

Many of the older refrigerant dryers sold around the world use a refrigerant called R-22. Emissions of R-22 are considered by some experts to be a significant factor in depleting the ozone layer that protects animals and people from harmful rays from the sun.

Companies now have the choice to purchase a refrigerant dryer that uses a more efficient and environmentally friendlier refrigerant called R-410A, which is not only a good choice from an ecological point of view but also from an economical point view.

### What Makes R410a A Better Refrigerant?

#### It's Environmentally Friendlier.

If the refrigerant system ever leaks, the escaping refrigerant won't contribute to ozone depletion, unlike R22! Additionally, at the end of its life the unit will be easier and cheaper to dispose of in an environmentally friendly way.

**The risk that R-22 will become expensive or difficult to get in the future is avoided.**



The old refrigerant R-22 will be phased out along with other ozone depleting chemicals, and both supply and demand of this chemical will be significantly affected by current and upcoming regulations. By selecting a dryer that uses R-410A, you will avoid the risk associated with purchasing a product that is destined to become obsolete.

#### R-410A systems can be more reliable than R-22 or R-404a systems.

R-410A refrigerant dryers are today's "state of the art" systems and utilize the most advanced technology available for efficient and reliable operation. The heart of every unit is the refrigerant compressor and the FD120-510 range is specifically designed to use R-410A refrigerant. They incorporate smaller, heavier-duty "scroll-type" compressors that are quieter and operate with less damaging vibration than older compressors that operate on R-22 or R-404a. Since R-410A can absorb and release heat more efficiently than R-22 or R-404a ever could, compressors with R-410A run cooler, reducing the risk of burnout due to overheating.

#### R-410A uses a synthetic lubricant that helps to keep the system operating smoothly.

All refrigerant dryers use oil that circulates through the inside of the system to keep all of the parts well lubricated, just like the engine of a car. R-404a and R-22 dryers use mineral oil that has been used for decades. The FD120-510 use newer synthetic lubricants that are more soluble with the R-410A than the old mineral oils are with R-404a and R-22 refrigerants. This means the synthetic lubricants and R-410A can mix and circulate more efficiently to keep the compressor and other moving parts lubricated, reducing wear and extending their life. Also, just as many new cars use synthetic oils because they are less likely to

degrade under high stress and heat, the new synthetic oils used in R-410A are less likely to break down under extreme conditions.

## The Theory Of Ozone Depletion

### What is ozone?

Ozone is a type of molecule that is made of 3 connected oxygen atoms, which is written in scientific terms as O<sub>3</sub>. It is mostly found in the stratosphere and absorbs harmful ultraviolet radiation that would otherwise find its way down to earth causing a variety of problems for humans, animals, and plants. Stratospheric ozone is different from ground-level ozone, which contributes to smog in our cities.

### How could CFCs and HCFCs affect the ozone layer?

Ozone is constantly being made in our atmosphere, mostly by collisions of oxygen molecules (O<sub>2</sub>) and oxygen atoms (O). Ozone is also constantly being destroyed by similar collisions between O<sub>3</sub> molecules and O atoms, resulting in pairs of O<sub>2</sub> molecules. In theory then, there is a balance between creation and destruction that results in a constant layer of ozone.

The full names for CFCs and HCFCs are Chlorofluorocarbons and Hydrochlorofluorocarbons. CFC molecules are made of chlorine, fluorine, and carbon, and HCFC molecules also have hydrogen atoms attached. The widely accepted theory of ozone depletion is that these molecules, once emitted to the atmosphere, are eventually broken down over long periods of time into their individual atoms. The chlorine atoms then react with the ozone and cause ozone destruction to happen faster than ozone creation.

### Why is ozone depletion considered bad?

Because stratospheric ozone protects us from harmful ultraviolet rays, ozone depletion means people, animals and plants are all affected by these rays when the ozone layer fails to stop them. This may include:

- Increases in skin cancers.
- Increases in cataracts of the eyes which can result in loss of sight.
- Reduction in the yields of important food crops, according to some scientists.

### Why can't R-410A affect the ozone layer?

R-410A is not a CFC or an HCFC. It is called an HFC, or hydrofluorocarbon, and is made of hydrogen, fluorine, and carbon atoms. Because it has no chlorine, it won't interact with the ozone layer once it breaks down.

## Phase-out Of Ozone Depleting Chemicals

The United States signed the Montreal Protocol on Substances that Deplete the Ozone Layer, which is an international agreement to reduce and eventually ban the production of most ozone depleting chemicals. In order to implement this agreement in the U.S. Congress passed the Clean Air Act of 1990. This directed the EPA to implement regulations to phase out CFCs and HCFCs. The production of CFCs for air conditioning and refrigeration in the United States was banned in 1995. CFCs are much more harmful to the environment than HCFCs, but HCFCs are next in line for elimination.

