Operation & Instruction Manual

V25.01

FlexPak Leak Detectors

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Uncrating A Leak Detector

All Leak Detectors are shipped in a wooden crate, secured to the pallet base. The following instructions detail the appropriate tools and steps required to uncrate the Leak Detector safely.

Tools required:

Drill with ¼" Nut Driver Bit

Pry Bar

Hammer

⚠ **CAUTION:** The main component of the Leak Detector (the Vacuum Chamber) is built with Acylic panels. Striking or impacting the Vacuum Chamber could cause damage. Use caution when opening the crate.

Step 1: Remove the top of the crate by backing out the ¼" Hex Head Screws.

Step 2: The front panel of the crate is mounted with ¼" hex head screws, the other 3 sides are secured with nails. Remove the front panel of the crate by backing out the screws.

Step 3: The remaining wall panels are secured with nails. Starting with the back panel (Opposite to the front panel) carefully remove the remaining wall panels with a pry-bar.

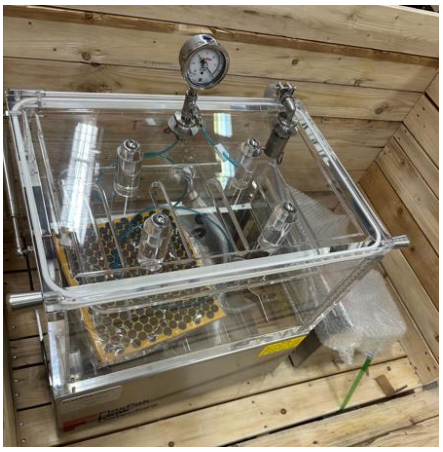
Step 4: If relocating the Leak Detector, use a pallet jack to lift the crate to move to the desired location, keeping the Leak Detector strapped to the crate while moving. Once in the desired setup location, remove the strapping securing the Leak Detector to the crate.

Step 5: Finally, lift the Leak Detector into the final position. When lifting the Leak Detector, it's recommended to use a minimum of 2 people. Larger models may require more personnel or machinery.

NOTE: Table Top models with Control Packages:

Control packages for table top units not fixed from the main Leak Detector's frame. The equipment is shipped with Vacuum Supply hose loosely connected (located at back of the Control package, Top Right outlet) between the Leak Detector and Control Package.

It's recommended to disconnect the Vacuum Supply Hose prior lifting and moving the equipment to a workbench. A ¼" nut driver is required to loosen the Hose Clamp on the Vacuum Supply hose. Using a Heat Gun on the Vacuum Supply hose will make removal and installation of the hose easier.



Leak Detector Model Numbers

Model Identification:

- Locate the Model Number on your unit - see image to the right.
- If your Leak Detector includes add-ons, they will appear in the model number ID. The following add-ons are commonly available:
    - No Add-Ons: Compressed Air Vacuum Generator
        - Example: FP242015
    - EVP: Electric Vacuum Pump
        - Example: FP242015-EVP
    - VAC: Vac Attachment, low head space testing tool
        - FP242015-VAC
    - FPSA-T: Semi-Automatic Controller (Compressed Air)
        - FP242015-FPSA-T
    - FPSA-EVP: Semi-Automatic Controller (Electric Vacuum Pump)
        - FP242015-FPSA-EVP
    - FPFA-T: Fully Automatic Controller (Compressed Air)
        - FP242015-FPFA-T
    - FPFA-EVP: Fully Automatic Controller (Electric Vacuum Pump)
        - FP242015-FPFA-EVP
    - FPIPA: Internal Pressure Assembly (ASTM F2096)
        - FP242015-FPIPA

Compressed Air Models (BaseModel)

- These models rely on a **venturi vacuum generator** powered by compressed air to create a vacuum.
- **Advantages:** Energy-efficient and requires no electrical power for vacuum generation.
- **Connections:** Utilize a **¼" FNPT inlet connection** and a **½" air hose feed** for optimal airflow.
- **Vacuum Levels:** Maximum vacuum level is **27 inHg (91 kPa)**.

Electric Vacuum Pump (BaseModel - EVP)

- Equipped with an **electric vacuum pump**, these models are ideal for environments without compressed air systems.
- **Advantages:** EVP models can be installed in area's where compressed air is unavailable.
- **Connections:** Comes with a 10-ft cordset featuring a GFI plug and an inline power switch for easy operation. 120/15/60 or 240/2/50 power supply required depending on region of purchase.
- **Vacuum Levels:** Maximum vacuum level is **25 inHg (85 kPa)**.

