



Solar Simulation

Environmental Chambers & Systems



SOLAR / WIND / HUMIDITY / TEMPERATURE

Environmental Light Irradiation Test Chambers

IWASAKI, the Lighting Experts

Iwasaki's environmental light irradiation test chambers expand conventional test chamber capabilities by providing constant temperature and humidity control, along with options for a wide array of light source conditions.

Multiple light technologies to meet diverse testing requirements

Iwasaki has over 60 years of experience and successful installations combining a wide array of light sources and optical filters to provide quality simulated solar lighting solutions.



400W Metal Halide technology Lamp
Complies with IEC and JIS Class C spectrum conformity.



150W Metal Halide technology Lamp
Complies with IEC and JIS Class B spectrum conformity.



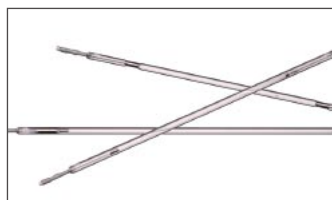
Dual Technology Lighting System
(Combined Metal Halide and Halogen Technology)
Ideal for custom environmental testing such as vehicle performance evaluation and artificial climate chambers.



Infrared Lamps
Optimum when placing emphasis on the heat quantity of infrared rays.



Ultraviolet Lamps
Spectral distribution corresponding to PV qualification standards (IEC61215 / IEC61646).



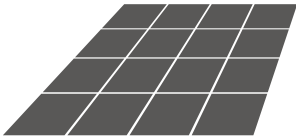
Pulsed Xenon Lamps
This technology provides the basis for our IEC and JIS Class A spectrum irradiation systems.



Optical Filter for Spectrum Control
Fully controls the designed spectral range.

Planning and designing the optimum device

Our flexible systems can be designed according to your test requirements, to suit environmental conditions like interior volume, temperature, humidity, solar radiation intensity, and in combination with various measuring instruments.

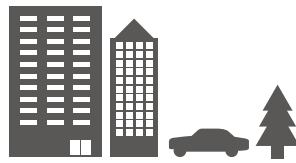


Supporting solar cells from development to manufacture

Solar energy is free and basically unlimited. Using it produces no greenhouse gases or other adverse environmental impact. To directly convert this outstanding energy source, however, more efficient photovoltaic (PV) systems must be developed. Iwasaki's lighting systems are playing an active role in each process of basic research, development and production.

Basic research and development	Output measurement evaluation test	Complex Environment Simulator
	Durability performance test	Class A Bench-top Solar Simulator EYE Super UV Tester
Production process	Stabilization of product quality	Light Irradiation Systems for PV Production Lines
	Improvement of production efficiency	Pulsed xenon solar simulator
Verification / quality assurance tests	IEC61646, IEC61215, etc.	Light-soaking Tester
		UV Preconditioning Tester (1SUN)
		UV Preconditioning Tester (1 to 5SUN)

Photovoltaic

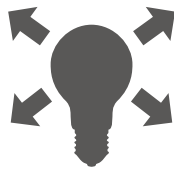


Solar simulation

IWASAKI's solar lighting systems are recognized for superior solar simulation environmental testing; evaluating outdoor-use product quality, reliability and safety.

- Climate Chambers
- Construction Material Testing
- Vehicle VOC Testing
- Other Environmental Tests

