



Freon™ M099

Refrigerant (R-438A)

“No Oil Change” R-22 Replacement Comparison Guide



Looking for an R-22 replacement for use in air conditioning?

Contractors have chosen Freon™ M099 for millions of quick, easy, and cost-effective R-22 retrofits. Freon™ M099 is U.S. EPA SNAP-approved, compatible with mineral oil and POE, and has the closest performance match to R-22 compared to other “no oil change” replacements. Look inside for more details!



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Important Criteria to Consider When Selecting a “No Oil Change” R-22 Retrofit Refrigerant for Air Conditioning

Criteria	Why It Matters
<p>Performance Match</p> <ul style="list-style-type: none"> ▪ Capacity ▪ Energy Efficiency (COP) 	<p>Technical Considerations</p> <ul style="list-style-type: none"> ▪ Capacity differences between refrigerants following a retrofit can be seen in the run time of a compressor. The greater the capacity loss, the longer the compressor will need to run to achieve the desired temperature. ▪ All “no oil change” blends designed to replace R-22 have a lower capacity; but, the closer the capacity match, the more likely the refrigerant will successfully achieve the desired cooling. ▪ When the energy efficiency (COP) of a blend is within a few percent of R-22, the end user should not experience higher energy costs as a result of the retrofit. <p><i>The Bottom Line: Closer capacity to R-22 means fewer maintenance call-backs!</i></p>
<p>Minimize Component Changes</p> <ul style="list-style-type: none"> ▪ Mass Flow Rate ▪ Suction Pressure ▪ Discharge Pressure 	<p>Technical Considerations</p> <ul style="list-style-type: none"> ▪ Refrigerants with mass flow rates within 10–15% of R-22, with similar suction and discharge pressures, should not require any component or line set changes during retrofits. ▪ Blends with 20–30+% higher mass flow rates than R-22 are more likely to require a change of a fixed metering device (capillary tube, orifice, etc.). If these components are not changed, then the system will likely run at reduced capacity and/or high condenser pressures. ▪ When comparing R-22 with replacement blends, pressure-temperature chart comparisons are not the best indicators of performance. It is critical to look at suction and discharge pressure differences at the appropriate operating conditions. <p><i>The Bottom Line: Minimizing component changes means a quicker and lower cost retrofit!</i></p>
<p>Compatibility with Lubricant</p>	<p>Technical Considerations</p> <ul style="list-style-type: none"> ▪ Use of incompatible refrigerant and oil pairings will first show up in system performance (reduced capacity and efficiency due to oil logging in piping and/or evaporator) and may also lead to compressor failure due to lack of sufficient lubrication. ▪ HFC blends with a small amount of hydrocarbon in the blend enables oil return in a system with mineral oil. ▪ Always consult manufacturer retrofit guidelines for more details. <p><i>The Bottom Line: “No oil change” blends can save time and money when you follow the guidelines!</i></p>
<p>Is it a 400-series blend?</p>	<p>Technical Considerations</p> <ul style="list-style-type: none"> ▪ All refrigerant blends with an R-4XX designation should be handled differently than a single-component refrigerant. Blends should be removed from the cylinder as a liquid for system charging. ▪ The number of components in a blend is irrelevant. Whether a blend has two components or six, typical system charging, servicing, and refrigerant handling practices are the same. <p><i>The Bottom Line: All blends require the same handling, regardless of the number of components!</i></p>



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R-421A (Choice™) vs. Freon™ MO99

- R-421A capacity is 12% lower than R-22, an additional 5% lower than MO99.
- Mass flow rate of R-421A is >20% higher than R-22, an additional -10% higher than MO99.
- R-421A is a pure HFC blend with a small amount of lubricant in the cylinder.
 - Cannot ensure lubricant is evenly charged into system.
 - No hydrocarbon blend component to facilitate oil return.
- R-421A published guidelines recommend converting to POE lubricant if vertical height difference of 20 ft or more between evaporator and condenser.

WINNER = FREON™ MO99

R-422B (NU-22B®) vs. Freon™ MO99

- R-422B capacity is 12% lower than R-22, an additional 5% lower than MO99.
- Mass flow rate of R-422B is 20% higher than R-22, an additional -10% higher than MO99.
- HFC-based refrigerant with hydrocarbon component to facilitate mineral oil circulation

WINNER = FREON™ MO99

R-422D (Genetron®) vs. Freon™ MO99

- R-422D capacity is 8% lower than R-22, similar to MO99.
- Mass flow rate of R-422D is >30% higher than R-22, an additional 20% higher than MO99.
 - Expansion device will likely be undersized and need to be replaced when using R-422D.
- HFC-based refrigerant with hydrocarbon component to facilitate mineral oil circulation

WINNER = FREON™ MO99

R-424A (RS-44) vs. Freon™ MO99

- R-424A capacity is 15% lower than R-22, an additional 8% lower than MO99.
- Mass flow rate of R-424A is -10% higher than R-22, comparable to MO99.
- HFC-based refrigerant with hydrocarbon component to facilitate mineral oil circulation

WINNER = FREON™ MO99

	R-438A	R-422D	R-422B	R-421A*	R-424A
Brand Name	Freon™ M099	Genetron® 422D Freon™ M029	NU-22B®	Choice™	RS-44 Cool50
Capacity (%)	-7	-8	-12	-12	-15
COP (%)	-2	-4	-3	-5	-1
Suction Pressure (psi)	-3	+1	-6	-7	-11
Discharge Pressure (psi)	+5	+12	-5	-7	-17
Discharge Temperature (°F)	-30	-39	-37	-36	-38
Temperature Glide (°F)	+7	+5	+6	+6	+5.5
Mass Flow (%)	+12	+32	+20	+21	+12

Performance relative to R-22; (+) is increase, (-) is decrease

Calorimeter Data at AHRI Standard 540 air conditioning conditions

45°F Average Evaporator Temp/115°F Average Condenser Temp/65°F Return Gas Temp/15°F Subcool from Average Condenser Temp

*POE Oil Change typically recommended for "HFC Only" Blends

For more information on the Freon™ family of refrigerants, or other refrigerant products, visit freon.com or call (800) 235-7882.

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