Controller Models ((BaseModel - FPSA/FPFA)

- Controller models feature integrated automation with **PLC systems**, enabling advanced test cycles, altitude simulations, and data logging.
- Control Packages are particularly suited for environments requiring repeatable and programmable testing protocols.

VAC Attachment (*(BaseModel* -VAC)

- Enables testing for **low-headspace or vacuum-sealed packages** by injecting air into the package during a vacuum cycle.

FPIPA (*(BaseModel* -FPIPA)

- See separate FPIPA manual for detailed instructions on how to operate the FPIPA system.

Leak Detector Quick Start and Operation Instructions

This section of the manual covers the setup and operation instructions for the two manual control configuration of FlexPak Leak Detector:

- Compressed Air Vacuum Generator Models
- Electric Vacuum Pump Models

If your equipment has a Control package, FPIPA or a custom configuration, refer to the auxiliary manuals for operational instructions.

Warnings

⚠ LBS - Table Top Weight Warning

Model	Fill Weight (lbs)	Weight (kg)
FP110808	60	27
FP181210	145	66
FP201413	225	102

The FlexPak Leak Detector is a heavy piece of equipment, even in the table top form factors. The three base model sizes listed in the table above detail the full weight of the Leak Detector when filled with water.

⚠ WTR - Water Filling Warning

Do not use water above **room temperature**. Even +10 °F over ambient can cause thermal expansion resulting in damage of the Acrylic Vacuum Chamber which will void warranty.

⚠ NDL - Sharp Needle Warning

VAC and FPIPA add-ons use medical grade needles to puncture packages. Always use caution and keep protective covers on needles when not in use.

LID - Lid Operation Warning

Warning Notice:

Releasing the lid while it is in motion can cause the lid to slam closed with significant force, posing a serious injury risk.

Safe Use Notice:

Ensure that operators hands and body parts remain clear of the testing chamber lid opening at all times while operating and moving the lid from closed to open or vise-versa.

Always maintain a firm grip and actively control the lid during both opening and closing operations; do not release it mid-motion. Releasing the lid mid-motion could cause bodily harm and/or damage to the equipment.

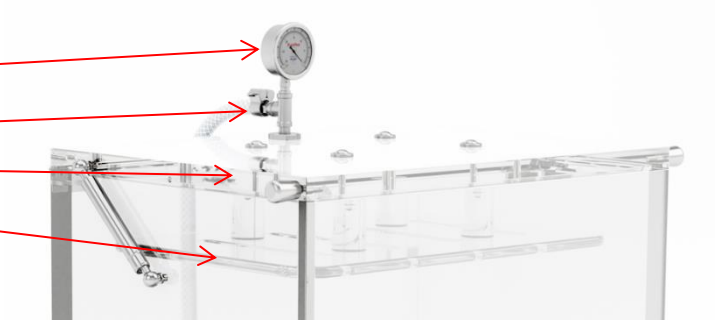
Compressed Air Vacuum Generator Models

Overview of Compressed Air Leak Detectors

Lid Assembly

The Lid Assembly of the Leak Detector houses the following Components:

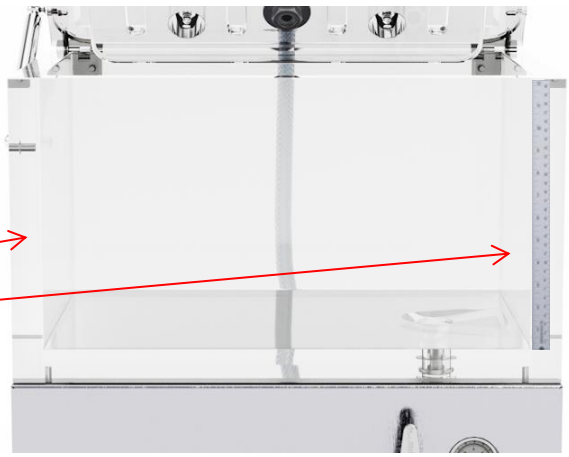
- The Vacuum Gauge
- Vacuum Inlet Port
- Lid
- Hold-Down Plate



Vacuum Chamber

The Vacuum Chamber is the testing chamber in which packages will be placed during testing.
The Vacuum Chamber contains the following components

- Vacuum Chamber
- Ruler



Drain Valve
The Drain valve is located at the bottom of the Vacuum Chamber, accessible through the Stainless Steel Base.
Table Top models have the Drain Valve accessible on the right hand side of the equipment. Floor Stand models have the drain accessible from the hand side.