Simulation

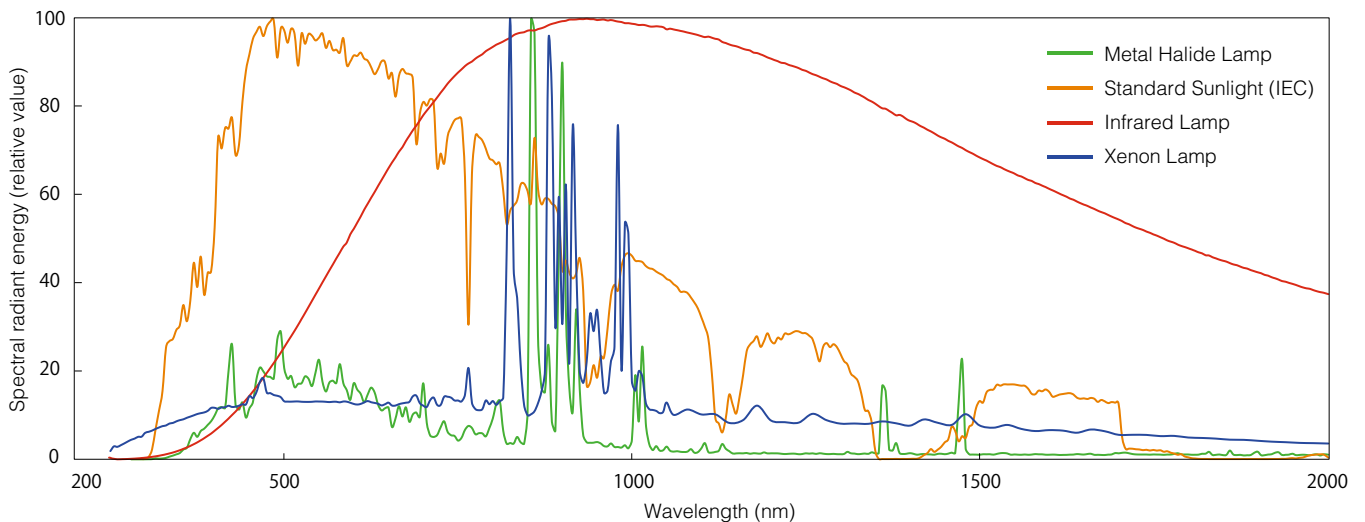


From general lighting fixtures (visible light) to industrial equipment applications

In addition to actively developing lighting that utilizes advanced optical technology, IWASAKI provides a wide selection of products and systems in various fields.

Applied Optics

Comparison of various light source spectral distribution (displayed in relative value with a maximum value of 100)



Supporting the Development and the Manufacturing of PV Cells and Modules

In order to create a better global environment, great hopes are being placed on solar photovoltaic arrays (PV) as a future primary energy source. Iwasaki is proud that our solar simulation lighting systems are playing an active role in the basic research, product development, and manufacturing of new technology PV panels. Solar simulation lighting has become indispensable for the efficient development and production of high performance, high quality PV panels. The environmental conditions required differ depending on the tests, such as output measurement evaluation and durability assessment, and manufacturing processes. Iwasaki's equipment perfectly controls the "Light", "Temperature" and "Humidity" according to each process and provides the optimal test environment.

Basic research and development

Conversion rate improvements for solar cells

Cell/module output measurement evaluation

Durability improvement quality assurance test

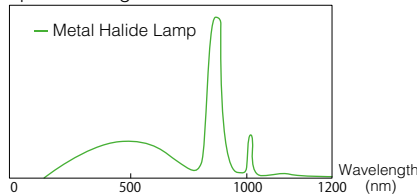
Durability performance test simulating an outdoor environment



Complex Environment Simulator

- Simulated Solar Lighting (diffusion light type)
- Programmable Temperature
- Programmable Humidity
- Multiple Samples

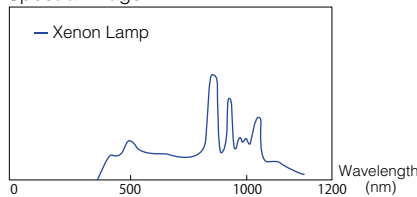
Spectral image



Class A Bench-top Solar Simulator

- Simulated Solar Lighting (parallel light type)
- Small Sample

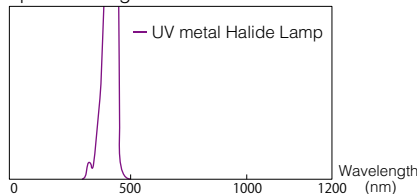
Spectral image



EYE Super UV Tester

- UV Light
- Programmable Temperature
- Programmable Humidity
- For Deterioration Testing

