

JIS

JAPANESE INDUSTRIAL STANDARD

**Light-and Water-Exposure
Apparatus (Open-Flame
Sunshine Carbon-Arc Type)**

JIS B 7753^{—1988}

Translated and Published

by

Japanese Standards Association

Printed in Japan

In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Light-and Water-Exposure Apparatus
(Open-Flame Sunshine Carbon-Arc Type)

B 7753-1988

1. Scope

This Japanese Industrial Standard specifies the light-and-water-exposure apparatus of open flame sunshine carbon-arc type to be used for testing the weather resistance of various industrial materials and products, hereinafter referred to as the "testing machine".

Remarks 1. The apparatus consists of the test tank and emission part attached to the middle part of test tank, arc stabilizer, test piece hold apparatus having rotary mechanism provided at periphery of emission part, spray apparatus, cooling apparatus, temperature regulation apparatus and humidity regulation apparatus⁽¹⁾ for regulating temperature and humidity in test tank, dew cycle test apparatus⁽²⁾, instrumentation apparatus, etc.

Further, an example is shown in Reference Attached Fig. 1.

Notes ⁽¹⁾ This applies to the test apparatus provided with a humidity regulation apparatus.

⁽²⁾ This applies to the test apparatus provided with a dew cycle test apparatus.

2. In this Standard units and numerical values shown in { } are in accordance with conventional units and are Standard values.

2. Definitions

For the purposes of this Standard the following definitions apply:

(1) weather resistance Properties difficult to be changed relative to natural actions of sunshine, wind and rains, etc. outdoors.

(2) light-and-water-exposure apparatus The apparatus to spray water discontinuously with irradiating an artificial light source similar to the sunshine in order to examine a part of properties of weather resistance in a short time.

3. Performance

3.1 Emission Part The performance and specifications of emission part shall be in accordance with Table 1.

Applicable Standards and Reference Standards: See page 23.

Table 1. Performance and Specifications of Emission Part

Item	Contents																			
Type of emission part	Open-type																			
Number of lamp	1																			
Arc voltage and current	Alternating voltage Permissible range 48 to 52 V Central value 50 ± 1 V Alternating current Permissible range 58 to 62 A Central value 60 ± 1.2 A Provided that the input voltage is constant.																			
Sunshine carbon electrode (herein-after referred to as "carbon")	There are three types of following ① to ③ . ① For the upper part diameter about 22 or 23 mm, length about 305 mm, 4 carbons, continuous burning time 22 h min. For the lower part diameter about 13 or 15 mm, length about 305 mm, 4 carbons, continuous burning time 22 h min. ② For the upper part diameter about 35 or 36 mm, length about 350 mm, 4 carbons, continuous burning time 60 h min. For the lower part diameter about 23 mm, length about 350 mm, 4 carbons, continuous burning time 60 h min. ③ For the upper part diameter about 36 mm, length about 410 mm, 4 carbons, continuous burning time 78 h min. For the lower part diameter about 23 mm, length about 410 mm, 4 carbons, continuous burning time 78 h min. In all cases, the carbon shall include cerium in the core and have the surface covered with metal coating such as copper or the like and be free from defects such as curvature, cracks, etc.																			
Glass filter ⁽³⁾	The filter shall be made of colourless and transparent glass and there are three classes of A to C. <table><tr><td></td><td>A</td><td>B</td><td>C</td></tr><tr><td>Shape and dimensions</td><td colspan="3">Panel shape, length 302.5 ± 2.0 mm, width 164 ± 1.5 mm, thickness 2.4 ± 0.2 mm, 8 sheets</td></tr><tr><td>Spectral transmittance before use (In the case of ordinary temperature)</td><td>255 nm: 1 % 302 nm: 68 % min. 375 to 700 nm: 90 % min.</td><td>275 nm: 2 % max. 320 nm: 75 % min. 400 to 700 nm: 85 % min.</td><td>295 nm: 1 % max. 320 nm: 40 % min. 400 to 700 nm: 90 % min.</td></tr><tr><td>Expansion coefficient</td><td>About $5 \times 10^{-6} \text{ K}^{-1}$</td><td>About $3 \times 10^{-6} \text{ K}^{-1}$</td><td>About $10 \times 10^{-6} \text{ K}^{-1}$</td></tr></table>					A	B	C	Shape and dimensions	Panel shape, length 302.5 ± 2.0 mm, width 164 ± 1.5 mm, thickness 2.4 ± 0.2 mm, 8 sheets			Spectral transmittance before use (In the case of ordinary temperature)	255 nm: 1 % 302 nm: 68 % min. 375 to 700 nm: 90 % min.	275 nm: 2 % max. 320 nm: 75 % min. 400 to 700 nm: 85 % min.	295 nm: 1 % max. 320 nm: 40 % min. 400 to 700 nm: 90 % min.	Expansion coefficient	About $5 \times 10^{-6} \text{ K}^{-1}$	About $3 \times 10^{-6} \text{ K}^{-1}$	About $10 \times 10^{-6} \text{ K}^{-1}$
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Expansion coefficient	About $5 \times 10^{-6} \text{ K}^{-1}$	About $3 \times 10^{-6} \text{ K}^{-1}$	About $10 \times 10^{-6} \text{ K}^{-1}$																	

