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**ACCELERATED TEST METHOD FOR LIGHT
RESISTANCE WITH XENON-ARC LAMP**

1. SCOPE

This standard specifies accelerated test method for light resistance (*1) of non-metallic materials and products in automobile cabin using light-exposure apparatus with xenon-arc lamp (*2) (hereinafter call "Test apparatus").

Note:

(*1) The property of resistance to variation of color, gloss, etc. under irradiation of light, and shall be distinguished from weather resistance, which is the property of resistance to variation to natural actions, such as out-door sunlight, wind, rain, etc.

(*2) Test apparatus capable of performing irradiation of an artificial light source closely resembling sunlight for examining part of the properties of light resistance in a short time.

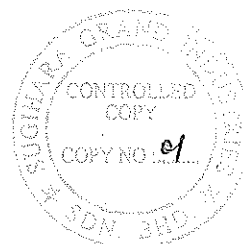
2. DEFINITIONS OF TERMS

Definitions of main terms used in this standard shall be accordance with Table 1.

Table 1

Term	Definition
1) Black panel temperature (hereinafter call "B.P.T.")	The temperature indicated by a black panel thermometer attached to a rack or rotary board, which is representative for the surface temperature of test pieces.
2) Xenon-arc lamp	An arc lamp which emits by xenon-arc discharge.
3) Emission part	The part composed of a xenon-arc lamp and a filter.

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3. TEST CONDITIONS

For evaluating variation of color, gloss, etc., conditions, such as temperature, humidity, irradiance, etc., which are effective on test results, shall be in accordance with Table 2.

Table 2

Item	Condition
1) Temperature	B.P.T. $89 \pm 3^{\circ}\text{C}$
2) Relative humidity	$50 \pm 5\% \text{RH}$
3) Irradiance (*3)	$48\text{-}100\text{W}/\text{m}^2$ (within 300-400nm)
4) Irradiance ratio	Irradiance of 320 nm max. shall be under 1.5% of that of 300-400nm.
5) Irradiation method	Continuous irradiation
6) Test period control	According to radiant exposure quantity

Note(*3): Selection of irradiance shall be effective on acceleration, however, irradiance also shall be effective on sample temperature and heat history. Appropriate irradiance is needed to be selected considering effect on samples by temperature.

4. APPARATUS AND PERFORMANCE

Test apparatus shall be constructed of an emission part, xenon-arc starting and stabilizing apparatus, irradiance adjusting apparatus, temperature adjusting apparatus, test tank, humidity adjusting apparatus, test piece holder, cooling apparatus, instrumentation apparatus, etc.

4.1 Emission Part

4.1.1 Emission part shall be as follows, according to clause 3:

- 1) Xenon-arc lamp: Xenon-arc lamps are long arc lamps of a.c. burning in which electrodes are sealed-in both ends of a quartz tube and xenon gas is sealed-in inside, and are used with performing forced water cooling or forced air cooling.
- 2) Filter: Filters are used for obtaining the required spectral characteristics and for cooling the xenon-arc lamp. For insulating the ultraviolet part, glass filters for ultraviolet-radiation insulation, running water, etc., are used.
- 3) Other: Based on the portion to be used, material superior in heat resistance, corrosion resistance, humidity resistance, or electric insulation shall be used.

4.1.2 Spectral characteristics of emission part

The xenon-arc lamp shall have a continuous spectrum at least over the wavelength range of 250 to 1200 nm, and shall have a similar spectral characteristics to glass-through-sunlight in combination with filter.

4.1.3 Irradiance of test piece surface

Irradiance of test piece surfaces shall be able to be set on any certain value within $48\text{-}100\text{W}/\text{m}^2$ at least over the wavelength range of 300 to 400 nm.

Also, spectral irradiances of test piece surfaces in the wavelength of 300 to 400 nm shall be indicated for each type of test apparatus. Further, the irradiance in other wavelength ranges or the spectral irradiance at a specific wavelength should also be marked upon agreement between the parties concerned. The measuring method is to be in accordance with the annex of JIS B 7754.

4.1.4 Tolerance in irradiance during operation

It shall be capable of maintaining $\pm 10\%$ of the set irradiance.