Spectral image



Production process

Product quality stabilization

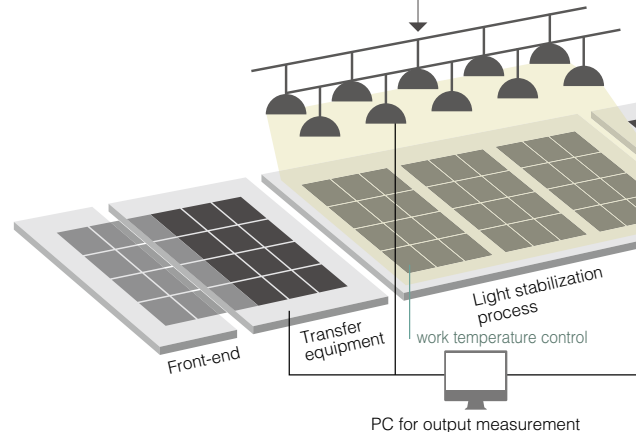
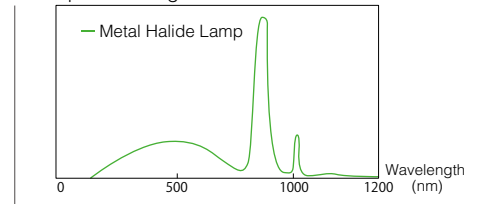
Light stabilization process

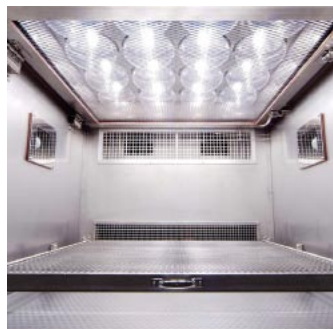


Light Irradiation System for PV Production Lines

- Simulated Solar Lighting (diffusion light type)
- Programmable Temperature

Spectral image





Solar simulator class

IEC 60904-9

Item	Class		
	A	B	C
Spectral concordance level	0.75~1.25	0.6~1.4	0.4~2.0
Irradiated area variation (%)	±2%	±5%	±10%
Irradiated time fluctuation (%)	STI(short term)	±0.5%	±2%
	LTI(long term)	±2%	±5%

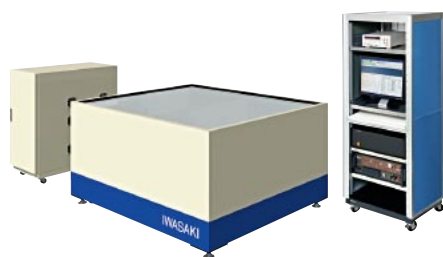
JIS C8912 · 8933

Item	Class		
	A	B	C
Spectral concordance level	0.7~1.25	0.6~1.4	0.4~2.0
Irradiated area variation (%)	Under ±2	Under ±3	Under ±10
Irradiated time fluctuation (%)	Under ±1	Under ±3	Under ±10

The quality of light is categorized into Classes by IEC and JIS standards. We will recommend the light technology and performance to meet the specific equipment requirements for use in basic research, development, production and verification testing.

Verification / quality assurance testing

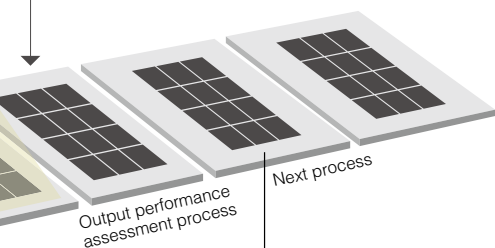
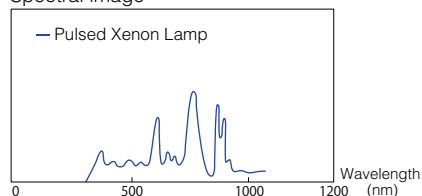
Quality assurance testing



Xenon Long Pulse Solar Simulator

Simulated Solar Lighting (diffusion light type)

Spectral image



Communication with the transfer equipment and the up-stream/down-stream process

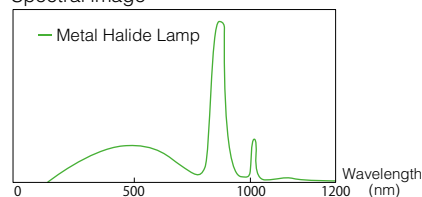
Comprehensive communication control system



