



From: Aquatics International [May 2013](#)
Posted on: April 19, 2013

Refrigerant Issue Heats Up

Dehumidifiers using R-22 pose problem for facility managers

By [Ralph Kittler](#)

Many aquatics facility managers don't realize their commercial HVAC dehumidifiers are ticking time bombs of operational expenses.

More than 95 percent of natatoriums built between 1980 and 2009 have commercial dehumidifiers using R-22 as their main refrigerant. Older facilities were likely retrofitted with an R-22 refrigerant dehumidifier during the same period.

Unfortunately, R-22 is a Pandora's box for natatorium owners. R-22 is classified as a hydrochlorofluorocarbon (HCFC) that the Environmental Protection Agency banned from dehumidifiers manufactured after Jan. 1, 2009. The EPA also has imposed a complete R-22 production phaseout by 2020, preceded by annual R-22 production cap reductions that have already tripled prices, according to Deb Goodge, reclaim programs manager at DuPont Refrigerants, a Wilmington, Del.-based refrigerant manufacturer.

The reason for this phaseout is that the "chloro" in R-22 is chlorine, which can be harmful to the earth's protective ozone layer. Additionally, service technicians must be EPA-certified and comply with strict reclamation requirements so as not to vent refrigerants and pollute the atmosphere during equipment repairs, retrofits or replacements.

Consequently, supply-and-demand economics are escalating R-22 costs. The supply is dwindling due to governmental restrictions; however, the demand remains high from the millions of existing R-22 units, ranging from residential and commercial building air-conditioning systems to supermarket refrigeration display units and, of course, natatorium dehumidifiers. R-22 retail market prices are between \$65 and \$85 per pound, and price increases are expected each year. Later in this decade, R-22 prices could very well rise to hundreds of dollars per pound or more.

This means the odds are high that a natatorium could face a hefty service bill if a refrigerant leak occurs during its dehumidifier's life cycle, usually 15 to 25 years. Depending on the amount of lost refrigerant, the cost of recharging the system with R-22 can easily be up to thousands of dollars. For example, a large-scale indoor waterpark could be operating a dehumidifier in excess of 1,000 pounds. A more conventional example is a medium-sized YMCA with a 25-meter pool and a dehumidifier with approximately 400 pounds of R-22. Multiplying the retail market price by 400 pounds is a range of \$26,000 to \$34,000, a catastrophic hit to any facility budget.

Consequently, facility managers are faced with the following tough equipment choices:

Keep existing equipment. A dehumidifier that's more than 15 years old might have only another five years left. A facility manager may choose to go with what he or she currently has until he is faced with a big repair bill.

There have been energy-saving advancements in new systems, such as direct-drive fan technology vs. belt-driven equipment, that could cut a natatorium's fan operating expense by 20 percent or more. Because natatorium dehumidifier fans generally run constantly to control humidity, a 20 percent reduction in fan operating costs could save up to \$20,000 annually, which would help defray the cost of a new dehumidifier.

Retrofit equipment. A 5- or 10-year-old dehumidifier is probably too new for scrapping. One alternative is retrofitting the unit to a more environmentally friendly refrigerant. Two types of retrofits are possible that involve hydrofluorocarbon (HFC) refrigerants, which the EPA condones as environmentally safer than the aforementioned HCFC's.

R-22 can be reclaimed from an existing dehumidifier and replaced with the HFC refrigerant R-407c. No equipment modifications are required, but the R-22 system's mineral oil must be replaced because R-407c can operate only with polyolester oil, or POE. These trade-offs should be considered along with the cost-effectiveness of a retrofit and a dehumidifier's expected remaining life.

Another HFC refrigerant, R-438A, recently was developed. It uses the same refrigeration oil type as R-22 and requires little, if any, equipment modification. R-438A and R-407c sell for considerably less than R-22 and don't have government-mandated production bans in the foreseeable future that could escalate prices.

Another modification variation is converting the system to dramatically reduce the refrigerant charge. Conventional dehumidifiers send refrigerant hot gas to an outdoor condenser via dozens of feet of refrigerant piping. Converting the outdoor condenser circuit to a dry cooler with a glycol loop potentially reduces the refrigerant use by at least half because the majority of the system can use cheaper, environmentally safe glycol. While this

is an ideal alternative for systems with long line sets to outdoor condensers, the additional cost of a heat exchanger for glycol heat rejection could decrease cost-effectiveness.

Incidentally, for groups with multiple facilities, an older retrofitted unit's R-22 refrigerant can be stored and reused in the other locations. However, the EPA mandates it must be used within the same organization and not sold on the open market.

New equipment. If an R-22 dehumidifier less than 15 years old experiences a problem that requires opening the system — such as component replacement, which most likely would involve reclaiming or purchasing dozens, possibly hundreds of pounds of refrigerant — it's probably a good opportunity to put those thousands of dollars of refrigerant costs toward a new system.

Buying new equipment requires budget planning. Therefore, some natatorium owners wisely work a new dehumidifier purchase into projects that involve remodeling other parts of the facility. The final argument for a new dehumidifier is the tremendous technological advancements in energy efficiency that have been developed in the last 20 years. The efficiency of today's dehumidifiers vs. a 20-year-old model generally can reduce operational costs by as much as 40 percent and have technological advancements that deliver better performance and reliability.

The new system undoubtedly will use the new HFC refrigerant R-410A, which is not scheduled for a ban and has a price of less than half that of R-22.

Another variation is a system that uses up to 85 percent less refrigerant, such as the aforementioned glycol solution. If a leak occurs, glycol is cheap, environmentally friendly and requires minimal service costs.

Facility managers should be proactive before a catastrophic leak occurs. They should learn the age and type of the dehumidifier and which refrigerant it uses. Then the aforementioned three options can be approached from an informed perspective when consulting a dehumidifier manufacturer.

Ralph Kittler, P.E., is co-founder and vice president of sales and marketing at Seresco USA in Decatur, Ga., a subsidiary of natatorium dehumidifier manufacturer Seresco Technologies Inc. Kittler has 23 years' experience in the HVAC industry and is an ASHRAE "Distinguished Lecturer."