SUPER SEAL

PROFESSIONAL FORMULA

Training Manual

Inside – Your Guide

Simplifying AC/R Repair

www.cliplight.com/hvacr/

SUPER SEAL HISTORY

Work on Super Seal leak sealants for residential and commercial systems began in August 1999, after the successful introduction of Cliplight's Super Seal Pro™, for automotive systems. Three and a half years later, after extensive product development, field and lab testing, Super Seal refrigerant leak sealants were introduced.

CLIPLIGHT

CELEBRATING 30 YEARS
SERVICE - WORLDWIDE

This new generation of sealants was designed to permanently seal micro leaks in air conditioning and refrigeration systems when conventional detection methods fail.

Since April 2003, Super Seal sealants have been a great success throughout the air conditioning and refrigeration field: From industrial to commercial, residential to appliance sized systems.

a) FREQUENTLY ASKED QUESTIONS

1. Can Super Seal ACR™, Super Seal HVACR™ and Super Seal 3 PHASE™ be used interchangeably? No, use as per application guideline below:

SUPER SEAL ACR™ (947KIT) For smaller systems, 230 to 18000 btuh (1 ½ ton) minimum, 10 ounces of oil required in sump.

SUPER SEAL HVACR™ (944KIT) For most residential systems 1½ to 5 ton, Minimum, 30 ounces of oil required in sump

Super Seal 3 PHASE™ (948kit) Commercial and industrial strength formula for 5 ton systems and larger.

2. When should Super Seal be used? It should be used when conventional leak detection methods are unsuccessful and all attempts to find and fix a leak have been exhausted. Use in compliance with the Montreal Protocol & regional or federal laws for handling of refrigerant.

3. How does Super Seal work? Super Seal is a light or low viscosity particle free liquid, which travels with the oil and refrigerant throughout the system. When a leak is detected, Super Seal™ forms a low tensile crystalline structure at point of leakage, when activated by moisture from the surrounding air.

4. What if there is moisture in the system? Minimal levels of internal moisture will lower the performance of sealing work that could be accomplished. Higher levels can prematurely activate the sealant and cause formation at areas of moisture concentration such as spent driers, and metering devices, resulting in possible restriction and system failure. We recommend that technicians always adhere to ARI recommended levels of moisture for AC/R systems.

5. Will Super Seal clog the valve core as I inject the product into the system? No, when the sealant is injected into the system, it has already been combined with the refrigerant charge and the refrigerant acts as a solvent cleaning the valve core as it passes through.

6. Will Super Seal harm the compressor or any other components in the system? No, the sealant is completely compatible with the electrical windings of the compressor motor. It will not interfere with compressor valves or form

wax in cap tubes, orifices, or thermostatic expansion valves, and does not impede the lubricity of the system oil in any way.

7. What happens to Super Seal while it is in the system? The chemical formulation remains in a stable state while it travels within the dry refrigerant stream. Only when it exits at a leak point and makes contact with moisture in the air does it begin to form a seal.

8. What size hole will Super Seal repair? This product has been specifically designed to seal micro pores (approx. the diameter of a human hair) such as seasonal leaks that cannot be detected by conventional leak detection methods. There is enough Super Seal in a single application to seal multiple leaks in an A/C or refrigerant system.

9. How much product should I install into my system? Super Seal ACR and HVACR applications are recommended as a 'one can injection' per system. On larger commercial and industrial systems 5 ton to 25 ton where Super Seal 3 phase is used, the unit should be monitored over a 10-14 day period to determine if the leak has been repaired or reduced before a second can is added. For systems 25 ton and larger, refer to specific guide lines, in section **i**, Refrigerant Sealant injection guide for units over 25 ton.

10. How long will Super Seal remain in the system? It will remain in a stable form for several years protecting the system against micro leaks. As with any chemical mixture it will eventually break down, but the by-products will be non-aggressive to components and not decrease or affect the system's performance in any way.

