What is THE BEST retrofit BLEND for R-22?

Technicians and equipment owners are asking this question more often as we approach the next step down in the production of R-22. It sounds like a simple question, yet the answer will depend on several key factors.

**Air Conditioning versus Refrigeration**

There is a fundamental difference between these two applications: evaporator temperature. R-22 air conditioners, with evaporator temperatures from 35°F to 50°F, will behave much differently than refrigeration systems running at 20°F (med temp) or -20°F (low temp). Some blends will match R-22 properties in A/C and others will be better suited for lower temperature operation.

**Application of Equipment**

Another difference might be design capacity and run time for the intended application. Air conditioners are sized for the hottest few days of the year and will cycle considerably most of the time. A/C can tolerate lower capacity blends by simply running a little longer. “Storage” refrigeration applications are also sized for 18 to 20 hours run time during the day. Lower capacity blends can also be tolerated in these systems because there is allowance for longer run times. Where systems are sized to match the capacity of the load, or seem to be running all of the time, blends with higher capacity will be needed to maintain equipment performance.

**Size of Equipment – Ease of Retrofit or Service**

Smaller, self contained refrigeration equipment or air conditioners will generally involve much less work to service or retrofit. If major components need replacement, it may often be easier to replace the entire unit, although replacement cost will also be a consideration. Blends that require component replacements or major oil changes may not be the best choice. Service of larger installations will more likely involve component replacement and planned retrofits can be

Continued on pg.2
Do I need to change the oil in my system when I retrofit to a blend?

Fifteen years ago, this was a popular question dealing with how much mineral oil should be replaced with alkylbenzene oil when changing from a CFC to an R22-based or hydrocarbon (HC) containing retrofit blend. Given the mix of R-22 alternative blends available today, the question is still just as popular.

All of the blends designed to retrofit R-22 are based on HFC refrigerants. Some of them contain hydrocarbons, which will soak into the mineral oil and help thin the oil so it can be returned to the compressor on the low side. The main problem with HC-containing blends, however, is that they will not mix with the liquid refrigerant on the high side. As a matter of fact, National's laboratory testing has shown that partial POE retrofits that replaced only 10% to 15% of the oil with POE have worked to keep R-404A, R-422D, and R-407A circulating properly through a retrofitted R-22/mineral oil system.

National is working with equipment manufacturers to gain their approval for this procedure, which will be much different from the multiple POE flush procedure currently in use. Field testing is underway to demonstrate that partial POE retrofitting will get proper oil return, instead of the traditional specification of 5% maximum residual mineral oil.

Will a perfect drop-in replacement be developed? Is there a refrigerant blend that does not have glide or fractionation or require an oil change but still provides increased capacity and efficiency?

No. We’ve mixed it all and haven’t found a perfect blend. Each blend has advantages and disadvantages which must be balanced to pick the best overall choice for your specific application. Although certain blends can be used in some applications with little or no changes, you should at least check the glide, oil solubility, and performance properties for problems.

<table>
<thead>
<tr>
<th>Blend</th>
<th>Environmental (GWP)</th>
<th>A/C</th>
<th>Refrigeration</th>
<th>Ease of Retrofit</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-404A</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>C</td>
</tr>
<tr>
<td>R-407A</td>
<td>+</td>
<td>-</td>
<td>+</td>
<td>A</td>
</tr>
<tr>
<td>R-407C</td>
<td>+</td>
<td>+</td>
<td>o</td>
<td>A</td>
</tr>
<tr>
<td>R-417A</td>
<td>o</td>
<td>o</td>
<td>-</td>
<td>D</td>
</tr>
<tr>
<td>R-422B</td>
<td>o</td>
<td>+</td>
<td>-</td>
<td>B</td>
</tr>
<tr>
<td>R-422C</td>
<td>o</td>
<td>-</td>
<td>+</td>
<td>D</td>
</tr>
<tr>
<td>R-422D</td>
<td>o</td>
<td>o</td>
<td>+</td>
<td>B</td>
</tr>
<tr>
<td>R-427A</td>
<td>+</td>
<td>o</td>
<td>+</td>
<td>A</td>
</tr>
</tbody>
</table>

A Partial POE replacement of mineral oil; no component changes
B Possible POE addition/replacement; possible component changes
C Partial POE replacement of mineral oil; component changes
D Possible POE addition/replacement; component changes
+ Preferred
o Acceptable
– Not Recommended

What is the best retrofit blend for R-22?

more comprehensive in terms of leak repair, seal or gasket replacement, oil changes, or adjustment of controls, which opens up the choice of retrofit blend. ■

Summary: When doing your homework on R-22 alternative blends, don’t settle for a quick, “one size fits all” solution. Depending on your application temperature, run time, and equipment size, you may find there are different answers to the question, “What should I use?”