- Drain Valve (Table Top Closed Position)

Compressed Air Vacuum Generator System
The Compressed Air Vacuum Generator utilizes a Venturi Pump to generate a Vacuum. The front of the unit will house the valves required to operate the system.
The Following Components are found on the Compressed Air System.

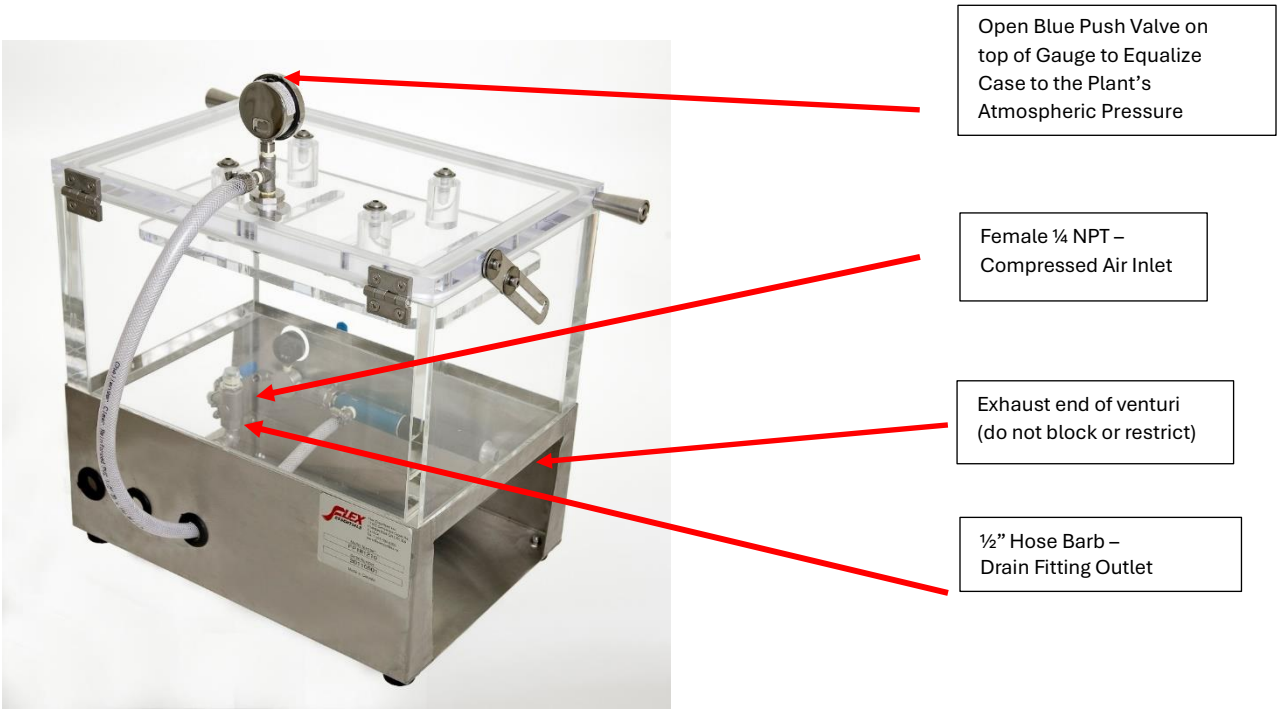
- Regulator Outlet Pressure Gauge
- Control Valve (ON/OFF)
- Regulator
- Venturi (hidden)

Setup and Services

Compressed Air Supply: Clean, dry air at a **minimum of 70 psig (4.8 bar) @ 13 SCFM (6.1 L/s)** is required. It's recommended to provide at least a ½" air supply hose to ensure adequate air flow through the venturi.

Vacuum Gauge Equalization: Open the Blue Push pin on the Vacuum Gauge to equalize the gauge case to Atmospheric pressure *(See Image below).*

Drain Line: The Leak Detector is fitted with a ½" hose barb drain port.



