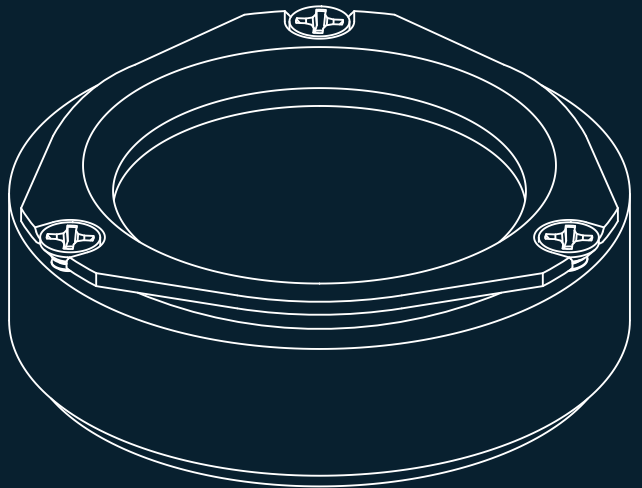


# WVTR TESTING KIT



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# 1. INTRODUCTION

Thank you for choosing the WVTR Testing Kit add-on for the Vapor Sorption Analyzer (VSA). It provides a fully automated solution for determining the water vapor transmission rate (WVTR) of packaging materials under strictly controlled temperature and humidity conditions.

This patent-pending WVTR Testing Kit is engineered to ensure that only water vapor crosses the testing material face. This design results in highly repeatable measurements, even with complex materials such as moderate WVTR films, coated paper, or other natural materials.

## 1.1 PACKAGE CONTENTS

Please verify that the following components are present and in good condition:

- 2 × Coated WVTR Testing Cells
- 1 × 1 3/8 in. hollow punch
- 1 × 4×4 in. cutting mat
- 1 × #1 Phillips screwdriver
- 1 × Laboratory spoon and spatula
- 1 × Drierite, 10–20 mesh (1 lb)
- 2 × Extra gaskets
- 4 × Extra retaining ring screws

## 1.2 SOFTWARE REQUIREMENTS

To conduct WVTR testing, AQUALAB's Moisture Analysis Toolkit (MAT) version 3 or higher must be installed.

The latest version can be downloaded from [aqualab.com/en/get-started](https://aqualab.com/en/get-started). A valid license key is required to enable WVTR testing features. This key is provided as a PDF document and will be sent to the registered email address upon purchase confirmation. For any issues or further assistance, please contact customer support.

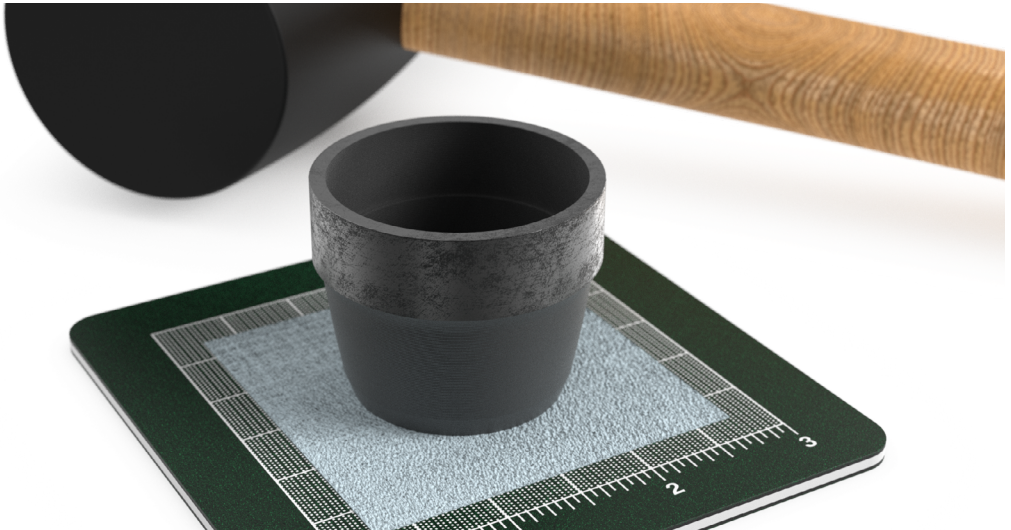
Before beginning operation, it is recommended to review the full instructions to ensure optimal performance of the WVTR Testing Kit.

