

Weather Meters



Products and materials that surround us in our everyday lives are fated to deteriorate and meet their end by being exposed to many different forms of weather environments such as light, rain, wind, and a variety of different temperature and humidity conditions.

Various researches are conducted in order to accurately predict the deterioration of these materials.

As a professional manufacturer of weather meters and weather meter lamps, Suga Test Instruments continues to grow as a global enterprise by assimilating its knowledge and experiences it has cultivated over the years and by responding to the needs of customers.

Representing Japan with determination since its foundation, Suga will continue to be the enterprise that serves the society through our "Suga-only" products.

Only SUGA
Only SUGA

Achieving supremacy as the expert maker of weather meters.

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**Suga is a registered agency of national accreditation
(certified under ISO/IEC 17025)**

JCSS spectral irradiation calibration (halogen, xenon)

ISO/IEC 17025: JIS Q 17025

(General requirements for the competence of testing and calibration laboratories)

JCSS: Japan Calibration Service System

(Calibration service registration system in accordance with the Measurement Act)

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Outdoor Exposure Testing: Correlation and Acceleration

Degrading factor and its simulation

“Weatherability is resistance against deteriorations mainly due, among the natural environments, to sunlight, rain and snow, temperature, humidity, and ozone.”

(JIS D 0205 Test Method of Weatherability for Automotive Parts)

It takes a long time to determine a material’s weatherability from performing outdoor exposure tests, but accelerated weathering tests with artificial light source can significantly shorten this time duration. There are three factors that determine the reliability of test results.

1 Correlation

(1) Understanding the actual degradation process

Outdoor exposure testing is an important method for studying the conditions and mechanisms of degradation, along with predicting the material’s lifespan. Various environmental factors must be measured during the test, including:

- ① Radiant exposure
- ② Temperature and humidity
- ③ Rainfall amount and water quality
- ④ Suspended particulate such as sea salt
- ⑤ Corrosive gases such as ozone and SO₂

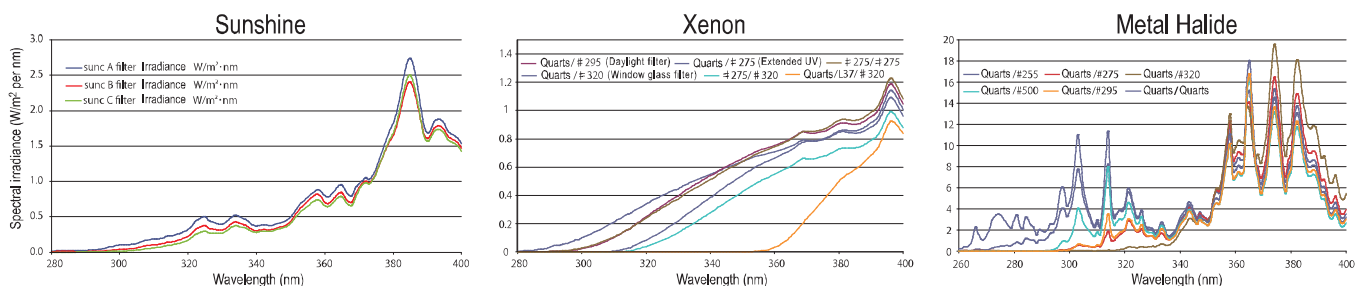
Light, heat and water will react with the specimens during exposure tests, but their amount and quality will vary depending on the location where the specimen material will be used. For example, the total amount of sunlight received per day from solar exposure at a 45° facing south angle is 1.6 times more than at a 90° angle. It is very important to have a good understanding of the environment where the materials will be put in practice before making comparisons with accelerated tests.



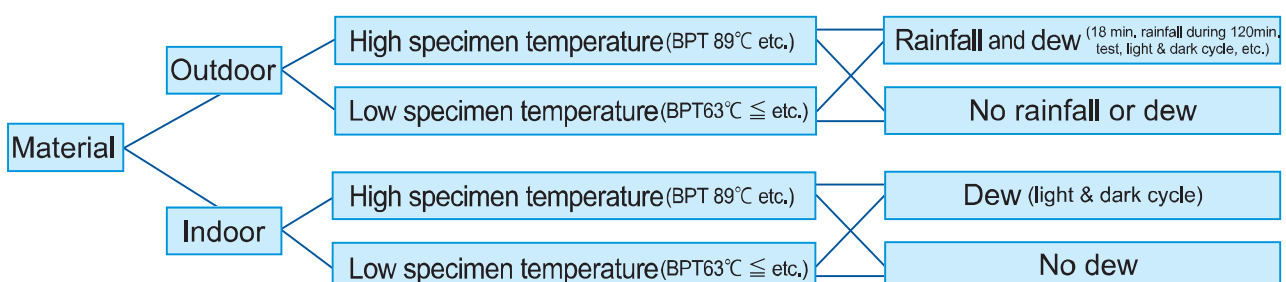
(2) Selecting the appropriate filters for the light source

Solar energy near the 300nm frequency is the most important factor for the degradation of materials. The right filters must be selected in order to achieve high correlation.

Location where the material is placed	Filter combination examples (inner/outer)
Outdoor (direct sunlight)	Quartz/#275, #275/#275, Quartz/#295
Indoor (sunlight through a window)	Quartz/#320, #275/#320, Quartz/IRCut (infrared cut)/L37/#320



(3) Determining the temperature, humidity, and rainfall cyclic test conditions



2 Acceleration

It is important to understand how the spectral distribution of the testing instrument's light source—a central feature of weathering tests—relates to the actual outdoor sunlight.

The ultraviolet, visible, and infrared portions (*1) of Japan's annual radiant exposure of 4500 MJ/m² (*2)

Wavelength(nm)	Proportion (%)	Radiant exposure (MJ/m ²)
300–400	6.8	306
400–700	44.6	2,007
700–3,000	48.6	2,187
Total	100.0	4,500

*1 CIE Publication No.85 1st Edition (TC2-17)

*2 JIS D 0205 Test Method of Weatherability for Automotive Parts

For example, let us say that the Super Xenon 180W/m² weather meter (300–400nm) is used for a weathering test. The number of seconds it takes to achieve the annual radiant exposure is obtained by dividing the annual radiant exposure in the 300–400nm range (306MJ/m²) by the lamp's wattage: 306,000,000 ÷ 180 = 1,700,000 seconds, or about 472 hours (1,700,000 ÷ 3600). This means that, in terms of radiant exposure, a test time of one year can be shortened to 472 hours (*3).

