

# alternative refrigerant

## Natural Refrigerants Are the Future of Supermarket Refrigeration

BY MAREK ZGLICZYNSKI

There is currently a lot of uncertainty in the refrigerant market due to recent court rulings and legislation around banning the use of hydrofluoro-carbon (HFCs) refrigerants in new refrigeration equipment. Because of this, some supermarket chains are moving to natural refrigerants not only to comply with these future standards, but to also be a sustainable, environmentally friendly company. This means contractors should be knowledgeable about natural refrigerants and prepared for the transition.

Choosing a natural refrigerant that has positive effects on the environment, while contributing to a reduction in energy usage is a win-win scenario for everyone in the industry.

Food retailers can combine high energy efficiency, better food preservation with low maintenance cost and space optimization when transitioning their current refrigeration systems to a cooling solution that uses Propane R290 natural refrigerant.

Making this switch to natural refrigerants for supermarket freezers and refrigerators will help businesses reap positive results for both the bottom line and increase supermarket shopper customer satisfaction.

### What are Natural Refrigerants?

Natural refrigerants are naturally occurring substances such as CO<sub>2</sub>, ammonia, and hydrocarbons Propane R290 and Isobutane R600a. Hydrocarbons are energy efficient gases that have zero ozone depleting characteristics, ultra-low global warming impact and provide a low-cost refrigerant option.

These fluids have no refrigerant glide, which provide an easier evaporator design. They are perfect for self-contained equipment which requires no need for a machine room and allows for in-store design and layout flexibility, cabinet mobility, quicker installation time and easier maintenance for refrigerator applications.

### Why Propane R290

Today, more than 25% of the U.S. light commercial refrigeration market has made the switch to R290 and more than half a million R290 compressors are in the U.S. market. Additionally, at least two million HFC-free plug-in units are produced annually worldwide. While this demonstrates momentum in the transition to natural refrigerants, the supermarket industry represents the next large segment to benefit from the switch for the following reasons:

1. *Preserves the environment:* Use of natural refrigerant Propane R290 reduces CO<sub>2</sub> emissions to total equivalent warming impact (TEWI), which measures the equipment's emissions during its lifespan. This is possible because of low direct emissions or low global warming potential (GWP) of refrigerant and because of significantly lower indirect emissions (CO<sub>2</sub> emissions when energy is generated) thanks to improved energy efficiency of appliances using R290.

2. *Quiet, efficient and cost effective:* R290 boosts the compressor's energy efficiency and therefore provides significant gain in system efficiency which helps to comply with U.S. energy standards and enables significant energy cost reductions. In addition, Propane R290 brings lower noise levels.

3. *Longer system life:* Compressors using these refrigerants have lower operating temperatures and pressures than those used with R404A, a high GWP HFC refrigerant blend. The result is an increase of compressor and system reliability due to the lower mechanical and thermal stress.

4. *Lowers maintenance time and costs:* With R290, service contractors can vent the refrigerant to the atmosphere rather than spend time recovering the refrigerant during servicing. Nevertheless, refrigeration equipment maintenance

must be performed only by skilled operators using specific tools due to refrigerant flammability.

5. *Prioritizes worker and shopper safety:* Hydrocarbons are flammable, but the risk of flammability is low. In fact, the refrigerant charge in many domestic and light commercial applications is equal to a few pocket lighters (between 40g and 150g for commercial systems). Plus, the entire electric circuit of compressors using this refrigerant is designed to prevent generating sparks.

6. *Simplifies inventory for OEMs:* R290 offers opportunities for OEMs to reduce their SKUs and provide solutions that offer operational excellence because it is a refrigerant that works very well in low-to-medium temperature applications.

Many supermarkets and other small grocery retailers have already started the transition to natural refrigerants to meet long-term standards. The benefits of natural refrigerants are proven. And the time is now to implement them. 🌱

Marek Zgliczynski is the Fellow Researcher, Director of Research and Development at Embraco North America. His main responsibility is to support development of Embraco household and light commercial refrigeration products globally with his 40 years experience in the field of refrigeration.

### ▶ TROUBLESHOOTING ANSWER

**Answer: No.** On high speed the furnace can only deliver approximately 808 CFM of air. A 3 ton air conditioning system normally requires 1200 CFM of air (400 CFM per ton)

$$\text{cfm} = \frac{\text{BTU input} \times \text{efficiency}}{1.08 \times \text{temperature rise}}$$

$$\text{cfm} = \frac{60,000 \times 0.80}{1.08 \times (127 - 72)}$$

$$\text{cfm} = 808$$