ISO 9237 Determination of Permeability of Fabrics to Air â€“ Testing Equipment

Description

7 Apparatus
Metrological confirmation of the test apparatus shall be carried out in accordance with ISO 10012-1.

7.1 Circular specimen holder, with an orifice allowing the test to be carried out on an area of 5 cm2, 20 cm2, 50 cm2 or 100 cm2.

The tolerance on the test area shall not exceed Â± 0.5 %.

NOTE 1: Adequate support of the test specimen, particularly for large test surfaces, is recommended.

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7.2 Means for clamping, to secure the specimen without distortion.

NOTE 2: Care should be taken to prevent leakage of air around the edges of the test specimen. Alternatively the leakage may be measured separately and subtracted from the test results.

7.3 Guard ring device, to prevent leakage, for optional use in conjunction with the clamping means

(7.2).

7.4 Pressure gauge or manometer, connected to the test head to indicate a pressure drop across the specimen test area of 50 Pa, 100 Pa, 200 Pa or 500 Pa, with an accuracy of at least 2 %.

7.5 Means for drawing a steady flow of air at controlled temperature and humidity through the specimen holder and for adjusting the flowrate to produce a pressure drop across the specimen of between 50 Pa and 500 Pa.

7.6 Flowmeter, volumetric counter or measuring aperture, indicating the rate of air flow in cubic decimetres per minute (litres per minute) with an accuracy of at least + 2 %.

NOTE 3: Flowmeters or volumetric counters measuring the rate of airflow in cubic centimeters per second (or other suitable units) may be used if the required accuracy of at least + 2 % is maintained.

8 Conditioning of samples and test conditions

Prior to test the samples shall be conditioned and the test performed in the standard atmosphere for testing (see clause 6).

Recommended conditions for the test are:

test surface area: 20 cm2:

pressure drop: 100 Pa for apparel fabrics;

pressure drop: 200 Pa for industrial fabrics.

In cases where these pressure drops cannot be achieved or are not appropriate, an alternative pressure drop of 50 Pa or 500 Pa may be used and for an alternative test area of 5 cm2, 50 cm2 or 100 cm2 may be chosen, if agreed between the interested parties.

NOTE 4: For comparison of results it is recommended to perform the test with the same test area and pressure drop.

9 Test procedure

NOTE 5: Advice on checking calibration and conducting the test is given in annex A.

Mount the test specimen in the circular specimen holder (7.1) with sufficient tension to eliminate wrinkles, if any, taking care that the fabric is not distorted in its own plane. Avoid selvedges and areas with creases or folded places. For fabrics for which the air permeability may be different between the two faces of the fabric, specify in the test report [see 11 a) 2)] which face was tested. Clamp specimens coated on one side with the coating towards the lower pressure side to prevent air leakage.

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Start the suction fan or other means (7.5) to force the air through the test specimen and adjust the flow of air gradually till a pressure drop, as recommended above, is achieved across the test area of the fabric. Record the air flow (see 7.6) after at least 1 min or until steady conditions are achieved.

NOTE 6: Some devices, e.g. volumetric counters, may need a volume of air flow of about 10 dm3 to assure the required accuracy.

10 Calculation and expression of results

10.1 Calculate the arithmetic mean of the individual readings and the coefficient of variation (to the near

est 0,1 %), stating the 95 % confidence interval.

10.2 Calculate the air permeability, R, expressed in millimetres per second, using the equation

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$$R = \frac{\bar{q}_V}{A} \times 167$$

where

$\bar{q}_V$ is the arithmetic mean flowrate of air, in cubic decimetres per minute (litres per minute);

A is the area of fabric under test, in square centimetres;

167 is the conversion factor from cubic decimetres (or litres) per minute per square centimetre to millimetres per second.

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10.3 For open fabrics and nonwovens, the air permeability R may be expressed in metres per second using the equation

$$R = \frac{\bar{q}_V}{A} \times 0{,}167$$

where $\bar{q}_V$ and A are as defined in 10.2.

10.4 Express the 95 % confidence interval in the units specified in 10.2 or 10.3, rounding the result R

to 2 % of the value obtained in 10.2 or 10.3.