Light-soaking System

Simulated Solar Lighting (diffusion light type) Programmable Temperature

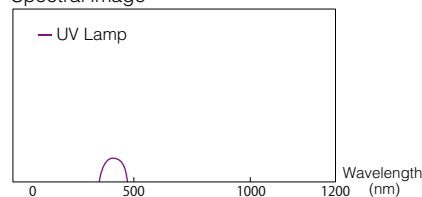
Spectral image



UV Preconditioning System (1SUN)

UV Light Programmable Temperature

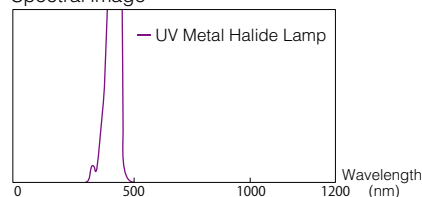
Spectral image



UV Preconditioning System (1 to 5SUN)

UV Light Programmable Temperature

Spectral image



Basic Research and Development

IEC60904-9

JIS C 8912

JIS C 8933

Complex Environment Simulator

Complies with IEC60904-9 solar simulator/classes B and C. Includes integrated temperature and humidity controls, allowing the output measurement testing and the complex durability testing to be conducted by one unit. The work size and the temperature/humidity control range, etc. can be customized.

These chambers are available at Iwasaki for testing your samples; please contact your local agent for details.

Item	Complex Environment Simulator
Irradiation range	300mm×300mm
Light source	Metal Halide Lamp
Radiant intensity	Approximately 1000W/m ²
Spectral concordance level	Classes B (0.6 to 1.4), C (0.4 to 2.0)
Irradiated area variation	Classes B (under ±5%), C (under ±10%)
Irradiated time fluctuation	Class A (under ±1%)
Temperature control	Work temperature : +25°C to +90°C
Humidity control	20%RH to 90%RH

* Specifications may vary depending upon application.
* Customization of the irradiation range, etc. is also available.



Delivery example

▶ Nagaoka University of Technology

Complex Environment Simulator
(large solar simulator)

Item	
Radiant intensity	Approximately 1000W/m ²
Spectral concordance level	Class C (0.4 to 2.0)
Irradiated area variation	Class C (under ±10%)
Irradiated time fluctuation	Class C (under ±10%)
Irradiation range	1200mm×1200mm
Temperature control	+20°C to +60°C (during irradiation)
Humidity control	20%RH to 70%RH (during irradiation)



IEC60904-9

JIS C 8912

JIS C 8933

Class A Bench-top Solar Simulator

Complies with IEC60904-9 solar simulator/class A. Primary light irradiation testing (performance evaluation testing) for solar research and development.

Item	Small solar simulator
Irradiation range	50mm×50mm
Light source	Xenon Lamp
Radiant intensity	1000W/m ²
Spectral concordance level	Class A (0.75 to 1.25)
Irradiated area variation	Class A (under ±2%)
Irradiated time fluctuation	Class A (under ±1%)
Incoming radiation angle	Under 3°

* Specifications may vary depending upon application.
* Customization of the irradiation range, etc. is also available.



Features

- Testing is accelerated to more than 10 times that of typical weathering chambers. Accurate and speedy weather-durability assessment is enabled by the uniform irradiation from our proprietary high intensity UV irradiation source.
- The irradiation distribution is uniform. The output irradiation power is programmable and maintained by a feedback control circuit.
- The system cuts wavelengths under 295nm. Negative influence by wavelengths that are not found in sunlight has been eliminated.

EYE Super UV Tester

UV rays are the greatest cause of product deterioration. This unique system dramatically intensifies the deterioration acceleration caused by UV rays. It can achieve an acceleration factor greater than 100 times normal sunlight, producing material effects equivalent to extended outdoor exposure. Its compact size makes it ideal for research and development testing of paints, inks, pigments and fibers as well as plastics.