Light source	Irradiance W/m ² (300–400nm)	Number of hours needed to achieve the annual radiant exposure (h)
Sunshine	78.5	1,083
Xenon	60.0	1,417
Super Xenon	180.0	472
Metal Halide	530.0	160

An effective method is to use a reference material with its relation between outdoor exposure and accelerated weathering tests proven from past field researches and weathering test data. They are important standards for weathering evaluation that can be effective towards shortening the test duration.

3 Reproducibility

The three important testing factors for achieving high reproducibility are the following:

Point 1 Controlling the light energy at a constant level

- Light energy to the surface of the specimen is directly controlled at a broadband (narrowband control also available on request).
- The lamp and its filters must be replaced according to their life.
- Light receptors and irradiance measuring devices must also be periodically calibrated.

Point 2 Controlling the temperature and humidity (dew) at a constant level

- Controlling the temperature and the humidity is important for the test's reproducibility as much as controlling light energy.
- Thermal sensors and black panel thermometers must be periodically calibrated.

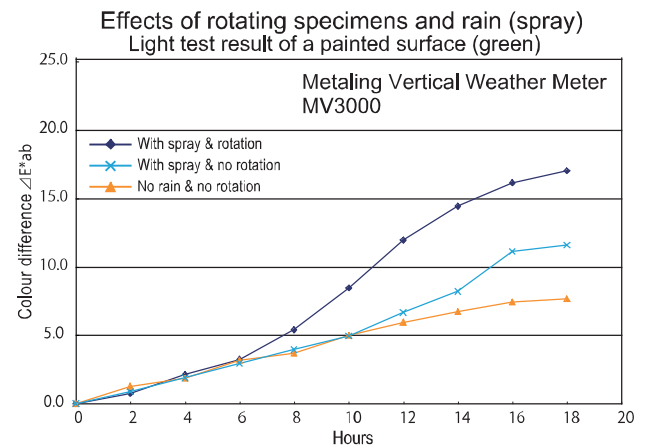
Point 3 Controlling the quality of spray water

- Rain, along with sunlight, is also a major factor for accelerating degradation.
- It is important to spray pure water from a pure water generator, as according to ISO 3696-2 (some specimens require spray temperature to be controlled).



Hidaka-Kawagoe factory

Suga runs a lamp manufacturing facility in the Hidaka-Kawagoe factory in Saitama prefecture to produce lamps for weather meters. Under strict quality control, our lamps for the weather meters are manufactured as high-quality light sources with excellent spectral composition, long life span, and great maintenance endurance. Suga endeavors to achieve the ultimate reproducibility for its weathering test instruments by applying all of its technological resources into the manufacturing of the instruments and its lamps.

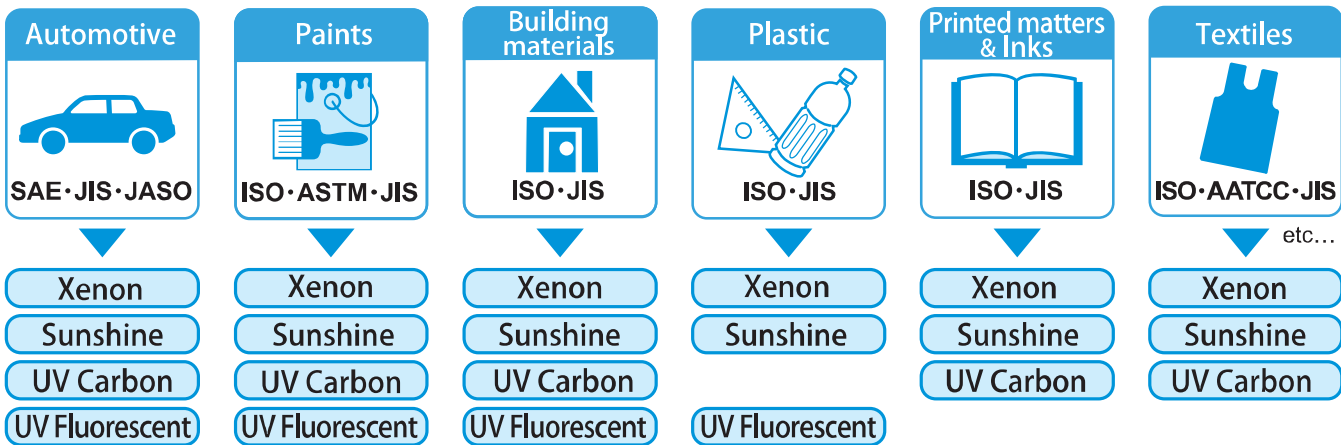


*3 Data on this table is based only on the ultraviolet portion (300–400nm), which is responsible for the majority of the degradation. Due to various other factors besides light that contribute such as rain, temperature, humidity, dew and gas, along with the structure of the material, the spectral structure of the instrument's light source, evaluation items, and difference in outdoor exposure test results, correlation between outdoor test time and accelerated test time cannot be determined with absolute precision.

It is dangerous to determine the rate of acceleration of weather meters versus outdoor exposure by only comparing the ultraviolet accumulation of sunlight and weather meter light sources. It is important to sufficiently understand the material's reactivity to different factors such as light, heat and water.

Putting Weather Meters into Use

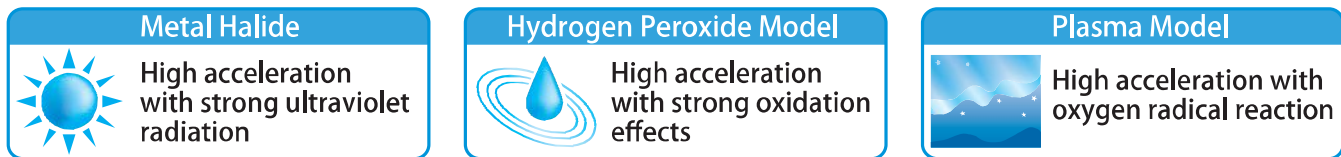
Point 1 Different weathering standards apply for different specimens



First and foremost, tests must be conducted with the right method for the specimen. The light source for each test is specified in their respective standards (page 15). It is crucially important for weather meters to perform a global standard test* according to the international standard.

