in Artists' Materials

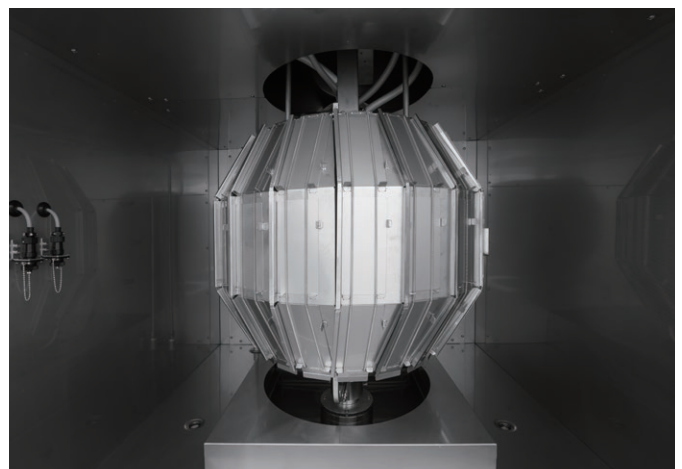
## ■ Sample frame installation example

### Capable of Batch Tests

This system can be used to test up to 108 samples for standard irradiation tests (30W/m<sup>2</sup> to 70W/m<sup>2</sup>) and 54 samples for high-intensity irradiation tests (60W/m<sup>2</sup> to 180W/m<sup>2</sup>).



XER-W83 Standard irradiation rotating drum



XER-W83 High-intensity irradiation rotating drum



# SPECIFICATIONS

## Specification for EYE SUPER UV TESTER

Model	<b>SUV-W161</b>	
Light source	Water-cooled 6kW metal halide lamp	
Shower	Shower available during irradiation, before and after condensation and before and after pause periods	
UV irradiation intensity	150±8mW/cm <sup>2</sup> *	
Uniformity ratio	90% or higher	
Temperature control range	Irradiation period (BPT)**	50 to 85°C RH (room temperature: 20°C)
	Pause period (BPT)**	35 to 75°C RH (room temperature: 20°C)
Humidity control range	Irradiation	40 to 70% RH (BPT 63°C)**
	Rest	50 to 90% RH (BPT 50°C)**
Effective irradiation area	Approx. 80,000mm <sup>2</sup> (190mm×422mm)	
Externally-supplied water	Water quality: Deionized water Water pressure: 0.1 to 0.3MPa Flow rate: Approx. 11ℓ/min (as required during operation)	
Power consumption	21kVA (three-phase 3W, 208V, 50/60Hz) Maximum current: 100A	
External dimensions	1400mm (W) × 1200mm (D) × 1800mm (H)	
Weight	Approx. 800kg	
Data output	USB flash drive	

● Please note that specifications may change due to continuous system improvement program.

● Contact us for other specifications. A “drain pan” for preventing water leakage is available.

\* Value specified by the JIS standard (100mW/cm<sup>2</sup> for conventional photometer (UVP365-01)).

\*\* BPT= Black panel thermometer

# SPECIFICATIONS

## Specifications for EYE SUPER XENON TESTER

Model	<b>XER-W83</b>		
Light source	Lamp	Water-cooled 7.5kW xenon arc lamp	
	Filters	Inner	Quartz glass (option available)
		Outer	Borosilicate glass (option available)
Test method	Enables to register 18 customized program consisted of maximum 14 segment.		
Irradiation intensity	Standard irradiation test	Control range: 30 to 70W/m <sup>2</sup> Control system: Automatic Measured wavelength range: 300 to 400nm	
	High-intensity irradiation test	Control range: 60 to 180W/m <sup>2</sup> Control system: Automatic Measured wavelength range: 300 to 400nm	
Uniformity	90% or higher		
Number of samples and effective irradiation area	Standard irradiation test	108 samples [70mm × 150mm] 11340cm <sup>2</sup> (including BPT panel)***	
	High-intensity irradiation test	54 samples [70mm × 150mm] 5670cm <sup>2</sup> (including BPT panel)***	
Temperature control range	Control range	Irradiation time: 40°C to 110°C (BPT)*** Dark: 25°C to 95°C (BPT)*** Accuracy: ±2°C	
Humidity control range	Control range	Irradiation time: 20% to 75%RH Dark: 30% to 95% RH (depends on set conditions) Accuracy: ±5%RH	
Power consumption	20kVA (three-phase 3W, 208V, 5/60Hz), Maximum current: 100A		
External dimensions	1400mm (W) × 1600mm (D) × 1850mm (H) (not including protrusions)		
Weight	Approx. 800kg		

● Please note that specifications may change due to continuous system improvement program.

\*\*\* BPT = Black panel thermometer

\* Portable photometer is optional.

