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Hand Protection – General Test Methods

手部防护 通用测试方法

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Hand Protection – General Test Methods

1 Scope

This Standard specifies the test methods for harmlessness of protective gloves (hereinafter referred to as "gloves"), glove size, putting-on and taking-off time, dexterity, water vapor permeability, water vapor absorption, water resistance, and grip performance.

This Standard is applicable to general test methods for industrial protective gloves.

This Standard is not applicable to the test methods for firefighter protective gloves, medical protective gloves, as well as special protective performance of protective gloves.

NOTE: Special protective performance refers to the protection performance provided against specific hazards, such as mechanical hazard protection, chemical hazard protection and so on.

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) is applicable to this document.

GB/T 4744 Textiles – Testing and Evaluation for Water Resistance – Hydrostatic Pressure Method

GB/T 7573 Textiles – Determination of pH of Aqueous Extract

GB/T 11048 Textiles – Physiological Effects – Measurement of Thermal and Water-Vapour Resistance under Steady-State Conditions (Sweating Guarded-Hotplate Test)

GB/T 22807 Leather and Fur – Chemical Tests – Determination of Chromium VI Content

GB/T 22890 Leather – Physical and Mechanical Tests – Determination of Water Resistance of Flexible Leather

QB/T 2724 Leather – Chemical Tests – Determination of pH

3 Terms and Definitions

For the purpose of this Document, the following terms and definitions apply.

3.1 Glove

Hand protective equipment that is used to protect the hands from injury.

NOTE: The length can also be increased to cover the forelimbs and the entire arm.

[GB/T 12903-2008, definition 8.1.1]

3.2 Glove back

The part of glove that covers the back of the hand.

3.3 Glove palm

The part of glove that covers the palm.

3.4 Dexterity

The flexibility of the hand to complete a task after putting on the glove.

4 Test Methods

4.1 Harmlessness test method

4.1.1 pH test

The specimen shall be taken from the glove palm. If the material of other parts of the glove is different from that of the palm, sampling and testing of other materials shall be carried out at the same time.

If the glove is composed of multiple layers, it shall be tested as a whole.

Leather gloves are tested according to the method specified in QB/T 2724.

Textile material gloves are tested according to the method specified in GB/T 7573.

4.1.2 Hexavalent chromium test

Leather materials are tested in accordance with the method specified in GB/T 22807.

If gloves contain different types of leather materials, all types of leather shall be tested separately; and the highest value of all test results shall be taken.

4.2.3 Glove width test

The glove width is measured by a ruler with an accuracy of no less than 0.1mm.

When measuring, the glove shall be naturally placed flat on the test platform; and the shortest distance of the glove palm shall be measured 20mm upwards from the bifurcation of the thumb and index finger of the glove.

The result is accurate to 1mm.

4.3 Test methods for putting-on and taking-off time

4.3.1 Quantities and conditions of specimens

The specimens are 3 pairs of new gloves of the same specification, without any softening treatment (such as tapping or squeezing, etc.). It shall be placed for at least 24h under the conditions of (23±2)°C and relative humidity (50±5)%.

4.3.2 Test equipment

A timer with an accuracy of 0.1s.

4.3.3 Test procedures

The test shall be carried out by 1 wearer and 1 timekeeper.

The wearer shall start the test after understanding the requirements for wearing gloves.

The size of the wearer's hand shall match the size of the glove under test.

The specimen shall be placed on a platform that is easy to pick up before testing.

The putting-on time counts from the wearer picking up the glove from the platform to showing the wearing state to the timekeeper after the putting-on is completed.

The taking-off time counts from both hands of wearer completes the putting-on gloves to the wearer placing the gloves on the platform.

NOTE: In order to preserve the test procedures, video recording can be used as a supplement.

4.3.4 Test results

The putting-on and taking-off time of each pair of specimens shall be recorded separately; and the arithmetic mean of the 3 pairs of specimens shall be calculated.

The arithmetic mean of putting-on and taking-off time shall be rounded-off to an integer.

4.4 Dexterity test methods

4.4.1 Quantities and conditions of specimens

The specimens are 2 pairs of new gloves of the same specification, without any softening treatment (such as tapping or squeezing, etc.). It shall be placed for at least 24h under the conditions of (23±2)°C and relative humidity (50±5)%.

4.4.2 Test equipment

5 pieces of stainless-steel test rods. Each is 40mm long; and has a diameter of 5.0mm, 6.5mm, 8.0mm, 9.5mm, and 11.0mm, respectively.

4.4.3 Test procedures

Place the test rod on a flat surface; and a wearer whose hand size matches the glove puts on the glove and picks up the test rod with the index finger and thumb. The wearer shall pick up the test rod smoothly and continuously 3 times within 30s.

4.4.4 Test result

Record the diameter of the smallest test rod that can be picked up after 4 tests in accordance with the test method specified in 4.4.3, which is the test result.

4.5 Test method for water vapor permeability

4.5.1 Water vapor permeability test of leather gloves

4.5.1.1 Principle

Fix the leather test piece at the mouth of the test bottle containing the solid desiccant; the test bottle moves under the specified temperature and humidity conditions; and the water vapor is absorbed by the solid desiccant through the leather specimen. Weigh the test bottle within the specified time to determine the weight of water vapor absorbed by the desiccant through the leather in this period of time.

4.5.1.2 Test equipment and materials

The test equipment and materials consist of the following parts:

a) Test bottle. as shown in Figure 2. Equipped with a threaded cap, the cap has a round hole with a diameter of 30mm; and the round hole is the same size as the inner diameter of the bottleneck. The plane of the bottle mouth is perpendicular to the inner wall of the bottleneck.

b) Test bottle holder. Driven by a motor, it rotates at a speed of (75±5) r/min. The test bottle is mounted on this circular holder; the axis of the test bottle is parallel to the axis of the circle; and the distance between the two axes is 67mm (see Figure 2).

1 – top cover;

2 – gasket;

3 - sample;

4 – base.

Figure 3 – Water Vapour Absorption Test Equipment

4.6.3 Test procedures

Test environment temperature (23±2)°C, relative humidity (50±5)%.

Weigh the pre-treated specimen first; and then place the sample on the base of the test equipment; fill 50cm^3 of water in the lower cover. Note that the inner surface of the glove shall be placed facing downward. Put the sealing ring, cap the top cover; and tighten the fixing bolts gently.

After 8h, remove the top cover; quickly take out the specimen and weigh it.

4.6.4 Test result

Water vapor absorption is calculated as the ratio of weight gain to the surface area of the specimen. The value is expressed in mg/cm^2; and the calculated result is expressed to one digit after the decimal point. The result is the minimum of the test results of 3 specimens.

4.7 Water resistance

4.7.1 Water resistance test of leather gloves

Test according to the method specified in GB/T 22890.

4.7.2 Water resistance test of textile material gloves

Test according to the method specified in GB/T 4744.

4.8 Test methods for gripping performance

4.8.1 Principle

The ability of the tester to pull the rope without gloves is compared with the ability of the same person to pull the rope after wearing the gloves to judge the gripping performance of the gloves.

4.8.2 Test equipment

The test equipment required for this test includes:

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