*Global standard tests are authorized as a global standard that follows international guidelines such as ISO, IEC and ASTM. Specifications such as the light source's spectral distribution, performance of the test instrument, and test procedure are detailed. Suga provides all weather meter models capable of performing global standard tests.

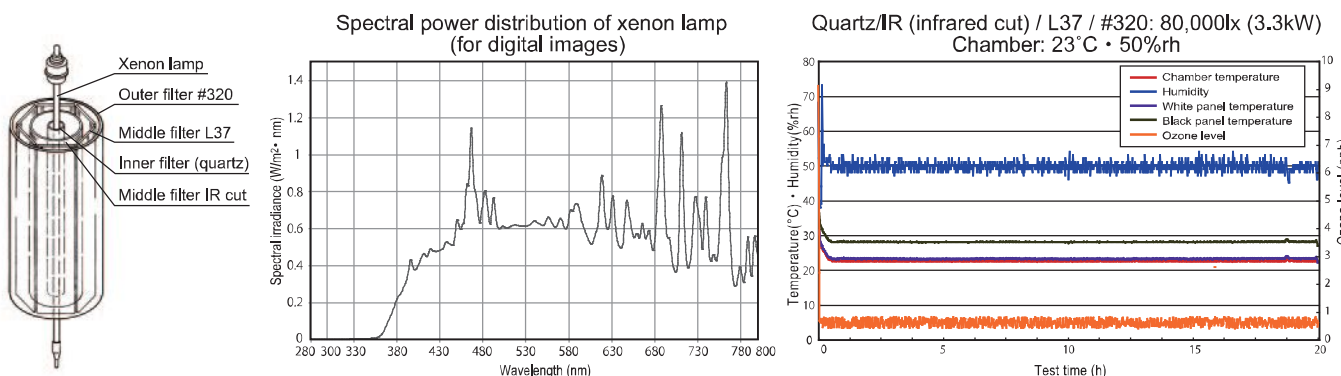
Point 2 For more advanced acceleration



As the speed of product development increases, so does the demand for super-accelerated weathering tests. Although super-accelerated tests are not standardized like global standard tests, its high-speed test time is accredited and applied by automotive, architectural, paint, and resin industries. Suga offers newly developed test instruments that provide super-acceleration in variety of methods, together with researching their correlation with outdoor exposure. They provide great support for those who do not have enough time to determine the durability of their products in conventional methods.

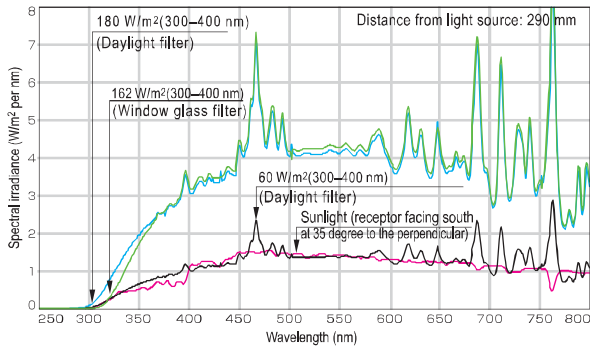
Point 3 Further correlation

It is not appropriate to use only a single type of weather meter for material evaluation. The most reliable method is to achieve correlation with multiple light sources and under the condition intended for the material's use. Some users set their own test variables (irradiation time, temperature, humidity, total test hours, etc.), based on the real environment of their material use. The following is an example of variables for testing the preservative quality of digital images.



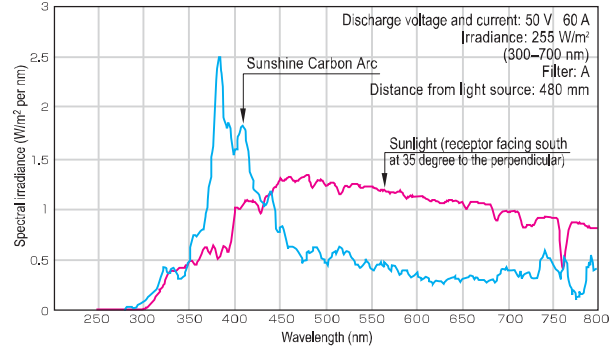
Light Sources for the Weather Meters

Spectral Power Distribution of 7.5 kW Xenon Lamp and Sunlight



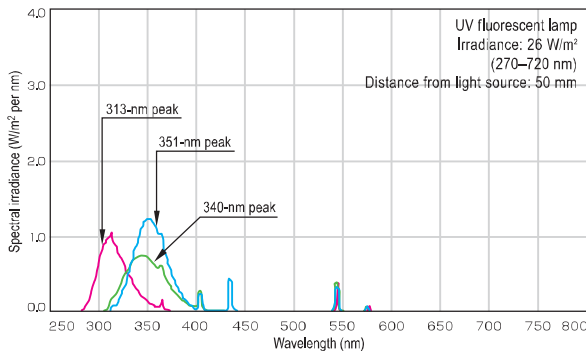
The spectral power distribution of this light source's irradiance in the ultraviolet and the visible portion is very much similar to that of sunlight. The spectral distribution of indoor and outdoor sunlight can be accurately simulated with the right combination of filters. The development of a new testing model capable of generating three times (180 W/m²) the irradiance of sunlight in the ultraviolet portion drastically improved the acceleration of its tests.(P.7,8)

Spectral Power Distribution of Sunshine Carbon Arc



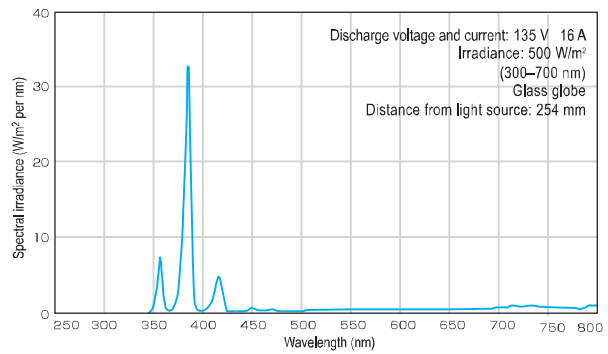
Trusted around the world for 60 years, this light source has an energy ascent in the ultraviolet portion very much similar to that of sunlight. Specified in many standards including JIS and ISO, its test results have contributed to the technological development of various products and materials.(P.9)

