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Rubber, vulcanized or thermoplastic - Methods of test for staining in contact with organic material

硫化橡胶或热塑性橡胶与有机材料接触污染的试验方法

(ISO 3865:1997, MOD)

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Foreword

This standard modifies and uses ISO 3865:1997 “Rubber, vulcanized or thermoplastic - Methods of test for staining in contact with organic material” (English version).

This standard was redrafted in accordance with ISO 3865:1997. The technical differences and reasons are as follows:

- ADD a sentence “This standard applies to the evaluation of the grade of staining of vulcanized or thermoplastic rubber in contact with organic materials” (clause 1 of this version), for the user to be more specific.

- Make reference to the ISO 2393 “Rubber test mixes - Preparation, mixing and vulcanization - Equipment and procedures” and ISO 4665-3 “Rubber, vulcanized - Resistance to weathering - Part 3: Methods of exposure to artificial light” as cited in ISO 3865:1997, which are corresponding national standard GB 6038 and GB/T 12831.

a) The main technical differences between the reference standard GB 6038 and ISO 2393 are as follows:

- ISO 2393 specifies that carbon black needs to be dried and conditioned before weighing; whilst GB 6038 has no this requirement, because many manufacturers in China do not have such conditions.

- ISO 2393 specifies that the temperature control range of the flat vulcanizing press is ±0.50 °C; whilst GB 6038 specifies it as ±10 °C, because many flat vulcanizing presses in China cannot reach this accuracy.

- ISO 2393 specifies the micro-internal mixing procedures; whilst GB 6038 does not specify it, because micro-internal mixers are not yet widely available in China.

b) The main technical differences between the reference standards GB/T 12831 and ISO 4665-3 are as follows:

- The radiation dose method in GB/T 12831 is determined only by instrumental method, whilst in ISO 4665-3 uses the blue wool fabric standard to determine the radiation dose, meanwhile details the method of using the blue wool fabric standard to determine the radiation dose, because there is no blue wool fabric standard when GB/T 12831 is formulated.

- GB/T 12831 makes reference to the 5 grades as specified in GB/T 3511 to evaluate the appearance change of the specimen after exposure; whilst

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Warning - Personnel using this standard shall have hands-on experience in formal laboratory work. This standard does not address all possible safety issues. The user is responsible for taking appropriate safety and health measures and ensuring compliance with the conditions set by the relevant national regulations.

1 Scope

This standard specifies three test methods for evaluating the staining of vulcanized rubber or thermoplastic rubber in contact with organic materials:

Method A - Contact stain and migration stain;

Method B - Extraction stain;

Method C - Penetration stain.

This standard applies to the evaluation of the grade of staining of vulcanized or thermoplastic rubber in contact with organic materials

2 Normative references

The provisions in following documents become the provisions of this standard through reference in this standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this standard; however, parties who reach an agreement based on this standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB/T 250 Gray scale for assessing change in color (GB 250-1995, idt ISO 105-A02:1993)

GB 730 Textiles - Tests for color fastness - Blue wool standards for color fastness to light and weathering (GB 730-1998, eqv ISO 105-13:1994)

GB/T 3512 Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests - Air-oven method (GB/T 3512-2001, eqv ISO 188:1998)

4.2 Method B (assessment of extraction stain): Allow the test liquid to pass over the surface of the tested rubber, to be in contact with the specified organic material. If required, the organic material is then thermally-irradiated.

4.3 Method C (assessment of penetration stain): Bond a designated light-colored thin-layer to the tested rubber. Then the thin-layer is thermally-irradiated.

4.4 Assessment of stain: Use the visual observation method for qualitative assessment. Use the grey scale for assessment. Use the reflectance spectrophotometer for assessment.

5 Devices

5.1 Hot-air aging box: It is in accordance with GB/T 3512.

5.2 Artificial light source: A xenon lamp that, through filtering, gives the spectral distribution equivalent to sunlight, meets the requirements of GB/T 12831, meets the requirements of 9.1. It is applicable to method A, method B, method C.

5.3 Radiation chamber: It includes lamp and sample holder, which meet the requirements of 9.3 and 9.4. It is applicable to method A, method B, method C.

5.4 Thermocouple or blackboard thermometer: See GB/T 12831. It is used to measure the surface temperature of the specimen. It is applicable to Method A, Method B, Method C.

