REFRIGERANT COMPARISON: R290 & R448a

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1. LEER REFRIGERANT INTRODUCTION

As an industry leader in temperature-controlled storage solutions, Leer is committed to staying at the forefront of ever-changing technologies, market demand, and the world we live in. We strive to continuously adapt to these conditions so we can consistently offer our customers best-in-industry products.

Since Leer began manufacturing Ice Merchandisers in 1952, R290 is the fourth primary refrigerant offered.

R12 was the go-to refrigerant from its introduction in the 1930's until the 1990's. Since then, technology improvements and environmental awareness have driven refrigerant transitions every 10-15 years. Our last transition was in 2007 when we began using R404a.

Technology and global environmental awareness have once again enabled the introduction of a much-improved refrigerant, R290.

REFRIGERANT	YEARS OF USE	ODP	GWP	THERMAL CONDUCTIVITY	PERFORMANCE
R12	Thru 1994	1.0	10,000+	0.0482	Good
R134a	1994 – 2007	0	1300	0.0586	Good
R404a	2007 – 2023	0	3900	0.0497	Good
R448a	Considered	0	1300	0.0469	Fair
R290	**2020 – TBD**	**0**	**3**	**0.0676**	**Very Good**

2. R290 DEFINITION

In everyday terms, R290 is referred to as refrigeration grade propane. R290 is classified as a hydrocarbon refrigerant, which is natural, non-toxic and the preferred alternative to hydrofluorocarbon refrigerants in cooler and freezer applications.

3. ADVANTAGES OF R290

A. HIGH-PERFORMANCE REFRIGERANT

- R290 has higher thermal conductivity than previous and considered refrigerants, which results in:
  - Higher refrigerant performance
  - Lower running costs
- R290 has lower high side compressor pressures than current and considered refrigerants, which results in:
  - Longer Compressor Life
- R290 has more consistent performance, which results in:
  - Easier to size and verify proper capillary tube and charge amounts
  - No glide*
  - Less unpredictable temperature variations

Many other styles of commercial refrigeration have already adapted R290, problem-free, and have seen great results.

*Glide = The total temperature glide of a refrigerant blend is defined as the temperature difference between the saturated vapor temperature and the saturated liquid temperature at a constant pressure. Another definition is the temperature difference between the starting and ending temperature of a refrigerant phase change within a system at a constant pressure. – ACHR News.

B. ECO-FRIENDLY

- R290 is classified as a hydrocarbon (HC) refrigerant, which is a natural, non-toxic refrigerant and the top alternative to hydrofluorocarbon (HFC) refrigerants – which results in:
  - Eco-friendly properties
  - Ultra-low GWP (Global Warming Potential)

- Zero ODP (Ozone Depletion Potential)
- Commercial market acceptance.
- Commercial refrigeration manufacturers have transitioned complete product lines to R290 and increasingly, retailers are beginning to request or demand such refrigerants.
- Projected to have long-term approval as a commercial refrigerant.

C. FEDERAL & 50 STATE COMPLIANCE

Proposed Federal Regulations by the EPA within the rights of the AIM Act highlight additional refrigerant restrictions. With a compliance date of January 1, 2025 for all U.S. States, the new proposed GWP limit is 150. Thus, making R404a and R448a non-compliant. R290 and other hydrocarbon refrigerants are considered 'final solution' refrigerants and will be compliant under these new regulations.

The California Air Resources Board (CARB) first adopted the vacated rules from SNAP, listing a phase out date of R404a on January 1, 2020. Since then, eleven additional states, Europe, and all provinces and territories of Canada have followed a similar path phasing out R404a. Over a dozen other states are a member of the U.S Climate Alliance and/or have proposed action in regards to Refrigeration

4. R290 vs. R448a

A. EFFICIENCY

	R290	R448A
Thermal Conductivity	0.0676	0.0469
Comparison		31%

Thermal Conductivity = The ability of material to transfer heat, measured in Btu/hr-ft- o F. Values listed are via ASHRAE. A higher value is better.

Highest Efficiency: R290

B. Eco-Friendly

	R290	R448A
ODP	0	0
GWP	3	1300

Ozone Depletion Potential (ODP) = The measure of the effectiveness in removing ozone, relative to standard compound (CFC-11/R11). A lower value is better.

Global Warming Potential (GWP) = The measure of the ability of a gas to trap heat in the atmosphere, relative to carbon dioxide (CO2). A lower value is better.

Greater Eco-Friendly Properties: R290

C. 50-STATE COMPLIANCE

R448a is considered a transitory/temporary/interim refrigerant. R290 and other hydrocarbon refrigerants are considered 'final solution' refrigerants.

Long-Term 50-State Compliance: R290

D. CONCLUSION

	R290	R448A
Performance	X	
Environmental Impact	X	
Service	X	X
50 State Compliance	X	X
Future Support / Longevity	X	
International Markets	X	
Leer's Choice	X	

We're committed to being your Ice Merchandiser partner today and in the years to come. Please visit leerinc.com/eco-friendly for more information.