Item	EYE Super UV Tester
Irradiation range	190mm×422mm
Light source	Metal Halide Lamp (with filter)
UV intensity	150±8mW/cm ²
Irradiated area variation	Under ±10%
Temperature control (BP: black panel)	+50°C to +85°C (during irradiation) +35°C to +75°C (idle)
Humidity control	40%RH to 70%RH (during irradiation) at BP 63°C 50%RH to 90%RH (idle) at BP 50°C
Shower	Available during condensation and after downtime (idle)

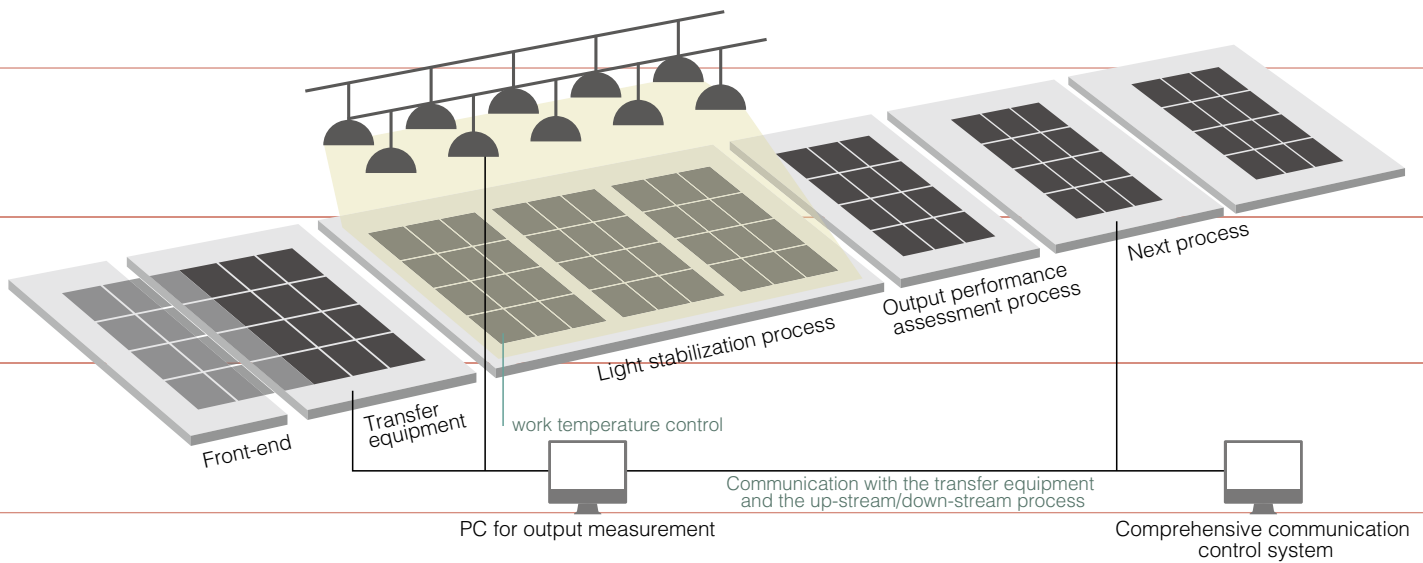
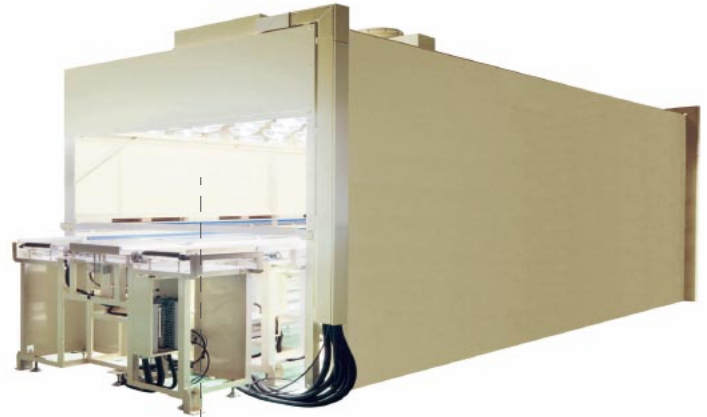
These chambers are available at Iwasaki for testing your samples; please contact your local agent for details.



Production Process

Light Irradiation System for PV Production Lines

In a PV production line, solar-simulated light is often required for light stabilization of modules and the assessment of PV output performance. Iwasaki has developed a system incorporating its unique continuous light source technology to provide the simulated solar irradiation required in the PV production line process. We provide a complete process system including material handling, temperature control, equipment control, and process communication.



