Forane® 410A

Forane® 410A (R-410A) is a non-ozone depleting blend of HFC refrigerants R-32 and R-125. It was developed as a replacement for many air-conditioning applications previously served by R-22. Due to its higher refrigerating capacities and operating pressures, R-410A should never be used to retrofit existing R-22 systems.

Application

Forane® 410A refrigerant is used in new residential and commercial air conditioning systems, heat pumps, dehumidifiers, and small chillers. R-410A is also being considered in some medium temperature refrigeration applications.

Properties & Performance

R-410A is a near-azeotropic HFC refrigerant blend that meets the industry's needs for many new air conditioning systems. It has an A1 safety rating (lowest levels of toxicity / flammability), as assigned by ASHRAE, as well as zero ozone depletion potential.

R-410A is a higher pressure and capacity refrigerant than R-22, requiring equipment and components specifically designed to accommodate the resulting higher system pressures and lower flow rates needed. Typical operating pressures of an R-410A system will be 50% to 60% higher than those in an R-22 system at comparable operating conditions. R-410A also has significantly higher volumetric refrigerating capacity than R-22 under most operating conditions. This allows OEMs to manufacture equipment of similar capacity and efficiency to R-22 in a smaller package.

Lubrication

To ensure proper oil return, R-410A is typically used with polyolester (POE) oil. The HFC components of R-410A are not miscible with mineral oil or alkylbenzene. Manufacturers provide new R-410A systems and compressors already charged with the appropriate lubricant. Care must be taken when handling POE lubricants because they are hygroscopic, which means that they can readily absorb moisture from the air. This is especially a concern when handling POEs in humid environments. High levels of moisture in the system can lead to oil degradation and system failure.

Charging

Due to the zeotropic nature of the R-410A blend, it should only be charged as liquid to prevent fractionation (changes in the designed refrigerant composition, See Definitions - Fractionation). In situations where vapor would normally be charged into a system, a valve should be installed in the charging line to flash liquid from the cylinder into vapor. Never introduce liquid into a running system, as compressor damage may result. R-410A requires the use of manifold gauge sets, recovery machines, and cylinders specifically designed and rated for its higher pressures.

Retrofit

Due to the significantly higher operating pressures and capacities of R-410A, it should never be used as a retrofit for R-22 systems. R-410A should only be used with equipment designed specifically for use with R-410A.

PROPERTIES	R-410A
Average Molecular Weight (g/mol)	72.6
Normal Boiling Point (°F)	-60.6
Critical Temperature (°F)	160.4
ASHRAE Safety Group Classification	A1
Ozone Depletion Potential (ODP)	0
Global Warming Potential (GWP)	2,088