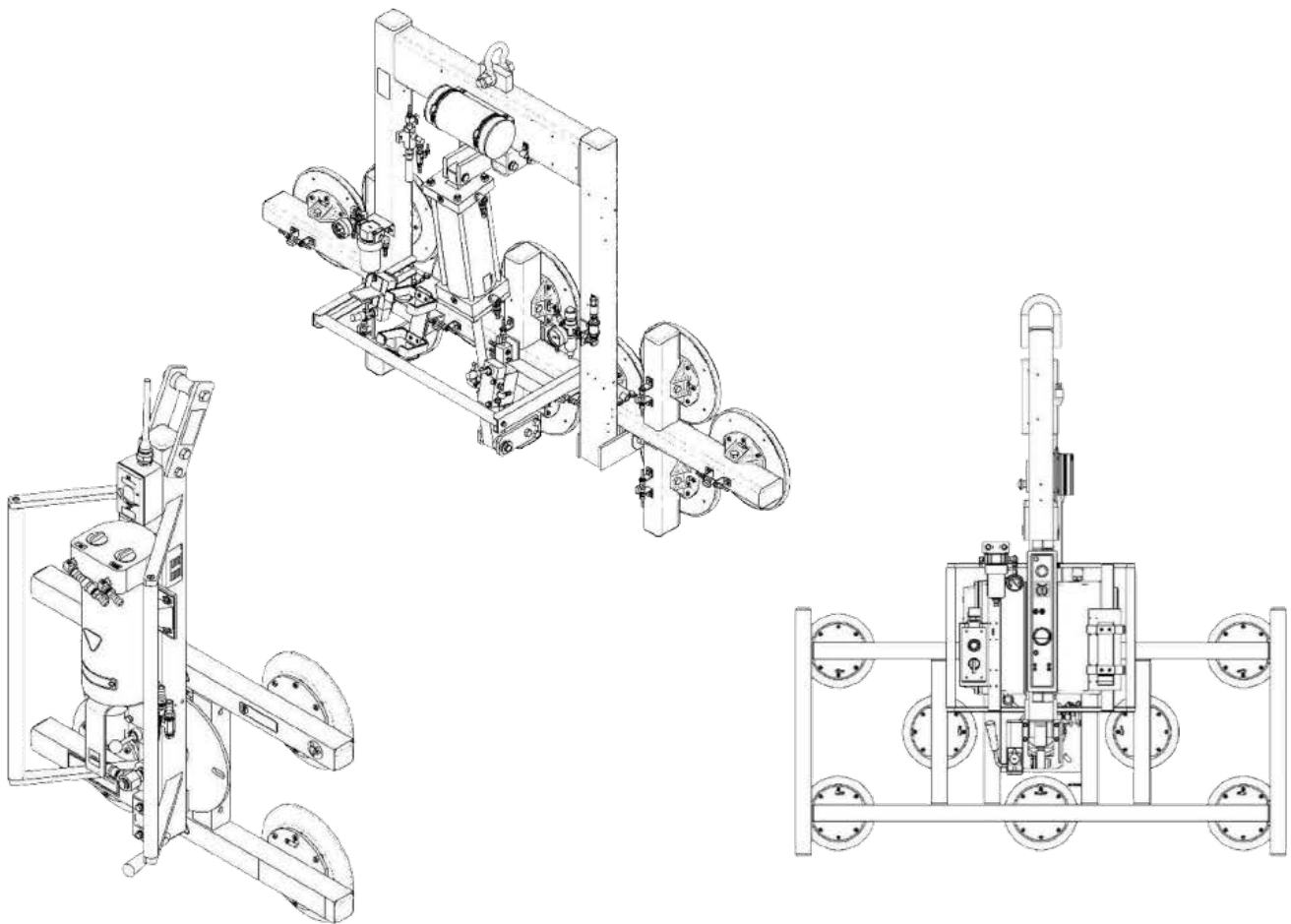


LEAK TEST PROCEDURE

GENERIC GUIDE TO LEAK DETECTION FOR VACUUM LIFTERS



***TESTING AND MAINTENANCE MUST BE
DONE BY A QUALIFIED PERSON***

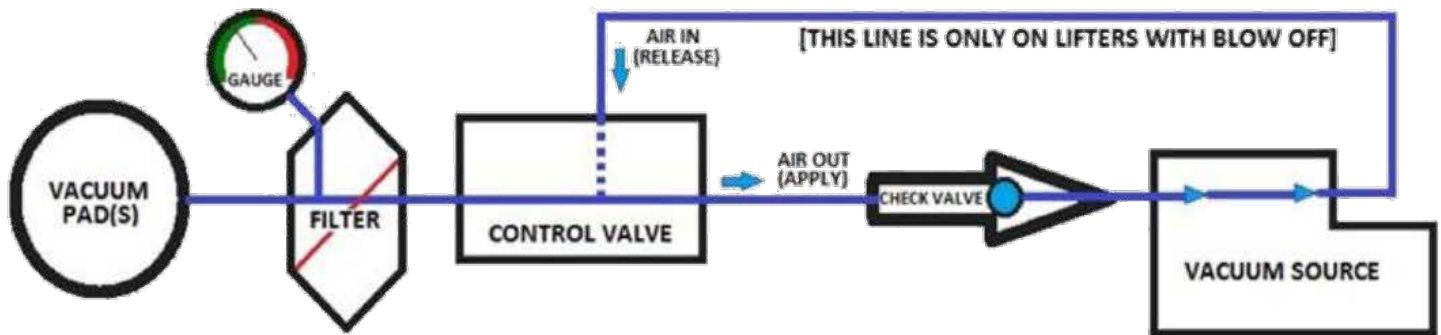
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UNDERSTANDING YOUR SYSTEM

If the vacuum system of your lifter has developed a leak, it is necessary to determine the cause and location of the leak in order to effect repairs. This general guide applies to most types of Wood's Powr-Grip powered vacuum lifters. If a specific guide exists for your specific model of lifter, please refer to it also, since it will provide more detail regarding specific components and their locations.

Basic Vacuum System Layout



This diagram represents the basic structure of vacuum generating systems found on nearly all of Wood's Powr-Grip's vacuum equipment products.

When the equipment is in "apply" mode, a vacuum pump (or venturi on air powered lifters) draws air through a control valve assembly evacuating the vacuum pad(s).

In "release" mode, the control valve allows air to re-enter the system causing the vacuum pads to release. This is accomplished either by opening a valve port to atmosphere or by pumping air directly into this port from the vacuum pump. The latter function, referred to as "blow-off" is found on equipment that requires faster release times.

In addition, an air filter with adjoining vacuum gauge is located in the vacuum line between the control valve and the vacuum pad(s). The vacuum gauge may be mounted directly to the filter or connect to the vacuum pad side of the filter via hose.

The primary system seal on the majority of our vacuum lifters is a check valve located in the vacuum line between the control valve assembly and the vacuum pump. The check valve prevents air from flowing back through the vacuum pump to the vacuum system. On some lifters, the primary seal is a solenoid valve which, when power is shut off to the vacuum pump (either manually or by way of vacuum switch settings), closes the port to the vacuum pad system, isolating it from the vacuum pump port.

If you have determined that your vacuum lifter has a leak and are unsure of what the primary seal is please contact Wood's Powr-Grip Co. with your model and serial number. With this information, additional details can be provided in respect to your specific lifter model.

Note: The information provided in this document is based on the basic vacuum system described above. If a leak is detected, and particularly if it is determined to be in the vacuum generating system, having information specific to your particular model may improve your ability to apply the test information to follow.