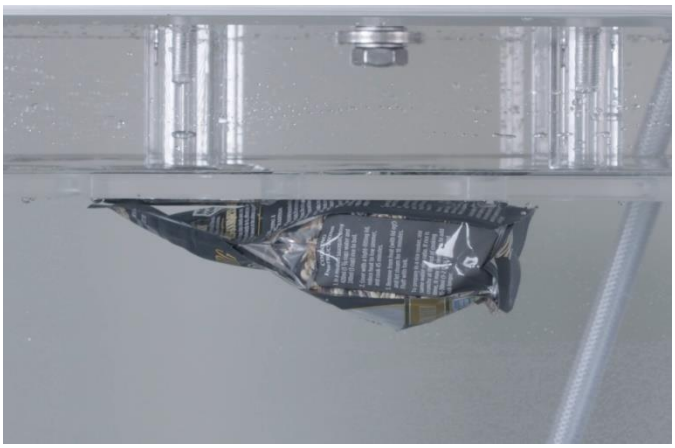
Air supply inlet on the Leak Detector is a ¼" NPT fitting (G-fitting adapters provided outside of North America)

Operation Instructions

Step 1: Set Water Level

Note: Skip step 1 if performing dry chamber testing

- Ensure the drain valve is closed before filling the Vacuum Chamber with water.
- Fill the Vacuum Chamber with room temperature water.
- Filling can be performed by lifting the lid. Use a flexible water hose or a bucket to add water to the Vacuum Chamber.
- The water level should be set to fully submerge the Hold-Down Plate when a package/test sample is submerged.



Step 2: Load Test Sample

- Load test Sample into the Vacuum Chamber for testing.

Step 3: Turn on Vacuum System

NOTE: If performing start-up or commissioning of the Leak Detector, adjust the Regulator so that the Regulator Pressure Gauge is set to zero prior to turning on the Vacuum System.

- Adjust the Control Valve to the ON (horizontal Position)
- Air will travel through the Venturi and exhaust out the Ventur's exhaust port. It is normal for Venturi exhaust air to travel out the left-hand side of the equipment.

Step 4: Adjust Vacuum Setpoint

- If necessary, the Vacuum Setpoint can now be adjusted.
- If the equipment is setup to perform testing at a specific setpoint, no adjustment is required.
- To adjust the setpoint
    - Pull the Regulator Knob out.
    - Turn Clockwise to increase the Vacuum level.
    - Turn Counter-Clockwise to decrease the Vacuum level.
    - Use the Vacuum Gauge mounted on the Lid to adjust the Vacuum level to the desired Vacuum Setpoint.
    - Push the Regulator Knob inward when Vacuum Setpoint at the desired level to "lock" the Setpoint.

Step 5: Monitor Sample for Leaks

- Watch the Package in the Leak Detector for Leaks. If a steady stream of air bubbles is made from the sample (for bubble emission tests) that would indicate a Leak and seal/package failure.
- Dry Chamber tests will have liquid contents leak out of the sample.

Step 6: Turn off Vacuum System & Complete Test

- Close the Control Valve (Vertical Position)
- Wait for the Vacuum Level to return to zero
- Lift the Lid
- Remove the Sample for further inspection.

Electric Vacuum Pump Models

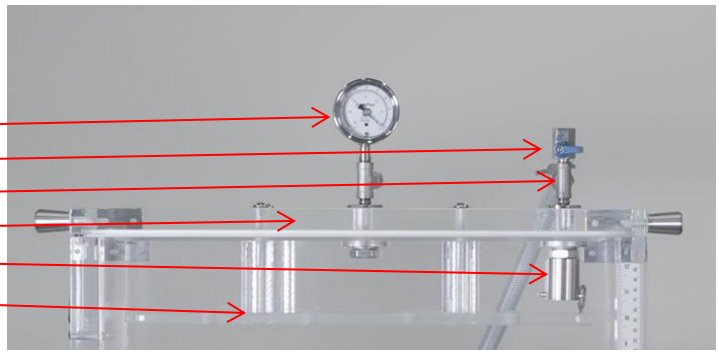
Overview of Electric Vacuum Pump Leak Detectors

There are several major components required to operate the EVP model Leak Detector. The figures below detail each of these components.

Lid Assembly

The Lid Assembly of the Leak Detector houses the following Components:

- The Vacuum Gauge
- Vacuum Relief Valve
- Vacuum Inlet Port
- Lid
- Water overfill Check-Valve
- Hold-Down Plate



Vacuum Chamber

The Vacuum Chamber is the testing chamber in which packages will be placed during testing.
The Vacuum Chamber contains the following components

- Vacuum Chamber
- Ruler

Drain Valve
The Drain valve is located at the bottom of the Vacuum Chamber, accessible through the Stainless Steel Base.
Table Top models have the Drain Valve accessible on the right hand side of the equipment. Floor Stand models have the drain accessible from the hand side.