Spectral Power Distribution of UV Fluorescent Lamp



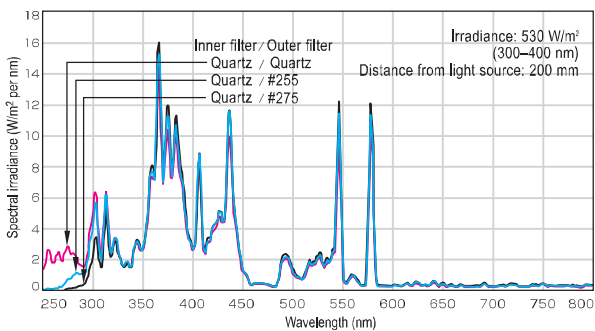
This ultraviolet fluorescent light source, with its peak in the ultraviolet portion between 280 and 315 nm (UV-B), is used in ultraviolet deterioration tests of paint and plastics. It is specified in ISO, ASTM and JIS standards.(P.9)

Spectral Power Distribution of UV Carbon Arc



This light source, with strong energy in the ultraviolet portion (around 388 nm), is the oldest light source in history. It is widely used for light-fastness tests of everyday products such as textile products, interior appliances and stationery.(P.9)

Spectral Power Distribution of 3 kW Metaling Lamp



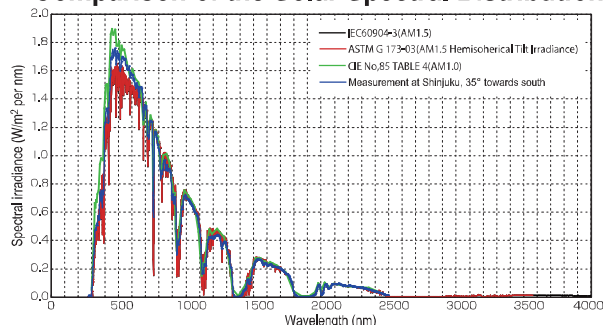
This light source produces ultraviolet energy that is much stronger than other light sources. It is developed for performing super-accelerated tests in order to meet the demand from today's high-speed product development. A research is in the process to determine its correlation with outdoor exposure.(P.10)

- Hydrogen Peroxide Model
- Plasma Model
- Combined Cyclic Model
- Mercury Lamp, Fluorescent Lamp, etc.

Suga offers newly innovated test instruments that achieve super-acceleration in variety of methods. Light sources such as mercury and fluorescence are used by many different industries for testing the light resistance of products and materials.(P.10,11,12)

The heart of the weather meter is its light source. Suga periodically measures the ever-changing spectral distribution of sunlight, and applies it as our fundamental data for researching and developing the light sources of our weather meters.

Comparison of the Solar Spectral Distribution



1. Global Standard Test Instruments

Xenon arc



GX75 7.5kW Xenon Weather Meter

This is the world wide model

Global general-purpose model compatible with international standards such as ISO, SAE, ASTM and AATCC.

Light source	Xenon-arc lamp WX7.5 (7.5 kW water-cooled type)
Test types	Light only, light & spray on front face (rain), dark only, dark & spray on back face (dew), dark & spray on both faces
Irradiance	40 to 120 W/m ² at 300 to 400 nm filter requirement example: daylight filter
Temperature and humidity range	Light test : 63 to 110 ± 2 °C of black panel temperature(BPT; depending on the level of irradiance), 50 ± 5 %rh (at 63 °C of BPT and 60 W/m ²) Dark test : 38 ± 2 °C of chamber temperature, 95 ± 5 %rh
Number of specimens	Maximum 63 pieces (150 × 70 × 1 mm)
External dimension of the instrument	Approx. width 103 cm, depth 127 cm, height 185 cm [weight: approx. 560 kg]

This product is also available as CE model upon request.



SX75 7.5kW Super Xenon Weather Meter

The paramount of world standard

This model is capable of super-accelerated tests with ultraviolet irradiance three times stronger (180W/m^2) than that of sunlight, meeting the expectation of today's high-speed product development.

Light source	Xenon-arc lamp WX7.5 (7.5 kW water-cooled type)
Test types	Light only, light & spray on front face (rain), dark only, dark & spray on back face (dew), dark & spray on both faces
Irradiance	60 to 180W/m^2 at 300 to 400 nm filter requirement example: daylight filter
Temperature and humidity range	Light test : 50 to $95 \pm 1^\circ\text{C}$ of black panel temperature (BPT; depending on the level of irradiance), 50 to $60 \pm 5\%$ rh(at 63°C of BPT and 180W/m^2) Dark test : $38 \pm 1^\circ\text{C}$ of chamber temperature, $95 \pm 5\%$ rh
Number of specimens	Maximum 54 pieces ($150 \times 70 \times 1\text{mm}$)
External dimension of the instrument	Approx. width 105 cm, depth 135 cm, height 204 cm [weight: approx. 570 kg]

This product is also available as CE model upon request.



GX25 2.5kW Xenon Weather Meter

A compact model with excellent cost performance

This model is used for wide range of materials, such as fabrics, wrappings, and cases for cosmetics.

Light source	Xenon-arc lamp WX2.5* (2.5 kW water-cooled type)
Test types	Light only, dark only
Irradiance	40 to 60W/m^2 at 300 to 400 nm filter requirement example: daylight filter
Temperature and humidity range	Light test : 45 to $110 \pm 2^\circ\text{C}$ of black panel temperature (BPT; depending on the level of irradiance); 30 to $50 \pm 5\%$ rh (at 63°C of BPT and 42W/m^2) Dark test : $38 \pm 2^\circ\text{C}$ of chamber temperature, $95 \pm 5\%$ rh
Number of specimens	Maximum 108 pieces ($65 \times 55 \times 1\text{mm}$)
External dimension of the instrument	Approx. width 100 cm, depth 115 cm, height 180 cm [weight: approx. 400 kg]

*An air-cooled model XA25 is also available.