## OPTIONS

**SUV-W161** ① External cooling unit

**XER-W83**

- ① External cooling unit (cooler)
- ② Water recycle system
- ③ Black standard temperature gauge
- ④ White standard temperature gauge
- ⑤ Optical filter for standard
- ⑥ Handheld photometer
- ⑦ High-intensity unit
- ⑧ Custom-made sample holder

- ① External cooling unit (cooler) is required as optional equipment if water for industrial use cannot be otherwise provided.
- ② A water recycle system is used for conserving pure water or tap water volume and lower running costs.

## Handheld UV photometer

### Features

#### 1 Accurate numerical management of UV irradiation intensity

Measurement values are digitally indicated and easy to read. A measurement value hold function helps preventing measurement errors.

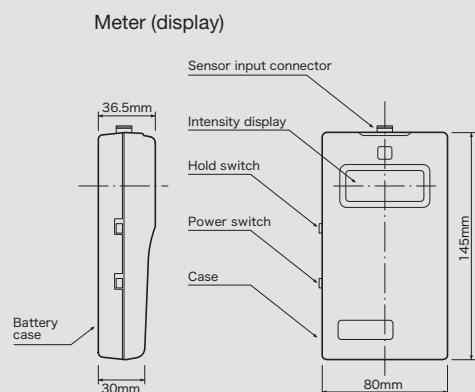
#### 2 High measurement accuracy

Spectral sensitivity characteristics that match the spectral distribution curve of the UV tester ensures high measurement accuracy.

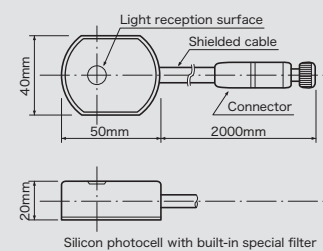
#### 3 Compact and easy to use

Measurements are available by turning the tester on and off and calibration is not required.

The receptor cells are silicon photocells. The receptors are compact. The meter is powered from a dry battery (9V). A battery check function is provided.



#### Sensor (receptor)



## Reference Data

# Correlation assessment test between SUV-W161 and outdoor exposure conditions

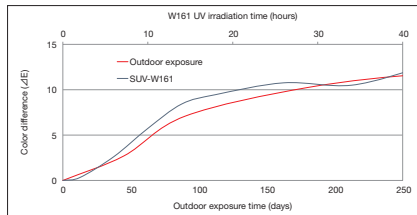
### Test data 1:

ABS (black), commercial product

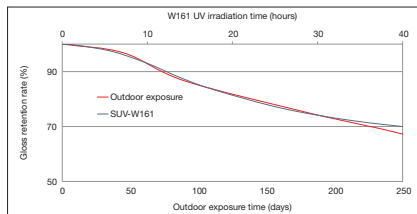
#### ○Testing conditions

Model: SUV-W161	
Irradiation setting	100mW/cm <sup>2</sup> (photometer: UVP365-01)
BPT temperature	63°C
Humidity	50%RH
Cycle	2-hour irradiation/2-hour condensation 4-hour irradiation/4-hour condensation after 20 hours

#### (1) Color difference



#### (2) Gloss retention rate



#### (3) Comment

Outdoor exposure	Gloss disappeared and bleached over time.
SUV-W161	Gloss disappeared and bleached over time.

Changes in color and gloss are visually the same. Color difference and gloss retention rate of the metering and measurements have a correlation. The acceleration ratio is estimated as approximately 150.

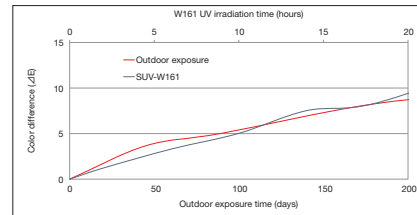
### Test data 2:

PC (transparent), commercial product

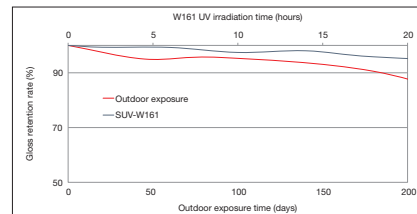
#### ○Testing conditions

Model: SUV-W161	
Irradiation setting	100mW/cm <sup>2</sup> (photometer: UVP365-01) *
BPT temperature	63°C
Humidity	50%RH
Cycle	2-hour irradiation/2-hour condensation

#### (1) Color difference



#### (2) Gloss retention rate



#### (3) Comment

Outdoor exposure	The color changed from transparent to brownish over time. There is little change in gloss.
SUV-W161	The color changed from transparent to brownish over time. There is little change in gloss.

Change in color is visually the same and there is little change in gloss. The color difference between the metering and measurements has a similar process and the acceleration ratio is estimated as approximately 240. However, there is some correlation difference in gloss as there is a slight change in gloss during natural exposure in the acceleration test.