IEC60904-9

JIS C 8912

JIS C 8933

Xenon Long Pulse Solar Simulator Three Target Sizes

Complies with IEC60904 Class A solar simulation standards. Up to 100ms of effective irradiated time is achieved. Through our proprietary filter technology, spectral concordance conforms to IEC / JIS Class A standards. Three systems provide a wide selection to meet your panel size, floor space, and performance requirements.

Item	Xenon Long Pulse Solar Simulator		
	XLP8	XLP16	XLP24
Target Irradiation Area (mm)	600 x 1200	1100 x 1400	1100 x 2000
Light Source	Filtered Pulsed Xenon Lamp		
Radiant Intensity	1000W/m ²		
Total Cycle Time	10 sec / test; production capacity up to 360 modules / hr		
Effective Pulse Duration	Programmable 10 to 100ms		
Spectral concordance level	Class A (0.75 to 1.25)		
Irradiated area variation	Class A (under ±2%)		
Irradiated time fluctuation	Class A (under ±1%)		

* Specifications may vary depending upon application.

* Customization of the irradiation range, etc. is also available.

1

Flash

1000

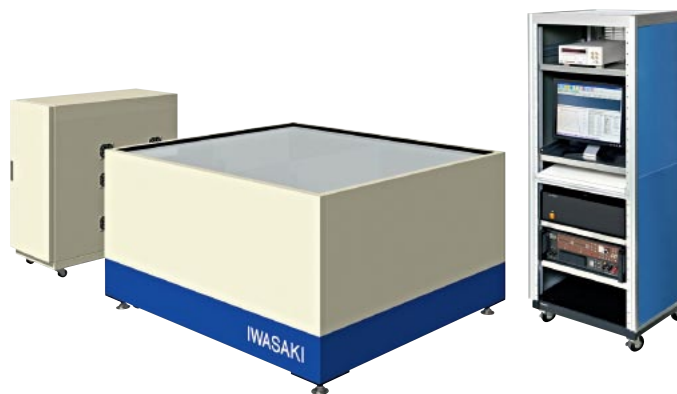
points

Reduced inspection time

Enhanced quality management

Features

- A proprietary power system reduces total process cycle time to 10 seconds, providing 50% greater production throughput over most existing systems for more productivity per line.
- IV data of over 30 to 1,000 points can be obtained with one luminescence as it has a relatively longer light emission duration compared to conventional pulsed types.



Light irradiation

We can provide you with a comprehensive customized proposal calculating the necessary dwell time and insolation distribution based on the desired specifications such as the required cumulative insolation (kW-h/m²) and installation space of the line.

Process temperature control

Designed so that the temperature can be maintained at a specified level while the irradiation subject is insolated.

Communication with the transfer equipment and the up-stream/down-stream processes

The system can be designed to interface directly with the production process or the process control communication system for comprehensive communication control systems.

Verification/Quality Assurance Testing

IEC61646

Compliant Light-Soaking System

This light soaking system is designed for PV module light stabilization and is especially suited for thin-film PV applications (IEC 61646).

※IEC61646 10.19 Light-soaking



Item	Light-soaking tester / I	Light-soaking tester / II	Light-soaking tester / IV
Irradiation range	1100×1400mm module ×1 sheet	1100×1400mm module ×2 sheets	1100×1400mm module ×4 sheets
Radiant intensity	800 to 1000W/m ² (equivalent to 1SUN)		
Spectral concordance level	Class C (0.4 to 2.0)		
Irradiated area variation	Class C (under ±10%)		
Irradiated time fluctuation	Class A (under ±1%)		
Module temperature	+40 to +60°C		

* Specifications may vary depending upon application.
 * Customization of the irradiation range, etc. is also available.
 * Customization for specifications compliant with IEC 61730 is also available.

Delivery example

▶ ULVAC, Inc.
Solar Energy Assessment Center

Light-soaking System

▶ ULVAC, Inc.
Solar Energy Assessment Center

UV Preconditioning System (1SUN)

▶ Japan Electrical Safety & Environment Technology Laboratories (JET)

UV Preconditioning System (1 to 5SUN)

IEC61646

UV Preconditioning System (1SUN)

Compliant with IEC61646*, this UV preconditioning system is designed specifically for thin-film technology PV panels and ensures uniform irradiation.



