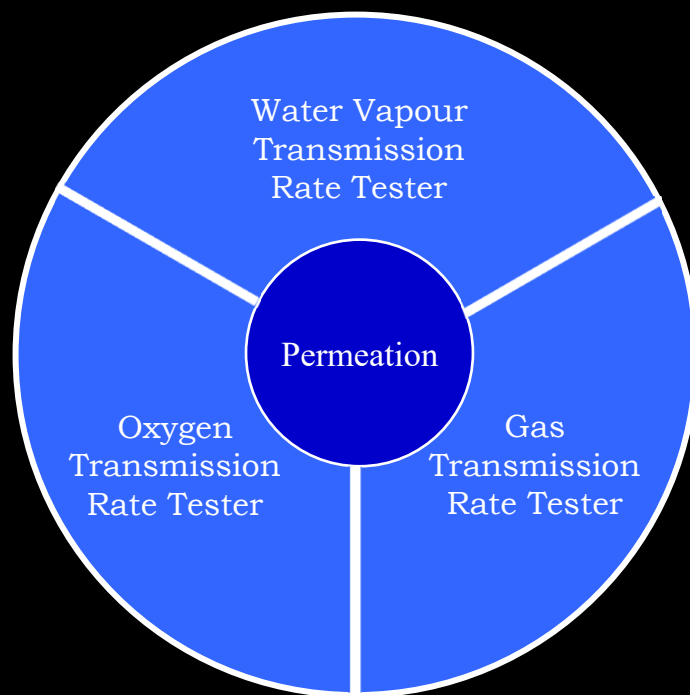


PERMEATION



TIEDEMANN

Permeation Testing Instruments

Tiedemann Instruments offers numerous devices for measuring gas, oxygen and water vapour permeation from Chinese partners GBPI, www.gbpitester.com 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, C330** are equipped with an electrolytic sensor, the devices **WVTR-I1, -I3 and W401, W405** 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 **W806/812** 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.

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
W401/W405	Water Vapour	Films and Foils, Packaging	3	infrared	Micro screen or PC
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
W806/W812	Water Vapour	Films and Foils	6 / 12	gravimetric	
GTR-G1/W500	Air, O2, N2, CO2, H2, He, CH4 u.ä.	Films and Foils	1	Pressure Differce	Computer necessary
GTR-G3/W530		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	Computer necessary
Y110/Y310	O2	Films and Foils, Packaging	1/3	coulometric	Micro display or PC
TQD-01	Air	Flat Material	1	Flow	Micro Computer
TQD-02	Air	Flat Material	1	Flow	Micro Computer
N600/N900	Air	Battery Membrane/ Textiles	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

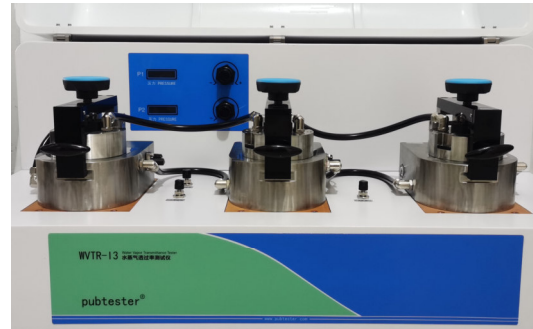
WVTR-I1 and I3

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	

WVTR W401 und W403

Features:

- W401: 1 chamber, W403: 3 independent chambers
- Integrated mini display or PC
- Automatic test mode with automatic temperature and humidity sensors

Advantages:

- Larger range
- Fully automatic



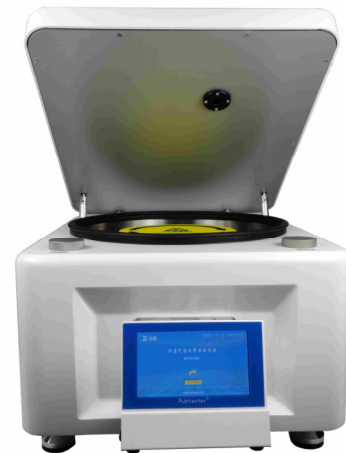
	W401	W403
Test range	0.001 - 100 g/m ² ·24h	0.005 - 500 g/m ² ·24h
Temperature range	10°C - 45°C	
Humidity range	30% - 90%, 100%	
Standards	ISO 15106-2, ASTM F1249, GB/T 26253, JIS K7129, YBB 00092003-2015	