- Drain Valve (Table Top Closed Position)

Electric Vacuum Pump System
The Electric Vacuum Pump (EVP) is located underneath the Vacuum Chamber in Table Top Units. Floor stand Units have the Vacuum Pump located on a side panel.
The Electrical Vacuum Pump System has several components.

- EVP Power Cable + Switch
- EVP Control Valve
- EVP

Setup and Services

A power supply outlet is required to energize the pump. A Standard electric plug will be sufficient.

Power Requirements: 120V/1P/3.3A - OR - 230V/1P/1.65A

Drain Line: The Leak Detector is fitted with a ½" hose barb drain port.

Vacuum Gauge Equalization: Open the Blue Push pin on the Vacuum Gauge to equalize the gauge case to Atmospheric pressure.

Operation Instructions

Step 1 – Prepare Testing Chamber

- Ensure the drain valve is closed before filling the Vacuum Chamber with water.
- Fill the Vacuum Chamber with room temperature water.
- Filling can be performed by lifting the lid. Use a flexible water hose or a bucket to add water to the Vacuum Chamber.
- The water level should be set to fully submerge the Hold-Down Plate when a package/test sample is submerged.
- **BUBBLE EMISSION TESTS WARNING** – Ensure the water level is below the Water overfill check-valve, this check valve prevents water ingress into the vacuum pump.

Step 2 – Place product in the Vacuum Chamber

- Lower the product into the Vacuum Chamber for Testing
- Close the lid to submerge the package under water.

Step 3 – Close Vacuum Relief Valve

- Turn the blue handle horizontal to seal the Vacuum Chamber

Step 4 – Turn the Vacuum Pump on

- Turn on the switch on the Vacuum Pump.
- The Vacuum Pump will start drawing a vacuum.
- Depending on where the EVP Control Valve was last set the Vacuum Pump will draw the Vacuum chamber to that level.

Step 5 – Adjust Vacuum Level

- If necessary, the Vacuum Setpoint can now be adjusted.
- If the equipment is setup to perform testing at a specific setpoint, no adjustment is required.
- To adjust the setpoint:
    - Turn the EVP control valve clockwise to increase the vacuum level.
    - Turn the EVP Control Valve counter-clockwise to decrease the Vacuum Level.
    - Use the Vacuum Gauge mounted on the Lid to set the Vacuum Setpoint.

Step 6 – Monitor Package for Leaks

- Watch the Package in the Leak Detector for Leaks. If a steady stream of air bubbles is made from the sample (for bubble emission tests) that would indicate a Leak and seal/package failure.
- Dry Chamber tests will have liquid contents leak out of the sample.

Step 7 – Break Vacuum

- Once your test is complete, turn the Blue Handle on the Vacuum Relief Valve to the vertical position.
- **WARNING:** Failure to break the Vacuum prior to turning off the EVP will cause air to back cycle through the Vacuum Pump. This can cause damage to the Vacuum Pump.

Step 8 – Turn off EVP

- Use the EVP Power switch to turn off the pump.

Step 9 – Remove Package for Inspection

- Lift the Chamber Lid and remove the Package from the Vacuum Chamber for further inspection.

Maintenance

Water Clean Out

- Frequency: Daily, or after sample burst/leakage into chamber.
- Wash the Vacuum Chamber with water and mild soap such as dish soap or an Acrylic compatible cleaning chemical. Always use **room temperature, not hot, water.**
- Ask our FlexPak team for more resources on Acrylic Compatible cleaning chemicals.
- Never use chlorine, bleach or any Alcohol base in the water as this can permanently damage the Acrylic Vacuum Chamber.

