Feature: How to Avoid Mixing Recovered Refrigerants

As the number and diversity of refrigerant products on the market continues to grow, the occurrence of refrigerant mixing or contamination becomes more likely. When more mixed refrigerant is returned to reclaimers, there is an increased burden of removing impurities or separating mixtures that can add to the cost of refrigerant reclaiming operations. In many cases, the contamination of recovered refrigerant is avoidable if a few best practices are followed during service and recovery.

Recovered refrigerant that is determined to be out of specification generally falls into one of two categories:

1. Intentional mixing of 2 or more different refrigerants that are not supposed to be mixed together, resulting in a product that is not close to specification.

2. Predominantly one refrigerant that is contaminated with some amount of another refrigerant that makes it slightly out of specification.

**Case 1:** An obvious suggestion is to avoid mixing different types of refrigerant in the same recovery cylinder. Unintentional mixing can certainly occur when systems or previously filled recovery cylinders are not labeled correctly. It is practically impossible to identify a single component refrigerant or refrigerant blend by pressure alone, even though a check of the pressure of a refrigerant against the PT chart will give some clue to its possible identity. For example, a container may have a pressure similar to R-22, but there are several retrofit blends that may also have a similar pressure. The exception might be R-410A, which should actually be pretty easy to identify based on the fact that its pressure is significantly higher than other refrigerants.

If you are not sure of the identity of a refrigerant — put it into a clean, empty recovery cylinder. Do not combine an unknown refrigerant with previously recovered refrigerant that you know is not out of specification. If a system is not labeled or reliable service records are not available to positively identify the refrigerant in question, then a sample of the refrigerant must be analyzed by a certified laboratory. OSHA regulations require that containers of hazardous materials be labeled with their chemical name and CAS number. In addition, DOT prohibits the transportation of hazardous materials without proper identification of the contents of the cylinder as well as a green nonflammable gas label. Finally, since equipment owners are required to maintain records related to service or disposal of their HVAC/R equipment, and technicians or service companies are the source for this documentation, proper identification of cylinder contents are the key to compliance with these record keeping requirements.

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How can I check in the field if I have a problem with the purity of my refrigerant?

As far as moisture and acidity are concerned, there are a few products that are designed to tell if the refrigerant is “good” or “bad.” Sight glass moisture indicators are one example of a tool that can be used to tell if the refrigerant is relatively dry. Sight glasses are calibrated typically around 35 ppm moisture, so it will not tell you exactly how much you have if it is higher than that, but it will certainly tell you that you shouldn’t have a problem if the indicator stays green. There are also several acid indicators that are designed to change color when a small amount of acidic refrigerant is vented through them. If there is no color change, there shouldn’t be any acid, but a color change does not necessarily tell you how much acid is present.

There is no reliable way to field check for refrigerant purity or correct composition of a blend. Although there are some small refrigerant analyzers on the market, they are somewhat expensive and will not tell you the exact composition of an unknown mixture of refrigerants. They are pretty good, however, at telling if your known refrigerant is relatively pure. However, the results are not absolute and the analyzer must be used properly, maintained, and calibrated to be reliable.

The most accurate way to tell the condition of refrigerant is to take a sample and send it in to a laboratory for analysis. An AHRI certified lab can report the exact values for moisture, acidity, non-condensables, residual oil, and composition/purity. You will have to consider the cost of the test compared to the amount of refrigerant you are testing, and the potential cost for disposal of the refrigerant if the analysis indicates there is a problem with the refrigerant that a reclamer cannot resolve at an economical price. For example, it might not make much sense to send in a 1 lb sample to determine the purity of a 5 lb air conditioner charge. It would make a lot of sense, however, to test a 1 lb sample from 2500 lbs of refrigerant recovered from a refrigeration system or chiller. Keep in mind that even if you are sending the recovered refrigerant to an EPA certified reclamer, the reclamer will rely on their own testing of the recovered refrigerant when determining acceptance or possible handling or disposal fees.

In reference to Propylene Glycol, what is the difference between Freeze Protection and Burst Protection?