11. What happens if a line bursts on a system containing Super Seal? Along with refrigerant and compressor oil, the sealant is carried out of the system. A trace amount of sealant will remain in the oil sump in a stable state and will not have any adverse effects on components.

12. What happens to Super Seal if I need to reclaim the refrigerant? It is removed from the a/c or refrigeration system with the refrigerant and carried through the recovery machine to the recovery tank. A trace amount of sealant will remain in the oil sump in a stable state and will not have any adverse effects on components.

13. How do I classify recovered refrigerant from a system which had Super Seal? As long as the system did not experience a burn out or a compilation of mixed refrigerants, the recovered refrigerant needs only to be identified as used when returned to a refrigerant recycling depot.
Because the sealant is a liquid it is quickly separated with the oil during the recovery process.

14. Has the chemical technology in Super Seal ever been used before? Yes, the sealant technology in Super Seal has been used for decades to seal leaks in underground gas transmission lines, as well as in pipes, tanks, compressors and gas pressurized vessels.

b) HOW DOES SUPER SEAL WORK?

Super Seal is a light (low) viscosity liquid which contains no solid particles. It will only react with moisture. In a non- contaminated system the sealant will make use of the moisture that is readily available in our present atmosphere. The process of repair takes place when the refrigerant with a percentage of oil and sealant begins to exit out of the ac/r system. As the refrigerant exits, it begins to lower the ambient air temperature down to the dew point where micro droplets of water are deposited around the perimeter of the leak area. When the sealant comes in contact with the droplets of water it begins to form a permanent low tensile crystalline structure, which creates a barrier preventing the refrigerant from escaping.

c) CAN YOU USE SUPER SEAL ON 410A SYSTEMS?

The sealant has been successful in micron leakage repair occurring under normal operating pressures typical of R410A. In house laboratory testing has shown micron sealing capability against pressures up to 700 psig.

d) WHAT SIZE MICRON LEAK WILL SUPER SEAL REPAIR?

For optimum success a system should not be leaking more than 14% of its total refrigerant charge over a 4 week period. It should be noted that leaks greater than this magnitude are categorized as substantial and technicians should be able to locate these points with the exception of intermittent loss due to unknown variables or buried line sets.

Definition of a micron leak: The definition of the size of leak which the sealant can repair is a maximum pore approximately 300 microns in diameter (the size of a human hair is between 40 and 300 microns). An excellent way of visualizing the size of leak that Cliplight's sealant can repair is by making a dot with a fine ball point pen (.). This is approximately 600 microns. Half of that dot is therefore 300 microns, which our product can 99% successfully repair. With the technology that exists today the technician should be able to find the 600 micron type leaks and make the necessary repairs.

e) WHEN TO USE SUPER SEAL?

Super Seal should only be injected into a system after a technician has carefully applied the conventional detection methods currently used today. Primarily this would involve the use of the soap bubble method and electronic detection coupled with dye and UV light analysis. Once it has been confirmed that the leak is not detectable the sealant should only be injected into a unit which has a fully functional liquid line drier installed. The existing drier should not be exhibiting a temperature difference of more than two degrees between its inlet and outlet. When an excess of a two degree differential exists across the drier the existing drier must be changed out so that the lowest ppm of moisture can be obtained. On larger driers temperature or pressure differentials can vary therefore one should consult with manufacturers specifications to properly determine what is acceptable.

f) HOW TO PREPARE A REFRIGERANT SYSTEM BEFORE THE INJECTION OF SEALANT.

1. A complete visual inspection of the compressor, condenser, evaporator, driers and line sets should be carried out. The technician should look for signs of past repairs that may be an indication of problematic leaking resulting in excessive wear to compressor internals and system lubricants. These factors are major contributors to particle contamination and eventually lead to critical failure.

2. If the unit has been found to have a history of refrigerant leaks then a test should be performed to evaluate if there are non-condensable in the system. Units that are operating with excessive levels of non-condensable will exhibit higher than normal head pressures. Where the system has been fitted with proper isolation valves and pressure ports a comparison between the liquid refrigerant pressure and corresponding saturation temperature at ambient conditions can also help to determine if foreign gases are present.