The impact on the ozone layer for every HCFC chemical such as R-404a or R-22 has been estimated and compared to that of CFC-11. This impact is called its "Ozone Depletion Potential" or "ODP". For R-22, this number is 0.055 because it is 5-1/2% as ozone depleting as R-11 over a 100 year period. There are many other ozone-depleting HCFCs, such as "141b" which is used for insulating refrigerators and houses. Production of HCFC-141b in the U.S. has already been banned and other HCFCs are scheduled to be phased out.

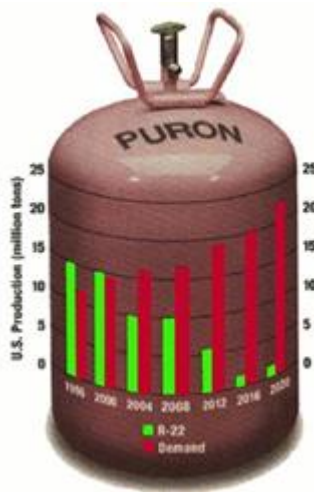
## Myths About R-410a

### **The higher pressures of R-410A are unsafe.**

Actually, the FD120-510 units are specially designed for the higher pressures of R-410A. These machines have been rigorously tested both in lab conditions and in field trials. Since other manufactures have not yet released products which use R-410a, they use the “high pressure” argument as it’s the only one open to them. With over a million R-410A based refrigerant systems operating worldwide, and nearly a decade of field testing and product history, there is no evidence to suggest that R-22/R-404a systems are any safer than systems that contain R-410A.

### **The higher pressures of R-410A cause refrigerant systems to break down more often.**

Evidence shows this is not only untrue, but that R-410A machine can be remarkably more reliable than those that use either R-404a or R-22. Dryers that use R-410A are designed to be heavier-duty, with a thicker compressor shell. Usually this results in smaller, sturdier pieces of equipment that vibrate less, putting less strain on the piping connections that are the source of most leaks and failures.



### **R-22 will be cheap and available through 2020.**

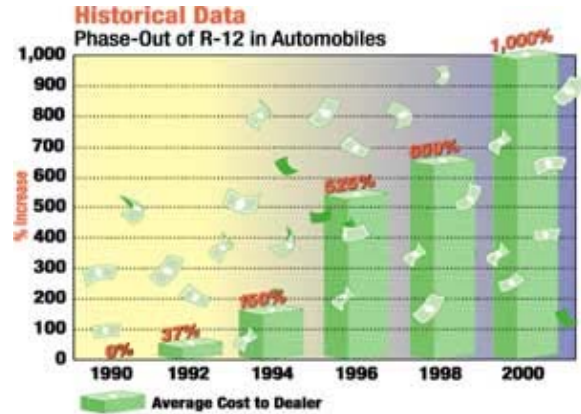
This is wishful thinking on the part of many dryer manufacturers and sales people. R-22 is being phased out globally, and the manufacturing plants that make R-22 in Europe, North America and other regions will eventually be shut down or converted to make other chemicals. Just this past year, the 3rd largest R-22 manufacturer in the U.S. closed its facility. In 2003 the U.S. EPA implemented an allocation program which limits both the companies who can make and import R-22, and the amounts that they each can make or import. This essentially “capped” the supply of R-22 in the U.S. In order to meet the reduction in use of ozone-depleting chemicals that Congress laid out in the Clean Air Act of 1990, the U.S. EPA expects to pass further laws before 2010 to reduce allocations of R-22 and other ozone-depleting chemicals. By 2015, the cap on R-22 and other ozone-depleting HCFC refrigerants will be reduced to allow a maximum of about 60 million pounds of virgin (new) R-22 to be produced in or imported into the U.S. Currently, the U.S. uses over 160 million pounds each year! Forecasting the effects of these regulations isn’t easy, but it sure doesn’t look good for R-22!

### **R-410A isn’t the final refrigerant, and other new refrigerants are coming.**

In addition to the FD120-510, and ultimately the whole FD range above 250 cfm, every major air conditioner manufacturer in the United States has selected R-410A as its choice to replace R-22 and R404a in new equipment. In fact there are at least a dozen brands of R-410A air conditioners or heat pumps available today, with more coming soon. Why? In less than 3 years the U.S. Department of Energy will require a serious increase in the minimum efficiency of new consumer and industrial refrigerant products. This means that manufacturers will have to find ways to increase the efficiency of their machines. One easy way is to use a more efficient refrigerant, and because the refrigerant 410A is so much more efficient than either R-22 or R404a, manufacturers can use R-410A to help them meet these energy efficiency goals.

