

INFRARED WATER VAPOR TRANSMISSION RATE TESTER (SINGLE- CELL)



Infrared Water Vapor Transmission Rate Tester (Single-Cell) - ToronWVTR™ Ir1

Single-Cell Modulated Infrared Sensor WVTR Analyzer for High-Barrier Films and Packages

The ToronWVTR™ Ir1 is an infrared WVTR tester that measures the water vapor transmission rate of flexible films, sheeting, and finished packages. The instrument uses the modulated infrared sensor method, a fast, sensor-based technique that reads permeated water vapor in a dry carrier stream. A detection floor of 0.005 g/m²·24h resolves the very low transmission rates of high-barrier foils and metallized films. Built around methods such as ASTM F1249 and ISO 15106-2, it serves packaging, pharmaceutical, and materials labs.

The ToronWVTR™ Ir1 tests both flat films and, with optional fixtures, finished packages, so one instrument covers material screening and package QC. Water-bath temperature control holds the chamber at a set point across a 5°C to 95°C range, and controlled relative humidity reproduces real storage conditions. High-purity nitrogen carries permeated moisture to the sensor, and digital carrier-flow control keeps the sweep stable across the run.

One-button operation runs each test automatically, and live data curves let operators follow water vapor, temperature, and humidity in real time. Traceable reference-film calibration keeps results defensible for audits, and overload protection guards the pressure, moisture, and temperature circuits. The ToronWVTR™ Ir1 (Single-Cell Infrared Water Vapor Transmission Rate Tester) suits high-barrier film, flexible-packaging, pharmaceutical, and R&D labs.

APPLICATIONS

Infrared Water Vapor Transmission Rate Tester (Single-Cell) - ToronWVTR™ Ir1 Applications

The ToronWVTR™ Ir1 suits moisture barrier testing where transmission rates are low and fast, sensitive measurement matters.

- **High-Barrier and Metallized Films:** measures the very low water vapor transmission of foils, aluminized films, and coated barriers that the gravimetric method resolves slowly.
- **Flexible Packaging and Converting:** qualifies laminates, metallized films, and coatings during development and production QC.
- **Pharmaceutical and Medical Packaging:** verifies the moisture barrier of blister foils, sachets, and pouches for moisture-sensitive drug products.
- **Food and Beverage Packaging:** measures moisture ingress through films and finished packs that protect dry and moisture-sensitive products.
- **Electronics and Photovoltaic Encapsulation:** screens ultra-high-barrier films that protect moisture-sensitive electronic and PV components.
- **High-Barrier Film R&D:** supports development of EVOH, SiOx, AlOx, and coated structures where low WVTR must be measured quickly.
- **Finished Package Testing:** measures whole-package WVTR for pouches, bottles, and trays with optional package fixtures.
- **Academic and Materials Research:** quantifies water vapor permeability of barrier films for material studies.



Standards

The ToronWVTR™ Ir1 is designed to align with internationally recognized infrared-sensor test methods for water vapor transmission rate measurement.

- ASTM F1249 - Standard Test Method for Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
- ISO 15106-2 - Plastics: Film and Sheeting: Determination of Water Vapour Transmission Rate: Part 2: Infrared Detection Sensor Method
- TAPPI T557 - Water Vapor Transmission Rate Through Plastic Film and Sheeting Using a Modulated Infrared Sensor
- JIS K 7129 - Plastics: Film and Sheeting: Determination of Water-Vapour Transmission Rate: Instrumental Method

FEATURES

Infrared Water Vapor Transmission Rate Tester (Single-Cell) - ToronWVTR™ Ir1 Key Features

The ToronWVTR™ Ir1 pairs a sensitive infrared sensor with a compact single-cell design for fast, low-level WVTR measurement.

- **Infrared Sensor Method:** a modulated infrared detector reads water vapor in the carrier stream directly, giving fast, sensitive WVTR measurement for high-barrier films.
- **Low Detection Floor:** reads down to 0.005 g/m²·24h, resolving the very low transmission rates of foils, metallized films, and coated barriers.
- **Single-Cell Design:** focuses the sensor and gas path on one specimen, keeping the instrument compact and straightforward to run.
- **Film and Package Testing:** tests flat films and, with optional fixtures, finished packages such as pouches and bottles.