4.1.5 Tolerance in irradiance of test piece surfaces

The difference of irradiances of test piece surfaces due to the position must not exceed 10 % of the maximum value.

4.1.6 Irradiation method

As a rule, a certain constant irradiance shall be kept continuously during operation.

4.2 Irradiance Adjusting Apparatus

The irradiance adjusting apparatus is an apparatus to correct the attenuation of radiation energy accompanying the use of a xenon-arc lamp and filter, measuring the irradiance in the wavelength of 300 to 400 nm, and shall be provided with one of the following conditions:

- 1) It shall be capable of manual adjustment of the lamp power to make the irradiance constant.
- 2) It shall be capable of automatic control of the lamp power to make the irradiance constant.
- 3) It shall be capable of manual adjustment of the lamp power stepwise according to the time of use.

4.3 Black Panel Thermometer

Black panel thermometer is so structured that the heat sensitive body, bimetal, platinum resistor, thermistor, thermoelectric couple, etc., is attached coincident with the center of the metal plate and is adhered tightly to the heat sensitive body protecting tube.

Remarks: Structures and dimensions shall be in accordance with 5.7(2) and Attached Fig. 1. Type A of JIS B 7754.

4.4 Test Tank

Temperature and humidity in test tank shall be as follows:

- 1) B.P.T. at the position of test piece shall be 89 ± 3 °C.

Remarks: Temperature will be different depending on the combination of xenon-arc lamp type and filter.

- 2) Relative humidity

It shall favorably be capable of keeping relative humidity 50 ± 5 % under the temperature specified in 1). Further, relative humidity shall be measured at the point close to and inside the exit of test tank.

4.5 Other

Items unspecified in the foregoing clauses, such as test tank, xenon-arc starting and stabilizing apparatus, temperature adjusting apparatus, humidity adjusting apparatus, test piece holder, cooling apparatus, instrumentation apparatus, etc., shall be in accordance with JIS B 7754.

5. TEST PIECE

5.1 Dimensions of Test Piece

Irradiation area of test piece shall be 30 mm min in vertical direction and over 30 mm min in horizontal direction, and thickness shall be determined according to agreement between the parties concerned. Further, when test piece has urethane foam backing layer as part construction, density and composition, etc. of the layer shall be determined between the parties concerned.

5.2 Other

In case of test piece with texture direction, such as fabrics, etc., attachment direction relative to test apparatus shall be indicated.

6. PROCEDURE

6.1 Attach test piece on test piece holder firmly so that it won't drop. Further, when backing material like urethane foam is attached on backside of test piece, the backside shall be contacted with backing material as tightly as possible so that it shall not become loose.

6.2 Set test piece holders with test pieces attached on a rack or a rotary board without gaps between the holders. When there are some test piece holders without test pieces, put white-colored papers, aluminum plates, stainless steel plates, etc., on all of the holders in order to keep heat equilibrium inside test tank.

6.3 Select a certain irradiance within 48-100 W/m² in the wavelength of 300-400 nm, and adjust test apparatus so that the selected irradiance shall be kept constant during exposure.

6.4 Adjust B.P.T. during exposure within $89 \pm 3^{\circ}\text{C}$ by temperature adjusting apparatus.

6.5 Adjust humidity during exposure within 50 ± 5 % RH.

6.6 In case of broad samples, their position shall favorably be replaced at certain intervals for better test accuracy.

Remarks: Radiant exposure quantity can be calculated by the following formula:

Radiant exposure quantity (kJ/m²) = Irradiance (W/m²) x Time (Hr) x 3.6

Applicable standards

JIS B 7754

JASO M 346

Revision Record

Year	Rec	Issue	NewsNo	Prep	Conf	Appvl
93	EST	93/10/28	93023	Kobayashi	Shimada	Yamada
93	Rewrite	95/05/31	-----	Kimura	Shimada	Yamada
93	Rewrite	98/06/30		Tashiro	Shimada	Honda
99	Correctio n	99/08/07	99011	Kobayashi	Naya	Tomino
99A	Correctio n	99/12/24	99017	Kimura	Naya	Tomino