For guidance on operating the Vapor Sorption Analyzer (VSA), refer to its corresponding manual available at [aqualab.com/en/get-started](https://aqualab.com/en/get-started).

## 2. OPERATION

### 2.1 PREPARE THE TESTING MATERIAL

- Place the testing material on the provided cutting mat.
- Position the hollow punch over the testing material to achieve a full circular cut.
- Use a small hammer or mallet to strike the top edge of the punch until the testing material is fully cut.



## 2.2 TEST SETUP IN MAT 3

MAT 3 includes a default "Package WVTR" test configuration, which can be selected from the 'Home' tab during test initiation.

A typical packaging test condition for a coated fiber would be at 75% relative humidity and 25 °C. The test parameters are outlined below:

- **Stage Type:** DVS
- **Start (aw):** 0.75
- **Final (aw):** 0.75
- **Temperature (°C):** 25
- **Step (aw):** 0.1
- **Trigger (%/hr):** Off
- **Timeout:** 2 days
- **Loop:** Off

For a moderate WVTR film (e.g. 4-10 g/m<sup>2</sup> × day), the test could be run at 90% relative humidity and 38 °C.

These and other default test configurations can be customized and saved in the 'Settings' tab of MAT 3.

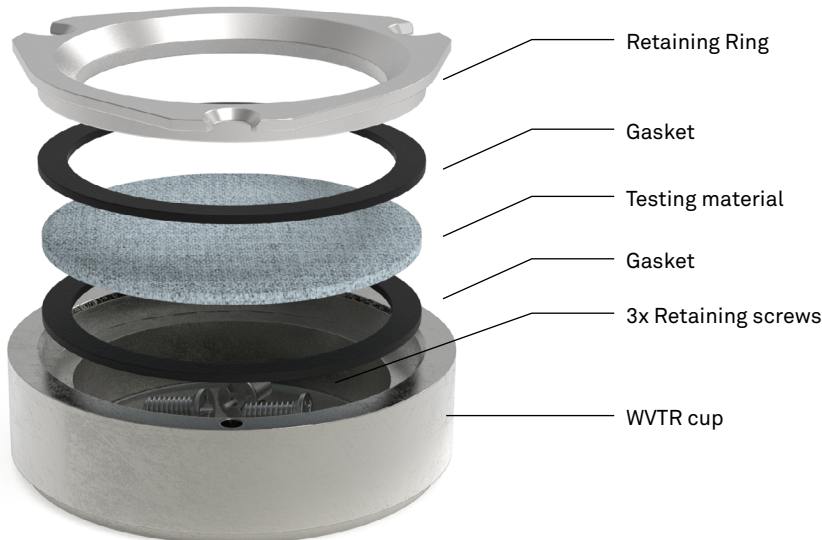
Once the configuration is set, proceed with running the WVTR test using the VSA.

## 2.3 RUNNING THE TEST ON THE VSA

NOTE: For optimal test results, regular cleaning and verifying of the VSA are mandatory. Detailed procedures are outlined in the VSA user manual.

### 2.3.1 TARING THE WVTR ASSEMBLY AND TESTING MATERIAL

- When prompted by the VSA, insert the WVTR cell with all its components (including the three retaining screws) as illustrated below into the sample chamber.