Purpose and scope of the ISO 9237 air permeability test

The ISO 9237 air permeability test aims to measure a textileâ€™s gas exchange. It does this by determining its differential pressure. The test applies to both medical-surgical and other textile materials. It measures how breathable textiles are. It does this by the amount of gas that passes through them over time at a given pressure difference. The test covers a wide range of materials. These include, but are not limited to, medical-surgical and other textiles. People use them in medical care, clothing, and home furnishings.

The test determines airflow through a specified area of the specimen. It does this vertically for a set time under defined pressure conditions. This allows us to calculate the air permeability. This process involves a precise measurement of the air permeability of textiles. It is essential for assessing their comfort, breathability, and durability. The ISO 9237 standard provides a consistent method for testing textile air permeability. This ensures that the results are reliable and comparable.

Also, ISO 9237 air permeability testing compares test standards and methods. ISO 9237 gives details on preventing air leakage in tests. It covers the use of specimen fixtures and rubber gaskets to ensure test accuracy. These comparisons, and the methods, extend the use of the ISO 9237 Air Permeability Test. It is a key tool for assessing the air permeability of textiles.

For which fabrics is the ISO 9237 Air Permeability Test applicable?

The ISO 9237 Air Permeability Test is suitable for testing the air permeability of speciality technical fabrics, general fabrics, knitted fabrics, coated fabrics, non-woven fabrics and industrial filter papers.

The ISO 9237 Air Permeability Test is a standard test. It assesses the air permeability of materials. The test method applies to many fabrics and materials. These include, but are not limited to, industrial and general fabrics, knitted and coated fabrics, non-woven fabrics, and industrial filter papers. Many applications use these materials, such as apparel and medical products. The ISO 9237 standard for air permeability testing is vital. It ensures the quality and performance of the tests.

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The test aims to measure a sampleâ€™s air permeability. It does this by measuring the change in pressure at both ends of an orifice plate. The instrument has orifice plates with various pore sizes. They test fabrics with different permeabilities. These ensure the testâ€™s accuracy and reliability. This test method can assess the air permeability of materials. It also provides useful reference info for material design and improvement.

ISO 9237 Air Permeability Test Method

The ISO 9237 test measures the airflow rate through a specific area of a specimen. It does this by testing for a set time at a specified differential pressure. We use the result to calculate the air permeability. The test principle consists of the following steps:

Test principle: First, place a pre-treated specimen between the test chambers. Then, clamp it. Then, the low-pressure chamber (lower chamber) receives an application of vacuum. After that, we evacuate the entire system. Once the vacuum level reaches, we close the lower test chamber. The high-pressure chamber is then filled with test gas at a certain pressure. Both sides of the specimen maintain a constant pressure difference. The gas will move to the low-pressure side. This is due to the pressure difference. By monitoring the pressure in the low-pressure side, the barrier parameters of the test specimen are obtained.

Test standard: The test pressure is pre-set to the standard. The instrument automatically controls and maintains it. A set of orifice plates measures the flow of air through the test sample. We measure the sampleâ€™s permeability by observing the change in pressure inside the orifice. Digitally shows pre-set units for direct reading.

The ISO 9237 air permeability test method conforms to several standards, both international and domestic. These include GB/T 5453-1997 and ASTM D737-2018. The former is for textile fabric air permeability, and the latter is for textile fabrics. These standards set uniform methods and parameters

for air permeability testing of textiles. They ensure the reliability and comparability of test results.

Why choose ISO 9237 for breathability testing?

We chose ISO 9237 for breathability testing. It has standardized methods, wide use, and reliable results.

The ISO 9237 standard details methods to test the air permeability of textiles. It ensures consistent, reproducible results. The standard details all aspects of the pre-test prep, the test, and the results. It ensures the test results are accurate and reliable.

The ISO 9237 standard applies to most textiles. This includes woven and nonwoven fabrics, inflatable bag fabrics, carpets, and pile fabrics. So, both industrial textiles and everyday products can be tested for air permeability using the ISO 9237 standard. It meets the needs for textile air permeability testing in different fields.

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Also, a comparison of ISO 9237 with ASTM D737 and GB/T 5453 shows they test the same way. Their area and pressure differences are also consistent. This ensures the reliability and comparability of test results.

In summary, using the ISO 9237 standard for air permeability tests ensures consistent, reliable, and comparable results. It also meets the testing needs of different textiles. So, it is widely accepted and used.

