

DM2/330 Differential and Equal Pressure Method Gas Permeability Tester



DM2/330 Differential and Equal Pressure Method Gas Permeability Tester is based on differential and equal pressure method, and is professionally applicable to the gas permeability test of films and packages. It is designed for tests of gas transmission rate, solubility coefficient, diffusion coefficient and permeability coefficient of plastic films, laminated films, high barrier material, sheets, aluminum foils and back-sheets as well as bottles, pouches, jars and boxes made of plastic, rubber, paper, glass, metal and other materials.



Professional Technology

- Differential pressure method and equal pressure method combined in one unit to meet distinct testing requirements
- Gas transmission rate, solubility coefficient and diffusion coefficient could be obtained at one operation
- Three distinct or equivalent specimens can be tested individually with six independent test results by two test methods at one operation
- Labthink patented design of diffusion chamber porous support plate
- This instrument comes with three test modes: proportional, standard and manual modes
- Wide range and high-precision of automatic temperature control to support various combinations of non-standard test conditions
- Test results could be easily obtained even at extreme condition by data fitting function, which could work at any temperature
- The instrument could be used to test poisonous, inflammable and explosive gases (customization required)
- The instrument is controlled by computer and test process is automatic
- Reference film for fast calibration to ensure accurate and universal test data
- Standard RS232 port for convenient data transfer
- Supports Lystem™ Lab Data Sharing System for uniform management of test results and test reports

Test Principle

Unique patent design; one tester can perform tests using both differential and equal pressure methods.

1. Equal Pressure Method:

Clamp the pre-conditioned specimen between the upper and the lower chambers. High pure oxygen or air flows in one side of the film (upper chamber); while high pure nitrogen flows in the other side of the film (lower chamber). Oxygen molecule passes through the film into the high pure nitrogen side (lower chamber), and is taken to the sensor by the flowing nitrogen. By analyzing the concentration of oxygen detected by the sensor, the oxygen transmission rate and other parameters can be obtained. For packages, nitrogen flows inside the package, and air or high pure oxygen flows outside.

2. Differential Method:

Clamp the pre-conditioned specimen between the upper chamber and the lower chamber. Evacuate the low-pressure chamber (lower chamber) and then the whole system. When the specified degree of vacuum is reached, shut off the lower test chamber and feed test gas of certain pressure to the high pressure chamber (upper test chamber). Ensure that a constant differential pressure (adjustable) is maintained between the two sides of the specimen. Thus, under the function of pressure gradient, the test gas permeates from the high-pressure side to the low-pressure side. By monitoring the pressure changes in lower chamber, various barrier parameters can be obtained.

3. Double Method:

Clamp the preconditioned specimen between the upper and lower chambers. Equal pressure method test proceeds first; and then, the differential method.

This test instrument conforms to the following standards:

ISO 15105-1, ISO 15105-2, ISO 2556, ASTM D3985, ASTM F2622, ASTM F1307, ASTM F1927, ASTM D1434, JIS K7126-1, JIS K7126-2, YBB 00082003, GB/T 19789, GB/T 1038

Applications

This instrument is applicable to the determination of gas transmission rate of:

Basic Applications	Films	Including plastic films, plastic composite films, paper-plastic composite films, coextruded films, aluminized films, aluminum foils, aluminum foil composite films and many others
	Sheeting	Including of engineering plastics, rubber and building materials, e.g. PP, PVC and PVDC
	Packages	Including plastics, rubber, paper, paper-plastic composite, glass and metal packages, e.g. Coke bottles, peanut oil packages, Tetra Pak materials, vacuum bags, metal three-piece cans, soft tube packages for cosmetic and toothpaste, and jelly cups
Extended Applications	Package Caps	Test seal performance of different package caps
	Solar Back-Sheets	Including solar back-sheets
	Plastic Pipes	Including various sorts of pipes, e.g. PPR
	Blister Packs	Test gas transmission rate of the whole blister packs
	Fuel Tanks of Cars	Plastic fuel tanks are widely used in cars for its light weight, buffering vibration and easy molding characters. But its fuel permeability is the most essential factor. This instrument can be used to test permeability of plastic fuel tanks
	Battery Plastic Shell	Battery electrolyte is protected by the plastic shell from outside environment. Battery service life is directly depended on its gas permeability. This instrument can be used to test gas transmission rate of battery plastic shell
	Biodegradable Films	Test gas permeability of various sorts of biodegradable films, e.g. starch-based packaging films
	Paper and Paper Board	Including paper and paper board, e.g. aluminum foil paper for cigarette packages and Tetra Pak materials