Propylene glycol is added to the water loop of a chiller, air conditioner, or refrigeration system for one of two reasons: either the system must continue to operate at temperatures below the freezing point of water, or the system will be shut down over the winter and you want to prevent damage from water freezing in the pipes. In the first case, the concentration of propylene glycol must be high enough so the entire charge remains liquid and able to be pumped around the system. No frozen solids can form in the mixture or the equipment will not run correctly. This can make it difficult to check proper system operation or set expansion valve superheat. Sometimes the best solution is to replace the refrigerant charge to make sure you have the right product in the system.

### TABLE 1: How much contamination makes a cylinder out-of-spec?

<table>
<thead>
<tr>
<th>AMOUNT OF AHRI700 PURE REFRIGERANT IN CYLINDER</th>
<th>AMOUNT OF DIFFERENT TYPE REFRIGERANT ADDED</th>
</tr>
</thead>
<tbody>
<tr>
<td>10 lb</td>
<td>2.4 oz</td>
</tr>
<tr>
<td>20 lb</td>
<td>4.8 oz</td>
</tr>
<tr>
<td>30 lb</td>
<td>7.2 oz</td>
</tr>
<tr>
<td>40 lb</td>
<td>9.6 oz</td>
</tr>
<tr>
<td>50 lb</td>
<td>12 oz (3/4 lb)</td>
</tr>
</tbody>
</table>

Best Recovery & Service Practices:

- **Use dedicated recovery equipment** that is separate from normal service or charging equipment.
- **Purge or evacuate hoses and gauges prior to using them with a different refrigerant.** Use the purge cycle on recovery machines to remove residual refrigerant contained...
Applications for the EZ ONE-SHOT™
• Not sure of refrigerant type — avoid possible mixing with other recovered refrigerant
• Temporary storage receiver for refrigerant that is to be returned directly back to the system
• Burned gas — avoid contamination of your primary recovery cylinder
• Infrequent jobs or products not regularly recovered
• Download everyday cylinder in order to return refrigerant
• Prevent mixing of different customer’s recovered refrigerant

For more information, visit www.refrigerants.com

National Refrigerants, Inc. is the proud recipient of EPA’s New Partner GreenChill Award. The award was presented to NRI at the 2011 FMI Energy & Store Development Conference in Atlanta. NRI joined the GreenChill Advanced Refrigeration Partnership in 2011 as part of our continued commitment to the refrigeration industry.

The GreenChill Partnership is a voluntary program to promote green technologies, strategies, and practices that protect the stratospheric ozone layer, reduce greenhouse gases and save money, and includes supermarkets and refrigeration equipment manufacturers. GreenChill Partners pledge to go above and beyond regulatory requirements to reduce refrigerant emissions as well as participate in industry/government initiatives to assess the performance of cutting edge “green” technologies in terms of energy efficiency, reduction of ozone-depleting refrigerant charges, and minimization of refrigerant leaks.
Deadlines approaching for owners of large refrigeration systems in California

A California Air Resources Board (CARB) regulation to minimize leaks of “high global warming potential” refrigerants established the following requirements and deadlines for owners/operators of systems using 2,000 or more pounds of these refrigerants:

**January 1, 2012:** Automatic leak detection systems must be installed.

**March 1, 2012:** Facility registration, fee payment and annual report due.

The regulation, known as the Refrigerant Management Program, also requires distributors, wholesalers and reclaimers of any amount of high global warming refrigerant to register and submit annual reports by March 1, 2012. Please visit the website below for additional requirements.

Common refrigerants subject to the rule include, but are not limited to: R-12, R-22, R-134a, R-404A, R-407C, R-410A, and R-507. These high-global warming refrigerants are thousands of times more potent than carbon dioxide in trapping the Earth’s heat in the atmosphere. Refrigeration systems that use ammonia or carbon dioxide are not subject to the rule. Air conditioners and other systems used exclusively for cooling building occupants do not need to be registered, but are still subject to required service practices.

**HOW DO I REGISTER?**

Registration opens January 2012. Online registration will be available. Check CARB’s Refrigerant Management Program website for upcoming training webinars on how to use the Refrigerant Registration and Reporting (R3) Tool.

For more information on registration and reporting requirements:

- [www.arb.ca.gov/StopRefrigerantLeaks](http://www.arb.ca.gov/StopRefrigerantLeaks)
- email refrackinfo@arb.ca.gov
- or call (916)324-2517

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**NRI Website**

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- Newly designed website featuring concise information on all products including refrigerants, chemicals, lubricants and services
- Easily accessible downloads of technical support information, Material Safety Data Sheets and more