*Other test types are also available.

This product is also available as CE model upon request.

XT750 750W Table Sun

A tabletop Xenon Fade Meter

This is a tabletop weather meter optimal for small specimens such as medical products, paper, cosmetics, pharmaceuticals, food, and stationery.



Light source	Xenon-arc lamp AX0.75**1 (750W air-cooled type)
Test type	Light only
Irradiance	$2,000$ to $30,000\text{lx}$ [equivalent to 10 to 138W/m^2 (300 to 700 nm)] (filter / #275)
Temperature range	Approx. $\text{RT} + 10 \pm 2^\circ\text{C}$ (RT: room temperature over 25°C)*2
Specimen stage area	$25 \times 25\text{cm}$ (irradiance distribution within $\pm 10\%$)
External dimension of the instrument	Approx. width 99 cm, depth 65 cm, height 57 cm [weight: approx. 90 kg]

*1,500 W lamp (40,000 to 100,000 lx) model is also available.

**A model with a refrigerator capable of 25°C tests and 60°C tests is also available.

*Other models available

- X75: capable of testing multiple specimens at once with its large specimen rack and irradiance adjustable between 25 and 70W/m^2
- XL75: a low-temperature cycle model (12 to 50°C) optimal for specimens sensitive to heat
- SX2D-75: a single unit with two independent chambers combined, allowing for test with different conditions performed simultaneously

Sunshine carbon arc



S80 Sunshine Weather Meter

The basic sunshine model cultivated by history

S80 is capable of approximately 78 hours of continuous irradiation using a total of eight sunshine carbon arc rods, with four sets on both the top and the bottom of the test chamber. It is also capable of automatically running the light and light + spray cycles.

Light source	Sunshine carbon arc lamp (4 pairs of ultra long-life carbon rods)
Continuous lighting time	78 hours
Discharge voltage and current	50 ± 2 V, 60 ± 2 A
Test types	Light only, light & spray on front face (rain)
Temperature and humidity range	Light test : 63 ± 3 °C of black panel temperature (BPT), 30 to 70 ± 5 %rh
Number of specimens	Maximum 70 pieces (150 × 70 × 1 mm)
External dimension of the instrument	Approx. width 136 cm, depth 135 cm, height 226 cm [weight: approx. 560 kg]

*Other models include the low-temperature model SL80, and the dewcycle model S80D, capable of light and dark (dew) tests.

UV fluorescent lamp



FDP Dewpanel Light Control Weather Meter

Most effective for ultraviolet deteriorating tests for coatings and plastics

This model provides high acceleration with cyclic test of UV light and dark (dew) cycles. Its light source SUGA-FS40 includes a light energy loss prevention system developed by Suga.

Light source	Eight UV fluorescent lamps (SUGA-FS40) including a system to prevent light energy loss, 313 nm of peak wavelength, (340 nm and 351 nm lamps are optional)
Test types	Light only, dark (dew), (spraying is optional)
Range of automatic irradiance control	26 to 42 W/m ² at 270 to 700 nm
Temperature and humidity range	Light test: 50 to 70 ± 3 °C of black panel temperature (BPT) Dark test: 40 to 70 ± 3 °C
Number of specimens	Maximum 48 pieces (150 × 75 × 1 mm)
External dimension of the instrument	Approx. width 137 cm, depth 50 cm, height 149 cm [weight: approx. 147 kg]

*Models with spray cycles also available

UV carbon arc



U48 Ultraviolet Fade Meter

The standard model for textile colour fastness tests

This cost-efficient model uses wicks to control humidity at below 50 %rh level, and controls temperature by introducing ambient air via opening and closing of the air damper.

Light source	Enclosed carbon arc lamp
Continuous lighting time	48 hours
Discharge voltage and current	135 ± 10 V, 16 ± 2 A
Temperature and humidity range	63 ± 3 °C of black panel temperature (BPT) , 50 %rh or less
Temperature control	Introduction of ambient air
Humidity control	Wicks
Number of specimens	Maximum 108 pieces (65 × 55 × 1 mm)
External dimension of the instrument	Approx. width 95 cm, depth 78 cm, and height 175 cm [weight: approx. 278 kg]

* Also available: U48AU, a model capable of 35 to 50±5 %rh humidity.

2. Super Accelerated Weather Meters

Metal halide arc



MV3000 3kW Metalizing Vertical Weather Meter

The answer to the demand for super-acceleration

This is the world's first super-accelerated weather meter model with a vertical metal halide lamp as its light source (patented in both Japan and the U.S.). Its design where specimens rotate around a vertically placed lamp allows for more specimens to be placed than models where specimens must be fixed in a single location. This allows for improved distribution of irradiance, temperature and humidity.

Light source	Vertical-lightning metalizing lamp M3.0 (3 kW indirect water-cooled type)
Test types	Light only, light & spray on front face (rain), dark only, dark & spray on back face (dew)
Irradiance	530 W/m ² at 300 to 400 nm (filter requirement example: quartz inner filter and #255 outer filter)
	830 W/m ² at 295 to 450 nm (option)
Temperature and humidity range	Light test : 63 to 85 ± 1 °C of Black panel temperature (BPT) , 50 ± 5 %rh (at 63 °C of BPT)
	Dark test : 30 to 50 ± 1 °C of chamber temperature (CT), 95 ± 5 %rh (at 38 °C of CT)
Number of specimens	Maximum 15 pieces (150 × 70 × 1 mm) at rack diameter of φ 400 mm
External dimension of the instrument	Approx. width 105 cm, depth 139 cm, and height 204 cm [weight: approx. 570 kg]

Plasma



Pla-2 Remote Plasma Weather Meter

A new axis of weathering using remote plasma Developed under technical cooperation with Nippon Paint

This revolutionary model can simulate 5 years of outdoor exposure in Okinawa in few hours, using a completely different process than the conventional accelerated weathering.

