


FORANE® 134A

- Non-ozone depleting refrigerant.
- Efficient refrigerant in various air conditioning and medium temperature refrigeration applications.
- One of the components of Forane® refrigerant blends (407C, 404A, 407A, 427A).

MAIN PROPERTIES

Composition	R-134a (100%) 
Type	HFC Single component fluid
ASHRAE safety classification	A1 - non-toxic and non-flammable
GWP*	1430
Recommended lubricant	POE or PAG (auto)

* GWP value for 100-year time horizons according to IPCC 2007 Fourth Assessment Report

MAIN APPLICATIONS

- Air conditioning: automotive air conditioning, stationary air conditioning (large size chillers, air conditioners)
- Medium temperature refrigeration : commercial refrigeration, food processing and storage, industrial refrigeration, transport refrigeration
- High temperature heat pumps

PERFORMANCE

Forane® 134a provides good energy efficiency to the systems even at high condensing temperatures.

LUBRICATION

Polyolester (POE) or polyalkylene glycol (PAG - only for auto A/C) lubricants must be used with Forane® 134a since it is not miscible with mineral oil or alkylbenzene lubricants. POE or PAG oils absorb moisture quickly when left exposed to the atmosphere. Handle them carefully and avoid prolonged exposure to air.

CHARGING

Charging with Forane® 134a can be done either as a vapor or a liquid. End-users should check with their equipment manufacturers' guidelines for specific charging instructions.

DELIVERIES

Forane® 134a can be delivered in various packaging:

- **bulk:** ISO container (20 tons) or ton-tank (950 kg).
- **pallet of 40 or 100 disposable cylinders** (13.6 kg each cylinder). This disposable packaging is commercialized according to local regulations.
- **other packaging available under requests.**

THERMODYNAMIC PROPERTIES

This information is based on values calculated using the NIST REFPROP Database (NIST Standard Reference Database 23, Version 9.0, Lemmon, E. W., Huber, M. L., and McLinden, M. O., Thermophysical Properties Division, 2010).

Critical temperature: **101°C**

Saturation points (bubble and dew points at same composition).

Temperature (°C)	Pressure (bar)	Liquid Phase Density (kg/m ³)	Vapor Phase Density (kg/m ³)	Liquid Phase Enthalpy (kJ/kg)	Vapor Phase Enthalpy (kJ/kg)	Liquid Phase Entropy (kJ/(kg.K))	Vapor Phase Entropy (kJ/(kg.K))
-40	0,5	1418	3	148	374	0,80	1,76
-35	0,7	1403	4	154	377	0,82	1,76
-30	0,8	1388	4	161	380	0,85	1,75
-25	1,1	1373	6	167	383	0,87	1,75
-20	1,3	1358	7	174	387	0,90	1,74
-15	1,6	1343	8	180	390	0,93	1,74
-10	2,0	1327	10	187	393	0,95	1,73
-5	2,4	1311	12	193	396	0,98	1,73
0	2,9	1295	14	200	399	1,00	1,73
5	3,5	1278	17	207	401	1,02	1,72
10	4,1	1261	20	214	404	1,05	1,72
15	4,9	1243	24	220	407	1,07	1,72
20	5,7	1225	28	227	410	1,10	1,72
25	6,7	1207	32	235	412	1,12	1,72
30	7,7	1188	38	242	415	1,14	1,71
35	8,9	1168	43	249	417	1,17	1,71
40	10,2	1147	50	256	419	1,19	1,71
45	11,6	1125	58	264	422	1,21	1,71
50	13,2	1102	66	272	423	1,24	1,71
55	14,9	1078	76	279	425	1,26	1,71
60	16,8	1053	87	288	427	1,28	1,70
65	18,9	1026	100	296	428	1,31	1,70

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See MSDS for Health & Safety Considerations