

PHASING IN THE HCFC PHASEOUT

The EPA has announced new rules regarding the use of HCFCs and related equipment—and the industry is rapidly adapting to the changes.

BY JOHN IWANSKI

To meet the demands of the Montreal Protocol (which requires a complete phaseout of the use of HCFCs by 2030), the U.S. EPA recently signed off on final rules (effective Jan. 1, 2010) regarding the allocation of HCFCs; and the banning of pre-charged appliances containing HCFC-22, HCFC-142b, or blends containing one or both of these substances. These rules—visit www.rsesjournal.com for a link to the U.S. Federal Register 40 CFR Part 82—were signed to meet the requirements of the aforementioned Montreal Protocol phaseout. [More details about the final rulings are available in Talbot Gee's Capitol Climate column in the January 2010 RSES Journal.] In the United States, the regulations require a reduction of HCFC production and consumption of 75% of the established baseline—15,537 ODP-weighted metric tons.

The new rulings will affect the supply and demand for refrigerants such as R-22 and R-142b over the next few years; increase pressure on the industry to further push the use of HFC refrigerants, such as R-410A, and corresponding equipment; and also generate more interest about retrofit options on existing systems. Certainly there will be a growing attraction toward—and purchases of—high-efficiency equipment utilizing R-410A, R-134a, R-404A, R-422B, etc. However, the pressures resulting from the economic downturn of the past two years have pushed home and business owners to seek ways to maintain their existing systems, keep them running efficiently—and seek out those aforementioned retrofit options.

“End-users need to be informed regarding the phaseout,” said Chris LaPietra, Marketing Manager for Honeywell Genetron Refrigerants. “Issues such as whether to retrofit, what retrofit refrigerant to choose, and how this new fluid will impact equipment will be a challenge for contractors, equipment owners and equipment manufacturers to manage.”

ICOR International Vice President/COO Gordon McKinney agreed, noting that “with most business analysts forecasting a very slow economic recovery, equipment replacement is expected to have a limited impact on closing the R-22 supply demand gap. This means that equipment owners will continue to choose ‘repair’ over ‘replace’ whenever possible to control costs. Just as products such as R-414b have played a vital

role in the replacement of CFC-12 [R-12], using R-22 alternative refrigerants will be the most practical option for closing the supply demand gap for many years to come.”

THE RULES AND TECHNICIANS

The allocation rule sets HCFC production and import limits from 2010–2014 in order to meet the 2010 phasedown caps under the Montreal Protocol. Over each of the next five calendar years (called control periods), this rule allocates HCFC allowances totaling 12,355 ODP-weighted metric tons for consumption and 11,621 ODP tons for production. Fewer HCFC-22 [R-22] allocations will be allowed each year, with the decrease (according to the EPA) being a result of reduced demand for HCFC-22. Existing regulations allow production and import of HCFC-22 and HCFC-142b after Jan. 1, 2010, only to service equipment manufactured before Jan. 1, 2010. The EPA also is: issuing consumption and production allowances for HCFC-123, HCFC-124, HCFC-225ca, and HCFC-225cb; and will issue allowances to specific companies, and will be flexible in permitting approved allowance trades between HCFCs and between companies.

“Based on the EPA vintag[e] model, R-22 demand will exceed supply by 27.5 million pounds per year,” said Joyce Wallace, North American Marketing Manager, Refrigerants, DuPont Fluorochemicals. “The key message is that [the] EPA is significantly reducing the R-22 production allowances, so it is important for contractors, [technicians], and equipment owners to be prepared and get experience with R-22 replacement refrigerants. If equipment owners and contractors wait to take action until the R-22 market becomes snug, it will be too late.”

Wallace added that the EPA is assuming that 20% of the demand for R-22 will be satisfied with reclaimed R-22 in 2010, and then increasing each year after. Based on the amount of R-22 currently reclaimed, adding this much reclaimed refrigerant to the pool would necessitate a significant change in service practices to make up for the shortfall.

“I think that the EPA, just by the design of the allocations and the regulations, certainly is going to force folks to pay more attention to reclamation,” said Maureen Beatty, Vice

HCFC PHASEOUT TIMELINE



Courtesy of Emerson Climate Technologies

« The chart at the left highlights the HCFC phaseout schedule for the Montreal Protocol, as well as the proposed model by the EU. The rules set forth by the EPA will reduce allocations of HCFCs in the U.S. each of the next five years.

