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The Fundamentals of Refrigerant Recovery

Here's a review of federal regulations and basic recovery techniques, plus a look at new technology that will help you get the job done faster and easier

Terms such as recovery, recycle and reclaim were once used interchangeably in the HVACR industry. Now they have specific meanings since new system servicing procedures were required to comply with U.S. EPA and Clean Air Act regulations.

Today, recovering refrigerant involves the process of removing refrigerant from a system and storing it in a container or cylinder. The service technician should handle the transfer of the refrigerant charge carefully and follow the recovery unit manufacturer's recommended operation and service instructions. Doing so will prevent contamination of the refrigerant charge and help maintain safe conditions during the service procedure.

It's advisable to test the purity of the charge during this process, and to keep a log for each system in order to track the charge condition so that future recycling, reclaiming or charge replacement procedures can be implemented appropriately to keep the system operating at peak performance.

In some cases, the refrigerant charge can be recovered and then returned to the system after a repair. In such instances the



service tech assumes liability for future system performance. Returning a charge to a system without testing for purity may lead to returning a contaminated charge. Also, it's advisable to replace the charge if the system has experienced a hermetic motor burnout.

All technicians should be aware of EPA codes and standards for handling refrigerants or servicing equipment with refrigerants as required by Type 1, Type 11, Type III or Universal Certification. The RSES "Refrigerant Service for the '90s" training manual is an excellent source of information on certification and recovery tips.

This article serves as a review of some of the important factors to consider when recovering a refrigerant charge. For starters,

the recovery unit must be Air Conditioning and Refrigeration institute (ARI) certified, which EPA requires if the unit was manufactured after Nov. 15, 1993. Recovery units built prior to Nov. 15, 1993, are grandfathered and do not require certification.

A recovery unit must be specifically designed and certified for the refrigerant being recovered. Using a recovery unit that is not ARI certified for the type of refrigerant being serviced is a violation of EPA regulations. It can be dangerous to use a recovery unit for a refrigerant other than the one for which the machine was certified. There have been accidents that have led to severe injury when ARI certified equipment for R-12 recovery was utilized to recover R-503. In addition ARI certification assures a technician that the recovery unit being utilized will obtain the appropriate vacuum levels required by the EPA.

Steps to recovery

Recovery systems come in three basic styles: vapor recovery only, liquid recovery only, and vapor and liquid recovery (some systems separate, system oil from refrigerant and others don't). If

oil is separated, the technician must adhere to local requirements for disposal of this oil; many reclaimers will dispose of the waste for a reasonable charge.

When recovering refrigerant the first step is to check out the manifold gauges to make sure they're in good working order and with tight fittings. Check the oil level in the recovery unit. The oil should be changed immediately after the recovery process if the recovered refrigerant is from a system where a burnout has occurred.

The recovery unit should be evacuated prior to each use, especially if the unit is used by different technicians and at different job sites with systems containing a variety of refrigerants. It's best to evacuate the system to avoid accidentally contaminating the charge. The empty cylinder should be evacuated; never refill disposable cylinders. Check the cylinder to make sure it is Department of Transportation approved as a refillable cylinder.

To speed up the recovery Process, the cylinder may be placed in an ice bath or other cooling media. Also, be sure of the refrigerant being pulled and mark the cylinder to prevent the possibility of future cross contamination.

Typically, the liquid is removed from the system first and then the vapor. Attach one hose to the liquid line, preferably at the lowest point of the system. After recovering the liquid, recover the remaining vapor.

Remember, don't fill a cylinder over 80 percent of its capacity or over 60 percent in cases where

the temperature might rise above 130' F. These important precautions will allow for refrigerant expansion. Once the recovery process is completed, the technician can begin repairing the system, whether it's replacing a relief valve, fixing a compressor, repairing a leak or otherwise.

New technology

Two new innovative techniques will change the way you recover refrigerant thanks to products called the Quick Change Tool and the CryoLine Canister.

As any service tech knows, when a high-pressure relief valve is leaking, the refrigeration system charge must be recovered so the valve can be replaced. On larger systems this means the system will be down for a significant amount of time as the charge is recovered and stored, and then the system is recharged.

Mechanics soon will be able to rent the Quick Change Tool from a local wholesaler where the replacement valve is purchased, turning a four-to-eight hour job into a 45minute job. The patent-pending safety relief valve Quick Change Tool allows for the change out of safety relief valves while a refrigeration or air-conditioning system remains under pressure.

The product eliminates the need to pull the charge to change a relief valve and is simple, safe and easy to use. Technically, the system will only be offline for approximately 30 minutes. A safety relief valve change out will now cost only a fraction compared to the refrigerant

system charge recovery and recharge method.

The CryoLine Canister utilizes adsorption technology, may change the way one recovers and contains refrigerant. Adsorption is a phenomenon where molecules concentrate on a solid surface without any chemical change.

The key to this technology is a synthetic zeolite that selectively adsorbs refrigerant gases. The zeolite is loaded inside the CryoLine canister and acts as a selective molecular sieve that captures only refrigerants; no other compounds adhere to the material.

Refrigerant that is dirty, wet or contains acids or other non-condensables is captured as easily as virgin refrigerant. Refrigerant gases are captured at ambient temperatures and at atmospheric pressure. This means that there are no special pressurized recovery cylinders required.

The CryoLine bottles are non-pressurized - once refrigerant is captured in the bottle, it can't escape. Even if the bottle were split open, no refrigerant would be lost. You could sweep the sieve material into a box and return it to your supplier and the refrigerant could still be recovered. Only through a patented desorption process can the refrigerant be released and then reclaimed to ARI standards. This technology has been proven to work with all CFCs, HCFCs and HFCS, including blends.

What does this mean for you? Remember, refrigerant gases are captured at ambient temperatures and the capture occurs at

atmospheric pressure. So when you're recovering refrigerant from any unit that contains pressure, the refrigerant will flow naturally to the recovery bottle.

Your recovery times can be cut drastically and getting refrigerant out of systems in cold weather will be much less of a problem. If you're changing a system to a new refrigerant, recharging a unit with new or reclaimed refrigerant or if you're re-commissioning a unit, this new technology is perfect for adsorbing a unit's charge so it can be processed and reclaimed.

This technology is being used as a high-efficiency purge unit emission collection canister in the U.S. and Canada, and smaller canisters are used by technicians to adsorb refrigerant from recovery unit hoses after use to minimize venting.

Blue Sky Technologies in the U.S. and CryoLine Supplies in Canada offer refrigerant credit programs with the zeolite canisters. Simply return the saturated canister and purchase a replacement canister, and the extracted refrigerant will be credited to your account. Once a significant amount of refrigerant has been credited, a cylinder of that refrigerant will be shipped to your facility.

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For more information, call Redi Controls at 800-626-8640

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