Southeast Ventilation

Refrigeration Retrofit Project: R410A to HCR 4141
Project Address: CONFIDENTIAL
Date: May 5th 2025
Project Overview:

The refrigeration system servicing the 2-ton cooling unit originally operated using R410A. A retrofit was completed to replace R410A with HCR 4141, a hydrocarbon-based low-GWP refrigerant designed for drop-in replacement. Post-retrofit performance was evaluated based on system pressures, temperatures, amp draw, and heat transfer characteristics.

Original System – R410A
- **System Size**: 2 Ton
- **Refrigerant**: R410A
- **Model**: 13ACXN03023024
- **Condenser Coil Refrigerant Temperature Differential (ΔT)**:
  - Discharge: 94°F
  - Inlet: 82°F
  - ΔT = 12°F
- **Evaporator Coil Refrigerant Temperature Differential (ΔT)**:
  - Discharge: 51°F
  - Inlet: 61°F
  - ΔT = 10°F
- **Compressor Amp Draw**: 7.6 amps
- **Liquid Line Pressure**: ~300 psi
- **Vapor Line Pressure**: ~120 psi

Retrofit System – HCR 4141
- **Refrigerant**: HCR 4141 (hydrocarbon blend alternative to R410A)
- **Condenser Coil Refrigerant Temperature Differential (ΔT)**:
  - Discharge: 87°F
  - Inlet: 81°F
  - ΔT = 6°F
- **Evaporator Coil Refrigerant Temperature Differential (ΔT)**:
  - Discharge: 61°F
  - Inlet: 65°F
  - ΔT = 4°F

- **Compressor Amp Draw**: 4.5 amps
- **Liquid Line Pressure**: ~135 psi
- **Vapor Line Pressure**: ~50 psi

Initial performance data following the retrofit to HCR 4141 indicates a notable improvement in system efficiency and operating conditions. These early results support the effectiveness of HCR 4141 as a drop-in replacement for R410A in similar cooling systems. Please see below summary for the refrigerant retrofit.

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Summary:

The retrofit from R410A to HCR 4141 demonstrated several key improvements in system performance. Most notably, the compressor amp draw dropped from 7.6 A to 4.5 A, indicating an approximate 40% reduction in power consumption and a significant gain in energy efficiency. The operating pressures were also substantially lower with HCR 4141, which reduces mechanical stress on components and is expected to extend system lifespan. Combined, the reduced pressures and lower electrical load imply that the compressor is operating under less strain, which contributes to greater long-term reliability and system durability.