

## C403M Oxygen/Water Vapor Transmission Rate Test System

**C403M Oxygen/Water Vapor Transmission Rate Test System** is based on the testing principles of coulometric oxygen sensor and infrared water vapor sensor. It is designed and manufactured in accordance with standards such as ASTM D3985, ASTM F1249, and ISO 15106-2. It provides a high-precision integrated testing solution for water vapor and oxygen transmission rates of high and medium barrier materials. It is widely applicable in pharmaceuticals, food, medical devices, daily chemicals, photovoltaics, electronics and other fields, accurately detecting the oxygen and water vapor transmission performances of films, packaging, sheets, and related materials.



### Product Features Note 1

#### Combining Tests of OTR and WVTR in One

- The instrument can switch between OTR+WVTR combo test mode, OTR test mode and WVTR test mode freely, so as to satisfy varied testing needs.
- One sample mounting can automatically start and accomplish the combo test of OTR and WVTR.
- Both OTR and WVTR performances of the same sample can be accurately evaluated, avoiding sample contamination issues caused by instrument replacement.

#### Core Competence: Coulometric Oxygen Sensor

- Equipped with a ppb-level coulometric oxygen sensor, Labthink's latest technical achievement, which can obtain a lower test limit.
- Designed according to ASTM D3985 with absolute value test principle and no need for calibration.
- Service life is three times that of traditional coulometric oxygen sensors.
- Oxygen absorption rate is as high as 95~98% (within the range).

#### Core Competence: Infrared Water Vapor Sensor

- Equipped with Labthink infrared water vapor sensor.
- Designed according to ASTM F1249.
- Non-consumable design ensures an ultra-long service life.
- Features over-limit alarm and automatic protection functions.

### **Multi-dimensional Temperature and Humidity Control for Precise Data**

- 360° airflow circulation constant temperature technology ensures superior temperature stability.
- Automated control of carrier gas flow and temperature during testing ensures higher accuracy.
- The NIST-standard humidity generation principle is applied for constant humidity.
- Equipped with high-precision temperature and humidity sensors and control systems for real-time monitoring and recording of temperature and humidity changes.
- Equipped with Labthink's independently developed gas purification system to remove trace oxygen from nitrogen, delivering ultra-pure nitrogen (optional).
- The system can achieve higher test repeatability of 0.02 cc/(m<sup>2</sup>·day).

### **Independent Three-Cell Design Enables Efficient Testing**

- Drawer-style test cells with automatic sample clamping, saving time and effort, and providing superior sealing.
- Three independent sets of 50 cm<sup>2</sup> standard area test cells allow for parallel sample tests that meet standard requirements.
- Simultaneous testing of three samples under the same conditions can be performed with independent data.
- Within one test cycle, the number of samples tested is increased from two to three.

### **Intelligent Control System Lowers the Barrier to Operation and Maintenance**

- 10" medical-grade touchscreen paired with desktop operating system offers a simple interface and convenient operation.
- Fully automated testing requires no manual intervention; data is automatically saved.
- The system is equipped with various sensors, providing intelligent alerts and enhancing operational safety.
- The system has embedded functions such as calendar, multi-language switching and multi-level access control, etc.
- The system has an embedded network port for convenient external access and data transmission, enabling remote upgrades.

### **Multi-instrument Collaborative Management for Large-scale Testing**

- Next-generation platform-based computer software enables a single computer control of one or

several instrument hosts (optional).

- Centralized platform-based management of test data.
- Real-time display of transmission rate curves, transmission coefficient curves, temperature curves, and humidity curves.
- Professional test mode provides flexible and comprehensive control functions to satisfy scientific research needs.
- Complies with GMP requirements for data traceability, meeting the needs of the pharmaceutical industry (optional).
- DataShield™ Data Shield System facilitates centralized data management and integration with information system (optional).

### **Low-carbon and Energy-saving, with Strict Control over Overall Costs.**

- Variable frequency control technology is applied to achieve low-power system operation.
- Low-energy-consumption components from world-renowned brands ensure stable and reliable performance.
- Computer is not a must; the instrument can independently complete the entire testing process.
- Without a professional constant temperature laboratory, stable test data can be obtained, reducing costs for laboratory construction and daily operation and maintenance.

### **Testing Principle**

The pre-treated sample is clamped between the test chambers. Oxygen or nitrogen with stable relative humidity flows on one side of the film, and high-purity nitrogen flows on the other side. Oxygen or water molecules diffuse through the film into the high-purity nitrogen on the other side and are carried to the sensor by the flowing nitrogen. By analyzing the oxygen or water vapor concentration measured by the sensor, the oxygen or water vapor transmission rate and other results are calculated.