Paint Films	Test gas permeability of various sorts of paint films
Contact Lenses	Test oxygen permeability of contact lenses
Flexible Plastic Infusion Bottles	Test oxygen permeability of flexible plastic infusion bottles
Red Wine Bottles	Test oxygen permeability of red wine bottles
Warm Paste Packaging Bags	Test oxygen permeability of the packaging bags of warm pastes
Various Gases	Test the permeability of various types of gases, e.g. O ₂ , CO ₂ , N ₂ , Air and He
Inflammable, Explosive Gases	Test the permeability of inflammable and explosive gases
Materials for Aerospace Usage	This instrument can test the Helium permeability of airship gas bags
Glass Fiber Cloth and Paper	Including glass fiber cloth and paper materials, e.g. Teflon paint cloth, Teflon welding cloth and Teflon silicon rubber cloth
Soft Tube Materials for Cosmetics	Including various types of cosmetic tubes, aluminum-plastic tubes and toothpaste tubes
Rubber Sheeting	Including various sorts of rubber sheeting, e.g. car tires

Technical Specifications

1. Equal Pressure Method

Specifications	Film Test	Package Test (Customization available)
Test Range	0.01~ 5000 cm ³ /m ² ·d (Standard)	0.0001~ 50 cm ³ /pkg·d (Standard)
Resolution	0.001 cm ³ /m ² ·d	0.00001 cm ³ /pkg·d
Test Gas	O ₂ , Air and other gases (outside of supply scope)	
Specimen Size	/	100% O ₂ Test:<Φ90 mm, Height should be less than 280 mm
		No size limitation for Open (Air) Test
Number of Specimen	3 (with independent test results)	
Specimen Specification	/	Bottle: inner diameter of bottle mouth should be more than Φ9 mm, outer diameter of bottle mouth should be less than Φ50 mm (Standard)
		Bag and Box: Testing accessories are required

2. Differential Pressure Method

Test Range	0.05~ 50,000 cm ³ /m ² ·24h·0.1 MPa (Standard)
Vacuum Resolution	0.1 Pa

Vacuum Degree of Test Chamber	< 20 Pa
Test Gas	O ₂ , N ₂ , CO ₂ , etc. (outside of supply scope)
Test Pressure	-0.1 MPa~ +0.1 MPa (Standard)
Number of Specimen	3 (with independent test results)
Test Area	38.48 cm ²

3. Other Specifications

Temperature Range	5°C~ 95°C
Temperature Accuracy	±0.1°C
Pressure of Test Gas	0.6 MPa
Port Size	Φ8 mm PU Tubing
Carrier Gas	99.999% high purified nitrogen (outside of supply scope)
Pressure of Carrier Gas	0.05 MPa
Port Size	1/8 inch copper tubing
Instrument Dimension	1080 mm (L) x 720 mm (W) x 490 mm (H)
Power Supply	AC 220V 50Hz
Net Weight	120 kg

Configurations

Standard Configurations	Mainframe, Temperature Controller, Precision Nitrogen Pressure Regulator, Precision Oxygen Pressure Regulator, Professional Software, Communication Cable, Vacuum Pump (Imported), Round Sample Cutter and Fast Quantitative Filter Paper
Optional Parts	Accessory for Package Test, Accessory for Small Specimen Test, Blades of Sample Cutter, Vacuum Grease, Vacuum Pump Oil and Fast Quantitative Filter Paper
Note	1. The gas supply ports of the instrument are Φ8 mm PU tubing and 1/8 inch copper tubing; 2. Customers will need to prepare for gas supply and distilled water.