Modular systems for precision water vapor analysis of packaging film barriers

Applications

- Barrier films
- PET bottles
- Containers
- Closures
- Flexible Pouches
- Bags

Features & Benefits

- Analytical Systems Manufactured traceable to NIST.
- System validation with certified gas or film for speed and convenience.
- Over 25 yrs experience of Proprietary Coulometric P₂O₅ sensor.
- Absolute moisture measurement - No calibration required.
- Flow, temperature and humidity control for ultimate responsiveness and repeatability.
- Intuitive Windows based software.
- For medical and pharmaceutical permeation testing, we can now offer software which conforms to 21CFR Part 11.
- No liquid coolants, catalysts or special gas mixtures required.

Conforms to:  ASTM F-1249*  ISO 15106-3  ISO 15105-2  DIN 53122-2
Our test laboratory will perform your Permeation Testing Analysis. Whether you are developing innovative materials and packages or validating that your supplier is meeting specification. We can exceed your expectations with:

- Competitive Prices
- Fast Turnaround
- Independent non-biased results
- 30 Years Experience

Manufacture traceable to NIST

All Systech Illinois analyzers are certified traceable to NIST. In addition, analytical performance is validated using NIST certified gases and NIST traceable films. A set of validation films and a spare P₂O₅ sensor comes as standard with all of the water vapor permeation analyzers.

P₂O₅ Sensor Technology

The two most common sensor types for measuring moisture are IR (infra-red) and P₂O₅ (phosphorous pentoxide). The P₂O₅ sensor is more sensitive and stable than IR and does not require calibration. P₂O₅ is the primary method for absolute moisture measurement. Illinois have over 25 years experience of using P₂O₅ and IR sensor technology.

*The Systech Illinois 7000 series analyzers comply with ASTM standard F-1249 with the exception of the sensor technology. The standard relates to an infrared sensor whilst the Systech Illinois analyzer uses a coulometric sensor - a dedicated method of moisture analysis.

Wide measurement range

The 7000 series offer a wide measurement range providing research grade flexibility.

- Measurement range of 0.002-1000 g/m²/day for films with masking.
- Quality Assurance oriented speed and agility.
- Up to five expansion modules available to increase testing throughput.

Precision control

These analyzers offer precision temperature and humidity flow control providing ultimate responsiveness and repeatability.

- Test gas and carrier flow gas controlled by premium electronic mass flow controllers.
- Accurate relative humidity range from 20% to 90%.
- Wide sample temperature range of 41 to 122°F (5 to 50°C).

Laboratory Testing Services

Our test laboratory will perform your Permeation Testing Analysis. Whether you are developing innovative materials and packages or validating that your supplier is meeting specification. We can exceed your expectations with:
Software

The intuitive Windows based software offers:

- Easy input and recall of operating parameters and test protocols.
- User-friendly data tracking, searches, sorts, storage and output capabilities.
- Graphical representation of measurement data in real time.
- Auto-stop feature stops test when samples have reached equilibrium or by user entered elapsed time value.
- Complete system diagnostics.

Start up

Set up

Actual data

Principle of Operation

Utilising our proprietary sensor technology to detect water vapor transmission rates, samples are clamped or attached to a diffusion chamber. Wet nitrogen is then introduced into the upper half of the chamber while a moisture-free carrier gas flows through the lower half.

Molecules of water diffusing through the sample into the lower chamber are conveyed to the sensor by the carrier gas.

Sample Test Chamber

This allows a direct measurement of the water vapor without using complex extrapolations. Water vapor transmission rate of the test sample is displayed as either g/m²/day or g/100in²/day.

P₂O₅ Sensor

To achieve an absolute measure, the technology draws upon a fundamental principle of physics.

The phosphorous pentoxide (P₂O₅) moisture sensor consists of a dual platinum winding formed around a quartz tube.

The change in the resistance across the windings creates a change in the measured current. According to Faraday’s Law this is directly proportional to the amount of moisture in the gas stream.
Systech Illinois’ range meets the requirement for the testing of any application.

Systech Illinois’ 7002 Water Vapor Transmission Analyzer delivers the same high performance as the 7001 but with an extended measurement range for more demanding applications.

### Technical Specifications

<table>
<thead>
<tr>
<th>Measurement Range</th>
<th>7001</th>
<th>7002</th>
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</thead>
<tbody>
<tr>
<td>Film Unmasked</td>
<td>0.002 to 10 g/m²/day</td>
<td>0.002 to 70 g/m²/day</td>
</tr>
<tr>
<td>Film Masked</td>
<td>0.02 to 70 g/m²/day</td>
<td>0.02 to 1000 g/m²/day</td>
</tr>
<tr>
<td>Package</td>
<td>0.00001 - 0.05 g/pack</td>
<td>0.00001 - 0.05 g/pack at 10 cc flow, up to 0.5 g/pack at 50 cc flow</td>
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</tbody>
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| Test Temperature Range | 41°F to 122°F (5°C to 50°C) |
| Test RH Range         | 20 to 90% RH |
| Sample Size           | 50cm², adapters available for smaller samples |

<table>
<thead>
<tr>
<th>Operating Conditions</th>
<th>Standard laboratory environment</th>
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<tbody>
<tr>
<td>Power Requirements</td>
<td>100-240 VAC, 50/60Hz, 840 VA (max)</td>
</tr>
<tr>
<td>Supply Pressure</td>
<td>1.7 bar regulated</td>
</tr>
<tr>
<td>Gas Fittings</td>
<td>1/8 in. Swagelok (supplied)</td>
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<tr>
<td>Enclosure</td>
<td>Epoxy coated heavy gauge steel</td>
</tr>
<tr>
<td>Dimensions</td>
<td>20.98 x 20.98 x 12 (inches)</td>
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<tr>
<td>Weight</td>
<td>52 lbs</td>
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<table>
<thead>
<tr>
<th>Options</th>
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<tbody>
<tr>
<td>Expansion Modules 7011</td>
<td>Available for simultaneous WVTR analysis of up to 12 samples</td>
</tr>
<tr>
<td>(Up to 5 modules can be linked)</td>
<td>For finished package testing under special conditions</td>
</tr>
</tbody>
</table>

Systech Illinois have over 30 years experience of providing analysis solutions for a wide range of industries. From our manufacturing plants in the U.S and UK we produce gas analyzers for industrial process industries, headspace analyzers for monitoring gas flushing of food products, and our range of permeation analyzers.