### **Reference Standards**

ASTM D3985, ASTM F1307, GB/T 19789, GB/T 31354, DIN 53380-3, JIS K7126-2-B, YBB 00082003-2015

ASTM F1249, ISO 15106-2, GB/T 26253, JIS K7129, YBB00092003-2015

## Test Applications

Basic Applications	<b>Films</b>	Oxygen and water vapor transmission rate tests of various plastic films, plastic composite films, paper-plastic composite films, co-extruded films, metalized films, aluminum foil composite films, glass fiber aluminum foil paper composite films, and other film materials.
	<b>Packaging</b>	Oxygen and water vapor transmission rate tests of bottles, pouches, cans, boxes, and barrels made of plastic, rubber, paper, paper-plastic composite, glass, and metal, including pharmaceutical packaging, wine bottles, cola bottles, peanut oil barrels, Tetra Pak packaging, vacuum packaging pouches, three-piece cans, cosmetic packaging, toothpaste tubes, jelly cups, and yogurt cups, etc.
	<b>Sheets</b>	Oxygen and water vapor transmission rate tests for sheet materials such as PP sheets, PVC sheets, PVDC sheets, metal foil sheets, rubber sheets, and silicon wafers.
Extended Applications	<b>Packaging Caps</b>	Oxygen and water vapor permeability tests of the caps of various packaging.
	<b>Solar Backsheet</b>	Oxygen and water vapor permeability tests for solar backsheets and related materials.
	<b>Pipes</b>	Oxygen and water vapor permeability tests for PPR pipes and pipes made of various materials.
	<b>Medical Blisters</b>	Overall oxygen and water vapor permeability tests of medical blister packs.
	<b>Vehicle Fuel Tank</b>	Oxygen and water vapor permeability tests of plastic fuel tanks.
	<b>Battery Housings</b>	Oxygen and water vapor permeability tests for battery housings

## Technical Parameters

**Table 1: Test Parameters** Note 2

Parameters\Model	C403M

<b>Test Range</b>	<b>cc/(m<sup>2</sup>·day) (Standard area of 50 cm<sup>2</sup>)</b>	0.05~200
	<b>g/(m<sup>2</sup>·day) (Standard area of 50 cm<sup>2</sup>)</b>	0.05~40
	<b>cc/(m<sup>2</sup>·day) (MASK area of 5 cm<sup>2</sup>)</b>	0.5~2000 (Optional)
	<b>g/(m<sup>2</sup>·day) (MASK area of 5 cm<sup>2</sup>)</b>	0.5~400 (Optional)
<b>Resolution</b>	<b>cc/(m<sup>2</sup>·day)</b>	0.0001
	<b>g/(m<sup>2</sup>·day)</b>	0.0001
<b>Repeatability</b>	<b>cc/(m<sup>2</sup>·day)</b>	0.02 or 1%, whichever is greater
	<b>g/(m<sup>2</sup>·day)</b>	0.02 or 2%, whichever is greater
<b>Temp. Range</b>	°C	15~50
<b>Temp. Fluctuation</b>	°C	±0.2
<b>Humidity Range</b>	%RH	0%, 35~90%±2%
<b>Extended</b>	<b>GP-02 Gas Purification Device</b>	Optional
	<b>DataShield™ Data Shield <sup>Note 3</sup></b>	Optional
<b>Functions</b>	<b>GMP Computer System Requirements</b>	Optional
	<b>CFR 21 Part 11</b>	Optional

◇ For users with special requirements, our company can provide customized production within our capabilities to meet their needs.

**Table 2: Technical Specifications**

<b>Test Cells</b>	3 Sets
<b>Sample Size</b>	4.2" x 4.2" (10.6cm×10.6cm)
<b>Sample Thickness</b>	≤120 Mil (3 mm)
<b>Test Area</b>	50cm <sup>2</sup>
<b>Gas Specification</b>	99.999% nitrogen and 99.5% oxygen (gas source is to be provided by the user)
<b>Gas Source Pressure</b>	≥ 40.6 PSI / 280 kPa
<b>Port Size</b>	1/8" Metal pipe
<b>Dimensions</b>	30.7" H x 14.1" W x 26.7" D (78cm × 36cm × 68cm)
<b>Power Source</b>	120VAC ± 10% 60Hz / 220VAC ± 10% 50Hz (Select one from the two)
<b>Net Weight</b>	176Lbs (80kg)

**Table 3: Product Configuration**

<b>Standard Configuration</b>	Instrument host, sampler, vacuum grease, $\Phi$ 4 mm polyurethane tube
<b>Optional Parts</b>	GP-02, software, computer, GMP computer system requirements, CFR 21 Part 11, air compressor, DataShield™ Data Shield <sup>Note 3</sup>
<b>Note</b>	<b>The compressed air inlet of this instrument is a <math>\Phi</math>4 mm polyurethane pipe (pressure <math>\geq</math> 79.7 PSI / 550 KPa); the air source is to be provided by the user.</b>

**Note 1: All product specifications shall be subject to the exact markings in the "Technical Parameters" table.**

**Note 2: All parameters in the table were measured by professional operators at Labthink Laboratory in compliance with relevant laboratory environmental standards and conditions.**

**Note 3: The DataShield™ Data Shield System provides secure and reliable data application support. This system can be shared by multiple Labthink products; please purchase optionally as needed.**

✧ Labthink is committed to continuously innovating and enhancing product performance and functionality. Accordingly, the technical specifications of our products may be modified without prior notice. The company reserves the right to make changes and to provide final interpretations.