### **R-410A costs too much.**

It's true that non-ozone depleting refrigerants are more expensive to manufacture. They use more expensive raw materials, are more difficult to make, and aren't yet produced in the large quantities that R-22 and R404a are produced. However, due to the increased performance of R410a compared with these other refrigerants, less is needed in a given machine. Additionally, over the long-term, manufacturing costs are likely to decline as R-410A becomes more popular and is produced on a larger scale, and at the same time costs for older refrigerants will increase. An example of this is R-12 refrigerant, which became hugely expensive as it was phased out during the 1990's.



### **R-410A is new and may not be available to service your new dryer if it breaks down.**

As the inventor of R-410A, Honeywell is committed to having ample supplies of this refrigerant available, and started up a new \$100 million manufacturing plant in 2003 to make sure that there is plenty of R-410A continuously. There are now at least 2 other refrigerant companies in the U.S. besides Honeywell who offer their own brands of R-410A, providing both ample supply and competitive pricing to manufacturers, distributors service technicians.

### **The lubricating oil used in R-410A systems absorbs water and makes systems break down.**

Many refrigerant contractors who haven't learned about R-410A often hear this myth and repeat it to others. Refrigerant systems that use R-404a or R-22 use a mineral oil that circulates through the system to keep the compressor and other parts lubricated. Systems containing R-410A usually use a synthetic oil. Some of these synthetic oils do absorb moisture more readily than mineral oils, but there are several reasons why this is not an issue.

First, equipment manufacturers train their technicians to keep these oils from getting exposed to the air where they could absorb moisture. As long as technicians follow the manufacturers' directions in installing and servicing R-410A systems, then the oil will remain clean and dry. Second, nearly all refrigerant systems that use R-410A have a device called a "filter drier". This important part does exactly what the name implies - it filters, cleans, and dries the refrigerant and oil as it circulates through the system just like the oil filter in a car. This device has been an important reason why systems with R-410A are considered by some manufacturers to be the most reliable product they make.

## Refrigerant Types - Technical Summary

### **R11 (ODP=1.0 / GWP=4000)**

A single chlorofluorocarbon (CFC) compound. A high chlorine content ensures high ODP & GWP. Non toxic. Exhibits no glide or fractionation. Can be charged in gas form.

Notes: For environmental reasons this refrigerant is outlawed and may not be used in either new or existing equipment.

### **R22 (ODP=0.05 / GWP=1700)**

A single hydrochlorofluorocarbon (HCFC) compound. A low chlorine content ensures modest ODP & GWP. Non toxic. Exhibits no glide or fractionation. Can be charged in gas form

Notes: For environmental reasons this refrigerant is in the process of being phased out.

### **R134a (ODP=0.0 / GWP=1300)**

A single hydrofluorocarbon (HFC) compound. A zero chlorine content ensures no ODP & modest GWP. Non toxic. Exhibits no glide or fractionation. Can be charged in gas form

Notes: A very environmentally friendly refrigerant but inefficient (low heat capacity), meaning that it's not economically feasible to use in dryers bigger than 200cfm.

### **R404a (ODP=0.0 / GWP=3750)**

A ternary blend of hydrofluorocarbon (HFC) compounds (R143a/R134a/R125). A zero chlorine content ensures no ODP but high GWP. Non toxic. Exhibits modest glide and fractionation. Can be charged in gas form, but liquid form is recommended

Notes: The natural replacement for R-22, since it has a similar heat capacity with a reduced impact on the environment.

### **R407c (ODP=0.0 / GWP=1610)**

A ternary blend of hydrofluorocarbon (HFC) compounds (R32/R134a/R125). A zero chlorine content ensures no ODP but modest GWP. Non toxic. Exhibits high glide and significant fractionation. Must be charged in liquid form, leakage is best treated with recovery and full recharge

Notes: Although very environmentally friendly, this refrigerant has a huge glide which means that PDP is both unstable and unpredictable. Only used by a handful of manufacturers for this very reason.

### **R410a (ODP=0.0 / GWP=1890)**

A binary blend of hydrofluorocarbon (HFC) compounds (R32/R125).  
A zero chlorine content ensures no ODP but modest GWP. Non toxic. Exhibits minimal glide and fractionation. Can be charged in gas form, but liquid form is recommended

Notes: Even more environmentally friendly than R-404a but with the added benefit of also being far more efficient, especially when you consider that all the refrigerant components can be smaller. The refrigerant of choice for all new dryer and air conditioning technology.

**GWP = Global Warming Potential**  
**ODP = Ozone Depletion Potential**