Degassing of Water

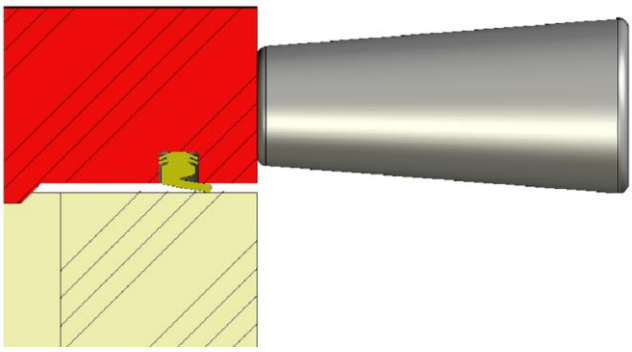
- Frequency: After every water Change
- Method:
  - Draw Vacuum System to a high Vacuum (minimum 24 inHg)
  - Run system for 3 minutes, air bubbles will rise and collect on Chamber walls
  - Turn off Vacuum System
  - Use a cloth or squeegee to remove air bubbles from chamber walls (under water).

Acrylic Polishing

- Frequency: Yearly
- Method:
  - Plastic polish manufactured by Novus can be used to re-polish the finish on the plastic tank (http://www.novuspolish.com/)
  - Polish 3, 2 and 1 will be required to remove heavy scratches

Lid Gasket Replacement

- Frequency:
  - Yearly
  - Failure of inspection test,
  - After 18,000 Vacuum Cycles
- Inspection Test:
  - Fill Chamber with water
  - Draw Vacuum System to Maximum Level
    - Compressed Air – 27 inHg
    - Electric Vacuum Pump – 25 inHg
  - If system is unable to reach the maximum levels, the Lid Gasket needs to be replaced.
- Method:
  - Replacement lid seals can be purchased from FlexPak Leak Detectors Inc.
  - Prior to placing the seal in the groove, cut the end you will be first installing square and smooth.
  - When replacing lid seal, care must be taken not to stretch the seal during installation or the seal will shrink after cutting to length and will leak at the butt joint.
  - Carefully push the seal into the groove (slightly compressing in length direction) without stretching it. Wrinkles in the Lid gasket will indicate too much compression .
  - Orient the seal lip as per the image to the right.
  - When the seal has been inserted into the groove, cut the excess material smooth and square and 1/8-1/4 inch (3.0-6.0 mm) LONGER THAN NECESSARY to fill the groove.



  - Compress the seal into the groove. No adhesive is required. If seal is cut properly the compression of the butt joint will be adequate to seal properly.

Testing Examples

Pouch Production Testing

- Seal the pouch with a sponge of specific dimensions inside the pouch in order to control the amount of air that is being sealed in the pouch
- Test the pouch under 15 inches Hg vacuum; if no leak, the pouch is acceptable
- Bring the pouch under vacuum up to 25 inches in order to determine burst level
- Document and trend burst level throughout the production run
- If burst level occurs below 18 inches Hg, adjust pouch machine to correct seal

Food Packaging Testing

- Suitable for any package that has a gas inside of it.
- Place the sealed package in the tank and test to 15 inHg or your desired Vacuum Setpoint. If the package leaks, package is a failure.

Note: Various companies will have many different standards, i.e. Different vacuum levels for determining an acceptable product. It is up to the individual company to determine what standard is suitable for their own industry.

Dry Chamber Testing

Samples containing liquids, with some head space can be tested in Dry Chambers.

- place product in the dry chamber on a paper towel
- close lid and start vacuum
- increase vacuum to expand package and put pressure on seals
- when test is completed, examine the paper towel for evidence of moisture

Note: The VAC Attachment can also be used for testing packages containing liquid to add headspace to the sample.

Empty Bag Testing

To achieve more consistent results when testing empty bags for seal integrity, we advise that a specific size block of foam (a sponge) is sealed in the bag for volume and operator consistency.

Rigid Tray with Lidding, Tub or Cup Testing

Empty trays with lidding film can be tested with film side down. When trays are filled with product, it is recommended to test with film side up in order to view the gases escaping when seal integrity is compromised.

Setting of Quality Control Testing Standards

Every application will have a different "acceptable" vacuum level that will be used for consistent quality control testing of packages. Determining of this level will change from company to company and application to application. For a particular package, consistent water level, vacuum level, and time of test are necessary for consistent quality control of the production process.