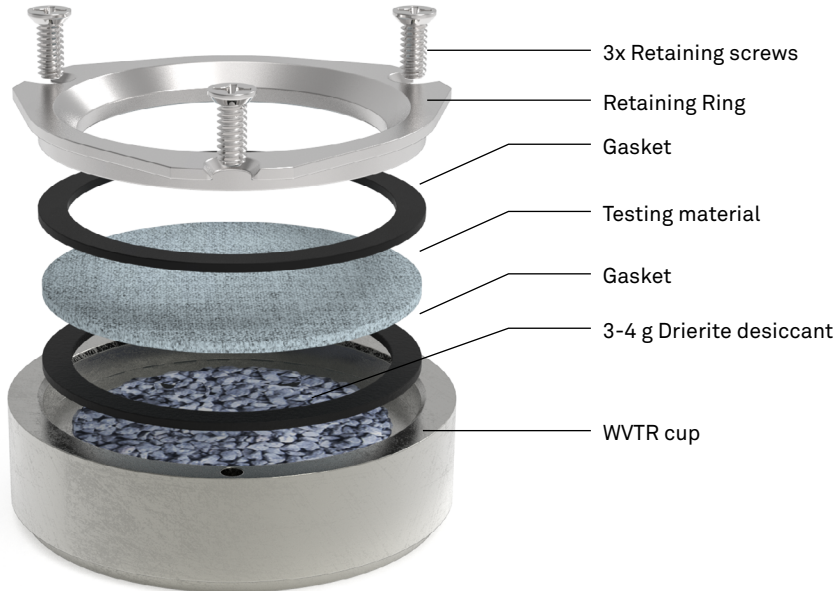
- Close the sensor block and move the lever to the 'Read' position to seal the chamber.
- Select >> to initiate taring.

### 2.3.2 ADDING DESICCANT TO THE WVTR CELL

- When prompted to "Insert sample and seal the chamber", remove the WVTR Cell from the VSA.
- Add 3-4 g of Drierite desiccant to the WVTR cup using the lab spoon. Ensure the inner rim of the cup is free of any desiccant particles. Use the spatula end of the spoon to clean the rim as needed.

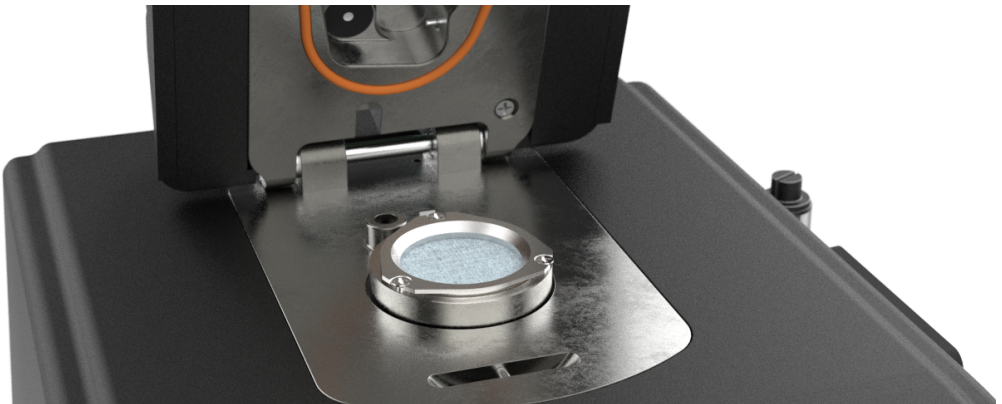
## OPERATION

- Assemble the WVTR Cell as shown and secure it using the retaining screws. Hand-tighten screws gradually in an alternating pattern. Do not fully tighten one screw at a time and avoid over-tightening. Gently shake the cell side to side to ensure even distribution of the desiccant.



### 2.3.3 STARTING THE TEST

- Reinsert the fully assembled WVTR Testing Cell into the VSA.
- Close the sample chamber and move the lever to the 'Read' position to begin the test.