SYMPTOMS OF VACUUM LEAK

DC (battery powered) lifters:

Severe leakage is evidenced by a lifter's inability to draw full vacuum while attached to clean, smooth, nonporous surface. In such cases, the vacuum pump runs continuously and the vacuum level shown on the vacuum gauge will be less than 16" hg [-54 kPa], the red zone of the vacuum gauge.

Moderate leakage is indicated by intermittent cycling of the vacuum pump and vacuum indicator light during a lift. If the vacuum generating system turns on more than once every 10 minutes, leakage is serious enough to warrant repairing the lifter's vacuum system.

AC or Air powered lifters:

Severe leakage is evidenced by a lifter's inability to draw full vacuum while attached to clean, smooth, nonporous surface. In such cases, the vacuum level shown on the vacuum gauge may be less than 16" hg [-54 kPa], the red zone of the vacuum gauge, or noticeably lower than what the vacuum system was able to achieve in the past.

Since the vacuum source of this type of lifter runs constantly while in use, moderate leakage may only be noticed when performing a vacuum test as described in the Maintenance section of the instruction manual for your lifter.

All vacuum lifters:

To determine if your lifter has a vacuum leak perform the Vacuum Test as described in the Maintenance section of your instruction manual. Note, if your lifter has quick connects used to reduce the number of vacuum pads, it should be tested with both the quick connects connected and disconnected to verify system integrity under all possible conditions.

When performing the vacuum test, if the lifter tests positive for a leak, we recommend that you note the time and leakage rate such as "lost 5" [-17 kPa] in 10 minutes". This information can assist in diagnosing the location of the leak because there may be more than one component leaking vacuum. For example, when you are performing maintenance, if an isolated section tests positive for a leak but the leakage rate is less than that of the whole lifter, the indication is that there is still one or more vacuum leak elsewhere in the system.

If the rate of leakage is sufficient to warrant repair proceed as follows:

To locate the cause of leakage, begin by inspecting the vacuum pads, fittings and hoses of the entire vacuum system. Look for contamination, cuts or abrasions on pad faces, cracks in suction stems on the back of pads, cracks, abrasions or cuts in hoses, damaged fittings and loose or damaged hoses at connection points. If leakage is severe, the cause is often a visibly damaged part.