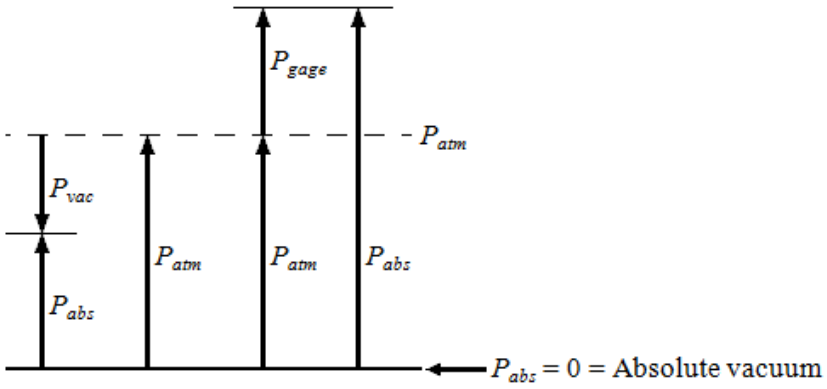
With consistent testing, package consistency is easily tracked, trended and controlled. Visual knowledge of where the leak is physically located will allow the machine operator to exactly pinpoint where the operator must make an adjustment on the seal bars. This kind of physical testing can indicate an uneven seal bar, inadequate dwell time, inadequate seal pressure or temperature.

Please reference ASTM 3078-02 for Bubble Emission Testing and ASTM 6653 for Altitude Testing. These standards give good information as to the accuracy and repeatability of these test methods.

Absolute Vacuum vs Gauge Pressure

Vacuum indicated on vacuum gauge of tank is the "gauge pressure". Absolute vacuum of the Chamber is equal to the atmospheric pressure of your location minus the gauge pressure indicated on the vacuum gauge.

Please see the following image below. Pvac is represented by the actual indicated gauge pressure of the vacuum gauge on the Leak Detector. Therefore Pabs=Patm-Pvac:



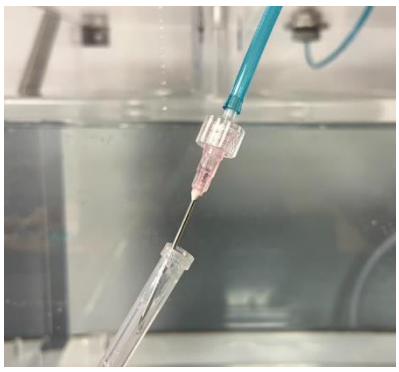
VAC Attachment Instructions

The following section includes a step-by-step procedure on how to use your VAC attachment.

Step 1: Ensure that the white clamp attached to tubing (top of tank's lid) is closed (depressing tube).

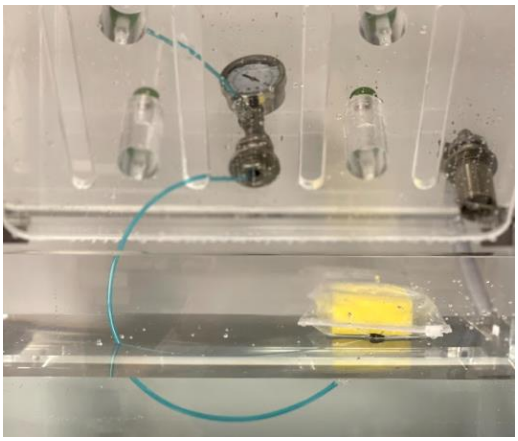
Step 2: Place septum on package to be tested

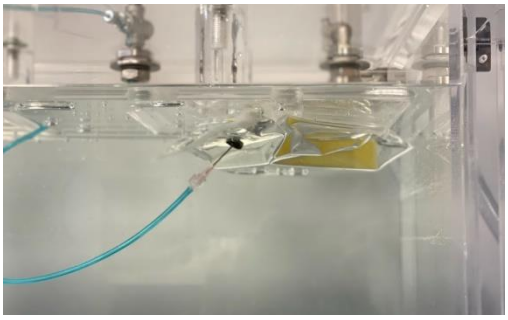
Step 3: Remove cover from needle. **PLEASE NOTE:** While the cover is over the needle, turning clockwise will tighten the needle in the tubing adapter fitting. Twisting the cover counter clockwise will loosen the needle. Ensure the needle is secure in the fitting.



Step 4: Carefully insert needle into septum. Ensure the needle does not puncture the opposite side of the package or into product.

Step 5: Open lid and place package into water within the tank.