※IEC61646 10.10 UV preconditioning test

Item	UV Preconditioning Tester / I	UV Preconditioning Tester / II	UV Preconditioning Tester / IV
Irradiation range	1200×1700mm module ×1 sheet	1200×1700mm module ×2 sheets	1200×1700mm module ×4 sheets
UV intensity	Approximately 50W/m ² (equivalent to 1SUN)		
Irradiated area variation	Under ±15%		
Module temperature	+60°C ±5°C		

* Specifications may vary depending upon application.

* Customization of the irradiation range, etc. is also available.

IEC61646

IEC61215

UV Preconditioning System (1 to 5SUN)

Compliant with IEC61646*¹ and IEC61215*², this system is designed for both crystalline and thin-film modules and delivers accelerated UV irradiation to significantly reduce preconditioning process time.

※1 IEC61646 10.10 UV preconditioning test

※2 IEC61215 Crystalline silicon terrestrial photovoltaic (PV) modules-Design qualification and type approval



Inverter panel



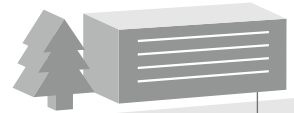
Control panel



Item	UV Preconditioning Tester / S
Irradiation range	1700×1850mm
Ultraviolet intensity	50 to 250W/m ² (equivalent to 1 to 5SUN)
Irradiated area variation	Under ±15%
Module temperature	+60°C ±5°C

Solar Light Simulation

For reliable and safe performance tests for products used outdoors, irradiation testing with a simulated solar lighting system is effective. We can provide solutions specific to your application needs, optimized from the selection of the light source to the design of the control system.



Clarification of the heat-island phenomenon

Light source : Simulated Solar Lighting Metal Halide Lamp

The angle can be automatically altered up to 45°, allowing adjustment of the radiation direction.



Construction material test

Light source : Simulated Solar Lighting Metal Halide Lamp

Environmental testing and durability testing for heat insulation material, etc.



Climate chamber

Light source : Simulated Solar Lighting Metal Halide Lamp

Simulates sunlight radiating from a window



Our various light sources are used for vehicle performance testing.

From individual parts to vehicles (large automobiles), we can design a system specific to the desired target size and required test process.



Vehicle surface heat testing and vehicle interior VOC[※] testing

Light source : Infrared Lamp, Simulated Solar Lighting Metal Halide Lamp

The subject temperature is regulated through temperature feedback control.
JAMA's testing method, "In-car VOC Testing Method (for passenger cars)" can be set as the testing process.

※VOC : Volatile Organic Compounds



Vehicle environmental testing

Light source : Simulated Solar Lighting Metal Halide Lamp, Halogen Lamp (with IR cut filter)

This system supports various environmental tests (positioning system, rotation mechanism) and can be rotated horizontally and raised or lowered to reproduce sunlight radiation from all angles.



Optical Application Technology

In addition to actively developing lighting that utilizes advanced optical technology, IWASAKI provides a wide selection of products and systems in various fields.



For details, please see our catalog.

IWA1.09.7



For details, please see our catalog.



UV18.09.11

UV/EB Sterilization Systems

The UV/EB Sterilization Systems, which utilize the sterilizing action of UV rays, are effective on all types of germs and provide a safe and effective sterilization method. A range of various sterilization methods is available including "surface sterilization", "running water sterilization" and "air sterilization".



For details, please see our catalog.

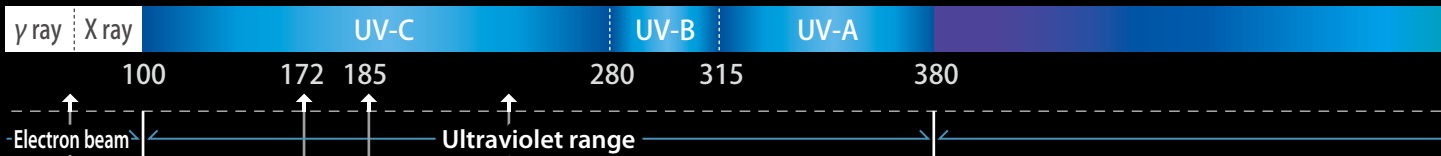


HRL06.11

Lights for plant cultivation

Artificial light can be utilized in nurseries and controlled horticulture.