President of Operations for National Refrigerants Inc. “If you don’t already have a plan [to deal with the supply limitations] for HCFCs, you need to put one in place now.”

The pre-charged appliances rule prevents the sale or distribution of pre-charged A/C and refrigeration products and components containing HCFC-22, HCFC-142b, or blends containing one or both of these substances manufactured on or after Jan. 1, 2010, but not to appliances or components manufactured before that date. The rule also applies the same restrictions for appliances to pre-charged components, such as linesets and pre-charged condensing units.

McKinney noted that while the restrictions on R-22 production/importation could lead to serious supply and demand issues (and subsequently higher prices), “many progressive HVACR contractors and equipment owners have already developed and implemented long-term strategies to cope with the impending demise of R-22.” He added that the four basic strategic options include: replacing existing R-22-designed equipment with new HFC-based units; reducing system leaks; improving recovery practices (label cylinders and systems to avoid mixing); and maintaining existing R-22 systems by utilizing non-ODP alternatives such as R-422B and, for low-temp refrigeration systems, R-422C.

Gus Rolotti, Director, Technical Sales and Service for Arkema Inc.’s Fluorochemical group, also made the point that technicians should be wary of “drop-in” replacements for HCFCs

since, as he said, “there are no ‘drop-ins,’ and alternatives will require a compromise. [HVACR professionals] will need to go through the data and decide what is really important for them. Key aspects to look at are close performance to R-22, with special emphasis on capacity, a lower or comparable GWP to R-22, and a reliable supplier that can provide technical support after a retrofit.” [Note: Technicians and

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KEY CHARACTERISTICS OF HCFC ALTERNATIVES

» Because HFC replacements for refrigerants such as R-22 and R-142B typically are blends of other refrigerants, technicians must account for factors such as glide and capacity. The chart at the right lists the traits of several replacement options.

	R-404A	R-134a	R-410A	R-407C	Propane
Glide	0.50 °C	0.00	0.11 °C	5.40 °C	0.00
HGWP	0.94	0.28	0.44	0.37	0.02
Pressure at 54.5 °C (kPa)	2,544	1,476	3,406	2,262	1,887
Compressor Energy Efficiency Ratio (EER) (% R-22)	98–109%	101%	92–101%	95–101%	98–100%
Capacity (% R-22)	92–108%	65%	149–155%	98–105%	85%
Heat transfer	Same	Lower	Higher	Lower	Same
Pressure drop	Same	Higher	Lower	Same	Lower
Tubing size	Same	Larger	Smaller	Same	Same
System performance (% R-22)	95–105%	97–98%	98–105%	95–100%	100–103%
System cost	Same	Slight increase	Slight decrease	Same	Large increase*
Redesign required	Moderate	Significant	Significant	Moderate	Significant*

Courtesy of Emerson Climate Technologies

contractors should always contact their refrigerant supplier and the equipment manufacturer to discuss any retrofit program. See table above for a list of HCFC-alternative refrigerants and their characteristics.]

Beatty added that the relationships that technicians and contractors have established with their wholesalers also will be important. “Wholesalers aren’t going to refuse sales to anyone, but they certainly will make a point to take care of their key customers.”

FACT-FINDING

Refrigerant manufacturers and distributors continue to work with OEMs—and legislators—to make the current phaseout as smooth as possible. But for technicians and contractors working with these substances in the field on a daily basis, education and training remain key elements to providing customers with the most cost-effective options.

For example, LaPietra noted that Honeywell has created brochures; conducted webinars; and held face-to-face meetings with wholesalers and contractors—all part of its effort to serve as a resource for updates on the phaseout process and the impact it will have on the end-user. Other manufacturers, including Airgas, National Refrigerants, ICOR International, DuPont and Honeywell, have created similar programs. And Beatty noted that Web sites such as www.phaseoutfacts.org offer HVACR professionals a wealth of unbiased information and facts to help them make informed recommendations to their customers. [Note: RSES also has created an R-410A Industry Awareness page, www.rses.org/410a.aspx, where RSES Service Application Manual technical bulletins and RSES Journal feature articles on the topic may be viewed.]