Do not apply soapy water to fittings or vacuum hoses in an attempt to find leaks, since it will only be drawn inside the vacuum system.

If the source of leakage is not immediately evident, the various sections of the entire vacuum system must be systematically isolated to determine the leakage point. The process to accomplish this will be described in the tests to follow.

RECOMMENDED TOOLS

Please note, the information that is gathered when performing a vacuum test is only valid if the tools used to perform the test are accurate. Be sure that the tools you use are capable of completely sealing the isolated parts of your system when tested.

Recommended tools, in addition to an appropriate test surface, are plugs for hoses and fittings, a ball valve with vacuum gauge attached and extra vacuum hose. Hoses should be sized with the appropriate inside diameter for barbed fittings and outside diameter and hardness for push-in fittings. The size and type hose will vary based on the model and age of your lifter.

This procedure is written with the assumption that you have access to the appropriate tools. If needed test equipment is available from Wood's Powr-Grip Co. and are shown at the end of this section.

A set of screwdrivers may also be needed if enclosures need to be opened. Note, always proceed with caution when opening enclosures containing electrical wiring. Wiring is often connected to components in the cover, as well as the enclosure itself, and hinged covers open only one way, so open them gently so as not to damage the enclosure or attached wiring.

Note, when removing hoses from barbed fittings take care to avoid damaging the barbs of the fitting the hose is attached to. Cuts or nicks in fitting barbs can create a leak that did not previously exist. Additionally, if a hose is removed from a barbed fitting cut approximately ¼" [6mm] off the end of the hose before reinstalling it on the fitting to remove damaged hose ends.

Cutting a small amount (1/8" [3mm] to 1/4" [6mm]) from the end of a hose used on a push-in style fitting is also recommended. These are compression style fittings and will typically leave a small depression in the hose at the point where they compress. Cutting a small portion off relocates this depression, allowing the fitting to make a good seal in a new location. Additionally, push-in fittings require that the hose be cut straight and square to seal properly.



**STANDARD PARTS PROVIDED IN
BASIC LEAK TEST KIT # 66102**

*For information
concerning test kits
and individual parts,
please contact the
sales staff at
Wood's Powr-Grip
Co., Inc.*



**HOSE AND FITTING ADAPTERS
PROVIDED IN ACCESSORY KIT #
66102AM**

HOW THE VARIOUS TOOLS ARE USED

The ball valve / gauge assembly:

The primary tool is the ball valve with the vacuum gauge. This can be used to plug off sections between the lifter's vacuum gauge and control valve or vacuum pump providing a gauge reading when the lifter's gauge is not part of the section being tested. An example of this is shown in **FIGURE 1**, where the ball valve has been installed in the line between the vacuum filter and the control valves. In this instance, the filter is capped off and the ball valve with gauge installed with the ball valve's vacuum gauge towards the control valve. Vacuum was applied and the ball valve closed. Now the vacuum filter and control valve are separated into two sections by the (closed) ball valve. If a leak were noted on the ball valve's vacuum gauge, it would indicate that the leak is between the ball valve and vacuum pump, not the vacuum filter. If a leak were noted on the vacuum filter's vacuum gauge, the indication is that the filter assembly is the cause of the leak.



FIGURE 1

If you did not have the ball valve assembly and a leak was noted when just the filter was plugged you would not be able to determine which part, from the vacuum filter to the pump, was the cause of the leak since the gauge is not accessible down line of the filter.

The ball valve provides an additional vacuum gauge that can be located in any section requiring testing.

The other use of the ball valve is to use it to test individual components. In **FIGURE 2** the hose was removed from a pad fitting and the valve end of the ball valve was attached to the hose. An additional piece of hose was attached to the gauge end of the ball valve and pad fitting installed in the hose and then capped off with a plug. Vacuum was applied and then the ball valve was closed. In this instance if the pad fitting leaked it would be indicated on the ball valve's vacuum gauge.



FIGURE 2

To use the ball valve on vacuum lines larger or smaller than the standard 1/4" i.d. line an adapter fitting is required. Depending on your model lifter, vacuum lines used on barbed fittings may be 1/8" i.d., 1/4" i.d., 3/8" i.d. or 1/2" i.d. Vacuum lines used with push-in fittings may be 3/8" o.d., 1/4" o.d. or 5/32" o.d.

Plugs and caps:

The plugs and caps are used to cap off fittings in order to isolate individual components or sections to be tested. This allows you to tell what sections or parts leak vs. those that do not.

In **FIGURE 3** a tee fitting has one barbed connected to the vacuum system and the other two barbs capped off. In this example, the pad system is being tested only up to this tee fitting. If the vacuum lifter still leaks, the indication is that the leak exists between this tee fitting and the filter. If no leakage is indicated, but the lifter as a whole does leak, then the indication is that the leak is between this tee and the vacuum pads.