Table 1. (Continued)

Item	Contents	
Glass filter ⁽³⁾	Limit of total service period	2000 h
Average irradiance of test piece single surface ⁽⁴⁾	255 ± 45 W/m ² (in the case of attached filter) (wavelength range 300 to 700 nm) 285 ± 50 W/m ² (in the case of no filter) (wavelength range 300 to 700 nm)	

Notes ⁽³⁾ In the case dew cycle tests, there are cases of using glass filter and using no glass filter.

⁽⁴⁾ The test method shall be in accordance with Appendix.

Further, its spectral distribution is shown in Reference Attached Fig. 2.

3.2 Test Piece Hold Apparatus The performance and specifications of test piece hold apparatus shall be in accordance with Table 2, and the relative position of test piece hold apparatus, omission part, and spray nozzle shall be as shown in Attached Fig. 1.

Table 2. Performance and Specifications of Test Piece Hold Apparatus

Item	Contents	
Rotary frame	Outside diameter	960 ± 10 mm
	Number of revolutions	About 1 rpm

3.3 Spray Apparatus The performance and specifications of spray apparatus shall be in accordance with Table 3, and the relative position of spray nozzle and test piece shall be as shown in Attached Fig. 1.

Table 3. Performance and Specifications of Spray Apparatus

Item	Contents
Cycle meter	For spray time, at least following three classes may be set. (1) 18 min out of 120 min (2) 12 min out of 60 min (3) Without spray Accuracy shall be ± 0.5 min.
Spray nozzle	The apparatus consists of four nozzles and faces to the surface attached with test piece and has a circular cone shape and, further, is capable of spraying uniformly and continuously. This nozzle is capable of obtaining spray water quantity of 2.1 ± 0.1 l/min (total water amount of 4 nozzles) at the spray pressure of 0.10 MPa {1.0 kgf/cm²}.
Pressure reducing valve	When the feed water pressure is constant between 0.15 to 0.30 MPa {1.5 to 3.0 kgf/cm²}, the spray pressure can be set at 0.08 to 0.13 MPa {0.8 to 1.3 kgf/cm²}.
Water pressure gauge	The scale of maximum pressure specified in JIS B 7505 shall be 0.3 to 0.6 MPa {3 to 6 kgf/cm²}. The scale interval is not more than 0.02 MPa {0.2 kgf/cm²}.
Solenoid valve	The conduit is capable of being opened and closed electrically and securely according to the signal of cycle meter.

3.4 Temperature Regulation Apparatus The performance and specifications of temperature regulation apparatus shall be as given in Table 4.