3. System should be charged so that superheat and sub cooling is functioning at peak performance. Condensers and evaporators should be cleaned including blowers so that proper air/heat exchange is taking place. Driers should not be exhibiting a maximum of more than two degrees differential between its inlet

and outlet.

4. Systems which have experienced a compressor burnout and have not under gone a complete flushing of contaminants should have the refrigerant recovered and a recommended cleanup procedure carried out with new liquid /suction driers installed.

5. The technician should watch for excessive factors, noise, vibration and compressor oil temperature over 130 degrees F / 54 degrees C. In most instances a temperature reading taken at the base of the compressor will give an approximate operating oil temperature (Not to be confused with gas discharge temperature). Refer to compressor manufacturer's guide lines on normal operating temperatures when trouble shooting semi-hermetic and open drives. These will vary from one manufacturer to the next. Abnormally high amperage draws on start up or running amperage could be an indication of low oil, excessive refrigerant level and/or permanent damage to compressor internals. These conditions should first be rectified before injecting the sealant.

6. Units that have had a history of low refrigerant conditions or a history of multiple service repairs should be checked using an acid/moisture test kit and followed up with a recommended clean up procedure. Systems which have lost over 14% of their total charge over a 4 week period must be treated as contaminated. Refrigerant must be recovered and system evacuated to completely remove all moisture and non condensable. Always install a new liquid line drier each time a system is opened up.

Caution: If a system has fallen into a contaminated state, the introduction of Cliplight's HVACR sealants may accelerate the overall failure of the system. Wet refrigerants laden with moisture or particle contamination can cause premature set-up of sealant lowering sealing capabilities and form restrictions in strainer baskets such as those that exist before a TXV or similar expansion device. The characteristics of the sealant are such that it can act as a cleaning agent picking up contaminants/particulate and deposit them in driers and filter screens. It is therefore essential that a system is clean or has filters installed to help trap these contaminants so they will not interfere with the performance of the unit.

Whenever refrigerant has been recovered replace system driers. Units which have not been fitted with driers must be installed at this time prior to the sealant injection. The system must be evacuated to remove all the non-condenables. This can only be accomplished by means of the triple evacuation method.

DEFINITION OF A TRIPLE EVACUATION

Step 1. Evacuate the system to 1000 microns from both service valves. To measure vacuum a micron vacuum gauge must be used. Compound manifold gauges can not be used for these fine measurements.
Step 2. Break the vacuum with dry nitrogen to approximately 15 psig and hold for a minimum of ten minutes before bleeding off to 0 psig.
Step 3. Evacuate to 500 microns
Step 4. Repeat Step 2
Step 5. Evacuate to the lowest pressure vacuum that the pump will achieve for a minimum of one hour. Systems must be evacuated to obtain a minimum of 350 microns or less to eliminate moisture and non-condensables before injection of sealant is to take place.

g) WHY PULL A DEEP VACUUM ON A SYSTEM ALREADY SUSPECTED OF LEAKAGE?

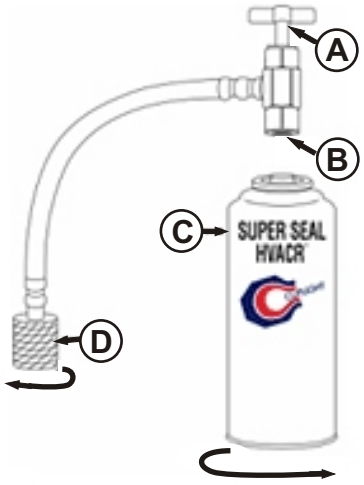
At Cliplight we firmly believe that best work practice should always be exercised for long term results. If the leak cannot be found or repaired and is in suspect of being contaminated than the next logical step is to recover the entire refrigerant and install new over sized liquid line driers and carry out a triple evacuation to fully remove system moisture.
Field and lab tests have indicated that some systems can hold a tight vacuum at levels as high as 295 micron but expel refrigerant under pressures greater than atmospheric. Contributing factors come in to place such as load, acoustics and temperature variation which can influence the rate of leakage.
The methodology around pulling the 350 micron vacuum is to bring attention to the technician the size of leakage that truly exists on that particular system. At that point the decision can be made whether to use the sealant product or apply a mechanical fix. The greater the leak the more difficult it is to pull down to specific vacuum levels. The types of leaks which are difficult to find usually are classified under intermittent in comparison to continuous leakage. Although given enough time these usually can be found but because of economics they pose a restriction in the practical world.