FIGURE 3

FIGURE 4 shows the pad fittings of a lifter capped off. This would tell you if the pads are the cause of the leak or if it is some other component, since, if the leak stops, the pads are indicated, but if the leak



FIGURE 4

continues the leak is cause by another part that is still connected to the vacuum system.

An additional use for the plugs and caps is to create a suitable plug for the small hose used on various push in fittings. An example of this is shown in **FIGURE 5**. A plug was created for two inline filters that use 1/4" o.d. push-in hose. This was done by cutting a short piece of suitably sized additional hose and capping off the end of the hose.

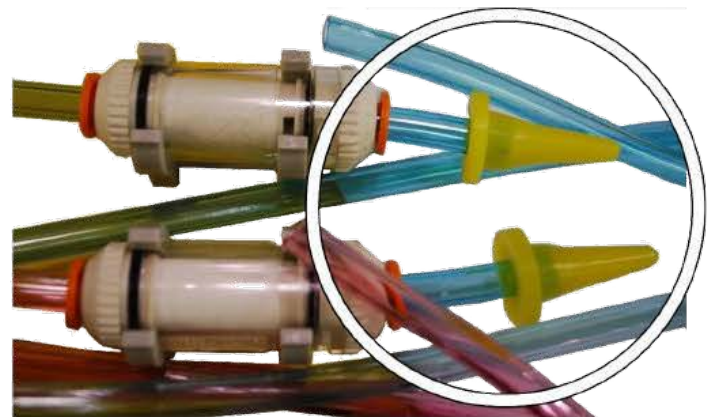


FIGURE 5

This process can also be used to create a plug for 5/32" o.d. push-in hose.

LEAK DETECTION PROCESS

The most common problem encountered when dealing with vacuum equipment is leakage.

Essentially any component of a vacuum system may leak, allowing air to enter the system. This compromises the lifter's overall efficiency, capacity, and ultimately the ability to operate safely.

Leakage is determined by performing a standard vacuum test as described in the instruction manual provided with every lifter. If during this test a loss in vacuum is noted, it indicates that a leak is present somewhere within the system. If the leak is significant, it should be located and repaired prior to using the lifter. For lifters used on smooth, non-porous materials, significant leakage is typically considered to be more than 4" Hg. [-14 kPa] in 10 minutes or less, as shown on the vacuum gauge, when testing on this type surface (as recommended by the leak test).

The vacuum system of vacuum lifters is comprised of two major sections: the "vacuum generating system" and the "vacuum pad system". The dividing point for these sections is typically considered to be the vacuum filter assembly.

Leaks are located by isolating the sections of the vacuum system and performing vacuum tests that ultimately will identify the component(s) causing the leak. This is a trial and error process where you can accurately determine which parts are leaking by first identifying which parts do not leak.

To begin this process, first perform a standard vacuum test with all components attached to know the total rate of the leak. This will help determine if there is more than one component involved, by comparing this rate to the rate of leakage found as sections are disconnected from the system e.g., if the rate of leakage when testing the vacuum generating system is only half the rate noted as when the entire system was tested, you can determine that there is more than one component involved and that at least one leak exists in both the vacuum generating system and the vacuum pad system.

To perform the vacuum test, clean the vacuum pads and attach the lifter to a clean, non-porous surface. Turn on the lifter and switch the lifter to the apply position. Allow the system to reach a suitable vacuum level, then, with the lifter still in apply, turn off or disconnect the power. Note, DC lifters may shut off automatically but the power will still need to be disconnected for the test.

Once the system as a whole is tested, the lifter should be divided into sections (typically at the filter assembly) and testing continued, working either forward or back through the system until the leak is no longer present. This is described in the Preliminary Test to follow.

PRELIMINARY TEST

This test determines whether leakage is located in the vacuum generating system or the pad system.

- 1) Locate your vacuum filter. This will be shown in the “Operating Features” graphic of your lifter’s instructions.

For most model lifters the filter will be a bowl type filter similar to the filters shown in **FIGURE 6**. Some model lifters may use a plastic or brass inline filter as shown in **FIGURE 7**.

Note, lifters with dual vacuum systems, are typically identifiable by the use of both red and green vacuum lines, will have two separate filters, one for each vacuum circuit.



FIGURE 6



FIGURE 7

- 2) Plug the vacuum filter on the end that connects to the vacuum pad system.

If the vacuum filter has a vacuum gauge attached, cap off the end with the vacuum gauge. Note, the type of plug required will depend on the type of filter, the type and size of the vacuum line and how it attaches to the filter and where the vacuum gauge is located.

