



# R-22 PHASE-OUT:

What rink owners should consider when deciding to replace the refrigerant or the system

**D**o you still have an R-22 (Freon) refrigeration system? If so, it's time to think about how you will address the impending phase-out of the R-22 refrigerant. Although R-22 is still available, owners will eventually have no choice but to consider either dropping in a replacement refrigerant or installing a new system. This article looks at the replacement options and brings forward some considerations and details you should consider in determining your R-22 replacement strategy.

## Why do we have to replace R-22?

In 1987, an international summit known as the Montreal Protocol brought countries from all over the world together to discuss a global strategy to eliminate refrigerants harmful to the

environment. The Protocol deemed certain refrigerant blends such as R-22 to be phased out based on or their effects on the thinning Ozone layer. Based on the Ozone depleting characteristics of R-22 the participating countries agreed and adhered to the phase-out schedule below:

## Important Dates for North American R-22 Phase-Out Schedule

### Pre-2010:

- R-22 production limited to 1989 production levels.

### Jan 1, 2010:

- No new R-22 systems can be installed. Existing system components can still serviced or replaced.

- R22 production limited to 0.5% of 1989 production levels.

### Jan 1, 2020:

- No more R-22 permitted for production.

The laws of supply and demand tell us that we can expect the price of R-22 to explode! Experience with other, previously phased-out refrigerants such as R-12 leads us to expect that the price will increase by 50 times the pre-2010 price.

## Replace the Refrigerant or Install a New System – Which One Makes Sense?

To help point you in the right direction we have developed a quick questionnaire that will aid you in determining whether it is more advantageous to replace the refrigerant or install a new system.

### Questions (Yes/No):

1. Would decreasing my refrigeration capacity by 10% cause operational issues?

**THE PHASE-OUT OF R-22 IS NOT AN EASY TASK FOR RECREATIONAL USERS, HOWEVER, IT IS INEVITABLE AND WILL BECOME EVEN MORE EXPENSIVE AND HARDER TO FIND IN THE COMING YEARS.**

2. Am I uncomfortable that the other new refrigerants such as Freons in the market will be phased out?
3. Is my system more than 20 years old?
4. Am I concerned with maintenance costs associated with my refrigeration system?
5. Do I find my energy bills relating to the refrigeration system high?

If you answered yes to any of the above questions (especially 1 and 3) then you should probably consider installing a new system.

### R-22 Replacement Refrigeration Options

A drop-in alternative could be a viable option. Below is some basic methodology to help you understand the factors you should consider as part of your drop-in strategy.

#### Step 1 – Identify system type:

First, you need to identify the type of system (flooded or direct expansion) because certain replacement refrigerant blends perform better in different systems.

#### Step 2 – Identify required system modifications:

Your local contractor can help you determine this and which blends are most suitable for your facility. There are several different blends that are available on the market but not all of that conform to the original manufacturer's specifications. Each year, 10-15 new Freon blends are introduced and are usually designed for specific

temperature applications.

We advise you to be cautious and consider the following decision factors and criteria when selecting your final refrigerant blend. To help determine which refrigerant is the right choice for your facility, you can start by analyzing the cost of the following:

- Initial refrigerant cost
- Future operational cost
- Changes to the metering device
- Changes to the oil return system
- Changes in the type of oil used in the system
- Capacity loss and efficiency loss
- Required changes to the compressor o-rings, shaft seal and gaskets
- Changes in discharge temperatures affecting heat recovery
- System operating pressure design vs. drop-in operating pressure requirements

**Step 3 – Implementation:** Once you have determined the refrigerant type and are comfortable with the total costs associated with the changeover, it is now time to proceed with the change-out to the new refrigerant.

1. Pump out and recover existing refrigerant
2. Remove compressor oil
3. Make changes to system as identified in Step 2
4. Pressure test and evacuate
5. Charge new oil and Freon
6. Identify the new refrigerant in the system with a proper label.

### Capital Replacement Options

If you answered yes to any of the five questions in the questionnaire above you may want to consider a new system. Newly constructed systems are specifically designed for the intended refrigerant and will ensure you have sufficient capacity to hold and maintain high quality ice. Also, there have been several advances in system design that will decrease energy usage, recover waste heat and reduce maintenance which may help you to lower operating costs and make the project viable. The overall cost of ownership is an important consideration when deciding on a new system.

Moving forward we see most facilities heading towards natural refrigerants such as Ammonia or CO2. They offer several advantages such as heat recovery, lower operating costs, future stability and less maintenance. All refrigerants have their advantages and disadvantages. Natural refrigerants are the right choice to decreasing your environmental footprint and improving your operational efficiency.

In conclusion, the replacement of R-22 in your system is not as easy as simply removing the refrigerant and dropping in a new one. To avoid complications you need to consider the performance, system modifications, costs and future trends. You also must look at the age of your system, total modification costs, system capacity and the risks of other future refrigerant phase-outs. This will help you decide if a completely new system that uses Freon type refrigerants or natural refrigerant is the right choice.

The phase-out of R-22 is not an easy task for recreational users, however, it is inevitable and will become even more expensive and harder to find in the coming years. ✪

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