Table 4. Performance and Specifications of Temperature Regulation Apparatus

Item	Contents		
Regulation of black panel temperature	Range capable of setting: 50 to 70°C or 50 to 93°C Permissible variation range: At set value of 63°C, $\pm 3^\circ\text{C}$. Provided that the circumferential temperature is the standard temperature condition 20°C grade 5 ($20 \pm 5^\circ\text{C}$) specified in JIS Z 8703.		
Black panel thermometer	Response performance	Temperature rise	Put the black panel thermometer in water in water tank adjusted at 30°C with leaving its scale part. After waiting until the temperature is stabilized in the range of $30 \pm 1^\circ\text{C}$, put it quickly into a water tank adjusted at 70°C, and let the time to pass through 63°C be not longer than 10 sec.
		Temperature fall	Put the black panel thermometer in water in the water tank adjusted at 70°C with leaving the scale part. After waiting until the temperature is stabilized in the range of $70 \pm 1^\circ\text{C}$, put it quickly into a water tank adjusted at 30°C and let the time to pass through 37°C be not longer than 10 sec.
	Spectral reflectance		When measured in accordance with the geometrical condition d of illumination and light receiving specified in JIS Z 8722, the range of wavelength is 380 to 780 nm and the spectral reflectance (including the regular reflection light) of black panel shall be not more than 7 %.
	Scale		Highest 80°C or 100°C, scale interval 1°C
Temperature regulator	To be capable of adjusting the black panel temperature within the specified range possible to be set.		

3.5 Humidity Regulation Apparatus The performance and specifications of humidity regulation apparatus shall be in accordance with Table 5.

Table 5. Performance and Specifications of Humidity Regulation Apparatus

Item	Contents
Humidity regulation	The relative humidity at air outlet of test tank is $50 \pm 5\%$. Provided that the circumferential humidity is standard humidity condition 65 % grade 20 ($65 \pm 20\%$) specified in JIS Z 8703, and the black panel temperature is $63 \pm 3^\circ\text{C}$.

3.6 Dew Cycle Test Apparatus The performance and specifications of dew cycle test apparatus shall be in accordance with Table 6 and the relative position of test piece hold apparatus, emission part and cool water spray nozzle, as shown in Attached Fig. 2.

Table 6. Performance and Specifications of Dew Cycle Test Apparatus

Item	Contents
Timer for dew cycle test	The timer is capable of flashing repeatedly arc lamp, and of setting the cycle of flashing at 60 min/60 min at least.
Test piece cooling apparatus ⁽⁵⁾	The cool water spray nozzle shall be capable of cooling the upper and lower test pieces uniformly by spraying cool water in circular cone shape, with facing to the back surface of test piece. Nozzles shall be two pieces and the total spray water amount is about 0.16 l/min. The cooling water apparatus is capable of feeding cool water at $7 \pm 2^{\circ}\text{C}$ (at cool water feed opening).
Temperature and humidity regulating apparatus	At the time of extinction of arc lamp, when the setting place is at standard temperature condition 20°C grade 5 ($20 \pm 5^{\circ}\text{C}$), and at standard humidity condition 65 % grade 20 specified in JIS Z 8703, the apparatus is to be capable of regulating the temperature in test tank at $32 \pm 3^{\circ}\text{C}$, and humidity at not less than 95 %.

Note ⁽⁵⁾ It is the apparatus to cool the test piece by spraying cool water to the back surface of test piece at the time of extinction of arc lamp.

3.7 Instrumentation Apparatus The performance and specifications of instrumentation apparatus shall be in accordance with Table 7.

Table 7. Performance and Specifications of Instrumentation Apparatus

Item	Contents
Voltmeter	To be grade 2.5 for switchboard specified in JIS C 1102, or those equal or superior thereto. Scale range: double scales of 0 to 300 V and 0 to 100 V, or double scales of 0 to 250 V and 0 to 100 V. Scale interval: 2 V max. in the measuring range of arc voltage.
Ammeter	To be grade 2.5 for switchboard specified in JIS C 1102 or those equal or superior thereto. Scale range: 0 to 100 A Scale interval: 2 A max. in the measuring range of arc electric current.
Integrating hour meter	Maximum display 9999.9 h min.
Time switch	Setting range: 0 to 24 h min. Scale interval: 0.1 h max.