ISO 9237 Air Permeability Test Sample Requirements

ISO 9237 is a standard for the determination of air permeability of textile fabrics. The requirements for ISO 9237 test samples can be summarised as follows:

Sampling:

Sampling follows the procedures in the product standard or a mutual agreement. In the absence of provisions, you can do this based on Appendix B.

For test equipment that can test large nonwovens, at least 5 random parts must be selected as test specimens. For equipment that cannot test large specimens, use a cutting die or template. It must cut at least 5 specimens, each 100 mm x 100 mm.

Specimen size:

The specimen round table has a circular vent with a test area of 5cmÂ², 20cmÂ², 50cmÂ², or 100cmÂ². The test area error must not exceed Â±0.5%.

The product standard or a negotiation should set the test area.

Specimen Preparation:

Put the specimen from the ordinary environment into the standard atmospheric environment, per GB/T6529. This will adjust the humidity to equilibrium.

Hold the edge of the specimen to avoid changing the natural state of the nonwoven test area.

Specimen installation:

Place the specimen on the test head. Use the clamp to prevent twisting or gas leaks during the test.

If the front and back sides of the specimen differ in air permeability, note the test side in the report.

Other Precautions:

The test point should avoid the clothâ€™s edge and folds. Use enough tension when clamping the specimen to make it flat but not deformed.

To prevent air leakage, place a washer on the low-pressure side of the specimen. This is the side of the specimen round table.

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The ISO 9237 standard forms the basis of the above information. We must test based on the productâ€™s properties and the standards. Also, different countries may have different standards. So, pay special attention to these differences when trading internationally.

ISO 9237 Breathability test how to debug the equipment

The commissioning process of an ISO 9237 test instrument has three main steps:

Installation and connection: Make sure you install all components. You must connect the instrument to the power supply and other equipment.

Calibration: Calibrate the instrument to its requirements. This ensures the testâ€™s accuracy. This may include calibration of pressure transducers, flow meters, etc.

Setting Test Parameters: Set the test parameters, like pressure and time, as required. These parameters are usually pre-set according to ISO 9237 or other relevant standards.

Install the correct test head and fixture. This will ensure that the test sample is properly fixed on the instrument.

Starting the test: The instrument is started and the permeability test begins. The instrument automatically maintains a preset pressure during the test. It measures the air flow through the test sample using orifice plates. This determines its permeability.

Once we complete the test, we record the results and analyze the data. Usually, the system shows the test results in digital form. It also allows printing them.

Maintenance and servicing: After testing, we maintain and service the instrument. This ensures its long-term operation and the accuracy of the tests.

ISO 9237 Air Permeability Test Procedure

The ISO 9237 air permeability test procedure includes the following steps:

Prepare the test sample: It must meet the test requirements. Select the appropriate specimen area fixing circle (e.g. 5cmÂ², 20cmÂ², 50cmÂ², 100cmÂ², etc.) as required.

Test instrument installation: Install the test instrument correctly. Adjust the pressure drop. Set the permeability range (0.2 to 12000mm/s). Control the measurement error within Â±2%.

Set the test parameters: According to ISO 9237, set the test pressure. It must be automatically maintained to accurately measure the sampleâ€™s air permeability index.

Mounting the specimen: secure it to the test head opening with the clamping ring. Then, fit the appropriate orifice plate.

Starting the test: The test begins. The instrument will control and maintain the test pressure. It will measure the airflow through the test specimen using some orifice plates. A digital display will show the air permeability index.

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Record results: Record the test results. They include the air permeability index and unit form. You can read or print them out.

During testing, you need to take the following points into account.

Make sure the testing environmentâ€™s temperature and humidity meet the standards.

For different fabrics, you may need to use different test methods and settings.

When conducting multiple tests, ensure consistent conditions for each. This will yield comparable results.

By following the above steps, you can effectively do the ISO 9237 Air Permeability Test. It assesses the air permeability of textiles.

ISO 9237 Standardised Air Permeability Classes

ISO 9237 is a standard from the ISO. It measures the breathability of fabrics. Breathability is a gasâ€™s ability to pass freely through a fabric. It is usually measured in air permeability. This is in cubic metres per square metre per second (m3/m2/s) or litres per square centimetre per second (l/cm2/s). ISO 9237 classifies breathability into the following classes.

