

## Product Information

Freon™ M099 is the first versatile R-22 retrofit refrigerant for replacing R-22 in direct expansion (DX) air conditioning and refrigeration systems.

Freon™ M099 refrigerant, invented and patented by Chemours, combines R-22 pressure-enthalpy characteristics with mineral oil compatibility in a unique HFC refrigerant that can be used to replace R-22 over a wide range of evaporator temperatures. Freon™ M099 is compatible with traditional and new lubricants; in most cases, no change of lubricant type during retrofit is required.

### Applications

- Commercial Air Conditioning
  - Roof Top Units
  - Indoor Packaged Units
  - DX Chillers
  - Split Systems
- Residential Air Conditioning
- Refrigeration (Low and Medium Temperature)
  - Self-Contained Systems
  - Condensing Units
  - Rack Systems

### Benefits

- Lower retrofit costs versus HFC/POE options
  - No expansion valve or line set changes
  - Eliminates disruptive oil changes
    - Compatible with AB, MO, and POE lubricants
  - Minimizes time spent on control set point adjustments and subsequent service calls
- Not subject to phaseout under the Montreal Protocol and the U.S. Clean Air Act
- 42% lower global warming potential (GWP) than R-404A

### Expected Performance After Retrofit

Based on field experience, calorimeter testing and thermodynamic property data, Freon™ M099 provides similar cooling capacity and energy efficiency versus R-22 in most systems, while operating at a lower compressor discharge temperature. Evaporator and condenser pressures are similar to R-22. No set point changes are needed during the retrofit; however, some minor adjustments may be necessary to optimize system performance after the retrofit. Actual performance depends on system design and operating conditions. After retrofit, the system can be topped off during service without removing the entire refrigerant charge.

### Freon™ M099 Compressor Calorimeter Performance Compared to R-22 at Refrigeration and Air Conditioning Conditions

Performance with subcooling based on thermocycle calculations from calorimeter data and do not include heat transfer effects.

	Low Temperature* -25 °F evaporator, 105 °F condenser, 65 °F return gas with 10 °F subcooling	Medium Temperature 20 °F evaporator, 120 °F condenser, 65 °F return gas with 10° F subcooling	A/C and High Temperature 45 °F evaporator, 115 °F condenser, 65 °F return gas with 15 °F subcooling
Discharge Temperature, °F	-22	-45	-31
Discharge Pressure, psi	+3	+6	+5

+ is increase and - is decrease for FREON™ M099 vs. R-22

\*R-22 assumes demand cooling with low temperature discharge temperature of 275°F

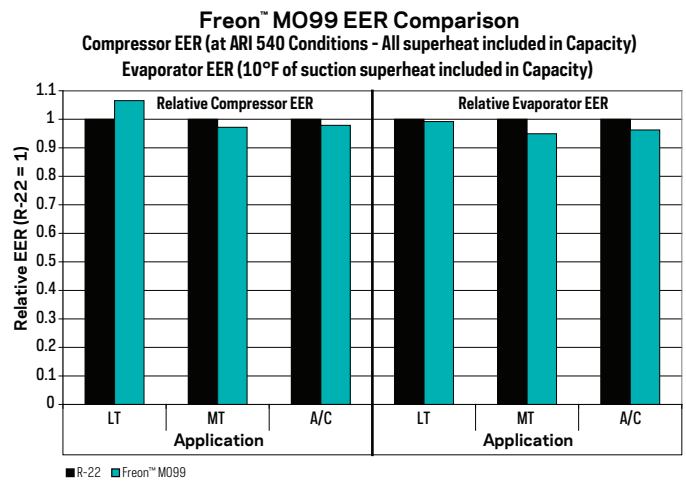
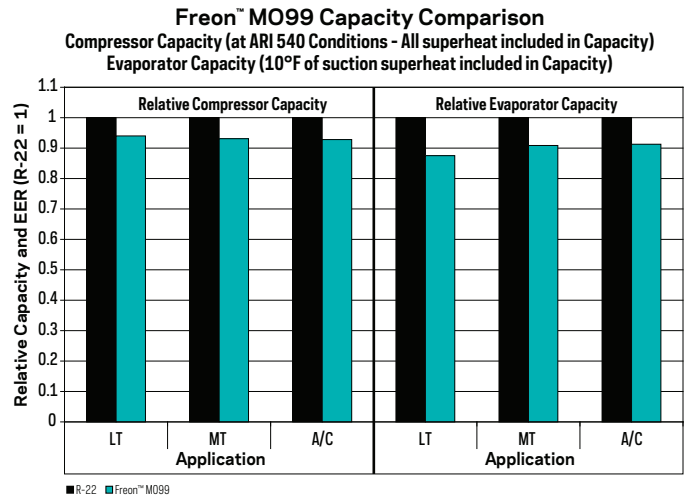
## Retrofit Considerations

Freon™ M099 is compatible with traditional and new lubricants—mineral oil, alkylbenzene, and polyol ester. In most cases, no change of lubricant is required. Oil return is determined by a number of operating and design conditions. In some systems with mineral oil and complex piping configurations, POE may need to be added. Minor equipment modifications (e.g., seal replacement, TXV adjustment) may be required. No expansion device replacements are required if the system was properly designed and operating with R-22. Refer to the Freon™ M099 Retrofit Guidelines for details.

## Freon™ M099 Product Composition

Component	Weight %
HFC-32	8.5
HFC-125	45.0
HFC-134a	44.2
n-butane (HC-600)	1.7
Isopentane (HC-601a)	0.6

ASHRAE #: R-438A



Low Temperature (LT): -25°F (-32 °C) Evaporator, Seasonal Average Condenser (70% at 80 °F/ 30% at 105 °F), 10 °F subcool liquid, 65 °F return gas

Medium Temperature (MT): 20 °F Evaporator, Seasonal Average Condenser (70% at 80 °F/ 30% at 120 °F), 10 °F subcool liquid, 65 °F return gas

Air Conditioning (A/C): 45 °F Evaporator, 115 °F Condenser, 15 °F subcool liquid, 65 °F return gas