Note: These comments do not address new equipment. If the entire system is being replaced, there are new “industry standard” choices for A/C and refrigeration. That topic will be addressed in a future issue.

National Refrigerants has developed a brochure, “National R-407A and R-407C Refrigerants for R-22 Applications – Retrofitting and New Systems” that explains the R-22 alternative choices based on environmental impact, system performance, and ease of retrofit.

Go to www.refrigerants.com or contact your nearest National Refrigerants, Inc. representative.
Lubricants & Chemicals

Lubricants

SOLEST® Lubricants has extended its viscosity range of synthetic lubricants by incorporating SOLEST® Lubricants to its existing product line. SOLEST® Lubricants are designed for use with air conditioning and industrial refrigeration equipment operating with screw, scroll, rotary vane and reciprocating compressors.

SOLEST Lubricants Description:

• SOLEST LT-32 is designed to provide better miscibility in very low temperature applications.
• SOLEST 46 and SOLEST 68 are used in centrifugal, reciprocating and rotary vane compressors.
• SOLEST 100, 120, and 370 provide better oil return in screw compressors.
• SOLEST 150 and SOLEST 170 are used mainly in Bitzer and Carlyle screw compressors.
• SOLEST 220 is used in large screw applications operating with R-134a.
• CP 4214-320 is used in R-22 screw compressors.
• Alkylbenzene 500E provides better miscibility in screw compressors operating with HCFC refrigerants.

Chemicals

Inhibited Propylene Glycol has a low toxicity level, so it can be used in applications that have contact with food or beverage products such as immersion freezing and packaging carbonated beverages. It is also used for secondary cooling and heating applications and for various defrosting and dehumidifying applications.

Due to the need to eliminate or at least reduce refrigerant leaks, major equipment manufacturers are designing medium temperature secondary refrigeration systems for use with 35% Inhibited Propylene Glycol. A secondary refrigeration system operates by pumping propylene glycol between the refrigeration system and refrigerated fixtures. The elimination of high pressure refrigerant circulation throughout the floor area reduces refrigerant charge and minimizes refrigerant leaks.

Inhibited Propylene Glycol heat transfer fluid contains Dowfrost™ blended to different concentrations. It contains a performance additive that prevents metal corrosion, lowers maintenance cost and improves heat transfer. It also provides freeze and burst protection based on the type of application.

Dowfrost (TM) Trademark of the Dow Chemical Company ("DOW") or an affiliated company of DOW.

Corrosion and freeze protection for closed systems.

Note: An uninhibited version is also available in 55 gallon drums.

Dowfrost (TM) Trademark of the Dow Chemical Company ("DOW") or an affiliated company of DOW.
Refrigerant Banking

Refrigerant banking is once again gaining in popularity as large refrigerant users are faced with the management of their R-22 supply. Originally, the banking program was started to assist customers in maintaining their CFC supply for future use. Now, the same is true for R-22. As the price of R-22 continues to rise, nearly doubling in the past year, R-22 becomes a valuable asset that can be reclaimed to ARI-700 standards and stored for use whenever needed. Deposits and withdrawals can be easily handled directly through NRI or through our wholesale distributors at nearly 300 locations in the United States alone.

The economics of refrigerant banking are easily recognized. After cleanup fees and nominal storage fees are factored in, each 30 pound cylinder of R-22 can net you a significant savings per cylinder.

Statements detailing monthly deposit and withdrawal activity as well as account balance are provided. An enhanced feature allows customers to view their bank activity electronically at their convenience through the internet.

Refrigerant banking will ensure your refrigerant supply beyond phase out deadlines. This guarantees adequate supply while stabilizing costs. It also allows equipment owners to maximize the life of their equipment and plan for system conversion or replacement dictated by their own timeline and financial ability rather than by government mandate. In these economic times, it is priceless to determine your own refrigerant and equipment destiny.

Refrigerant Banking = Money in the Bank

Regulatory Update

The Environmental Protection Agency (EPA) published two long-awaited Notice of Proposed Rulemakings (NPRM) that will impact the refrigeration and air conditioning industry over the next several years.

The first NPRM, referred to as the Allocation Rule, proposes adjustments to the quantity of HCFCs that can be produced or imported into the US from January 1, 2010 through December 31, 2014. The intent of this rule is to bring the US HCFC cap in compliance with international agreements.

The second NPRM, referred to as the Pre-charged Equipment Rule, proposes to ban the import, sale or distribution of HCFC air conditioning and refrigeration appliances, meeting certain criteria, beginning January 1, 2010.

To read the full text of the proposed rules and obtain information on submitting comment, please go to http://epa.gov/ozone/strathome.html