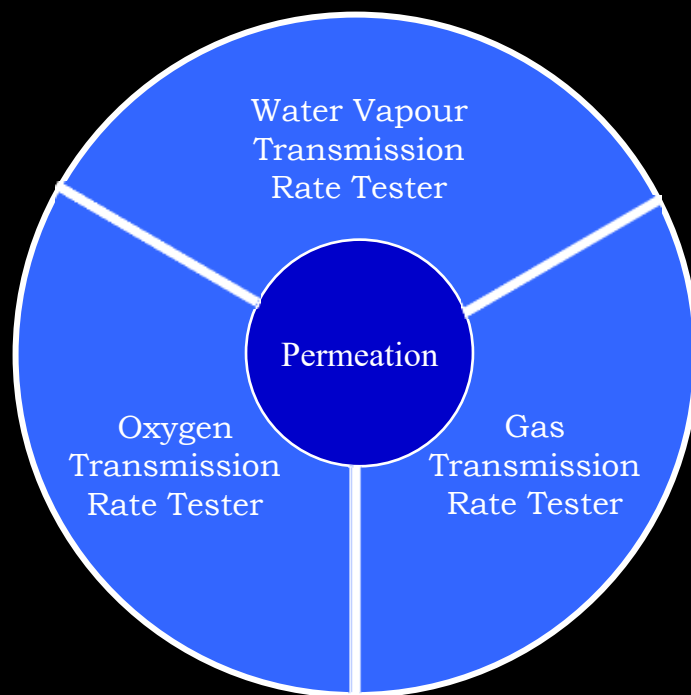


PERMEATION



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Permeation Testing Instruments

Tiedemann Instruments offers numerous devices for measuring gas, oxygen and water vapour permeation from Chinese partners Labthink Instruments and Jinan Zhongce Electromechanical Equipment Co., Ltd, www.pubtester.com.

The modern, high-precision devices work with the latest and mostly integrated software. This means that only the connection of output devices is necessary. Some devices also require a computer connection. The software allows the user a precise data evaluation through different display options as well as comparison, search and help functions and an automated status query of the device with regular calibration reminders.

All instruments work according to the current standards. In addition to the permeation testers, Tiedemann also offers a wide range of products in the field of mechanical material testing, investigation of heat-sealing properties, leak testing and much more.

Water Vapour Transmission Rate Tester

With our water vapour permeability testers, the permeation amount of water vapour through a material layer can be measured.

The specific ambient temperature and humidity can be set for each test procedure. Depending on the requirements, devices are available for flat packaging materials or finished packaging, as well as different sensors or measuring methods.

The devices for barrier materials **WVTR-E1, -E2, C330G and H** are equipped with an electrolytic sensor, the devices **WVTR-I1, -I3 and C390M and H** with infrared sensors. These units have integrated software and can test both finished packages and flat material samples.

With the models **WVTR-W1, -W3, -W6, -W6A and -W12**, as well as **C360M and H** permeation is determined by weight measurement. The numbers at the end of the designation stand for the number of chambers. The model **WVTR-W12** therefore has 12 measuring points.

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Overview of Devices

Tester	Media	Kind of Sample	Independent Chambers	Method	Computer or Tablet
WVTR-E1	Water Vapour	Films and Foils, Packaging	1	electrolytic	Tablet incl.
WVTR-E3	Water Vapour	Films and Foils, Packaging	3	electrolytic	Computer
C330G and H	Water Vapour	Films and Foils, Packaging	3	electrolytic	Tablet incl.
WVTR-I1	Water Vapour	Films and Foils, Packaging	1	infrared	Tablet incl.
WVTR-I3	Water Vapour	Films and Foils, Packaging	3	infrared	Computer
C390M and H	Water Vapour	Films and Foils, Packaging	3	infrared	Tablet incl.
WVTR-W1	Water Vapour	Films and Foils	1	gravimetric	Tablet integrated
WVTR-W3	Water Vapour	Films and Foils	3	gravimetric	Tablet integrated
WVTR-W6	Water Vapour	Films and Foils	6	gravimetric	Tablet integrated
WVTR-W6A	Water Vapour	Construction Materials	6	gravimetric	Tablet integrated
WVTR-W12	Water Vapour	Films and Foils	12	gravimetric	Tablet integrated
C360M and H	Water Vapour	Films and Foils	6 / 12	gravimetric	Tablet
GTR-G1	Air, O2, N2, CO2, H2, He, CH4 u.ä.	Films and Foils	1	Pressure Difference	Computer necessary
GTR-G3		Films and Foils	3	Pressure Difference	Computer necessary
OTR-O1	O2	Films and Foils, Packaging	1	coulometric	Tablet incl.
OTR-O3	O2	Films and Foils, Packaging	3	coulometric	Tablet incl.
C230M, G, H	O2	Films and Foils, Packaging	3	coulometric	Tablet incl.
TQD-01	Air	Flat Material	1	Flow	Micro Computer
TQD-02	Air	Flat Material	1	Flow	Micro Computer
TQD-03	Air	Face Mask	1	Flow	Micro Computer

