

# **Ultraviolet Light Accelerated Weathering Tester - with automatic irradiance control**

**BGD 856**

## **Product Description**

Our BGD 855 & 856 UV Light Accelerated Aging Test Chamber (hereinafter referred as UV) adopts a fluorescent UV lamp as the light source. Its inner temperature and humidity can be properly controlled to obtain the periodic condensation on the sample for fully evaluating the damaged factor caused by sunlight, moisture and temperature (materials aging phenomenon includes fading, disluster, intensity reduction, cracking, flaking, chalking, and oxidation). Fluorescent UV light can emulate the effect of sunshine, while condensation and water spray system can emulate the effects of rain and dew. During the test, radiation energy and temperature are controllable. A typical test cycle generally carries out under strong irradiation of UV light or in the dark and wet condensation period with 100% relative humidity. These tests generally applied in the fields of paint and coatings, automotive industry, plastic, wood, glue, etc...



## **Standards**

- ISO 11507 : Paints and varnished-Exposure of coatings to artificial weathering- Exposure to fluorescent UV lamps and water
- ISO 4892-1 : Plastics-Methods of exposure to laboratory light sources-Part 1: General Guidance
- ISO 4892-3 : Methods of exposure to laboratory light sources-Part 3: Fluorescent UV lamps
- ASTM D 4587: Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
- ASTM D 4329: Standard Practice S for Fluorescent UV Exposure of Plastics
- ASTM G-151: Standard Practice for Exposing Nonmetallic Materials in Accelerated Test Devices that use laboratory light sources
- ASTM G-154: Standard Practice for Operating Fluorescent Light Apparatus for UV Exposure of Non-Metallic Materials
- BS 2782:Part5: Method 540B (Methods of Exposure to Lab Light Sources)
- SAE J2020: Accelerated Exposure of Automotive Exterior Malts Using a Fluorescent UV/Condensation Apparatus
- JIS D 0205: Test Method of Weather-ability for Automotive Parts

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## **Technical Specification**

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The ultraviolet rays of sunlight are the main factor who damage weathering resistance of most materials. We use UV lamps to simulate the short wave part of sunlight, it produce few visible lights and infrared lights. According to different testing requirements, we choose different wavelength UV lamps, this is because each type UV lamps produce different irradiance energy and wavelength. Generally speaking, UV lamps can be divided into UVA and UVB.

Different types fluorescent UV lamps are used in different fields, for example:

1. UVA-340 Lamp: UVA-340 Lamp can highly simulate short-wave ultraviolet light of sunlight, the wavelength range is from 365 nm to 295 nm.
2. UVA 351 Lamp: Simulates UV sunlight which has passed through the windows. It is excellent for testing materials aging process indoor.
3. UVB 313 Lamp: this lamp emits stronger shortwave ultraviolet light compared with the ultraviolet rays on Earth, thus can accelerate material aging process. However, this lamp may cause some unrealistic material damage. It is mainly used in quality control, research and development, and the test of the materials with strong weather resistance.

### **General Specifications:**

- Original UVA or UVB lamps from America, ensure the comparability of testing results.

All UV machines use fluorescent UV lamps produced by American as testing light source, comparing with other type lamps (including xenon Lamps), UV lamps are more stable. Its spectrum power distribution won't change as the lamps weathering, even upto 6,000 hours. Thus more repeatable testing results can be achieved easily, and decrease changing lamps times and reduce the running cost..

Furthermore, these lamps from American are produced on the base of more than 40 years' experience and fluorescent technology. It is designed specially and tested with most serious quality control.

- With Original Intellectual Property Rights, our ballast can extend the lamp life to 6,000 hours, save use-cost greatly for users.
- Irradiance can be controlled automatically (with the closed-loop system, the value of irradiance is more precise and steady. Only for BGD 856)

The superiority of BGD 856 UV Light Accelerated Aging Test Chamber is that it can be controlled and adjusted automatically during testing process. As it is well known, the energy in testing process is the main factor in polymer materials aging. In order to ensure reproducibility and comparability of testing results, the UV energy is a very important

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technical indicator. We adopt the principles which similar to Sun-eye automatically monitor the testing process throughout the energy value, when the lamp energy is less than the expected value, the system can automatically monitor the difference and automatically replenish energy immediately.

- Irradiance can be calibrated automatically (Only for BGD 856)

As any other lamps, UV lamps energy of BUV also decreases as time increase. The control system would compensate it automatically through strengthening the voltage of lamps. But as the using time become longer and longer, the energy of lamps decrease continuously. For some high set point of irradiance, BUV couldn't keep this irradiance any longer, and now the system of BUV would reminder failure "the error of irradiance is too large" and shut off the machine. Now, the operator should calibrate the BUV by standard calibration radiometer. If machine still can't get the set point after calibrating, the user should replace the two pcs lamps corresponding to the relative sensor and calibrate again.

BUV is calibrated by BGD Calibration Radiometer which is produced by our company. User can use one radiometer to calibrate some BUV, radiometer can test fluorescent UV lamps. It is not only used to calibrate the UVA lamps, but also to do UVB lamps. For UVB lamps, it has been calibrated well under the wave length 313 nm with  $W/m^2/nm$  unit before delivery. For UVA lamps, it has been calibrated well under the wave length 340 nm with  $W/m^2/nm$  unit.

Calibration Radiometer is made up of radiometer and sensor (see picture as below):

The sensor of BGD 8118 calibration radiometer is very sensitive to ultraviolet rays, but it doesn't have any action to visible light, and just have a little response for infrared light even can be ignored. So other rays will not have any influence on this radiometer.