Test pressure	Maximum 550 Pa, minimum 90 Pa
High-frequency electricity	Maximum 290 W, minimum 10 W
Frequency of radio frequency electricity	13.56 ± 0.07 MHz
Oxygen gas flow rate	Maximum 0.7 L/min, minimum 0.1 L/min.
Specimen stage	φ 100mm, including an elevator
External dimension of the instrument	Approx. width 129 cm, depth 86 cm, and height 209 cm [weight: approx. 370 kg]

Spectral aging



SPX Spectral Radiation Tester

Determining the fastness wavelength of a specimen via spectral radiation

Divides the xenon light (similar to sunlight) into high resolution spectrums, and radiates strong ultraviolet and visible light. It is used for determining the fastness wavelength of paints, plastics, textiles, medical products and fluids.

Light source	Xenon short-arc lamp (300W air-cooled type)
Spectroscopy	Reflection grating
Wavelength	Switchable between 220 to 520 nm and 400 to 700 nm
Area of irradiation	Approx. width 160 mm, height 17mm
Optical resolution	Approx. 2 nm/mm (per 1 mm slit width)
Slit	1 to 10 mm continuously variable
Energy monitor	Monitors the lamp's life by observing its 300 nm light energy
Safety devices (terminating the operation)	Cumulative irradiance limit met, irradiation time limit met
External dimension of the instrument	Approx. width 77 cm, depth 67 cm, height 65 cm [weight: approx.100 kg]



Point 1 Environmentally friendly air conditioners with no factor of ozone destruction.

Point 2 Combination of TM heating/vaporizing systems and inverter cooling system* that allow temperature and humidity control with minimal amount of energy and water. *excluding certain models

Point 3 Accelerated weather meters equipped with a touch panel controller also include paperless recorder. No inks or papers necessary.

3. Other Irradiation Instruments

For Photovoltaic Modules



CCT-LXU Super Xenon Combined Weather Chamber Determines the outdoor durability of photovoltaic modules

This model performs accelerated weathering tests on photovoltaic modules, simulating various harsh outdoor conditions. Up to two full-scale photovoltaic modules can be tested.

Light source	Eight xenon-arc lamps WX7.5 (7.5 kW water-cooled type)
Test types	Single or cyclic tests of: light test, dry test (high temperature test), humidity test (high temperature high humidity test), low temperature test, water test
Irradiance	60 to 180 W/m ² (three times that of sunlight) at 300 to 400 nm
Chamber temperature range	-30 to 90 °C (-10 to 90 °C during light test)
Number of specimens	2 units (120 × 150 × 5cm)
External dimension of the instrument	Approx. width 530 cm, depth 338 cm, height 370 cm [weight approx: 8,000 kg]

Light + Corrosion

CCT-1LX Combined Cyclic Corrosion Test Instrument with light test Determines the outdoor durability of numerous materials and products

This is a compact combined cyclic weather meter capable of simulating*¹ various harsh outdoor conditions via combination of light, salt spray, dry, humidity, salt immersion, low temperature, and water washing tests.



Light source	Xenon-arc lamp WX7.5* ² (7.5 kW water-cooled type)
Test types	Single or cyclic tests of: light, salt spray, dry, humidity, salt immersion, low temperature, water washing
Chamber temperature range	-30 to 70 °C (depending on test type, such as 40 to 70 °C during light test)
Internal dimension of chamber	Approx. width 96 cm, depth 61 cm, height 86 cm
External dimension of the instrument	Approx. width 180 cm, depth 190 cm, and height 217 cm [weight: approx. 1,400 kg]

*1 Models with corrosive gases such as O₃, SO₂, H₂S, NO₂, Cl₂ are also available.
*2 Models with different light source such as metal halide lamps are also available.



CCT-RX Weather Test Chamber

Determines the outdoor resistance of large full-scale products

This combined cyclic test chamber simulates various harsh outdoor conditions (light, acid rain spray, dry, humidity, dew, low temperature) in combination of the user's choice. It is capable of testing large-sized components and full-scale products such as automobiles and motorcycles.

Light source	Three xenon-arc lamps WX7,5* (7.5 kW water-cooled type)
Test types	Single or cyclic tests of: light, acid rain, dry, humidity, dew, low temperature
Irradiance	60 W/m ² (at wavelength of 300 to 400 nm)
Chamber temperature range	-20 to 80 °C, depending on test type (example: 40 to 70 °C during light test)
Internal dimension of the chamber	Approx. width 350 cm, depth 302 cm, height 176 cm
External dimension of the instrument	Approx. width 540 cm, depth 377 cm, height 279 cm [weight: approx. 5,000 kg]

* Models using other light sources such as metal halide lamps are also available.

Mercury vapor lamp



H75 Ultraviolet Fade Meter for Glass

Specifically designed for ultraviolet deterioration tests of laminated glass

This is an ultraviolet fade meter with a light source of 750W mercury vapour lamp. It performs deterioration tests for laminated glass used for windows of automobiles, railway, buildings and ships.

Light source	Mercury vapor lamp (750 W, approx. 500 V 1.6 A)
Chamber temperature	45 ± 5 °C
Specimen rotation	Approx. 3 rpm
Number of specimens	3 pieces (300 × 300 × 6.5 mm)
External dimension of the instrument	Approx. width 80 cm, depth 64 cm, height 123 cm [weight: approx. 130 kg]
Standards	JIS R 3212, ISO 3917, ISO 12543

Super fluorescent lamp



FL Super Fluorescent Fade Meter

Accurately simulates the indoor fluorescent light

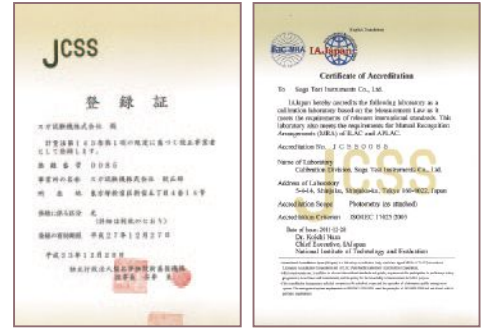
This model is used to test lightfastness of digital print and other printed images, medical products, etc. under fluorescent light from its 40 high-power 110W super fluorescent lamps. Its irradiance is constantly adjusted and tests can be performed under constant temperature and humidity.