Still, research and data show that in light of the difficult economic conditions of the past few years, contractors continue to hold off on installing higher-efficiency R-410A systems. Emerson Climate Technologies has published several surveys on phaseout preparedness; in fact, a survey the company conducted at the end of 2008 indicated that nearly 60% of contractors surveyed expected to see more R-22 repairs versus replacement with an R-410A system. With a continuing need for R-22 and a diminishing supply of new product, more pressure will fall on service technicians to properly reclaim refrigerant so that it can make its way back into the supply stream.

“The potential shortfall of 27.5 million pounds in supply

can be mitigated by: year-end carryover inventory, retrofitting existing R-22 systems to HFC refrigerants [such as R-438A varieties]; improved leak-reduction practices; increased recovery and reclaim activity; and overall improved refrigerant-management practices,” said Wallace.

She added that in recent years, the company has enhanced its reclaim program by offering more options through its network of authorized reclaim centers in an effort to make it easier for technicians and equipment owners to return recovered refrigerants.

Beatty said that reclaimers also are making a point to put their best foot forward to ensure that the necessary reclaimed HCFCs make their way back into the supply chain.

“[Reclaimers] are trying to work with EPA and others in the industry to show trade professionals through third-party verification that the proper steps are being taken,” she noted. “One of the complaints we’ve often heard is that ‘there is no place to take the gas.’ We want to reduce the barrier for reclamation as much as we can.”

She added that industry involvement with the EPA has led to things such as a checklist on the EPA’s Web site of certified reclaimers (www.epa.gov/ozone/title6/608/reclamation/reclist.html) and more ways to educate wholesalers and distributors about reclamation options. [Note: Readers also can find more about the reclamation process by reading “The Rush to Recover R-22” in the March 2009 RSES Journal; and “Addressing the Refrigerant Reclamation Challenge” in the April 2009 RSES Journal.]

WHAT IS NEXT

As the phaseout of HCFCs continues, most agree that prices for refrigerants such as R-22 will increase. How much and how soon will depend on a variety of factors, including economic recovery and just how successful the industry is at reclaiming the amount of HCFCs needed to make up for the built-in shortfall in the EPA’s regulations.

Another area of interest is the possibility of HFCs being phased down as well. With climate-change and cap-and-trade legislation becoming such a major issue in Washington, D.C., the possibility that these refrigerants also could be included for removal from use is a concern for many. [Note: HARDI Vice President Talbot Gee discussed this topic in Capitol Climate in the May 2009 RSES Journal, as well as on pg. 16 of this month’s issue.]

CHLORINE-FREE REPLACEMENTS FOR R-22

Identification	Ingredients	Glide (°C)	GWP	Toxic/flammable
R-404A	125/143a/134a	0.50	3,260	No
R-134a	134a	0.00	1,300	No
R-410A	32/125	0.11	1,730	No
R-407C	32/125/134a	5.40	1,530	No
R-290	Propane	0.00	<20	Yes
R-717	Ammonia	0.00	1	Yes

Courtesy of Emerson Climate Technologies

« The table at the left notes the global warming potential of several R-22 replacement candidates, as well their toxicity and flammability potential. Technicians should review each application individually to determine the best course of action when determining an alternative refrigerant.

“For the short term, HFCs have and continue to be the preferred choice for most refrigeration and A/C equipment manufacturers,” said Craig Thomas, Business Manager, Refrigerants, Arkema Inc. “To avoid surprises, end-users should be following this trend closely to understand the final result and timing of any changes.”

Just *how* HFCs are treated in future legislation is one of the big issues facing refrigerant manufacturers—and ultimately HVACR service professionals who are servicing equipment while following the ever-changing guidelines.

“We support the treatment of HFCs in a separate cap from the fossil fuel CO₂ emissions. This was a proposal made in the recently passed Waxman-Markey bill,” said LaPietra. “HFCs are not a waste, but an on-purpose product. And they provide a safe and efficient fluid for running commercial re-

frigeration equipment. Combining them with CO₂, would result in inefficient environmental choices.”

Wallace noted the importance of the fact that proposed climate-related legislation under consideration by the Senate is a *phasedown* rather than a phaseout. “Refrigerants provide societal value in comfort cooling, food preservation and medical applications, and in meeting these needs, HFCs offer the best balance of properties as the industry transitions from HCFCs.”

That transition is something that, like it or not, is here now. HVACR service professionals must stay on top of the alterations occurring in the industry; take note of changing market conditions and regulations; and educate themselves on new products and alternatives to offer their customers the best services and solutions. ☺

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