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Test method of artificial leather and synthetic leather - Determination of tensile load and elongation at break

人造革合成革试验方法 拉伸负荷及断裂伸长率的测定

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Table of Contents

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1 Scope

This Standard specifies the principle, three test methods, namely the strip method (method A), the grab method (method B), and the dumbbell-shaped sample method (method C), and test report for determination of tensile load and elongation at break of artificial leather and synthetic leather.

This Standard applies to the test of tensile load and elongation at break of artificial leather and synthetic leather.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 2918-2018, Plastics. Standard atmospheres for conditioning and testing

JB/T 7797, Tensile testing machines for rubber and plastics

3 Principle

The sample of specified size is stretched and elongated to break at a constant elongation rate. Record the maximum load and the elongation at break.

4 Strip method (method A)

4.1 Test instrument

4.1.1 Tensile testing machine: it shall meet the requirements of JB/T 7797, where the constant elongation rate is 200 mm/min, and the tolerance is ±10%; the center of the two fixtures of the instrument shall be on the tension line; the jaw shall be perpendicular to the tension line; the clamping surface shall be on the same plane. The fixture shall be able to clamp the sample without making it slip; it shall not shear or damage the sample. If the sample slips, appropriate

4.3.1 Parameter setting

Set the distance between fixtures at (100±1) mm and the constant elongation rate at (200±20) mm/min.

4.3.2 Sample clamping

Respectively clamp two fixtures at both ends of the sample length direction; ensure that the center line of the pulling force passes the midpoint of the fixture. Draw marker lines at both ends of the initial distance between fixtures.

The sample can be clamped under pretension or loosely clamped. When the sample is clamped under pretension, the produced elongation is not more than 2%. If it cannot be guaranteed, use loose clamping, namely tensionless clamping.

4.3.3 Determination

Turn on the tester and stretch the sample to break. Record the maximum force value (unit: N), accurate to 0.1 N, and the clamp spacing L_2 (unit: mm) at break, accurate to 0.1 mm.

4.3.4 Abnormal test result

If the sample slips more than 2 mm from the jaw or breaks within 5 mm from the jaw, discard the test results and re-sample for testing.

4.3.5 Wetting test

Remove the sample from the liquid and place it on absorbent paper to absorb excess water on the surface of the sample; immediately perform the test according to 4.3.1 ~ 4.3.3.

4.4 Result calculation

4.4.1 Record the maximum force value of each sample in the longitude and latitude directions or the vertical and horizontal directions, in Newtons (N).

4.4.2 Calculate the elongation at break δ of each sample according to Formula (1); express in %.

$$\delta = (L_2 - L_0) \times 100 / L_0 \qquad \cdots\cdots (1)$$

Where:

L_2 – distance between fixtures of the sample during tensile breaking, in millimeters (mm);

L – total length, (200 ± 2) mm;

L_0 – initial distance between fixtures, (100 ± 2) mm;

L_1 – the distance between the fixture and the edge of the sample, 37.5 mm;

d_1 – width of the front fixture, (25 ± 1) mm;

d_2 – width of the rear fixture, (50 ± 1) mm;

b – sample width, (100 ± 2) mm.

Figure 2 -- Schematic diagram of sample clamping by the grab method

5.2.2 Sample state adjustment and test environment

Sample state adjustment and test environment are same as 4.2.2.

5.3 Test procedure

5.3.1 Parameter setting

Set the distance between fixtures at (100 ± 2) mm and the constant elongation rate at (200 ± 20) mm/min.

5.3.2 Sample clamping

Clamp the middle part of the sample; ensure that the vertical center line of the sample passes through the center line of the fixture; clamp the marker line on the sample to one side of the clamp closely; sag by the weight of the sample; clamp the lower fixture; ensure that the length direction of the sample is parallel to the direction of the tension line.

The sample can be clamped under pretension or loosely clamped. When the sample is clamped under pretension, the produced elongation is not more than 2%. If it cannot be guaranteed, use loose clamping, namely tensionless clamping.

5.3.3 Determination

Same as 4.3.3.

5.3.4 Abnormal test result

Same as 4.3.4.

5.4 Result calculation

Same as 4.4.

r – small radius, (14 ± 1) mm;

b – width, (25 ± 0.5) mm;

b_1 – width of parallel part, (10 ± 0.5) mm.

Figure 3 -- Dumbbell-shaped sample

6.2.2 Sample state adjustment and test environment

Sample state adjustment and test environment are same as 4.2.2.

6.3 Test procedure

6.3.1 Parameter setting

Set the distance between fixtures at (86 ± 1) mm and the constant elongation rate at (200 ± 20) mm/min.

6.3.2 Sample clamping

Clamp the two ends of the dumbbell-shaped sample in the length direction into two fixtures respectively; ensure that the vertical center line of the sample passes through the center line of the fixture and is perpendicular to the fixture jaw line.

The sample can be clamped under pretension or loosely clamped. When the sample is clamped under pretension, the produced elongation is not more than 2%. If it cannot be guaranteed, use loose clamping, namely tensionless clamping.

6.3.3 Installation of extensometer

Respectively clamp the upper and lower clamp holders of the extensometer on the marker line and adjust.

6.3.4 Determination

Turn on the tester and stretch the sample to break. Record the maximum force value (unit: N), accurate to 0.1 N, and the distance between the marker lines L_2 (unit: mm) at break, accurate to 0.1 mm.

6.3.5 Abnormal test result

If the sample slips more than 2 mm from the jaw or breaks beyond the clamping distance of the extensometer, discard the test results and re-sample for testing.

6.4 Result calculation

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