h) INSTALLATION INSTRUCTIONS WITH ADDITIONAL COMMENTARIES

SUPER SEAL HVACR™

Installation Instructions
Professional Formula - For Residential Systems
1 ½ ton/5.3 KW systems up to 5 ton/17.6KW

- For professional use only: Always wear safety glasses and protective gloves
- Do not use on mobile systems, ask for Super Seal Premium™ or Super Seal Pro™
- Use in compliance with the Montreal Protocol and Regional or Federal laws for the handling of refrigerant.



Important before proceeding: Before installing Super Seal HVACR™ check the overall condition of the unit. The system should be operating within its approximate normal pressure/ temperature conditions. Check the compressor by taking a temperature reading at its base. Readings above 130°F/ 54°C may indicate a line restriction or low oil/refrigerant charge. Failure to install or replace a contaminated or plugged filter drier may result in compressor failure. Where there is the possibility of refrigerant contamination

an acid/moisture test should be performed and followed up with recommended clean up procedure. If the system has to be evacuated it is advisable to change both liquid and suction line driers and to obtain a minimum of 350 microns or less to eliminate moisture and non-condensables. Charge to factory required levels.

INSTRUCTIONS

clock wise = cw and counter clockwise = ccw.

1. Turn off A/C unit and allow enough time for refrigerant to equalize in system.
2. Confirm that can tapper piercing pin (B) is fully retracted below seating washer. Turn valve handle (A) ccw.
3. Thread Super Seal HVACR can (C) onto can-tapper (B) by turning cw. Be careful not to cross thread or over tighten.
4. Thread female fitting (D) onto vacuum pump and draw vacuum for approximately 1 minute to eliminate air in tap hose. (Where Regional and Federal laws permit, you may use systems refrigerant to purge hose.)
5. Remove female fitting (D) from vacuum pump while it is running to maintain vacuum in tap hose. After disconnecting shut down vacuum pump.
6. Thread female fitting (D) onto low side service port immediately after removing from vacuum pump.
7. Turn can-tapper piercing handle (A) cw until it stops. This action pierces the can.
8. Hold can upside down and above the low side service port. Turn handle (A) ccw slowly allowing the system's refrigerant to fully charge can. The can will become warm once the refrigerant mixes with its contents. Allow the can to dissipate the additional heat of charging which should take between 5 to 10 minutes depending on systems charge and ambient air conditions. When the can's temperature has equalized with ambient air conditions then proceed with next step. Be sure to check that all connections from can to unit are secure and that there is no leakage occurring.
9. Turn handle (A) cw until it stops, isolating charged can from A/C or R unit.
10. While holding the can upside down, turn on A/C or R unit. Slowly turn handle (A) ccw gradually releasing sealant into the system. This should take approximately 3 to 5 minutes. Releasing sealant too quickly could result in liquid slugging. Shake can gently to determine when empty. If all of the contents in can are not emptied after 5 minutes then turn can tapper piercing handle (A) cw until it stops. Turn off A/C or R unit and repeat steps 8, 9 and 10 as many times as necessary to empty contents of can. This should dislodge any particles that may have entered the can from the refrigerant system.
11. Once can is empty remove female fitting (D) from low side service port, then shut down A/C or R unit. Allow system's pressure to equalize. The A/C or R unit should be left off for approx. 5 minutes. This procedure allows product to mix with systems oil and when the unit is restarted will allow for equal distribution throughout system.
12. Reclaim residual refrigerant from can and hose using a recovery machine. Always purge recovery machine with dry nitrogen after reclaiming refrigerant from can and hose. When finished reclaiming refrigerant, dispose of can and hose.