## 2.4 DATA ANALYSIS USING MAT 3

- Import the WVTR isotherm file from the instrument or computer.
- Navigate to the **Analysis** tab.
- Click the **WVTR** button.

The calculated WVTR value will appear on the right side of the interface. Units of measurement can be adjusted via the drop-down menu as needed.

For accurate measurements, the system must operate in a steady state. This means the desiccant must absorb moisture at a consistent, linear rate without variations in its absorption capacity.

To facilitate this, the software automatically excludes the first hour of data collection, allowing the VSA and test cell to stabilize. After this initial period, the remaining data is fitted with a linear model to calculate the desiccant's rate of weight change, which is then used to determine the WVTR.

A steady state is indicated by a linear change in weight over time. A non-linear trend suggests that steady-state conditions have been exceeded.

+ Analysis

**Home**

**Analysis**

**Shelf Life**

**Formulation**

**Temp Views**

**Settings**

**Help**

**WVTR raw file.vsa**  
2025-03-18

Compare with: Selected Items (1)

Raw Data
Isotherm Analysis
Critical RH (Aw)
WVTR

Calculate the Water Vapor Transmission Rate (WVTR) for a packaging material using an isotherm generated with the WVTR test configuration.

**WVTR** g/m<sup>2</sup>/day

4.8544

Temperature 38.0 °C

Humidity 90.0 %

**Slope (g/h)**

0.0002

542 Records 0 Excluded

Show/Hide Columns ⚙

Exclude	Record	Date/Time	Cumulative Time (hr)	Water Activity	Water Potential (MPa)	Weight (mg)	% Weight Change	% Moisture Content (db)

### 3. SPECIFICATIONS

#### MEASUREMENT SPECIFICATIONS

##### Testing material

Suitable testing materials	Paper, plastic film, sheeting, fiberboards
Maximum material thickness	1.40 mm (0.055 in)
Testing material diameter	35 mm
Drierite steady-state capacity	~4% increase in mass; e.g. +0.14 g for 3.5 g sample
Typical detectable transmission rate	1-100 g/(m <sup>2</sup> *day) / 0.065-6.45 g/100 in <sup>2</sup> *day
Repeatability	0.5 g/(m <sup>2</sup> *day)

##### Temperature & humidity

Testing temperature range	15 - 60 °C
Testing humidity range	5-95 % relative humidity
Accuracy	±0.1 °C

##### Typical test length

24 - 48 hrs dependent on properties of testing material

#### PHYSICAL SPECIFICATIONS

##### WVTR cup dimensions

Major diameter	43.03 mm (1.694 in)
Cup diameter	42.01 mm (1.654 in)
Height of cell	13.84 mm (0.545 in)
Volume	5.39 mL (0.329 in <sup>3</sup> )

## AQUALAB WVTR CELL

### Cell materials

Retaining ring	Stainless steel
Screws	Stainless steel
Cup	Nickel-teflon coated aluminum
Gaskets	Silicone

### Applied Method

ASTM E96

## 4. CUSTOMER SUPPORT

### NORTH AMERICA

Customer service representatives are available for questions, problems, or feedback Monday through Friday, 7:00 am to 5:00 pm Pacific time.

**Email:** [support@aqualab.com](mailto:support@aqualab.com)  
[sales@aqualab.com](mailto:sales@aqualab.com)

**Phone:** +1.509.332.5601

**Fax:** +1.509.332.5158

**Website:** [aqualab.com](http://aqualab.com)

### EUROPE

Customer service representatives are available for questions, problems, or feedback Monday through Friday, 8:00 to 17:00 Central European time.

**Email:** [sales.europe@aqualab.com](mailto:sales.europe@aqualab.com)

**Phone:** +49 89 20 80 49 202

**Website:** [aqualab.com](http://aqualab.com)

If contacting Addium by email, please include the following information:

Name	Email address
Address	Instrument serial number
Phone	Description of the problem

**NOTE:** For products purchased through a distributor, please contact the distributor directly for assistance.