5.5 Apparatus for determining light intensity: It in accordance with the wavelength range as given in 9.1. It is applicable to Method A, Method B, Method C. It is recommended to use it.

5.6 Blue wool standard parts: It is in accordance with GB/T 730. It is applicable to Method A, Method B, Method C.

5.7 Gray scale: It complies with the provisions of GB/T 250. It is applicable to Method A, Method B, Method C.

5.8 Reflective spectrophotometer: The wavelength range is 400 nm ~ 600 nm. It is applicable to Method A, Method B, Method C.

5.9 Beaker and drip device: It is applicable to method B.

5.10 Drip holder and drying rack: It is applicable to method C.

provisions of GB 6038. Roll the un-vulcanized rubber to a thickness of 2.0 mm ± 0.2 mm. The both sides are protected by inert materials such as starched cambric cloth or polyethylene film. Cut the film to the desired molded size.

Roll the light-colored thin rubber layer to a thickness of 0.5 mm ± 0.05 mm. Use a protective aluminum foil at least on one side to flatten it.

When bonding, remove the protective layer from one side of the test rubber and the thin layer. It may use a plate press or a press roll to apply pressure, to firmly press the two exposed surfaces together, to ensure that the aluminum foil remains outside the thin layer.

Place the assembly which contains the aluminum foil in a flat vulcanizer for molding and vulcanizing. Pay attention to locate the thin layer and the aluminum foil at the bottom of the mold. The test report shall contain the vulcanization conditions. The protective layer on the thin layer is retained before the test.

6.3.3 Painted specimens

Immerse the vulcanized rubber specimen in a 25 mm depth paint (see 6.2). Then hang it on an appropriate holder to dry it. After drying, immerse it in the paint for the second time. Then dry it again until the surface is not sticky.

Dissolve the un-vulcanized thin rubber layer in a suitable solvent (volume ratio 1:6) to prepare an adhesive paste instead of the paint. The preparation procedure of the specimen is the same as the preparation procedure of the painted specimen.

The aluminum foil immersed in the varnish/adhesive paste is used as a blank specimen.

The thickness of the varnish layer is 0.1 mm ± 0.02 mm. The thickness of the adhesive paste layer is 0.16 mm ± 0.04 mm.

6.4 Blank specimen and reference specimen

6.4.1 Blank specimen

Except that the tested rubber is replaced by inert material, the blank specimen and the tested rubber are prepared and processed by the same method. The appropriate inert material which is used to replace rubber specimen is 0.4 mm ~ 0.6 mm thick aluminum foil.

6.4.2 Reference specimen

The reference specimen has the same structure as the tested specimen (6.1 ~ 6.3) and is prepared in the same manner. However, it shall use appropriate method to avoid light exposure, that is, use appropriate covering during

recommended in clause 9, illuminate the painted surface of the specimen. Then use the distilled water which contains approximately 2% (mass fraction) non-alkaline detergent to rinse this sheet. Follow the requirements of clause 10 to evaluate the penetration stain.

The blank test is carried out in parallel with the stain test. Compare the blank specimen to evaluate the degree of stain.

9 Recommended illumination conditions

9.1 Intensity

The light source is a xenon lamp (see 5.2). The wavelength of the lamp is 300 nm ~ 830 nm. the radiant intensity of the specimen surface is 1000 W/m^2 ± 200 W/m^2.

9.2 Illumination time

Unless otherwise specified, the suitable illumination time is 24 h, 48 h or 168 h.

Alternatively, illuminate the specimen together with the blue wool standard piece (see 5.6), until one of the previously selected standard piece 3, standard piece 4 or standard piece 6 presents a gray color which is equivalent to grade-4 of grey scale (see 5.7) between the illuminated area and the non-illuminated area.

9.3 Surface temperature

The surface temperature of the specimen is 55 °C ± 3 °C. Use a blackboard thermometer (see 5.4) to make measurement.

9.4 Position arrangement of specimen

When several specimens are simultaneously exposed to light, take care to make all specimens are illuminated equally. The change in radiant intensity at any point on the surface of the specimen shall not exceed ±10% of the average.

These requirements may be achieved by rotating the specimen around the xenon lamp.

10 Evaluation of stain degree

The evaluation of stain degree may be carried out by the methods as specified in 10.1, 10.2, 10.3. The degree of stain is evaluated in accordance with Table 1.

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