If the lifter’s vacuum gauge is not part of the section being tested, a ball valve with vacuum gauge attached is required to perform this test. Using a short piece of hose, attach the end of the ball valve with the vacuum gauge to the vacuum filter on the end that connects to the vacuum pad system. Note, an adapter fitting may be needed if the fitting on the filter is of a different size or type than that of the ball valve assembly. Once attached to the filter, close the ball valve (handle turned perpendicular to the valve) to seal the system at the valve.

- 3) Turn on the lifter and switch the lifter to the apply position. Allow the system to reach a suitable vacuum level. If the lifter has a power switch, turn the lifter off at the power switch. For lifters that turn on when a manual valve is switched to the apply position (typically DC lifters) disconnect the power source. This will be either the battery or airline, depending on the type of lifter being tested, (all AC powered lifters are equipped with a power switch).

The condition should now be that the lifter’s control valve is in apply mode, the vacuum gauge (of the lifter or ball valve) shows a vacuum level and power to the lifter is either shut off or disconnected.

- 4) Observe the vacuum gauge to locate the general area of leakage.
- If the vacuum level on the vacuum gauge holds steady and does not drop, the indication is that the vacuum generating system does not leak, indicating that the leak is located in the pad system. Proceed to the Pad System Test.
 - If the vacuum level on the vacuum gauge starts and continues to drop, this indicates the vacuum generating system does leak. Proceed to the Vacuum Generating System Test.

Note, if the leakage rate observed during this test is noticeably less than the rate observed when the lifter as a whole was tested, this indicates that a leak may be present in both the vacuum generating system and the pad system. When this is the case, the leak in the vacuum generating system should be repaired before proceeding to the pad system.

However, if the leakage rate is not significant at this point you may proceed with repairs to the pad system with the knowledge that once the leakage rate drops to the rate noted in this test, any leaks in the pad system have likely been found and repaired.

VACUUM GENERATING SYSTEM TEST:

At this point, the specific type of lifter will determine what components can actually be tested and what conclusions can be derived from those tests. The standard combinations are as follows:

Type A: Manual control valve assembly connected to vacuum filter assembly via hose connection.

Type B: Electric (solenoid) control valve assembly connected to vacuum filter assembly via hose connection.

Type C: Manual control valve assembly connected directly to vacuum filter assembly via fittings (hard connection).

On most lifters the vacuum gauge is mounted either directly to the pad side of the vacuum filter or connected to the pad system itself via hose. Since the vacuum gauge is located on the pad side of the filter, you will lose access to the lifter's vacuum gauge once you move beyond the vacuum filter towards the pump. In this scenario, a ball valve with vacuum gauge is required for the following tests.

The following assumes you have access to suitable plugs, a ball valve with vacuum gauge, and additional hose for connecting the ball valve to the lifter's vacuum lines and fittings.

Lifters with manual or electric control valve assembly connected to vacuum filter assembly via hose connection (types A and B above):

Note: For type C above, manual control valve assembly connected directly to vacuum filter assembly via fittings, proceed to step 11.

- 1) Identify the hose that connects the vacuum filter assembly with the control valve assembly. Remove this hose from the vacuum filter.
- 2) Install the end of the ball valve assembly with the vacuum gauge into this hose. Note, this may require the use of a hose adapter if the hose is a size other than 1/4" i.d.

Close the ball valve (handle turned perpendicular to the valve) to seal the system at the valve.

- 3) Turn on the lifter and switch the lifter to the apply position. Allow the system to reach a suitable vacuum level, then either turn off or disconnect power to the lifter while leaving it in apply mode.
- 4) Observe the vacuum gauge on the ball valve to locate the area of leakage.
 - If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop this indicates the leak is located in the filter assembly. Closely inspect the filter assembly. This is best accomplished by referring to the filter maintenance section of your instruction manual for any warnings in respect to the type filter used on your lifter.

Check that bowls or caps are tight. That, if a plastic style bowl or filter, that there are no visible signs of cracks or damage. If a filter assembly with fittings and/or vacuum gauge attached, that there are no damaged or cracked fittings and the gauge appears to be in good shape. If it is a filter with push-in style fittings, check that the ends of the hoses are cut square, that the hoses are pushed in securely, and that there is not excessive pull or side pressure on the hose.

Additionally, if the filter has been recently serviced, check that it was done thoroughly and correctly. Consult servicing instructions or contact Wood's Powr-Grip for information on servicing your filter.

Repair or replace parts as needed, noting that sometimes it is easier to replace the assembly than to guess at which individual part may be the cause of the leak.

- If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates the leak is located between the ball valve and the vacuum pump.

This includes the hose from the filter to the control valve, the control valve itself and, on lifters where a check valve is used between the pump and control valve, the check valve.

- 5) Remove the ball valve from the hose that was connected to the filter. Disconnect the hose from the control valve. Attach a piece of (new) hose to the end of the ball valve with the vacuum gauge and attach the other end of this hose to the control valve. Close the ball valve and repeat the vacuum test above with the new hose attached.
 - If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop this indicates the leak is located in the hose from the control valve to the filter. Replace the hose.
 - If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates the leak is located between the ball valve and the vacuum pump.