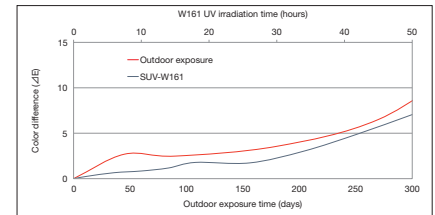
### Test data 3:

PVC (black), commercial product

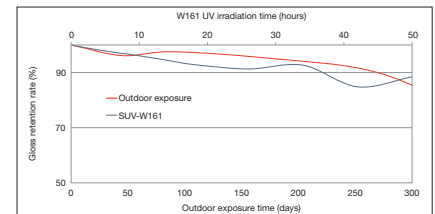
#### ○Testing conditions

Model: SUV-W161	
Irradiation setting	100mW/cm <sup>2</sup> (photometer: UVP365-01) Note
BPT temperature	63°C
Humidity	50%RH
Cycle	2-hour irradiation/2-hour condensation 4-hour irradiation/4-hour condensation after 20 hours

#### (1) Color difference



#### (2) Gloss retention rate



#### (3) Comment

Outdoor exposure	Bleached over time. There is little change in gloss.
SUV-W161	Bleached over time. There is little change in gloss.

Changes in color and gloss are visually the same. The color difference between the metering and measurements has a similar trend. The acceleration ratio of the color difference is estimated as approximately 140. Gloss retention rate of the metering and measurements shows a higher retention rate for both the tests.

\* 150mW/cm<sup>2</sup> by the JIS standards (UVP365-03A).

## Other IWASAKI equipment related to environmental testing.

### Large area UV irradiator (10 to 30SUN)

This system is a UV durability tester that employs a large sample area and is capable of larger sample tests. The sample itself can be tested.

Lamp	Water-cooled metal halide lamp
Irradiation area	1100×1400mm
UV intensity	150mW/cm <sup>2</sup>
Irradiation deviation	±15% or lower
Work temperature	60°C±5°C



### Compact optical irradiation tester (EYE SUN-CUBE® Xenon)

Compact lightfastness tester suitable for simple light deterioration test requirements.

Lamp	Xenon lamp
Rated power	400W
Sample stage area	□200mm
Uniformity	90% or higher (φ100mm)
Input power	960VA
Input voltage	AC100V (both 50/60Hz)



# Delivery record of large UV irradiation equipment



Walk-in weather durability tester

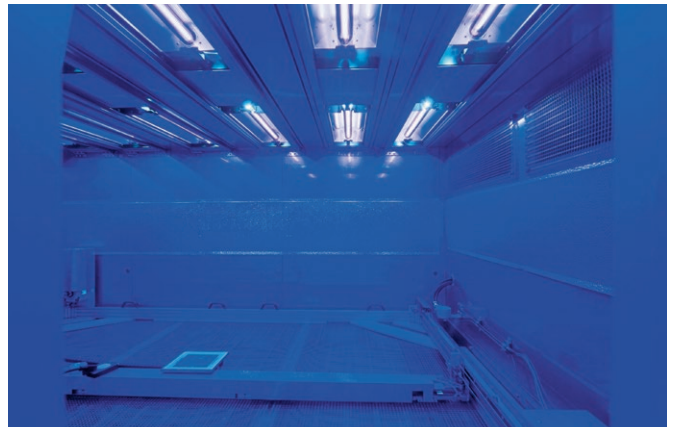


Light irradiation environmental test chamber



Walk-in weather durability tester interior

Client: Railway Technical Research Institute  
 Deliverables: weather durability tester (4 x 12kW metal halide lamps)  
 Maximum effective ultraviolet irradiation range: 2.0m x 1.0m



Inside the test chamber during ultraviolet irradiation

Client: Japan Electrical Safety & Environment Technology Laboratories  
 Deliverables: Light irradiation environment test facility (12 x 4kW metal halide lamps)  
 Maximum effective ultraviolet irradiation range: 1.8m x 1.5m

## ⚠ Important safety information

- For your safety, be sure to observe the following.
- Read through the Operation Manual prior to use. Always operate in accordance with the Operation Manual.
- For optimum results, use only as directed and for the stated purpose.

### Warning

Improper usage could lead to serious injury or death.

- Always shut off the power before opening the lid or commencing inspection or maintenance procedures.
- Due to the risk of electric shock and injury, the mains power box should only be opened by suitably qualified operators.
- Irradiation can harm the eyes and cause skin inflammation. During inspection, do not look directly at the lamp or expose the skin to irradiation.
- Keep hands away from conveyors and other rotating parts to avoid injury.

### Caution

Improper usage could lead to danger with potential for injury or damage.

- The lamp becomes very hot during use. When replacing the lamp, wait until it has cooled down completely to prevent injury or burns.
- The power supply and self-ballasted irradiator must be properly earthed.
- Do not block external ventilation intake holes, which are used for internal ventilation of the system.
- Keep hands away from moving parts such as the ventilator fan and conveyor motor to avoid injury.
- Do not operate the system if the ambient temperature is 35°C or higher, as this may cause the cooling system to perform a safety shutdown. Contact Iwasaki Electric for advice.
- The operating environment should be relatively free of contaminants such as foreign gases and dust particles, which can cause corrosion or compromise system control.

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