Electrolytic Method

WVTR- E1 and E3

Features:

- E1: 1 Chamber
- E3: 3 independent chambers
- Tablet incl.
- Test of films and packaging

Advantages:

- Suitable for high barrier material
- Large temperature range



	Film and Foils	Packaging
Test range	0.001 - 50 g/m ² ·24	0.0001 - 0.25 g/pkg·d
Temperature range	5°C - 95°C	
Humidity range	0%, 35% - 90%, 100%	
Standards	ISO 15106-3, GB/T 21529, DIN 53122-2, YBB00092003	

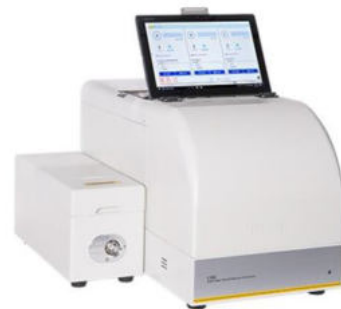
C330G and C330H

Features:

- Simultaneous testing of three material samples with individual results.
- Integrated computer control system
- Testing of films, paper or packaging

Advantages:

- Automatic test mode with temperature and humidity control
- 12" touch screen pad



	C330G	C330H
Test range	0.00005 - 5 g/m ² ·24h 0.00000025 - 0,025 g/pkg·24h	0.005 - 50 g/m ² ·24h 0.000025 - 0,25 g/pkg·24h
Temperature range	10°C - 55°C	
Humidity range	5% - 90%, 100%	
Standards	ISO 15106-3, GB/T 21529, YBB 00092003-2015	



Infrared Method

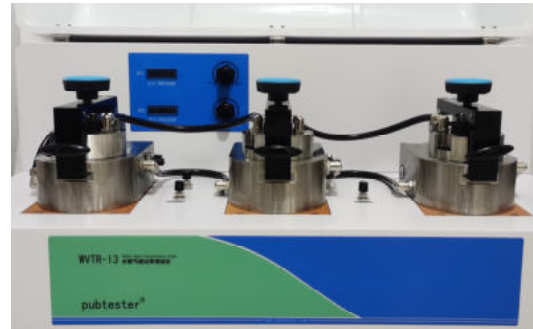
WVTR-I1 and I3

Features:

- E1: 1 chamber
- E3: 3 independent chambers
- Tablet incl.
- Test of films and packaging material

Advantages:

- Suitable for high barrier material
- Large temperature range



	Films and Foils	Packaging
Test range	0.001 - 50 g/m ² ·24h (Standard)	0.0001 - 0.25 g/pkg·d
Temperature range	5°C - 95°C	
Humidity range	0%, 35% - 90%, 100%	
Standards	GB/T 26253, GB/T 21529, YBB 00092003, ASTM F1249, ISO 15106-2, TAPPI T557, JIS K7129, ISO 15106-3, DIN 53122-2	

C390M and C390H

Features:

- Simultaneous testing of three material samples or finished packages with individual results.
- Integrated tablet control system
- Automatic test mode with automatic temperature and humidity sensors

Advantages:

- Parallel testing
- 12" touch screen pad



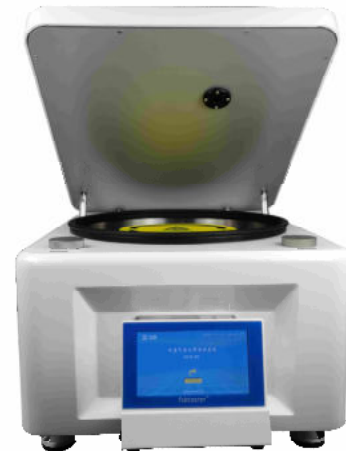
	Packaging Materials	Packaging/Containers
Test range	M: 0.05 - 40 g/m ² ·24h H: 0.005 - 40 g/m ² ·24h	0.000025 - 0.2 g/pkg·d
Temperature range	10°C - 55°C	
Humidity range	5% - 90%, 100%	
Standards	ISO 15106-2, ASTM F1249, GB/T 26253, JIS K7129, YBB 00092003-2015	

Gravimetric Method

WVTR-W1, -W3, -W6 and W12

Features:

- Full automatic tests for desiccant and water method for flat material
- W1: 1 chamber
- W3: 3 independent chambers
- W6: 6 independent chambers
- W12: 12 independent chambers
- Automatic temperature- and humidity control
- Space-saving control system via tablet



Advantages:

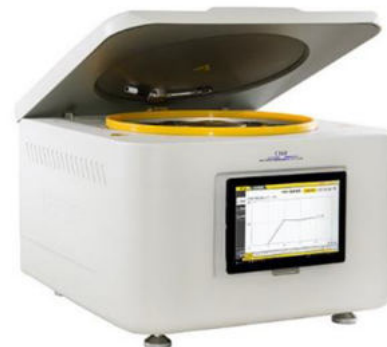
- Value for money

Test range	0.1 – 10.000 g/m ² ·24h
Temperature range	15°C - 55°C
Humidity range	10% – 98 %
Standards	ISO 2528, GB 1037, GB/T 16928, ASTM E96, ASTM D1653, TAPPI T464, DIN 53122-1, JIS Z0208, YBB 00092003

C360H and C360M

Features:

- Latest technology
- Fully automatic test process
- Automatic humidity and flow control



Advantages:

- Long-life desiccator (up to 20,000 hours working time).

	C360H	C360M
Test chambers	12	6
Test range (water method)	10000/n (1-12) g/(m ² ·24h)	10000/n (1-6) g/(m ² ·24h)
Test range (desiccant method)	1200 g/m ² ·24h	
Temperature range	20°C - 55°C	
Humidity range	10% – 90%	
Standards	ASTM E96, ASTM D1653, ISO 2528, TAPPI T464, DIN 53122-1, GB 1037, GB/T 16928, YBB 00092003	



Gas-Permeation

The devices for measuring gas permeability can be used for various materials and gases (air, O₂, N₂, CO₂, CH₄, H₂, He, organic gases and mixtures).

The following devices can be used to test flat materials. The principle of permeation measurement is based on the pressure difference method. For this purpose, both chambers are evacuated. The gas to be tested then flows into one side of the chamber at very low pressure. If the evacuated pressure increases on the opposite side, this is a measure of the permeation through the separating material.

By measuring the pressure difference, the **GTR-G1 and GTR-G3** models can measure the transmission rate of gas, the solubility coefficient, the diffusion coefficient and the permeability rate through plastic films, laminated films, specially impermeable materials, tyres, metal sheets, osmosis membranes and many other materials. The GTR units are controlled via an integrated tablet. Temperature and humidity levels are set via the software and are controlled automatically.

Due to their robustness and because no sensor is consumed, the systems are also very suitable for oxygen permeation.

The GTR units are equipped with three gas connections as standard. If you want to connect more than three gases, you need an appropriate multi-way valve system (accessory).

The **TQD** permeation devices measure the volume flow through various materials such as fabrics, filters, leather, textiles, non-woven fabrics, paper and also finished products such as breathing masks.