- 6) What additional tests can be performed will depend on 1) does your model lifter use a check valve between the vacuum pump and the control valve and 2) that, if a check valve is used, where is it located.

If you need assistance in determining if your lifter has a check valve and where it is located please note the model and serial number of your lifter and contact Wood's Powr-Grip Co., Inc. for information regarding your particular lifter.

If it was determined that your model lifter does not use a check valve or if a check valve is used, and is attach to the vacuum pump assembly and then connected to the control valve via a hose connection proceed to step 7.

If the lifter has a check valve and it is connected directly to the control valve via fittings proceed to step 9.

- 7) Remove the ball valve from the control valve and cap the port of the control valve that the hose was connected to. Remove the hose from the control valve that connects it to the vacuum pump. Using the ball valve with a hose attached to the end with the vacuum gauge, attach the hose to the control valve and connect the hose that runs to the vacuum pump to the other end of the ball valve. With the ball valve in the open position (handle in line with the valve), turn on the lifter and switch the lifter to the apply position. Allow the system to reach a suitable vacuum level, then close the ball valve (handle turned perpendicular to the valve) and either turn off or disconnect power to the lifter while leaving it in apply mode.
- 8) Observe the vacuum gauge on the ball valve to locate the area of leakage.
 - If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop this indicates the leak is not located in the control valve and that, since the leak was still evident in step 5, there is likely a check valve located in the system and that it is the cause of the leak. Locate and replace the check valve.
 - If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates the leak is located in the control valve assembly.

Note the model and serial number of your lifter and contact Wood's Powr-Grip Co., Inc. for additional assistance and information.

- 9) If the check valve is connected to the control valve via fittings (hard connection), an additional ball valve is needed to continue testing.

In this instance, the ball valve with test gauge attached will still be attached to the control valve assembly as it was described in step 5 (ball valve closed, vacuum gauge towards the control valve). An additional ball valve needs to be installed between the control valve and the vacuum pump, vacuum gauge end toward the control valve.

With the ball valve between the vacuum pump and control valve in the open position, turn on the lifter and switch the lifter to the apply position. Allow the system to reach a suitable vacuum level, then close the ball valve and either turn off or disconnect power to the lifter while leaving it in apply mode.

- 10) Observe the vacuum gauge on the ball valve located on the filter side of the control valve to locate the area of leakage.
 - If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop this indicates the leak is located in the check valve. Locate and replace the check valve.
 - If the vacuum level on the ball valve's vacuum gauge starts and continues to drop, this indicates the leak is located in the control valve assembly.
 - If the vacuum level on both vacuum gauges starts and continues to drop, this indicates that both the control valve and the check valve are leaking.

If it is determined that the leak is in the control valve (regardless of whether or not the check valve is involved) note the model and serial number of your lifter and contact Wood's Powr-Grip Co., Inc. for additional assistance and information.

Lifters with manual control valve assembly connected directly to vacuum filter assembly via fittings (type C above):

- 11) If the filter is connected via fittings (hard connection) to the control valve, there is no sure way to determine the faulty component. Options are as follows:

If the check valve is connected to the vacuum pump and then connected to control valve via a hose connection proceed to step 12.

If the check valve is connected directly to the control valve via fittings (hard connection), proceed to step 16.
- 12) If the check valve is connected to the vacuum pump and then connected to control valve via a hose connection an additional test can be performed to determine if the check valve is the cause of the leak and not the control valve/filter assembly.
- 13) Using a plug, cap off the filter where it connects to the vacuum pad system. Using an additional piece of hose, connect the end of the ball valve with the vacuum gauge to the fitting of the control valve that connects to the vacuum (intake) port of the vacuum pump and connect the other end of the ball valve to the hose running to the pump / check valve assembly.
- 14) With the ball valve in the open position (handle in line with the valve), turn on the lifter and switch the lifter to the apply position. Allow the system to reach a suitable vacuum level, then close the ball valve (handle turned perpendicular to the valve) and either turn off or disconnect power to the lifter while leaving it in apply mode.
- 15) Observe the vacuum gauge on the ball valve to locate the area of leakage.
 - If the vacuum level on the ball valve's vacuum gauge holds steady and does not drop this indicates that the leak is located in the check valve. Locate and replace the check valve.
 - If the vacuum level on ball valve's vacuum gauge starts and continues to drop, this indicates the leak is located in the control valve/filter assembly.
- 16) If the check valve is connected directly to the control valve/filter assembly via fittings or if it was determined in step 15 that the control valve/filter assembly is the cause of the leak the only remaining option is to check the assembly.
- 17) Examine the filter and control valve for indications of cracked or damaged fittings. Check that bowls or caps are tight and that there are no cracks or visible damage to the filter or attached fittings. If the filter has been recently serviced, check that it was done thoroughly and correctly. Consult servicing instructions or contact Wood's Powr-Grip for information on servicing your filter.

