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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 16641-2019

Replacing GB/T 16641-1996

**Footwear - Test methods for whole shoes - Dynamic
waterproofness**

鞋类 整鞋试验方法 动态防水性能

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1 Scope

China's national test for whether a finished shoe keeps water out while it is being walked in. It specifies the test method for the dynamic waterproofness of whole shoes and applies to the detection of dynamic waterproofness for all types of whole shoe, excluding sizes below 230. The word that matters in the title is dynamic. A static immersion test tells you very little about a shoe, because a shoe leaks where it flexes: the vamp creases at every step, the seam at the toe box opens and closes, the joint between the upper and the sole works against the adhesive, and a membrane that is watertight lying still is not necessarily watertight after ten thousand flex cycles. The method reproduces that. A whole shoe is mounted on a machine that flexes it in a trough of water while the shoe travels through it, so the specimen is walked through water rather than left in it. Water ingress is then determined - by the mass of water taken up, or by detection inside the shoe, over a defined number of cycles. Because the answer depends on the severity of the flexing and on how deep the water is, the standard fixes the machine and its geometry, the water level relative to the shoe, the flexing rate and angle, the number of cycles, the conditioning of the specimen beforehand in a standard atmosphere, and the way the result is expressed. The size exclusion exists because the machine cannot grip a small shoe correctly, and a result from a badly held specimen would not mean anything. Issued on 30 August 2019 and in force since 1 March 2020, it replaces GB/T 16641-1996.

This Standard specifies the test methods for dynamic waterproofness of whole shoe. This Standard is applicable to the detection of dynamic waterproofness of various types of whole shoes. This Standard does not apply to whole shoes of which the footwear size is less than 230.

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 22049-2019, Footwear. Standard atmospheres for conditioning and testing of footwear and components for footwear QB/T 2885-2007, Footwear. Test methods for outsoles. Flex resistance

3 Principle

Install the whole shoe on the whole shoe dynamic waterproofness testing machine; place a certain depth of water in the water tank of the testing machine to contact with the shoe; the testing machine pushes the forefoot bending of the shoe to simulate the walking state at a certain angle and frequency, to test the number of bends or the time that is required to penetrate water from the outside to the inside of the shoe.

4.1 Whole shoe dynamic waterproofness testing machine (see Figure 1)

4.1.1 Testing machine movable plate; it is used to push the forefoot bending of the shoe to simulate walking; the swing frequency is 60 times/min ~ 65 times/min; the maximum bending angle is adjustable.

5 Sample and conditioning

5.1 The sample shall be the whole shoe after 48 hours of processing.

5.2 The sample shall be free of obvious defects.

5.3 Each group of samples shall be not less than two pairs.

5.4 Before the test, the sample shall be placed for at least 4 hours under the temperature conditions of the reference standard atmosphere in accordance with the provisions of GB/T 22049-2019.

6 Test conditions

Perform the test at room temperature.

7 Test steps

7.1 Adjust the bending angle of the movable plate to $45^{\circ} \pm 1^{\circ}$. In special cases, the angle of the movable plate can also be adjusted according to the test requirements.

7.2 Draw a flex line on the outsole of the shoe in accordance with

6.1 of QB/T 2885-2007.

7.3 Use adhesive tape to fix the probe of the permeable signal device on the joint between the sample flexure part insole and the upper; the probe shall be in good contact with the sample.

7.4 Put the simulated foot into the sample and install it on the platform of the testing machine.

7.5 Use water-repellent material to protect the shoe mouth, to prevent water entering the shoe from the shoe mouth during the test.

7.6 The water level of the water tank is set as follows:

a) When the shoe is placed horizontally and the forefoot is not bent, the water level in the water tank shall reach one-half of the distance BETWEEN the junction of the sole and the upper AND the seam between the upper and the tongue;