

Tips for Working Safely With R-410A

If you understand its characteristics and handle it properly, R-410A is just as safe as R-22, according to a technical expert from a leading manufacturer

BY DAVE BATEMAN

R-410A is the leading HFC replacement for R-22 in new residential and light-commercial air-conditioning and heat pump systems. It's the leading choice of most major OEMs and more contractors are successfully recommending, installing and servicing new R-410A equipment.

R-410A has zero ozone depletion, is non-flammable, performs well, and when the manufacturers' recommended practices are followed, it

can be used, stored and handled as safely as R-22. Here's how:

1. Understand what you're working with and where and where not to use it. R-410A is an ASHRAE product designation for a two-component refrigerant blend consisting of 50 percent HFC-32 and 50 percent HFC-125. R-410A is marketed under various brand names such as DuPont Suva 410A, Carrier Puron and Genetron AZ20.

Although they have different names, they all have the same chemical composition and perform the same in equipment. Although it is a blend, R-410A acts very much like a single-component refrigerant. It is non-flammable and does not become flammable under any reasonably foreseeable leak scenarios.

R-410A is designed for new equipment only, due to its much higher cooling capacity and operating pressure. R-410A is a higher-pressure refrigerant than R-22 and should be used only in equipment specifically designed for R-410A.

R-410A systems can be designed to provide higher energy efficiency than R-22 and will meet and exceed U.S. Department of Energy efficiency guidelines. Equipment designed for R-410A has up to 60 percent greater capacity than current R-22 equipment. It can be

topped off in the event of a leak, which should be identified and repaired to comply with government regulations.

The physical and chemical properties of R-410A are very similar to those for R-22 as well as most of today's HFC refrigerants. The major difference is the higher pressure.

2. Follow general safety guidelines. Refrigerants can be used safely when recommended safety and handling practices are followed. Pressure, frostbite, overexposure to vapors and deliberate inhalation are all potential hazards with most commonly used refrigerants.

In general, R-410A should be handled the same as R-22, with the exception of the higher pressure. The 8-hour time-weighted-average "allowable exposure level" for R-410A is the same as R-22, which is 1,000 parts per million (ppm).

Use gloves, safety glasses and safety shoes when handling containers. Avoid skin and eye contact with liquid refrigerant. Work in well-ventilated areas and note that the vapors are heavier than air and might concentrate near the floor or in low areas.

Certain concentrations of R-410A in air at elevated temperature and/or pressure can become combustible. Never mix R-410A with air for leak testing. And, make sure you read and

understand the material safety data sheets (MSDS) of the product you are using for additional safety and handling precautions.

3. Store and transport responsibly. Storage requirements for R-410A are the same as R-22 and other commonly used refrigerants. Cylinders should be stored in a clean, dry area out of direct sunlight. Keep valves tightly closed, and valve caps and hoods in place when the cylinder is not in use.

Storage temperature should not exceed 125° F, including when cylinders are stored in the back of service trucks and vans. Temperatures in excess of 125° F could result in cylinder contents being released due to activation of the safety-relief disk. Cylinders should be properly secured when not in use to avoid damage to the cylinder as well as any other potential personal injury.

R-410A cylinders are equipped to handle the higher pressure during normal transportation, use and handling, and meet the same rigorous standards the U.S. Department of Transportation (DOT) requires to ensure safe transportation of all compressed gases.

4. Use the right tools for the job. Air-conditioning equipment, cylinders and service tools have been re-engineered to handle the higher pressure of R-410A. When servicing R-410A equipment, make sure you use reversing valves, expansion valves, filter-driers and other components specifically designed for R-410A. As noted above, cylinders used for new R-410A as well as recovered R-410A have been redesigned for the higher pressure.

Service equipment also must be designed for R-410A. Manifold gauge sets must be rated for the higher pressure of R-410A. There are currently several available to the industry.

They will typically have a high-side range of 0 psig to 800 psig and a low-side range of 0 psig to 300 psig. High-



Working with R-410A is not much different than any other refrigerant. However, R-410A does have higher pressure and can become combustible when mixed with air.

pressure recovery machines and high-pressure recovery cylinders (4BW400) are required.

5. Be prepared to react in case of an emergency. When exposed to high temperatures from flames or electric resistance heaters, fluorine-based refrigerants such as R-22 and R-410A can decompose and form toxic and irritating compounds like hydrogen fluoride. If this occurs, evacuate the area and ventilate before re-entering. If exposed to decomposition products, go to an area where there is fresh air and seek medical attention.

When brazing or welding, it is important to take precautions. As a minimum, recover refrigerant from equipment before beginning this type of work, evacuate the equipment, purge with nitrogen, ventilate the area and leave the system open to prevent pressure buildup.

Like R-22, R-410A is non-flammable at normal room temperatures,

but, to repeat, can become combustible if mixed with air at elevated temperature and/or pressure. The required conditions depend on air concentration, pressure and temperature. Do not mix R-410A with air for leak testing or other purposes, but instead use a mixture of R-410A and nitrogen for leak testing.

6. Keep pressure in perspective. The vapor pressure of R-410A (at 70° F) at 201 psig is higher than R-22 at 136 psig. But these pressures are lower than those of other gases that you may be familiar with and use routinely.

For example, take oxygen and acetylene used in cutting torches and nitrogen used for purging systems during brazing and welding as well as for leak checking. The pressure in a nitrogen or oxygen cylinder can be as high as 2,500 psig.

Even CO₂, which is commonly used in the beverage industry, is typ-



R-410A is marketed under various brand names such as DuPont Suva 410A, Carrier Puron and Genetron AZ20.

ically shipped and stored in cylinders at 830 psig. When R-410A is stored in cylinders or when the refrigerant is operating in a system, the pressure is much lower than many other commonly used industrial gases. Though

pressure is an important distinction compared to R-22, R-410A can be used and handled safely when recommended practices are followed.

7. Recover the right way. You must recover R-410A in a high-pres-

sure recovery cylinder. The proper designation for a recovery cylinder is 4BA400; for a half-ton recovery tank the proper designation is 4BW400. Similarly, recovery units should be rated for R-410A use; check with the manufacturer or your equipment supplier if you have any questions about the rating of your equipment.

R-410A is the leading HFC replacement for R-22 in new residential and light commercial air-conditioning and heat pump systems. Following these seven steps will help ensure that you use R-410A as safely as R-22 and that it will provide reliable, high performance in air-conditioning and heat pump equipment. ♦

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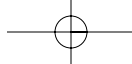
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