Repeat the last test performed. If the leak continues contact Wood's Powr-Grip Co., Inc. for additional assistance and information.

PAD SYSTEM TEST:

Isolate the vacuum pads, fittings and vacuum line sections until the leak point can be located, as follows:

- 1) Remove the cap or ball valve from the filter's barbed fitting and reconnect the vacuum line to the pad system.
- 2) Remove and cap each pad fitting as shown in **FIGURE 8**, disconnecting all the pads from the vacuum system.
- 3) Turn on the lifter and switch the lifter to the apply position. Allow the system to reach a suitable vacuum level, then either turn off or disconnect power to the lifter while leaving it in apply mode.
- 4) Observe the vacuum gauge on the ball valve to locate the area of leakage.
 - If the vacuum level on the vacuum gauge holds steady and does not drop, this indicates the leakage is in one or more pads. Reconnect one pad to its vacuum line and retest. If indications of leakage resume, replace that pad. Continue testing until all pads have been reconnected and all defective pads have been replaced.
 - If the vacuum level on the vacuum gauge starts and continues to drop, this indicates the leakage is in the fittings or vacuum lines between the vacuum pads and the vacuum filter.
- 5) If it is determined that the leak is in the fittings or vacuum lines continue testing the individual sections and parts.
- 6) Fittings may be tested in the same manner as the pads, by removing the fitting from its vacuum line and plugging the hose or fitting. Vacuum line sections may be tested by moving up each line (toward the vacuum generating system) to the next fitting, removing the hose and plugging it at the fitting.

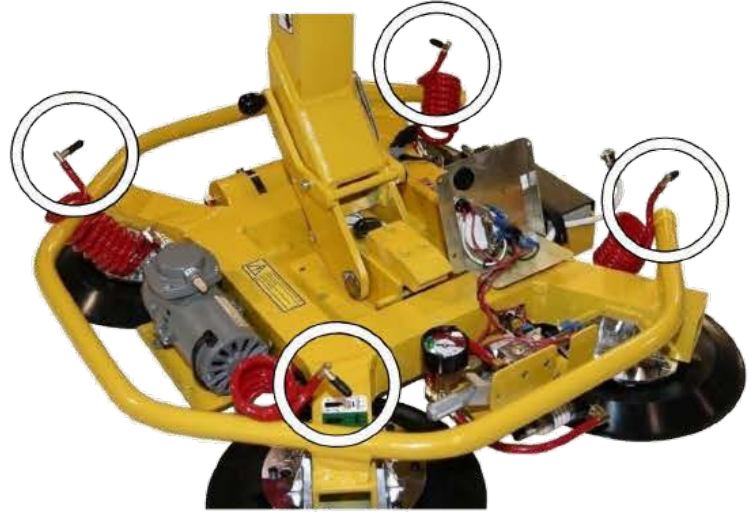


FIGURE 8

In **FIGURE 9**, the hoses that connect to the vacuum pad lines have been removed from the tee fitting that connects to the valve assembly. If a leak is still present when tested, this fitting (or the hose connecting it to the filter assembly) would be the cause of the leak, since these are the only parts connected.



FIGURE 9

Apply this method to add or remove fittings and lines, using the vacuum test as the indicator to determine which part is the cause of a leak.

- 7) Parts can also be tested by using the ball valve assembly and plugs. In **FIGURE 10**, a pad suction fitting (circled item) is being individually tested by connecting the capped fitting to a short piece of hose and connecting the hose to the end of the ball valve assembly with the vacuum gauge. The other end of the ball valve is connected to the original hose that was previously connected to the suction fitting currently being tested.

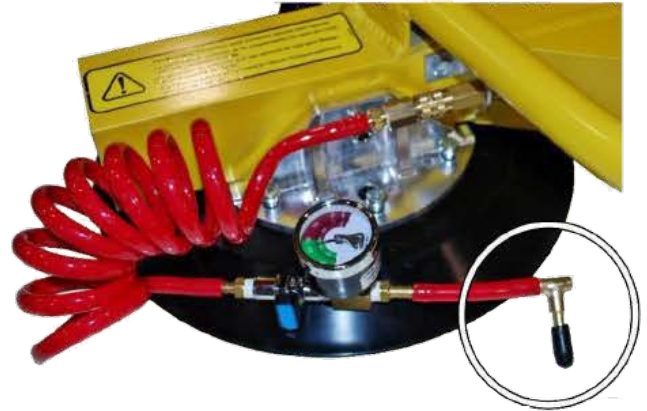


FIGURE 10

Vacuum was applied and the ball valve was then closed.

Leakage on the ball valve's gauge would indicate that the attached fitting leaks. Leakage on the filter's vacuum gauge would indicate that the leak is located between this fitting and the filter assembly.