- Water Spray and Condensation function

### Water spray

For some applications, the water spray can simulate end-use environmental conditions better. Water spray can effectively simulate heat shock or mechanical erosion caused by dramatic temperature changes or rain. In some practical application conditions, such as a sudden brash in a sunshine day, can bring heat shock because the temperature of the material changes drastically. This heat shock severely tests the properties of many materials. BUV water spray can simulate this heat shock and / or stress corrosion.

BUV spray system design with 12 nozzles, each side has 6 pieces in the test chamber. Spray system can run a few minutes and then shut down. This transitory water spray can cool the samples quickly, creating heat shock conditions.

### Condensation

In many outdoor environments, materials are placed in wet condition for over 12 hours each day. Studies have shown

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that the main factor of this wet condition outdoor is caused by dew, not rain. BUV simulates the outdoor moisture erosion through the unique condensation capabilities. In the condensation cycle during the test, water on the bottom of the chamber is heated to obtain superheated steam filling the test chamber. Hot steam makes the chamber maintain 100% relative humidity, and maintain a relatively high temperature. Sample was fixed on the wall of test chamber. Thus the sample surface is exposed to the ambient air of test chamber. The other side of the sample is exposed to the natural environment which has a cooling effect, bringing internal and external surfaces of the sample with temperature difference, and the temperature difference leads to the test surfaces always have drips caused by condensation process.

- Control the temperature automatically with high precision Pt 100 temperature sensor of black panel

In each cycle, the temperature can be controlled at a set value. At the same time, the black panel thermometer can monitor the temperature. Temperature increase can accelerate the aging process, and the temperature control for reproducibility of the test is also very important.

BST (Black panel thermometer) consists of a PT100 sensor and a metal panel painted by black coating, and be exposed to the same condition as test panels. It's used to monitor exposing test panels surface temperature during test. BST can be set any value according to different requirements and also be controlled automatically during the whole test. It also can be calibrated periodically.

- Confirms to many test standards. Operator can set different program freely

According to different standards or test methods, operator can edit different test programs. For each program, it can be set as 10 segments, and each segment can set different work conditions (4 types: Irradiation, water spray, condensation and finish) as well as relevant test parameters.

BUV will permit operator to edit six test programs at most and save it permanently. Generally speaking, if the operator has set and saved one program in the BUV, for next test, if he still use this same program, just choose this program and run BUV directly, no need to set again.

- Controlled by touch screen with user-friendly windows, the operator can check any parameter during test

BUV all controllings and showings are finished by a high definition colorful touch screen. Menu operation interface is very convenient for operator to use and maintain BUV. During the working, all parameters are show on the touch screen.

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- Real-time collect and store data, all testing data can be converted EXCEL format automatically and be saved

There is a USB interface at the BUV back, through this interface, operator can export all running parameters at any period by a U disk. It's convenient for operator to search and do statistics for BUV, and achieve the real unattended running.

- Supplied with TCP/IP Ethernet interface, the user can tele-control BUV through TCP/IP internet

With this interface, operator only need to set reasonable IP address, then can monitor BUV working status at any place. Even operator is not in his laboratory, he still can run and maintain BUV. Moreover, this function is also convenient for Biuged to help our customers to solve all problems and do some necessary after service. Settle completely user's troubles back at home.

- Supplied with a booster pump, in case the user's external water pressure is not sufficient, the BUV can still work normally with this booster pump
- Alarm and protection functions: Water shortage, over-temperature of black panel, large deviation of irradiance between setting value with showing value

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### **Main Technical Parameters**

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- Light Source: UV-A (wave length 340 nm) or UV-B (wave length 313 nm) ; 40W×8 pcs (the normal use-life is upto 6,000 hours)
- The range of Irradiance:  $0.3 \text{ W/m}^2 \sim 1.55 \text{ W/m}^2$
- Temperature Range: Black Panel temperature (BPT):  $RT+10^{\circ}\text{C} \sim 80^{\circ}\text{C}$
- Interior of cabinet: Stainless steel - SUS 304 material
- Exterior of cabinet: Powder coating on SUS 304
- Insulating Area:  $5,175\text{cm}^2/828\text{in}^2$
- Sample Capacity: 48 pieces of standard specimen (75mm×150mm standard samples) or 15 pieces of 100mm×300mm
- Adjustable range for water supply: 0-4 LPM
- Water Consumption: 7L/day (for condensation) ; 3L/minute (for spray)
- Overall Size: 1,360mm×520mm×1,300mm (L×W×H)
- Net Weight: 161 KG
- Total Max. Power: 3kW
- Power: 220VAC±10%/50Hz (Optional: 60 Hz) ; 15A (Max Electric Current)
- Ordering Information:
  - BGD 855 - Basic Ultraviolet Light Accelerated Weathering Cabinet (without irradiance control)
  - BGD 856 - Ultraviolet Light Accelerated Weathering Cabinet

### **Accessoires**

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- BGD 8110 - UVB Lamp 40W/313nm
- BGD 8111 - UVA Lamp 40W/340nm
- BGD 8118 - Calibration Radiometer 313nm & 340nm (QUV only: for BGD 855 and 856)
- BGD 8170 - Purity Water System: 20L/h

### **Disclaimer**

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The information given in this sheet is not intended to be exhaustive and any person using the product for any purpose other than that specifically recommended in this sheet without first obtaining written confirmation from us as to the suitability of the product for the intended purpose does so at his own risk. Whilst we endeavour to ensure that all advice we give about the product (whether in this sheet or otherwise) is correct we have no control over either the quality or condition of the product or the many factors affecting the use and application of the product. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever or howsoever arising for the performance of the product or for any loss or damage (other than death or personal injury resulting from our negligence) arising out of the use of the product. The information contained in this sheet is liable to modification from time to time in the light of experience and our policy of continuous product development