TAPPING VALVE AND HOSE NOT TO BE REUSED.

NOTE: One 3oz/85ml can of Super Seal HVACR should only be used on units that have a minimum of 30 oz/887ml total oil capacity in compressor sump and at least 4 lbs/1.82kg refrigerant capacity. Super Seal HVACR™ is to be used only on the low-pressure side of A/C or R unit. Can and hose must not be subject to pressures that exceed 300psi/20.7 bar working pressure.
Refer to www.cliplight.com/hvacr/ for complete 410a installation instructions and training manual.

Procedure for injection of sealant with additional commentaries on Step 4,5,6 and 8

Step 4,5,6) It is important to purge the hose so that you do not introduce air into a refrigeration system. The air would add to higher head pressure and displace refrigerant lowering the efficiency of the unit. Where Regional or Federal laws permit, rather than pulling a vacuum on the hose, an alternative method to removing air from the hose, is to replace the air with refrigerant from the system. Switch the a/cr unit off. First confirm that the can tapper pin is fully retracted below the seating washer on the delivery hose. Proceed to attach the delivery hose to the can by clockwise threading the can onto the piercing valve, connect to the system low side charging valve. Carefully back off the can from the piercing valve approximately one half turn allowing the systems refrigerant to purge the delivery hose. This will take less than a minute. After purge is completed turn the can gently clockwise onto the piercing valve to effectively maintain a tight seal. The delivery hose is now free of air and ready for use.

Step 8) **When charging the vacuumed packed can.**
When opening the valve carefully throttle it so that the gas enters slowly into the vacuum packed can so as not to disturb particles which may be residing in the suction line of the unit. A rush of refrigerant will occur because of the pressure differential between the static pressure of the off line system and the cans vacuum state if not properly regulated by the valve. The hose has an orifice which is 29,000th of an inch diameter and can easily be restricted if the system is heavily contaminated with loose particles such as copper oxide or sludge.

If a blockage of the orifice occurs and the full contents of the can were not injected turn the valve off (cw) and shut down the unit. Repeat steps 8, 9 and 10 until all of the sealant has been injected. If several attempts to inject are unsuccessful this is an indicator that the system is overly contaminated with loose particles and or excessive moisture levels. Recover all refrigerant, install suction and liquid line driers where applicable, perform triple evacuation and recharge to normal operating parameters before attempting injection of sealant.

Step 8) Cont. **Cooling down period for can.**
Once the can has been charged with the systems refrigerant be sure to let the can cool down fully before injecting. Do not attempt to close the valve until the can has completely cooled down to ambient temperature. Closing the valve before the can has cooled off will result in a minimal injection of the sealant. Reason: With the system shut down the static refrigerant is naturally higher than its operating suction pressure. This static pressure charges the can which is in vacuum state of approximately 20 inches mercury. When the refrigerant makes contact with the sealant a reaction of heat is generated. The excess heat causes the liquid to expand taking up volume which would other-wise be used by the refrigerant. With the valve closed (isolating the can from the system) prior to the cool down the liquid contracts and the trapped gas expands with a reduction in pressure lowering the differential pressure needed to inject all of the contents from the can into the operating system which is now at its suction pressure verses the static pressure.

Step 8) Cont. **When the can does not fully empty**
Generally there are two reasons for the can not to empty after following through the instructions (outside of mechanical failure of the kit).
a) Problem: When charging the can's its exterior shell did not show a temperature rise. Temperature increases of 20 to 30 degrees above ambient occur after a complete charge.