The ball valve can also be used to test items such as quick connects as shown in **FIGURES 11** and **12**. **FIGURE 11** shows the quick connect female being tested when disconnected from the male portion. **FIGURE 12** shows the quick connect being tested with the male connector attached and capped off.

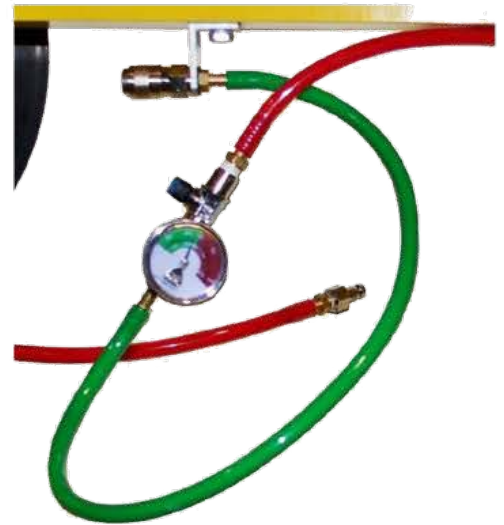


FIGURE 11

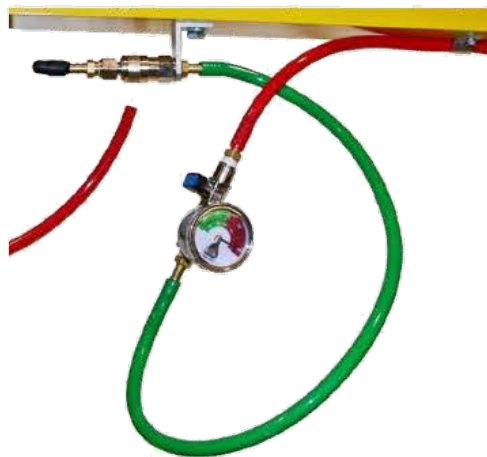


FIGURE 12

Vacuum was applied and then the ball valve was closed.

A drop in vacuum on the ball valve's vacuum would indicate that the part does leak as tested. If the vacuum level on the ball valve's vacuum gauge holds steady the part does not leak.

This process can be used to test various sections and/or any individual part.

- 8) Continue testing until all fittings and lines are tested or the leak is located.

SYSTEM CONFIRMATION

Once all leaks are identified and repaired, reassemble all parts of the lifter.

The Vacuum Test, as described in the instruction manual, should be performed following any repair or service to a vacuum lifter.

Note: On lifters with quick connects installed, a second vacuum test should be performed with all quick connects disconnected. All parts must be verified in relation to their function and the lifter must pass the Vacuum Test before returning the lifter to operation.

ADDITIONAL INFORMATION

NOTES:

- 1) When requesting information on a particular lifter please have model number and serial number information available in order for us to properly identify components.
- 2) **CAUTION:** Always proceed with caution when opening enclosures containing electrical wiring.
Wiring is often connected to components in the cover, as well as the enclosure itself.
- 3) In some cases a leak may be identified to be in an assembly (such as in a filter or valve assembly) but the actual cause is not apparent (neither the filter nor valve itself are the cause). In these cases, it may be a cracked fitting. Cracks in fittings may be visible, but often are virtually impossible to locate except under factory test conditions; they will often appear as a dark line along the seam of female fittings, along the hex nut section of female hose nipples, or at the base of the threads on male fittings. If a leak is traced to an assembly and the cause is not visibly apparent it may be best to replace the whole assembly rather than a single component.
- 4) If any metal fittings are disassembled during testing, **always** apply thread sealant (Teflon tape or similar product) to the male threads prior to reassembly, to avoid vacuum leaks.
For plastic fittings use only Teflon tape; liquid sealants must not be used on plastic parts and may damage the parts.
- 5) When assembling fittings do not over tighten. After first applying adequate thread sealant or tape, the fitting is finger tighten as much as possible.
A straight fitting is tightened no more than two additional revolutions with a wrench.
An elbow fitting is tightened no more than one and a half additional revolutions with a wrench
Once an elbow or tee fitting is tightened with a wrench, the fitting is aligned in the clockwise direction with a wrench
- 6) Please note: The information that is gathered when performing a vacuum test is only valid if the tools used to perform the test are accurate. Be sure that the tools you use are capable of completely sealing your system.

If needed test equipment is available from Wood's Powr-Grip Co.

There are various ways to approach testing vacuum lifters.
For further suggestions or information, please contact our staff at:

Wood's Powr-Grip Co., Inc.
908 West Main
Laurel, Montana 59044
800.548.7341
406.628.8231
406.682.8354 (fax)
www.WPG.com



**ALL LIFTERS MUST BE TESTED AFTER MAINTENANCE. SEE
INSTRUCTIONS FOR ADDITIONAL INFORMATION**