Pressure Difference Method

GTR-G1 and -G3

Features:

- For gas tests of air, O₂, N₂, CO₂, CH₄, H₂, He or others
- For 3 different gases, optional 8
- Very good as OTR-Tester
- G1: 1 chamber
- G3: 3 independent chambers
- Wide range of test options for materials with low, medium and high barrier properties

Advantages:

- Large temperature range
- Flammable, toxic and explosive substances testable



Testing range	Device G1 and G3: 0.05 - 50,000 cm ³ /m ² ·24h·0.1MPa
Temperature range	5°C - 95°C
Vacuum	<20 Pa, 0,1 Pa
Standards	GB/T 1038, YBB 00082003, ASTM D1434, ISO 2556, ISO 15105-1, JIS K7126-A

Tester for Flow Transmission

TQD-01, TQD-02 and TQD-03

Features:

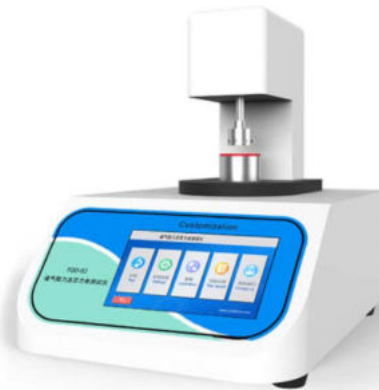
- Testing gases: Air
- Flow at constant pressure difference and pressure difference measurement at constant flow of any kind such as leather, PVC, textiles, non-wovens, paper, etc.

Advantages:

- TQD-01: Designed by car manufacturers
- TQD-02: Especially for medical mask material
- TQD-03: For ready-made medical masks



TQD-01



TQD-02



TQD-03

Pressure range	TQD-01: 0 – 1000 Pa TQD-02: 10 – 200 Pa TQD-03: 0 – 1000 Pa
Flow range	TQD-01: 0 – 30 l/min TQD-02: 1 - 10 l/min TQD-03: 0 – 100 l/min
Standards	TQD-01: ISO 9237, ISO 4638, ISO 5636, GB/T 10655, GB/T 5453, GB/T 4689.22, GB/T 13764, ASTM D737, TAPPI T460, JIS P8117 TQD-02/-03: GB 19083, J0469, GB2626, GB/T32610

Oxygen Transmission Rate Tester

The oxygen permeation testers **OTR-O**, **-O3** and the models **C230** are equipped with a coulometric sensor and measures the oxygen barrier of the material sample according to the equal pressure principle. Plastic films, laminated, extruded, coated or high barrier materials can be tested as well as packaging and containers made of plastic, rubber, paper or glass. The measurement can be carried out simultaneously in up to three independent chambers.

Not to forget the gas permeation devices **GTR-G**, which can measure all O₂ ideally and easily as long as no high barrier materials are to be tested.

Coulometric Method

OTR-O1 and O3

Features:

- O1: 1 chamber
- O3: 3 independent chambers,
- 1 Sensor
- 99,999 % N₂ Nitrogen as carrier gas
- Automatic control of temperature and humidity with high accuracy
- Control of the system via space-saving tablet or computer
- Intuitive Software



Advantages:

- Permeation of film and packaging
- Accessory for packaging test available
- Quick heating and cooling
- Large temperature range

Testings range	0,01 – 6500 g/m ² ·24h
Temperature range	5°C - 95°C for sample and sensor, automated heating or cooling
Humidity range	0%, 5% – 90 %, 100 %
Standards	ISO 2528, GB 1037, GB/T 16928, ASTM E96, ASTM D1653, TAPPI T464, DIN 53122-1, JIS Z0208, YBB 00092003

C230 G/H/M

Features:

- 1 chamber with a 3 in 1 diffusion cell structure.
- 99.999% Nitrogen as carrier gas
- Carrier gas is purified by palladium catalysts
- Temperature and humidity control

Advantages:

- Different carrier gases possible
- Accuracy increased by purification of nitrogen



	Model G	Model H	Model M
Range for packaging material	0.005 - 200 cm ³ /m ² ·d	0.01 - 200 cm ³ /m ² ·d	0.01 - 5000 cm ³ /m ² ·d
Range for packages / containers	0.000025 - 1 cm ³ /pkg·d	0.00005 - 1 cm ³ /pkg·d	0.00005 - 25 cm ³ /pkg·d
Temperature range	10°C - 55°C	10°C - 55°C	10°C - 55°C
Resolution	0.0001 cm ³ /m ² ·d	0.001 cm ³ /m ² ·d	0.001 cm ³ /m ² ·d
Standards	ISO 15105-2, ASTM D3985, ASTM F2622, ASTM F1307, ASTM F1927, JIS		

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