Causes: Improper connection to the low side charging valve because of a worn or deep seated Schrader valve preventing the can from receiving the full charge
Solution: Replace the Schrader and adjust the valve core so that it makes contact with the delivery hose connection. NOTE: Systems which use a shut off valve instead of a Schrader valve in the charging port connection can still be injected with sealant using the charging hose which comes with the kit.
b) Problem: When charging the can the exterior shell exhibited the temperature rise but would not empty on the injection step.
Causes: Extremely high moisture content or particle contamination of gas caused premature set up of sealant during the cool down period forming a blockage in the can and/ or delivery hose.
Solution: System will need to follow up with recommended clean up procedure before attempting sealant injection.

i) INJECTION GUIDELINES FOR UNITS OVER 25 TON

Application Rule

The injection of sealant is based on the ratio of one three ounce can of 3-Phase sealant to every 128 ounces of compressor lubricant.

Step 1) First begin by taking a temperature reading at the base of the compressor, this will give an approximate operating oil temperature. Temperatures over 130° F / 54° C may indicate a line restriction or low oil/refrigerant charge. Refer to manufactures acceptable operating temperatures. The technician should listen for excessive noise or vibration at the compressor. Check for abnormally high compressor discharge temperature. High amperage draw on start up or high running amperage could indicate low oil conditions, line restrictions resulting in permanent damage to compressor internals. These conditions should first be rectified before injecting the sealant. Determine the amount of refrigerant loss and the time period in which it was occurring. Example: A 70 Lb / 31.75 kg system leaking 10 Lbs / 4.5 kg of refrigerant over a period of 3 months. This would be the leak rate period.
NOTE: Temperature should not be higher than 140° F / 60° C at compressor oil sump. Note: The unit may be running at higher temperatures because of low refrigerant/oil condition or a line restriction down stream of compressor discharge (refer to compressor manufactures guidelines on operating temperature). Generally normal compressor operating conditions exhibit less than 130° F / 54.4° C.

Step 2) Obtain sample of system oil for acid /moisture analysis.
Examine oil for particulate and discolorization. Change out if particulate, discolored oil is found or contamination with an acid number of 0.05 or higher for mineral and alkyl benzene oils. And for polyol esters oils with an acid number of 0.16 or higher.
Step 3) Change out liquid line drier. Carry out evacuation to lowest micron vacuum level possible. Triple evacuation is recommended with the use of dry nitrogen to break vacuum between evacuations.
Step 4) Charge system to maximum operating efficiency paying close attention to super heat and sub cooling points.

Step 5) Once system has stabilized to operation mode and has satisfied maximum efficiency, shut down unit and allow system pressure to equalize. In accordance with Application rule , above, proceed to inject the 3 oz / 30 ml cans of sealant into the unit one after another. After a 1 hour period of normal operating cycles has lapsed, record super heat and sub cooling temperatures including ambient temperature and keep for future reference. Also monitor the system's operations paying special attention to pressure differential and / or temperature delta across liquid line drier. Drier will have to be changed out if high differential occurs. Monitor unit for refrigerant loss according to the time period which was originally determined as the leak rate. A comparison of super heat and sub cooling temperatures after the original injection, with previous readings, will indicate the system's performance. If the system's refrigerant loss has declined by at least 90% then proceed to charge unit to maximum operating efficiency. After this has been completed a final 3 oz / 30 ml injection of sealant can be administered. If system loss has not declined by at least 90% the leak may be irreparable using sealant technology and conventional repair methods will need to be implemented.

A final inspection of operating check points is recommended including pressure differential or temperature delta across liquid line drier to ensure continued maximum efficiency in operations.

j) SERVICING OF SYSTEMS CONTAINING CLIPLIGHT SEALANTS

These guidelines should be adhered to when servicing an ac/r system where sealant has been used and which requires opening up the unit and exposing it to atmospheric conditions, especially in the presence of high humidity.

A) After the unit's refrigerant has been successfully recovered proceed to purge using dry nitrogen through the system while venting to atmosphere.
B) A purge time of 2 minutes at 25 psi / 172.4 kpa is sufficient for most medium residential A/CR units with line sets of 25 ft / 7.62 meters. For every additional 25 feet / 7.62 meters of line set add 2 minutes purge time. The unit is now ready to be worked on.

