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Accelerated weathering test methods of automotive nonmetal components and materials using a fluorescent UV and condensation apparatus

汽车非金属部件及材料紫外加速老化试验方法

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Standardization Administration of PRC.

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Foreword

This Standard is drafted in accordance with the rules in GB/T 1.1-2009.

This Standard was proposed by the Ministry of Industry and Information Technology of the People's Republic of China.

This Standard shall be under the jurisdiction of National Automotive Standardization Technical Committee (SAC/TC 114).

Chief drafting organizations of this Standard: National Automobile Quality Supervision and Inspection Center (Xiangyang), Dongfeng Motor Corporation Technical Center, China FAW Group Corporation R&D Center, FAW - Volkswagen Automotive Co., Ltd., Dongfeng Peugeot Citroen Automobile Co., Ltd., Fifty-nine Institute of China North Industries, National Polymer Materials & Products Quality Supervision and Inspection Center, Shenzhen BYD Automobile Co., Ltd., Zhejiang Juner New Material Co., Ltd., DuPont Performance Coatings (Shanghai) Co., Ltd., Hainan Tropical Automobile Test Co., Ltd., CSTC Standards Technical Services (Shanghai) Co., Ltd., Chery Automobile Co., Ltd., Kingfa Technology Co., Ltd., Nanjing Automobile Group Co., Ltd., Anhui Jianghuai Automobile Co., Ltd., SAIC Motor Corporation Limited Passenger Car Division, Changan Automobile Company Limited Automotive Engineering Research Institute.

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Accelerated weathering test methods of automotive nonmetal components and materials using a fluorescent UV and condensation apparatus

1 Scope

This Standard specifies the test methods and evaluation methods to use UV aging test equipment to conduct accelerated aging against automotive non-metallic parts and materials.

This Standard applies to automotive plastics, rubber, coatings, adhesives, and other non-metallic parts and materials.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this document.

GB/T 250-2008 Textiles - Tests for color fastness - Grey scale for assessing change in color

GB/T 1766-2008 Paints and varnishes - Rating schemes of degradation of coats

GB/T 15596-2009 Plastics - Determination of changes in color and variations in properties after exposure to daylight under glass, natural weathering or laboratory light sources

GB/T 16422.3 Plastics - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

sensor and the sample in the same environment.

During exposure to UV irradiation, by supplying hot air to the chamber, MAINTAIN the sample surface temperature within ±3°C of the set temperature. During the condensation exposure, by heating the water in the water tray, MAINTAIN the sample surface temperature within ±3°C of the set temperature. The temperature control of UV irradiation and condensation cycle shall be independent of each other.

5 Test sample

5.1 The sample size shall be 50mm×75mm, 75mm×100mm, 75mm×150mm, 100mm×150mm, or as agreed between the test parties.

5.2 Before the test, the test sample shall be cleaned. AND it shall not use the cleaning agent which may erode sample surface. It is not allowed to wash away the intentionally applied protective film from the sample surface.

5.3 If the sample is cut from a large work piece, the test can be agreed by the test parties, BUT it shall ensure that the test part of the sample complies with the test requirements.

5.4 It shall take at least two samples, wherein one sample is used as file sample for evaluation and comparison, which is stored in a dark, dry environment. Unless otherwise agreed by the test parties, the file sample is generally not covered by half.

5.5 To provide the aging record of different time intervals, it is needed to provide sufficient number of samples.

5.6 As for the insulating material sample, such as plastic or foam, it shall control the sample thickness, so as to ensure the heat transfer to make the sample surface form condensation.

5.7 As for soft sample, it shall fix it on an inert metal back plate.

5.8 In order to prevent the loss of water vapor during test, as for the samples which have 2mm-above holes OR 1mm-above gaps with sample holder due to shape inconsistency, it is needed to seal the hole and gap of sample. As for the porous samples, such as fabric, it shall use water vapor barrier materials, such as metal materials, as backing.

7.4 When the condensation cycle starts, BEGIN exposure test. In order to ensure the condensing effect during the condensation cycle, CHECK whether the sample surface is with condensation once a week.

7.5 In order to reduce the effects caused by the changes of temperature and UV irradiation, it shall periodically rotate the sample position. Horizontally move the sample at least once a week.

8 Test results and evaluation

When the test is finished, it shall evaluate the color change, gloss change, chalking, cracking, blistering, and peeling of the test sample.

As for the visual color change of the sample, refer to GB/T 250-2008. As for the gloss change of the sample, the instrument measured color change, chalking, cracking, blistering, rusting, peeling, mildew, etc., refer to GB/T 1766-2008 and GB/T 15596-2009.

9 Test report

The test report shall include the following:

a) Description of the test sample;

b) Indicated number of this Standard;

c) Selected test method (test method 1, test method 2);

d) Test results (given in Chapter 8);

e) Used UV aging equipment model and serial number;

f) Fluorescent UV lamp supplier name, lamp name specified by the manufacturer, lot number or date code, AND wavelength corresponding to irradiance peak;

g) UV irradiation cycle time and temperature, condensation cycle time and temperature;

h) Time of aging test;

i) Whether the test is conducted in stages;

j) Any differences from specified test methods;

Appendix A

(Normative)

Test equipment maintenance and calibration

A.1 Maintenance and calibration

The test equipment shall be subject to regular maintenance, so as to ensure the uniformity of exposure. In accordance with the equipment instructions, CONDUCT necessary maintenance and calibration.

A.2 Irradiance calibration

A.2.1 The equipment shall be able to continuously monitor UV irradiance, AND automatically adjust the power of UV lamp, so as to maintain the irradiance set point.

A.2.2 When the lamp works for every 400h±25h OR when replacing a new lamp, in accordance with the equipment requirements, USE irradiance calibrator to conduct irradiance output calibration.

A.2.3 When it is not able to maintain the set irradiance, REPLACE all the lamps in the equipment.

A.3 Thermometer calibration

The black panel thermometer shall be calibrated once every six months. PLACE simultaneously the equipment's working thermometer and the calibration thermometer into thermos which is filled with hot water. As for the hot water temperature, refer to the maximum temperature of the running device. It is needed for 10min settling time to calibrate the thermometer reading, so as to correct the working thermometer.

A.4 Water tray maintenance

Every six months, DRAIN the water and clean water tray, AND it is also allowed to clean it more frequently based on local water quality. AVOID the surface float or underwater fouling from impacting water evaporation.

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