



ANALYSIS OF AIR PERMEABILITY CHARACTERISTICS OF FABRICS WOVEN FROM BLENDED FIBERS USING THE YG461F MODEL AIR PERMEABILITY TESTING EQUIPMENT

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ABSTRACT

For the experiment, we took 2 fabrics woven from mixed fibers. The 1st fabric was woven from 50% cotton and 50% wool fibers, the 2nd fabric was woven from 70% cotton and 30% polyester fibers. Our experiment was conducted in the research laboratory of textile products of Karakalpak State University. The air permeability of these tissues was determined on a YG461F machine imported from China

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Figure 1. Equipment for determining air permeability YG461F.

The air permeability tester is calculated by measuring the airflow velocity perpendicular to the given area of the sample for a certain time under specified pressure difference conditions. It complies with different testing standards of GB, ISO and ASTM and can set pressure differences to meet different requirements.

Principle of electronic measurement: built-in high-precision electronic flow meter, input pressure sensor. The pressure sensor is used to check the pressure difference on both sides of the sample, and the transmitted data is calculated by the central processing unit.



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Air conditioning: The sample should have an air conditioner at $20 \pm 2^\circ\text{C}$, $65 \pm 2\%$ pH.

Test times: GB/5453 is required at least 10 times in different locations on a single sample according to relevant standards. And DIN 53887 requires at least 5 times.

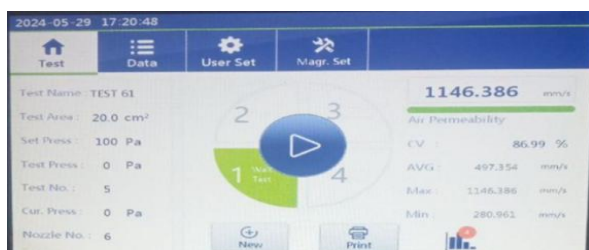
Sample size: Generally speaking, the sample doesn't need to be cut, it can be tested directly. If you need to cut, the sample size must be at least $25\text{ cm} \times 25\text{ cm}$ (ASTM D737) or $20\text{ cm} \times 20\text{ cm}$ (DIN53887).

The air permeability tester, also known as the digital air permeability tester, is responsible for determining the air permeability resistance of woven, knitted, and nonwoven and many textile materials.

The air permeability test is used to determine the air permeability properties of general fabric, knitted fabric, non-woven fabric, industrial filter paper, and filter fabric.

The specifications of the digital air permeability tester are given below:

- Use a 32-bit industry-level MCU (Mitsubishi, Japan), better clogging resistance, superior stability, faster data transfer speeds, and data storage up to 99 groups;
- Accept the microcomputer control system, branded high-precision pressure sensor, digital hum, and air volume adjustment;
- Automatic tracking, measuring, and displaying the pressure difference of each point with high stability and reproducibility;
- To make the test data more accurate, all nozzles were calibrated by point within the full test range;
- All test data is displayed on a large high-resolution LCD display, there is no need to manually calculate the test result;
- Support for language, Chinese and English, large LCD display and menu-type mode;
- Equipped with an internal printer,
- Accept microcomputer control, guarantee the accuracy of test data and the automatic storage and processing of test data.



This machine's power supply is AC220V 50Hz 800W, with a volume of $520 \times 850 \times 1050$ mm and a weight of 50 kg. On the left side of the color touchscreen, by pressing the color button, where the experimental parameter display area is located, a window for setting the specified

parameters will appear, where the indicators requested by the client can be entered.

Figure 2. Microcomputer control system of the machine.

Our samples are woven from twill and canvas weaves.

Canvas weave is the most widespread among textile weaves. In this case, the warp and weft threads alternate, with the warp and weft threads appearing on the right side of the fabric. It produces various fibers and fabrics for various purposes, including some dress, suit, and other fabrics made from wool.

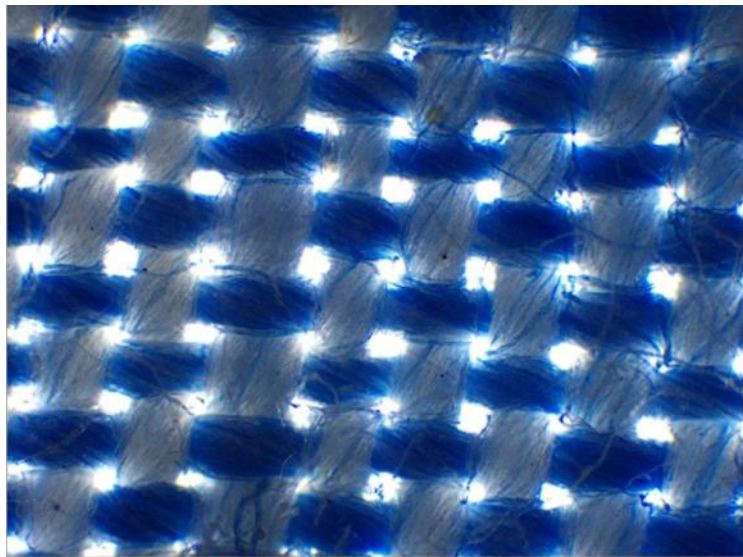


Figure 3. I-view of our sample under a microscope.

To create a twill weave, it is formed by installing three bundles on the loom, that is, one bundle more than the fabric weave. A distinctive feature of twill weaves is the presence of diagonal lines on the surface of the fabric, directed from left to right, from bottom to top. Fabrics of this type are elastic, soft, but less durable than fabrics of canvas weave, since the layers of the twill weave are more

elongated than the canvas weave. In the twill weave, sparsely woven fabrics are more elongated diagonally, and for greater beauty, the warp and weft threads should be twisted in different directions. With twill weave, cashmere, vertical twill, diagonal from cotton fabrics, cashmere, twill from silk fabrics, and various suit and dress fabrics from wool fabrics are produced.

The weight of our samples was determined using laboratory scales of the SHINKO GS brand. According to this, the weight of 1 m² of fabric in the 1st sample was 133 g, in the 2nd sample - 153 g.



Figure 4. Samples taken under a SHINKO GS microscope.

It was established that the density of the threads in the 10 cm of the 1st sample is 200 threads on the warp, 180 threads on the weft, in the 2nd sample 290 threads on the warp, 330 threads on the weft.

According to the experimental analysis, air permeability in the first sample was higher than in the second, one of the main factors being the fiber composition of the yarns in the fabric and the type of weave..

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