C) When working on the open system always remember to follow good service practices such as continuous dry nitrogen purging while applying heat for the use of brazing connections. Using dry nitrogen helps to prevent the formation of metal oxides, which could cause future line restrictions. When brazing, apply only enough heat to allow the brazing material to flow, avoid excessive heat.
D) A new liquid line filter drier should be installed as well as a suction line filter where applicable isolation valves and bypass capabilities are present. The suction line filter should be removed after 24 to 48 hours when specifically used as a cleanup procedure after a compressor burnout. The use of a suction line filter is generally used to help clean up a system when high levels of contamination are present. In the case where a suction line filter has been added to facilitate system clean up then Super Seal should be added only after the suction line filter has been removed.

E) After the necessary work has been finished accompanied with a new liquid line drier installation the system should then be evacuated to a minimum of 350 microns / .34671 mmHg before new refrigerant is added. Triple evacuation with nitrogen breaks is strongly recommended. If a unit is left open for a period of more then 24 hours it should be resealed and pressurized with a minimum amount of dry nitrogen to prevent ingress of air and moisture.
F) When a compressor is removed from a system for repairs it will be necessary to remove all oil from the compressor sump and disposed of

according to Government and local environmental regulations. Afterwards, a compressor flush with an approved OEM oil is required to effectively remove residual sealant. To complete the cleaning a gas purge using nitrogen gas through the compressor will help to remove accumulated oil and solid particles from intake and discharge. A two to three minute gas purge will be sufficient. **Following good repair work practices as outlined above will establish a high rate of success and help to eliminate call backs.**

k) WILL SUPER SEAL DAMAGE RECOVERY EQUIPMENT?

No, providing the technician uses the appropriate sealant (3 Phase, HVACR and ACR) for the size system. When the refrigerant is recovered it will act as a solvent and effectively clean the recovery unit and pass safely into the recovery tank. When recovering always pump down your recovery machine to completely remove the used refrigerant.

l) WHAT HAPPENS WHEN THE SYSTEM IS OPENED FOR REPAIRS AND MOISTURE ENTERS THE SYSTEM?

There are generally two reasons a technician has to open up a system. The first is a failure of a systems component such as an expansion valve, plugged capillary tube or failed compressor. In this case, the systems refrigerant would have to be removed from the unit. The second reason would be an accidental release of the systems refrigerant because of a pipe rupture, poorly brazed joint or excessive corrosion. In either case, the refrigerant exits the system taking the sealant with it, except a trace amount, left in the oil sump.

When a system containing Super Seal is evacuated any remaining trace sealant will be saturated with the greater amount of systems oil in the compressor sump and rendered non-active. The unit at this time can then be safely opened to do the necessary repairs. By following good work practice all open refrigerant systems regardless of whether or not they have sealant should have minimum exposure to atmospheric conditions.

m) WILL THE SEALANT CURE AFTER THE REPAIR AND CAUSE THE PIPING TO BE BLOCKED?

As mentioned in the previous question, once full recovery of the systems refrigerant is completed insufficient sealant will be present to set up and cause any blockage or restriction to the systems piping. The refrigerant's ability to act as a solvent depends on the oil/refrigerant to sealant ratio in a system. The importance of using the correct sealant and closely following the injection guide lines required for the size of unit cannot be over emphasized.

n) IF THE SEALANT HAS BEEN INJECTED OUTSIDE OF RECOMMENDED GUIDE LINES CAN THE SYSTEM BE CLEANED UP?

For each injection over the recommended amount the unit would need to be recharged with new refrigerant and then recovered. This process allows the effective removal of all the sealant and ensures that only a non active residual will be left. The additional use of flushing agents can also be used and specifically in the case where a system has experienced a high level of contaminates with compressor burn out. Always refer to the manufactures recommendations to be followed for system cleanup for your particular refrigeration system.

GENERAL NOTE: Manual instructions do not apply for any automotive Super Seal products.

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