



PRESSURE-TEMPERATURE CHART

TEMP (°F)	National R-438A	
	Liquid (psig)	Vapor (psig)
-10	19	1
-3	24	7
2	29	13
8	34	18
13	39	23
17	44	27
21	49	31
25	54	35
29	59	39
33	64	42
36	69	46
40	74	49
43	79	52
46	84	55
49	89	58
52	94	61
54	99	63
57	104	66
60	109	68
62	114	71
64	119	73
67	124	75
69	129	78
71	134	80
74	139	82
76	144	84
78	149	86
80	154	88
82	159	90
84	164	92
86	169	94
87	174	95
89	179	97
91	184	99
93	189	101
94	194	102
96	199	104
98	204	105
99	209	107
101	214	109
103	219	110

Values from NIST Refprop 8.0

R-438A

APPLICATIONS:

- Commercial Air Conditioning & Chillers
- Residential Air Conditioning & Chillers
- Low Temperature Refrigeration
- Medium Temperature Refrigeration

PERFORMANCE:

- Zeotropic HFC Blend
- Minor equipment modifications
- No expansion valve or changing of pipe sizing
- Existing TXVs is suitable (some adjustments may be required)
- No suction or liquid line set changes
- Changing of lubricant may not be required
- Compatible with mineral, alkylbenzene and polyolester oils

Physical Properties of Refrigerants

Refrigerant Classification	HFC
Molecular Weight	99.1
Boiling Point (1atm, °F)	-44.2
Critical Pressure (psia)	185.48
Critical Temperature (°F)	182.73
Critical Density (lb./ft ³)	1150.81
Liquid Density (70° F, lb./ft ³)	71.6
Vapor Density (bp, lb./ft ³)	72.7
Heat of Vaporization (bp, BTU/lb.)	69.6
Specific Heat Liquid (70° F, BTU/lb. °F)	348
Specific Heat Vapor (1atm, 70° F, BTU/lb. °F)	.253
Ozone Depletion Potential (CFC 11 = 1.0)	0
Global Warming Potential (CO ₂ = 1.0)	2,265
ASHRAE Standard 34 Safety Rating	1

Temperature Glide (°F)

NATIONAL R-438A

Refrigerant Classification	HFC
Molecular Weight	99.1
Boiling Point (1atm, °F)	-44.2
Critical Pressure (psia)	185.48
Critical Temperature (°F)	182.73
Critical Density (lb./ft ³)	1150.81
Liquid Density (70° F, lb./ft ³)	71.6
Vapor Density (bp, lb./ft ³)	72.7
Heat of Vaporization (bp, BTU/lb.)	69.6
Specific Heat Liquid (70° F, BTU/lb. °F)	348
Specific Heat Vapor (1atm, 70° F, BTU/lb. °F)	.253
Ozone Depletion Potential (CFC 11 = 1.0)	0
Global Warming Potential (CO ₂ = 1.0)	2,265
ASHRAE Standard 34 Safety Rating	1
Temperature Glide (°F)	7-8

AVAILABLE SIZES

Type	Size
Cylinder	25 lb



National Refrigerants, Inc.

11401 Roosevelt Boulevard
Philadelphia, PA 19154
Tel: 800.262.0012
fax: 215.698.7466
web: www.refrigerants.com
e-mail: info@refrigerants.com

General Considerations:

- **Fixed Expansion Devices.** Systems with orifice tubes may not perform exactly the same when retrofitted since high and low side pressures and other refrigerant properties are slightly different from R-22. Replacement of the orifice tube, however, is not usually required.
- **TXVs.** Properly sized R-22 TXVs will most likely be suitable for use with R-438A. If the valve is running at the limit of its capacity with R-22, it may appear to be undersized after retrofit and may need to be replaced.
- **Filter Dryer.** A filter drier should be added to a system as part of the retrofit process. If one already exists, the filter drier should be replaced with the same type currently in use.
- **Lubricant.** R-438A is compatible with mineral oil, alkylbenzene oil and polyolester oil. The hydrocarbon component in R-438A will help move mineral oil around most systems that do not have receivers. For any system that has difficulty with oil return, the addition of a few ounces of POE oil will help keep the mineral oil moving back to the compressor.
- **Performance.** R-438A may lose some capacity compared to R-22.* In a properly designed system, however, this will result in slightly longer run times. Low side pressure will be a few PSI lower than R-22 and high side pressures will be very similar.
- **Seals and O-Rings.** For any retrofit job it is recommended to change Schrader valve cores, o-rings on caps, and any seals found to be leaking before the retrofit takes place.



Retrofit Procedures:

1. Collect baseline data for operation of the system with existing R-22 charge. Make note of any obvious performance problems with the system. Leak check the system as well, identifying any repairs to perform during the retrofit process.
2. Disconnect electrical power to system and properly recover the R-22 charge. Do not top off a system that contains R-22 with R-438A. Record the weight of R-22 recovered.
3. Perform any required maintenance or repair operations previously identified, including replacement of Schrader cores and filter drier.
4. If desired, pressurize and leak check the system by preferred method. Evacuate the system down to 250 microns and confirm that it holds.
5. Remove liquid R-438A from the cylinder and charge the system to about 90% to 95% of the original R-22 charge size.
6. Restart the system and allow it to come to normal operation conditions. Compare the new operation data to the R-22 baseline data. Adjust charge or system settings as needed.
7. Place a label on the system indicating that it contains R-438A refrigerant and the oil type.

Servicing Considerations:

- R-438A can be added to a system during servicing, if required, without recovering the existing R-438A charge. Verify system performance. If the system has a critical charge, however, it is recommended that any remaining refrigerant be removed prior to servicing.
- This refrigerant blend must be removed from the cylinder as a liquid.
- Follow industry approved best practices for recovery of refrigerant and achieve full vacuum on the system at the end of the recovery process. Avoid mixing refrigerants during recovery.
- Recovery of R-438A requires a recovery cylinder with a service pressure of 260 psig minimum.

* Capacity loss will be greater in high ambient temperatures.

