Forane®
REFRIGERANTS

Forane® 407C Refrigerant

Technical Specifications

Forane® 407C is a zero ozone depletion blend of HFC refrigerants R-32, R-125, and R-134a. It closely matches the properties of R-22 and is used in many air conditioning applications. They include:

New residential and other unitary air conditioning, non-flooded evaporator chillers. With few modifications, Forane® 407C can be used in the same equipment designed for use with R-22.

Retrofit of existing R-22 systems. However, Forane®407C should not be used as a direct, "drop-in" replacement. Also, you should not use Forane® 407C in equipment that uses a flooded evaporator because of the zeotropic behavior within the system.

Definition of Terms

Since Forane® 407C is a zeotropic blend, it helps to understand terms like bubble point, dew point, fractionation, and glide.

Bubble point, or saturated liquid temperature, is the temperature at which Forane® 407C (at constant pressure) begins to evaporate. Or in other words, the temperature where the first bubble of vapor appears in liquid Forane®407C. Bubble point is equivalent to boiling point for single component refrigerants.

- Dew point, or saturated vapor temperature, is the temperature where condensation begins (at constant pressure). Or, think of dew point as the temperature at which the last droplet of liquid evaporates and saturated gas exists. It corresponds to the condensation point of a single component refrigerant.

- Bubble point and dew point are used to describe the behavior of zeotropic blends in an evaporator and condenser. Boiling point is not used because the blend's temperature changes as it evaporates or condenses.

Fractionation describes how a refrigerant blend like Forane® 407C changes from a liquid to a vapor or vice versa. Since the components of Forane® 407C evaporate (or condense) at different rates in the evaporator (or condenser), the blend's composition constantly changes between the bubble point (-46.12°F/-43.4°C) and dew point (-33.16°F/-36.2°C at one atm). Once the temperature exceeds the dew point, Forane® 407C is in a superheated vapor state.

Glide describes the difference in temperature between the evaporator outlet and inlet due to fractionation. Glide can vary, depending on the state of the liquid refrigerant at either end of the evaporator (or condenser) or on pressure losses. At most common system pressures, Forane® 407C has a temperature glide of 9 to 12 degrees F.

Retrofitting with Forane® 407C

Although its properties closely match those of R-22, Forane® 407C is not suitable for all R-22 systems. We recommend retrofitting only positive displacement, dry expansion refrigeration and air conditioning equipment with Forane® 407C. In all cases, the mineral oil must be flushed from the system and replaced with an approved polyolester (POE) lubricant. Consult the manufacturer's guidelines for further considerations.

Retrofit Procedures

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1. 1. Gather baseline data from the system using R-22.
   2. Recover the existing R-22 charge.
   3. Drain the original oil from the system. Recharge using an approved POE lubricant.
   4. Recharge the system using R-22 and run the system to circulate the new lubricant.
   5. Recover the R-22 charge again and check the residual oil content of the lubricant. The amount of the original lubricant in the POE must be below 5%.
2. 6. Repeat Steps 3, 4, and 5 until the lubricant charge if greater than 95% POE. At this point, perform standard maintenance on the system, such as replacing the filter-drier and fixing any leaks which have been located.
3. 7. Evacuate the system using a deep vacuum (less than 500 microns).
4. 8. Charge the system with Forane® 407C. Be sure to remove the refrigerant from the cylinder as a liquid.
5. 9. Start the system and adjust controls and/or charge until you achieve desired operation. Label the system to identify the Forane® 407C charge and the lubricant used.