1. Permeability class 0: Permeability less than 0.1 per cent.

Fabrics with a breathability rating of 0 are airtight. Gases cannot pass through them. This fabric is usually for waterproof or airtight products. They include mackintoshes and windproof jackets.

2. Breathability class 1: Breathability range 0.1-0.9

Fabrics in Permeability Class 1 are less breathable, but still slightly air permeable. These fabrics suit applications that need moderate breathability. They are good for outdoor sportswear and light-duty workwear.

3. Breathability Class 2: Breathability range 1.0-4.9

Fabrics with a breathability rating of 2 are moderately breathable. They provide good breathability. These fabrics are essential for breathability. They are in sportswear and outdoor gear.

4. Breathability class 3: Breathability range 5.0-9.9

Permeability Class 3 fabrics are more breathable. They have higher air permeability. These fabrics are for uses needing high breathability, like outdoor and summer sportswear.

5. Breathability class 4: Breathability range 10.0-19.9

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Fabrics with a breathability rating of 4 are very breathable. They have a high air permeability. These fabrics are often used for high-performance clothes. They include outdoor sportswear and mountaineering gear.

6. Breathability class 5: breathability greater than or equal to 20 per cent

Fabrics with a breathability rating of 5 are very breathable. They allow a high level of air flow. These fabrics are often used in niche areas. They include athletesâ€™ uniforms and high-intensity sports equipment.

What are the benefits of the ISO 9237 breathability test standard over others?

The ISO 9237 breathability test standard has the following advantages over other standards:

ISO 9237 applies to various textiles. They are: apparel, technical, airbag, carpet, pile, knitted, and multilayered fabrics. This means it is able to cater for a wide range of application scenarios.

Standardised test methods: The standard provides a test method. It ensures tests yield consistent, comparable results. This is vital for product quality and market access. It ensures products meet specific performance standards.

The ISO 9237 standard specifies key test parameters. They include test area, pressure differential, and pre-treatment conditions. These are essential for accurate air permeability measurements. This helps to ensure the accuracy and reliability of the test.

ISO 9237 is an international standard. It aligns with other global standards. This is important for trade and global production.

GB/T5453â€“1997 is equivalent to ISO 9237â€“1995. Textiles that conform to ISO 9237 meet the domestic standards. This simplifies market access for the products.

In summary, the ISO 9237 test is the preferred standard for textile air permeability. It has a wide range of applications, standardized methods, and detailed parameters. It aligns with and is equivalent to other national standards.

How does the ISO 9237 Air Permeability Test verify the test results?

The validation of ISO 9237 air permeability test mainly involves the following aspects:

Test standards comparison: Common air permeability tests are ASTM D737â€“1996, GB/T 5453â€“1997, and JIS L1096â€“1999. among them, GB/T 5453â€“1997 is equivalent to ISO 9237â€“1995. These standards provide different test methods and settings. So, when verifying the test results, ensure the selected standards are consistent.

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Test methods: Different fabrics may need different tests. For example, JIS L1096â€“1999 has two methods: A and B. Method A uses a Fraser-type air permeability tester. Method B uses a Greeley-type air permeability tester. Choosing the appropriate test method is critical to obtaining accurate test results.

All test standards mention measures to prevent air leakage. They require using specimen fixtures and rubber gaskets. Rubber gaskets can deteriorate and deform with repeated use. This affects test results. So, you should replace them periodically. Specimen fixtures suit some fabrics, but not all. So, select the right fixture when testing different fabrics.

Comparison of test results: You can compare test methods by using them to test the same fabric. For example, the YG (B) 461 digital fabric permeability instrument was tested per GB/T 5453-1997 and ASTM D737-1996. It measured the cotton fabricâ€™s permeability. Different standards showed varying results.

Factors affecting air permeability: Fabric material, its structure, and thickness affect it. When validating the test results, consider the impact of these factors. For example, the air permeability of fabrics, like cotton and nylon, will differ.



Air Permeability Tester According to ISO 9237

- Body coated with electrostatic paint.
- Air flow time setting
- Touch-screen.
- Air pressure unit: Pascal
- Maximum air flow measurement: 165 dm^3/min at 500 Pascal air pressure.
- Test areas 5cmÂ² â€“ 10 cmÂ² â€“ 20 cmÂ² â€“ 38 cmÂ² â€“ 50 cmÂ² â€“ 100 cmÂ²

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