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Testing method for the non-marking outsole of rubber shoes and sports shoes

胶鞋、运动鞋外底不留痕试验方法

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WARNING: Personnel using this document shall have practical experience in formal laboratory work. This document does not address all possible safety issues. Users are responsible for taking appropriate safety and health measures and ensuring compliance with relevant national regulations.

1 Scope

This document describes the test principles for the non-marking outsoles of rubber shoes and sports shoes, and specifies the apparatus, samples, sample conditioning, test procedures, test results and the contents of the test report.

This document is applicable to the non-marking test of the outsoles of various types of rubber shoes and sports shoes. It is divided into the horizontal friction method and the pendulum impact method. For other types of footwear, it can be used for reference.

2 Normative references

The provisions of the following documents constitute the essential clauses of this document through normative references in this text. Among them, for referenced documents with dates, only the versions corresponding to the dates are applicable to this document; for referenced documents without dates, the latest versions (including all amendments) are applicable to this document.

GB/T 251 Textiles - Tests for colour fastness - Grey scale for assessing staining

GB/T 2941 Rubber - General procedures for preparing and conditioning test pieces for physical test methods

3 Terms and definitions

There are no terms or definitions that require definition in this document.

4 Test principle

4.1 Horizontal friction method

The sample is placed on the specified friction plate surface and a reciprocating test is performed at the specified pressure, number of times, stroke, and frequency. After the specified number of tests, the mark left by the sample on the friction plate is observed and compared with the grey scale for assessing staining to assess the degree of the mark left.

4.2 Pendulum impact method

The sample is secured to the specimen fixture of the pendulum impact tester. The friction plate height is set so that the sample and plate are in contact but without pressure. The pendulum is raised to a certain height, the friction plate is fine-tuned upward, and then the pendulum is released. The mark left by the sample on the friction plate is observed and compared with the grey scale for assessing staining to assess the degree of the mark left.

5 Instruments and equipment

5.1 Horizontal friction test apparatus

5.1.1 Test bench

The test bench is shown in Figure 1 and shall include the following parts:

a) Horizontal metal platform;

b) Fixing clamp: fix the friction plate on the platform;

c) Travel device: Ensure that the horizontal metal platform can move horizontally a distance of (100.0±2.0) mm.

5.1.2 Test column and test head

The test column and test head are shown in Figure 1 and shall meet the following requirements.

a) Test column: The weight is installed on the top and the test head is installed on the bottom. It can move freely up and down.

b) Test head: It has a groove for holding the sample. The groove is cylindrical, with a diameter of $11.4^{+0.2}_{0}$ mm and a depth of (4.0±0.2) mm.

c) The total mass of the test column and test head is (300.0±5.0) g, and the mass of the weight is (600.0±5.0) g. After loading, the total mass of the sample load is (900.0±10.0) g.

d) Adjusting device: It is used to adjust the test column and test head so that the

5.3.1 The friction plate shall meet the following requirements:

a) The color is white or black;

b) The material is PU board or PVC board;

c) The hardness of PU board is (80.0±5.0) Shore A, and the hardness of PVC board is (90.0±5.0) Shore A.

5.3.2 The dimensions of the friction plate used in the horizontal friction method are (175.0±5.0) mm in length, (70.0±5.0) mm in width, and (2.0±0.5) mm in thickness.

5.3.3 The dimensions of the friction plate used in the pendulum impact method are (200.0±5.0) mm in length, (25.0±2.0) mm in width, and (2.0±0.5) mm in thickness.

5.4 Cutter

The rotary cutter has an inner diameter of $11.4_{-0.1}^{0}$ mm and a rotation speed greater than 1000.0 r/min, and is used to cut samples for the horizontal friction method.

Instruments for cutting samples, such as sharp cutters, are used to cut samples for the pendulum impact method.

5.5 Vernier caliper

The graduation value is 0.02 mm.

5.6 Grey scale for assessing staining

It shall comply with the requirements of GB/T 251.

5.7 Adhesives

Quick-drying adhesive that cures quickly after bonding samples.

6 Samples

6.1 Horizontal friction method

6.1.1 Take one sample each from the inner and outer sides of the forefoot metatarsophalangeal area of the outsole, at a distance of (12.0±1.0) mm from the edge. Cut 1 sample from the center of the heel of the outsole, at a distance of (12.0±1.0) mm from the rear end of the outsole, as shown in Figure 3.

6.1.2 Each set of samples shall contain no fewer than 6 samples, taken from at least 2 shoes. The samples shall be cylindrical, with a diameter of $11.4_{-0.1}^{0}$ mm and a thickness of (6.0±0.2) mm. If the thickness is insufficient, the test piece may be bonded

8.1.5 Start the switch and rub it 20 times.

8.1.6 After the specified number of frictions is reached, stop the machine, remove the friction plate, and evaluate the mark level on the friction plate caused by the sample in a standard light box according to the grey scale specified in GB/T 251.

8.1.7 Replace the friction plate with a new one, or adjust the friction position on the friction plate, and test another five samples according to steps 8.1.1~8.1.6.

8.2 Pendulum impact method

8.2.1 Use adhesive to attach the conditioned sample to the sample fixture of the pendulum impact tester, ensuring that the two sides of the triangular prism face outward.

8.2.2 Install the sample fixture onto the pendulum of the test instrument and secure it with a nut. Adjust the position of the fixture to ensure that the bottom edge of the sample is parallel to the plane of the pendulum end, and lift the pendulum.

8.2.3 Place the friction plate over the convex plate of the mounting platform. Use a black friction plate for white samples and a white friction plate for samples of other colors. Tighten the screw fixture to secure one end of the friction plate. Clamp the other end of the friction plate with the rear clamping fixture. Then, connect the weight to the friction plate through the rear clamping fixture.

8.2.4 Loosen the fixing screw, lower the mounting platform, lower the pendulum, and readjust the height of the mounting platform to ensure that the bottom edge of the sample contacts the friction plate when the pendulum is in the vertical position.

8.2.5 Raise the pendulum to an angle of 75° to the vertical direction, adjust the fine-tuning screw so that the friction plate rises by a height of (0.80±0.05) mm, and then tighten the locking nut.

8.2.6 Lower the pendulum and allow the sample on the end of the pendulum to rub against the friction plate. Observe the mark left by the sample on the friction plate. Remove the friction plate and assess the mark level left by the sample on the friction plate in a standard light box according to the grey scale specified in GB/T 251.

8.2.7 Replace the friction plate with a new one, or adjust the friction position on the friction plate, and test two more samples according to steps 8.2.1~8.2.6.

9 Test results

The lowest value of the mark level among the same samples is taken as the test result.

The deviation of the test results of the same sample shall not be greater than level 1;

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