254



For details, please see our catalog.



EB5.09.4T

EB Irradiation System

It is used in various industrial fields and is highly praised for enabling metallization, production of magnetic media and modification of plastic films by using the effect of EB irradiation such as hardening, bridging and flowing of substances. Its compact design has achieved an easy in-line application.



For details, please see our catalog.



LCM09.03

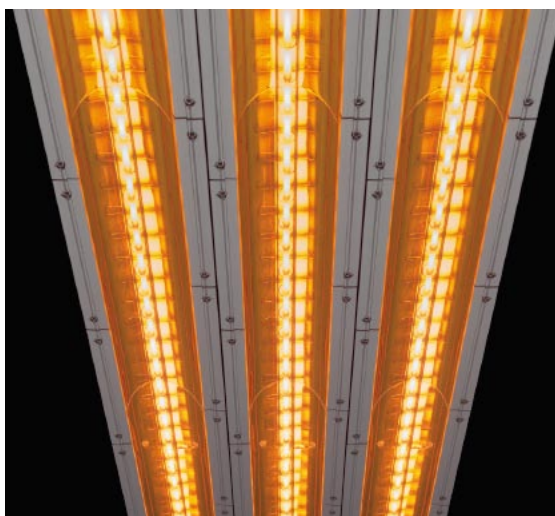
UV Cleaning System

Utilizing wavelength range of 200nm or less and 254nm wavelengths, this UV cleaning system is used in the removal of organic substances on glass surfaces, the pre-cleaning of base materials (glass), and the improvement of coating film adhesion.

Specialized Heating Halogen Heater

With quick halogen bulb start-up and effective energy radiating properties, this halogen heater is used in various heat processing measures.

We also provide water-cooled heating halogen that allows for production line speed-up and space saving with the achievement of a high watt density (100W/cm) lamp.



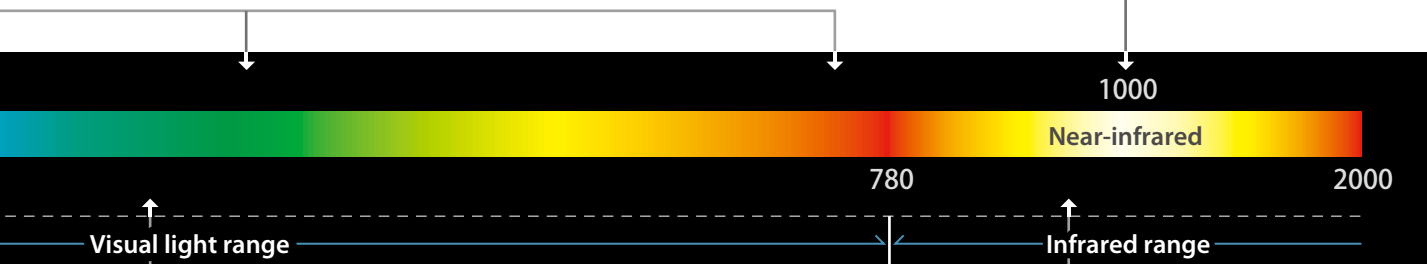
For details, please see our catalog.



HH'03-01



WHH09.3



High Speed Photographic Lighting System

This lighting system is ideal for automobile crash safety facilities. It features high-lumen simulated solar light radiation without flicker.



Reflective LED

We have developed high-intensity LED lamps for infrared/visible light using our proprietary LED lamp manufacturing technology. The EYE High luminance Reflector LED lamps utilize a revolutionary structure with a reflective function based on precision optics design. Compared to conventional resin lens LED lamps in general use, the forward light extraction efficiency is 2 to 5 times greater and succeeds at bringing out the maximum performance level in light-emitting devices.

<http://www.iwasaki.co.jp/>

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