Light source	110 W Super fluorescent lamp (white) × 40
Illuminance	70,000 lx (adjustable between 3,000 to 90,000 lx)
Chamber temperature range	24 ± 2 °C, 60 ± 5 %rh
Number of specimens	38 pieces (150 × 70 × 1mm)
Internal dimension of the chamber	Approx. width 100 cm, depth 100 cm, height 135 cm
External dimension of the instrument	Approx. width 217 cm, depth 166cm, height 214 cm [weight: approx. 1,500 kg]

4. Weather Meter Peripherals

It is important for weather meters to accurately measure the surface irradiance on its specimens. Accredited by Japan Calibration Service System (JCSS)*1, we calibrate our radiometers with precision using our standard xenon lamp traceable with an international standard lamp*2.

In addition, Suga is an Accredited Laboratory corresponded to Global MRA (Mutual Recognition Arrangement). This certifies that our calibration certificates are valid in nations that are members of APLAC (Asia Pacific Laboratory Accreditation Cooperation) and ILAC (International Laboratory Accreditation Cooperation).



*1 Businesses accredited by JCSS meet the technological requirements for calibration laboratories specified in ISO/IEC 17025.

*2 Spectral irradiance standard lamp by the National Institute of Advanced Industrial Science and Technology

Radiometer



RA Radiometer

Accurately measures the surface irradiance of specimens in the weather meter

This model consecutively measures the irradiance (W/m^2 or kW/m^2) and the cumulative radiant exposure (kJ/m^2 or MJ/m^2) values while attached to the weather meter's specimen rack during tests. The measurement is calibrated according to our JCSS light calibration technology. Models are available based on the measuring light source and wavelength (300–400 nm, 300–700 nm, 340 nm and 420 nm).

* The SRA model, which can measure the energy in the 300–700 nm wavelength in 5 nm intervals, is also available.

This product is also available as CE model upon request.

Water-Related Products



PW1 Pure Spray Water Supply Unit

Supplies pure water for spray test from its large-sized water tank

This unit stores pure water in its 250 liter tank for the weather meter's spray and vaporizer. The water is sent to the weather meter through the unit's pump.

External dimension of the instrument	Approx. width 64 cm, depth 110 cm, height 133 cm [weight: approx. 320 kg]
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*Alternate model: spray water temperature controller PWT for controlling the spray water's temperature according to the user's setting (20 to 40 °C \pm 3 °C), allowing for more accurate testing.



RW2 Water recycler

Recycles your water for repeated use

A resource saving appliance that collects, refines, and reuses the water used during spray tests. It is used together with a pure water generator.

External dimension of the instrument	Approx. width 86 cm, depth 112 cm, height 130 cm [weight: approx. 240 kg]
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* A pure water generator is not included.

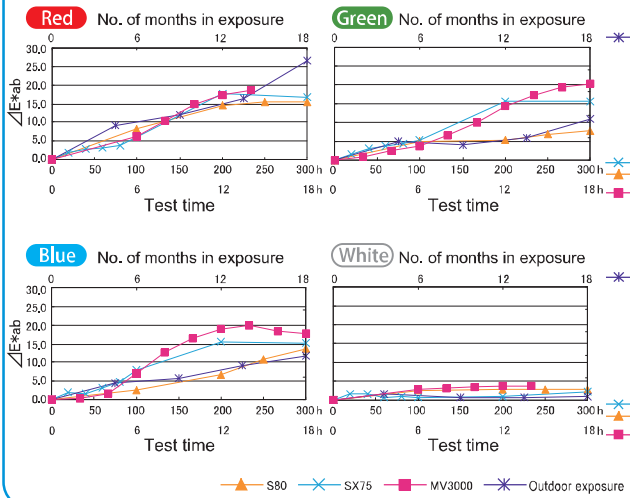


Correlation between Outdoor Exposure and Weather Meters

Our testing instruments determine the material's property from many different perspectives such as colour, gloss and surface analysis, leading to test results with more correlation with outdoor exposure.

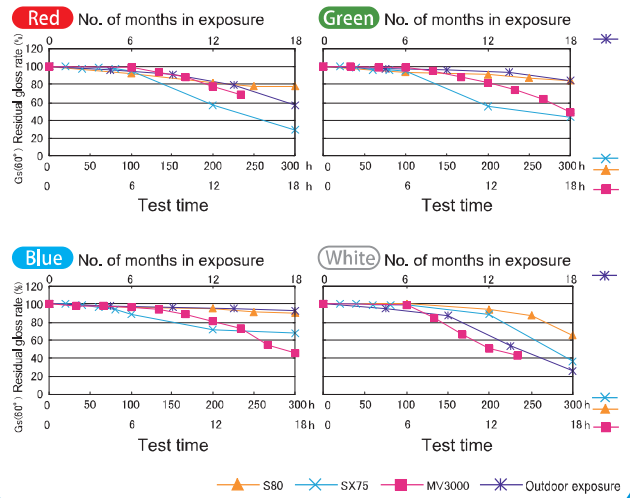
Colorimetry

Instrument used: Spectro colour meter SC-T by Suga



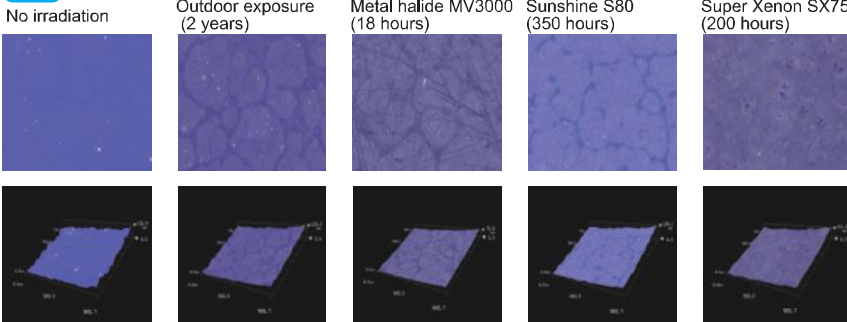
Gloss

Instrument used: Multi-angle gloss meter GS-4K by Suga

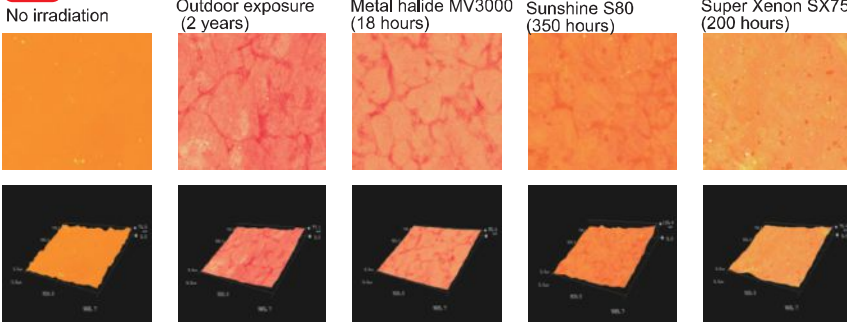


Surface analysis

Blue



Red



■ Specimen: painted plate

Red Blue Green White
70×50mm

Melamine alkyd bake cured solvent type paint (white: titanium dioxide)
Zinc phosphate pre-treated steel plate for substrate