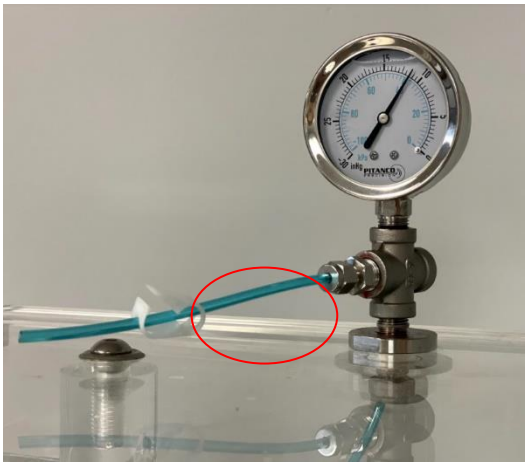




Step 6: Close lid so that package is submerged in water and held under the hold-down plate.

Step 7: Engage the Vacuum generation (either by Compressed Air ball Valve, Electric Vacuum Pump switch or Control Package)

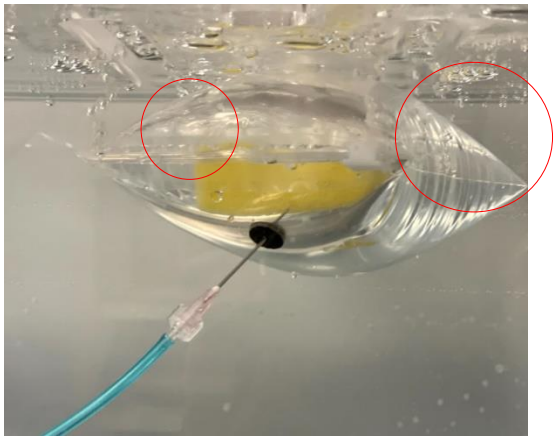
Step 8: Adjust Vacuum Level till Vacuum Gauge (on top of the Lid) reaches the desired test level.



Step 9: Open the White Valve on the Blue Air hose of the Vacuum Package Attachment (at top of lid) to add headspace to package.

Close White Valve once the package has inflated to an adequate level. The package should inflate, but not “ballon” or stretch to a point of bursting.

For low volume and thin film packages, it’s recommended to inflate packages at a lower setpoint (5inHg/20kPa) to avoid bursting the sample. Once inflated, increase Vacuum Level to desired setpoint



Step 10: Look for bubbles emitting in the water bath, indicated package failure.

Step 11: Note exact area for bubble emission. Correct sealing machinery as required.

Step 12: Turn of the Vacuum generation, remove the package from the tank and carefully remove the needle. At this time proceed back to step 1 for the next package.

Step 13: When testing is complete, ensure the needle cover is reinstalled on the needle.

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Vacuum Test Conversion Chart

The Chart Below provides a simple conversion of Vacuum Level to equivalent pressure of the package when it hooked up to the Vacuum Package Attachment.

Tank Vacuum Level		Internal Pressure Differential to Vacuum Tank when VAC Attachment Installed	
inHg	**kPa**	**PSI**	**kPa**
0	0	0	0
1	3.39	0.49	3.39
2	6.77	0.98	6.77
3	10.16	1.47	10.16
4	13.54	1.96	13.54
5	16.93	2.45	16.93
6	20.32	2.94	20.32
7	23.7	3.43	23.7
8	27.09	3.92	27.09
9	30.47	4.41	30.47
10	33.86	4.9	33.86
11	37.25	5.39	37.25
12	40.63	5.88	40.63
13	44.02	6.37	44.02
14	47.4	6.86	47.4
15	50.79	7.35	50.79
16	54.18	7.84	54.18
17	57.56	8.33	57.56
18	60.95	8.82	60.95
19	64.33	9.31	64.33
20	67.72	9.8	67.72
21	71.11	10.29	71.11
22	74.49	10.78	74.49
23	77.88	11.27	77.88
24	81.26	11.76	81.26
25	84.65	12.25	84.65
26	88.04	12.74	88.04
27	91.42	13.23	91.42
28	94.81	13.72	94.81
29	98.19	14.21	98.19
29.92	101.58	14.7	101.58

Ordering Spare Parts – VAC Attachment

1. Custom Septa – Contact our team (orders@flexpakinc.com) for Septa. Sold in packages of 585, 975 & 4,875 quantities.
2. Needle Kits and Other Parts kits for the VAC Attachment are also available.
3. Needles can be purchased in block from the following websites:
   a. Part Description: Needle Terumo 18 ga x 1.5" NN1838R Luerlok –
   b. Canada: http://medimart.com/product/needle-only-terumo-general-use-disposable-18gx1-5-sterile/
   c. United Sates: http://www.shopmedvet.com/product/needle-18-x-1-1-2-terumo-100-bx-1838RN/terumo-medical