- **Water-Bath Temperature Control:** holds the chamber at a set point across a 5°C to 95°C range for standardized, isothermal testing.
- **Controlled Relative Humidity Testing:** conditions the gas streams to a set RH so results reflect real storage conditions for moisture-sensitive barriers.
- **Digital Carrier-Flow Control:** adjustable nitrogen sweep keeps carrier flow stable and repeatable across each test.
- **24-Bit Delta-Sigma Data Acquisition:** high-resolution conversion resolves the low signals produced by high-barrier films.
- **One-Button Automated Testing:** a single command runs the complete sequence automatically, reducing operator effort and variability.
- **Overload Protection:** pressure, moisture-sensor, and temperature protection circuits guard the instrument during unattended runs.
- **Integrated Chamber Temperature Sensing:** a built-in sensor monitors chamber temperature throughout each test.
- **Built-In Ambient Monitoring:** an internal temperature and humidity sensor logs room conditions with every test for better traceability.
- **Multiple Test Modes:** selectable modes adapt the instrument to different materials and barrier levels.
- **Real-Time Data Curves:** on-screen plots of water vapor, temperature, and humidity let operators judge test progress and stability.
- **Traceable Reference-Film Calibration:** calibration against certified reference films keeps results defensible for QC release and certification audits.
- **Laboratory Data Management Integration:** connects to lab data management software for centralized records, review, and reporting.

THEORY & METHOD

Theory and Method

The infrared sensor method measures water vapor transmission by detecting the moisture that crosses a film into a dry carrier stream. The specimen separates a diffusion cell into two sides. A humid nitrogen stream at a set relative humidity flows over the upstream face, while dry nitrogen sweeps the downstream face. The humidity gradient across the film drives water vapor from the humid side to the dry side.

Water vapor permeates the film and enters the dry carrier gas, which delivers it to a modulated infrared sensor. Water molecules absorb infrared radiation at a characteristic wavelength, so the sensor reads the attenuation of the beam as a direct measure of water vapor concentration in the carrier stream. The signal rises until permeation reaches a steady state.

The system computes WVTR from the steady-state sensor signal, the carrier flow, and the test area, or the whole package for finished-package testing. Calibration against a reference film of known WVTR ties the reading to a traceable value. The infrared sensor responds quickly and resolves very low transmission rates, which makes the method well suited to high-barrier foils and metallized films where the gravimetric approach would take much longer.

TECHNICAL SPECIFICATIONS

**Infrared Water Vapor Transmission Rate Tester (Single-Cell) -
ToronWVTR™ Ir1 Technical Specifications**

Parameter	Specification
Film Test Range (Standard)	0.005 to 42 g/m ² ·24h
Film Test Range (Optional)	0.05 to 1,000 g/m ² ·24h
Film Resolution	0.001 g/m ² ·24h
Package Test Range	0.0001 to 0.3 g/pkg·d (optional)
Package Resolution	0.00001 g/pkg·d

Parameter	Specification
Specimen Amount	1 (single specimen)
Temperature Range	5°C to 95°C
Temperature Accuracy	±0.1°C
Humidity Range	0% RH; 35% to 90% RH; 100% RH (standard condition 90% RH)
Humidity Accuracy	±1% RH
Test Area	50 cm ²
Specimen Size (Film)	≥ 150 mm × 94 mm; thickness < 1 mm
Specimen Size (Package)	Max Ø120 mm × 400 mm
Carrier Gas	99.999% Nitrogen
Carrier Flow	0 to 200 ml/min
Gas Interface	1/8 inch
Voltage	AC 220 V, 50 Hz (110V is also available)
Dimensions	330 mm (L) × 600 mm (D) × 330 mm (H)
Net Weight	28 kg

Standard Delivery

Item	Description
Main Unit	Single-cell infrared WVTR test instrument
Computer	Dedicated control PC

Item	Description
Control Software	Instrument operation and data-analysis software
Temperature Controller	Water-bath temperature control unit
Tank Regulator	Regulates carrier gas supply pressure
PCIe Acquisition Card	Data acquisition interface for the control PC
Communication Cable	Connects the instrument to the control PC
Sample Cutter	Prepares specimens to the required test size
Vacuum Grease	Seals the specimen at the chamber interface

Optional Accessories

Item	Description
Package Fixtures	Adapters for testing finished packages such as pouches and bottles
Reference Film	Certified film for traceable calibration
Vacuum Grease	Additional sealing grease for specimen mounting
Sample Cutter	Additional specimen-preparation cutter
Laboratory Data Management System	Centralized data management and reporting software



Torontech Inc.

251 Consumers Road, Suite 1200
Toronto, Ontario, M2J 4R3, Canada 

Phone: +1 416 368 2721 | Fax: +1 416 981 7652
Email: info@torontech.com

Torontech, LLC

601 Brickell Key Drive, Suite 700
Miami, FL 33131, USA 

Toll-Free: 1-866-383-7919
Email: sales@torontech.com

Torontech ME FZE

Meydan Grandstand, 6th Floor,
Meydan Road, Nad Al Sheba,
Dubai-261440, UAE 

Phone: +971 488 19252
Email: me@torontech.com