Gravimetric Method

WVTR-W1, -W3, -W6, -W6A and W12

Features:

- Full yautomatic tests for dessicant and water method for flat material
- W1: 1 chamber
- W3: 3 independent chambers
- W6: 6 independent chambers
- W6A: ideal for construction material
- 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

WVTR W806 and W812

Features:

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



Advantages:

- Fully automatic

	W812	W806
Test chambers	12	6
Test range (water method)	0.05 - 10000 g/m ² ·24h	
Air movement	0,5-2,5 m/s	
Temperature range	10°C - 50°C	
Humidity range	5% – 95%	
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, GTR-G3, N500 and N530** 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 levels are set via the software and are controlled automatically. For different humidity an extra controller could be added.

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

Pressure Difference Method

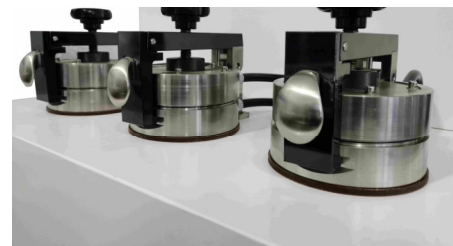
GTR-G1 and -G3

Features:

- For gas tests of air, O₂, N₂, CO₂, CH₄, H₂, He or others
- For 3 different gases, optional 8
- Very good 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

N500 and N530

Feature:

- Test Gases: Luft, O₂, N₂, CO₂, He, H₂ u.ä.
- Up to 3 different gases
- Very well as OTR-Tester
- N500: 1 chamber, N530: 3 chamber

Advantages:

- Fully automatic



Testing range	0,02 - 50,000 cm ³ /m ² ·24h·0,1MPa
Temperature range	5°C - 60°C
Vacuum value	<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, N600 and N900

Features:

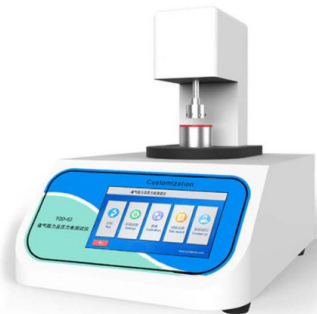
- Testing gases: Air
- Flow at constant pressure difference and pressure difference measurement at constant for flat materials of any kind such as leather, PVC, textiles, non-wovens, paper, etc.

Advantages:

- TQD-01: Designed by car manufacturers
- TQD-02: Especially for medical mask material
- N600: For textiles
- N900: Made for battery membranes



TQD-01



TQD-02



N900



N600

Pressure range	TQD-01: 0 – 1000 Pa TQD-02: 10 – 200 Pa N600: 0 – 300 Pa N900: 0 – 4000 Pa
Flow range	TQD-01: 0 – 30 l/min TQD-02: 1 - 10 l/min N600: 0.01 – 2,5 µm/Pa s N900: 0 – 40000 mm/s
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: GB 19083, J0469, GB2626, GB/T32610 N600: GB/T 458 -2008, GB/T 36363- 2018

Oxygen Transmission Rate Tester

The oxygen permeation testers **OTR-O, -O3 and 110, Y310** 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

Y110 and Y310

Features:

- Y110: 1 chamber
- Y310: 3 independat chambers
- N2 gas is cleaned by Palladium catalysation
- Temperature and humidity control
- Mini display or computer

Advantages:

- Fully automatic



	Flat Material (< 2 mm)	Packaging
Testing range	0.02 - 16500 cm ³ /m ² ·d (Standard)	0.0001 - 10 cm ³ /pkg·d (Standard)
Humidity range	0%RH, 30 - 90% RH oder 100% RH	
Temperature range	10°C - 45°C	
Resolution	0.001 cm ³ /m ² ·d 0.0001 cm ³ /m ² ·d	
Standards	ISO 15105-2, ASTM D3985, ASTM F2622, ASTM F1307, ASTM F1927, JIS	

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