■ Test conditions

	MV3000	S80	SX75	Outdoor exposure
Test condition	Q/#255 530W/m ² (300–400nm) BPT63°C, 50% Light & Rain: 18 min, → Light: 102 min.	Q/#255 255W/m ² (300–700nm) BPT63°C, 50% Light & Rain: 18 min, → Light: 102 min.	Q/#275(φ30) 180W/m ² (300–400nm) BPT63°C, 50% Light & Rain: 18 min, → Light: 102 min.	Main office roof top 2006.6.1– 2008.2.29

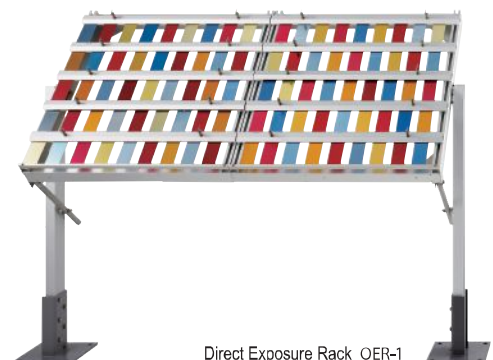
Outdoor exposure apparatus series

Outdoor exposure test is important for observing the actual deterioration and its mechanism, in order to determine the target value used to predict the material's life.

Suga offers various models such as fixed-angle direct exposure models, glass cover models for indoor conditions, and accelerated models that automatically track the sun.

Also available are weather measurement apparatuses such as integrated irradiance recorder that records sunlight in UV, visible and infrared portions.

(For more, please refer to the outdoor exposure apparatus series catalogue)



Direct Exposure Rack OER-1

Typical Standards for Weather Meters

Field	Light source	Standards				
Plastics	Xenon	ISO 4892-2*	ISO 4892-1	JIS K 7350-2*	JIS K 7350-1	
	Sunshine	ISO 4892-4		JIS K 7350-4		
	UV Fluorescent	ISO 4892-3		JIS K 7350-3		
Paints	Xenon	ISO 16474-2	ISO 16474-1	ASTM D 6695*	JIS K 5600-7-7*	
	Sunshine	ISO 16474-4		ASTM D 822	JIS K 5981	
	UV Carbon			ASTM D 3361		
	UV Fluorescent	ISO 16474-3		ASTM D 5031		
Building materials	Xenon	ISO 11431		JIS A 1439		
	Sunshine			JIS A 5759		
	UV Carbon/UV Fluorescent					
Printed matters and Inks	Xenon	ISO 12040		JIS K 5701-1		
	Sunshine / UV Carbon					
Textiles	Xenon	ISO 105-B02	AATCC TM16			
		ISO 105-B04	AATCC TM169	JIS L 0843*		
		ISO 105-B06*				
		ISO 105-B10*		JIS L 0891*		
	Sunshine		AATCC TM192	JIS L 0891		
Aluminum	UV Carbon		AATCC TM16	JIS L 0842		
	Xenon	ISO 2135		JIS H 8685-1		
	Sunshine / UV Carbon					
Rubbers	Xenon / Sunshine	ISO 28340				
	Xenon	ISO 4665*		JIS K 6266*		
	Sunshine	ISO 4665	ASTM D 750	JIS K 6266		
	UV Carbon			JIS K 6404-17		
Paper	UV Fluorescent	ISO 4665		JIS K 6404-18		
	Sunshine / UV Carbon			JIS K 6266		
Electric / Electronics	Xenon	IEC 60068-2-5		JIS P 4505		
		IEC 60068-2-9				
PV modules	Xenon	IEC 61215		JIS C 8917	JIS C 8918	
		IEC 61646		JIS C 8938	JIS C 8939	
	Sunshine	IEC 61215		JIS C 8917	JIS C 8918	
		IEC 61646		JIS C 8938	JIS C 8939	
Automotive	Xenon		SAE J2527 / SAE J2412			
		ISO 3917				
				JASO M 346*	JASO M 351*	
	Sunshine			JIS D 0205		
				JIS D 0202	JIS D 0205	
				JIS D 4604	JIS D 5500	
UV Carbon			JIS D 0202	JIS D 0205		
UV Fluorescent			JIS D 0202	JIS D 0205		
Railway	Xenon			JIS E 4037*		
	Sunshine / UV Carbon			JIS E 4037		
Recording	Xenon			JIS X 6245		
Tape	Sunshine / UV Carbon			JIS Z 0237	JIS Z 1528	
Photography	Xenon	ISO 18930		JEITA CP-3901		
Non-metallic materials	Xenon		ASTM G 155*	ASTM G 151		
	Sunshine		ASTM G 152			
	UV Carbon		ASTM G 153			
	UV Fluorescent		ASTM G 154			
Safety signs	Xenon	ISO 17398*		JIS Z 9107*		
	Sunshine	ISO 17398		JIS Z 9107	JIS Z 9117	

* Specifies the test condition for high-irradiance xenon arc (180W/m² or 162W/m²).

I S O : International Organization of Standardization AATCC : American Association of Textile Chemists and Colorists J A S O : Japanese Automotive Standards Organization
 I E C : International Electrotechnical Commission S A E : Society of Automotive Engineers J E I T A : Japan Electronics and Information Technology Industries Association
 A S T M : American Society for Testing and Materials J I S : Japanese Industrial Standards



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