Klea® 134a Data Sheet – SI Units

Physical Property Data for Klea® 134a

Property		Units	Value
Molecular Weight			102.03
Boiling Point	(1atm)	°C	-26.074
Melting Point		°C	-103
Critical Temperature		°C	101.03
Critical Pressure bara		bara	40.56
Critical Density		kg/m^3	508
Vapour Pressure	(25°C)	bara	6.652
Latent Heat of Vapourisation at nBpt		kJ/kg	216.77
Saturated Vapour Density at nBpt		kg/m^3	5.229
Coeff.Vol.Therm.Exp.	(LIQ,0-20°C)	$°C^{-1}$	-10.002766
Speed of Sound	(sat. LIQ)(25°C)	m/s	503
Adiabatic Exponent	(VAP)(25°C/2.9bar)		1.142
Acentric Factor			0.327
Dielectric Constant	(VAP 25°C/1 atm)		1.014
Dielectric Strength	(RI2=1)		0.5
Specific Resistivity (LIQ) AC		Mohm.cm	180
Specific Resistivity (LIQ) DC		Mohm.cm	66000
Purity		%wt	99.98
Solubility In Water (20°C/1atm)		%wt	0.0773

Equation of State (Martin-Hou)

$$Pr = \frac{XT_r}{V_r - B} + \sum_{i=1,4} \frac{(A_i + B_i T_r + C_i \exp(-KT_r))}{(V_r - B)^{(i+1)}}$$

Where :

$T_r = T/T_c$, $P_r = P/P_c$, $V_r = V/V_c = V.RHO_c$
X = 3.818866
B = 0.154030007
K = 7.479441939181823
T_c, P_c, RHO_c = 374.18(K), 40.56(bara), 508.00(kg/m^3)

A_1, B_1, C_1 = -10.6756547802, 5.21550874265, -531.021431657
A_2, B_2, C_2 = 12.3296910242, -7.4900230467, -1021.1029703
A_3, B_3, C_3 = -9.88578225598, 6.9362804137, 2523.40618122
A_4, B_4, C_4 = 2.8141385511, -2.03421178211, -1020.8091303

Extended Antoine Equation

$$Ln(P) = A + \frac{B}{C + T} + DT + ELn(T)$$

P = Vapour pressure bara
T = Temperature K

A = 102.5338784
B = -5238.876
C = 0
D = 0.02398227
E = -15.8343842

Latent Heat Vaporisation

$DH_{vap} = A + Bx + Cx^2 + Dx^3 + Ex^4$
Where $x = (1-(T/T_c))^{(1/3)}$

A = 0
B = 163.7313
C = 460.3925
D =-510.952
E = 219.1886

T = Temperature K
T_c = Critical Temperature K

DH_{vap} kJ/kg

Ideal Gas Heat Capacity

$C_p(ideal) = A + BT + CT^2 + DT^3 + E/T^2$

A = 0.1345064
B = 0.003258432
C = -4.2343E-06
D = 3.8408E-09
E = -1.370898

T = Temperature K
d vap = lb/cu ft

C_p (ideal) kJ/kg.K

Saturated Liquid Enthalpy

$h_{liq} = A + Bx + Cx^2 + Dx^3 + Ex^4$
where $x = (1-(T/T_c))^{(1/3)}$

A = 249.0896
B = 189.8021
C = -753.47
D = 261.1633
E = -157.687

T = Temperature K
T_c = Critical Temperature K
H_{liq} kJ/kg

Liquid Density

$D_{liq} = A + Bx + Cx^2 + Dx^3 + Ex^4$
Where $x = (1 - (T/Tc))^{(1/3)}$

A = 508
B = 967.57693
C = 298.02172
D = 79.877831
E = 89.838713

T = Temperature K
T_c = Critical Temperature K
d_{liq} kg/m^3

Liquid Viscosity

$Ln\ (\mu_{liq}) = A + B/T + CT^2 + D/T^3$

A = -9.707292
B = 1140.7291
C = 0.0282451
D = -4.6720E-05

T = Temperature K
μ_{liq} $_c$P

Liquid Thermal Conductivity

$K_{liq} = A + BT + CT^2 + DT^3$

A = 0.295701
B = -0.001285
C = 2.7941E-06
D = -2.9630E-09

T = Temperature K
Tc = Critical Temperature K
K_{liq} W/m.K

Surface Tension

$\sigma = A\ (1-(T/T_c))^{1.26}$

A = 60.21747

T = Temperature K
Tc = Critical Temperature K
σ mN/m

Saturated Vapour Density

$d_{vap} = A + Bx + Cx^2 + Dx^3 + Ex^4$
Where $x = (1-(T/Tc))^{(1/3)}$

-50° TO 0°C
A = -113.501
B = 3335.18
C = -11368.8
D = 13688.75
E = -5583.8

T = Temperature K
T_c = Critical Temperature K
d_{vap} kg/m^3

0° TO +80°C
A = 388.752
B = 84.07428
C = -3500.71
D = 5252.284
E = -2202.55

T = Temperature K
T_c = Critical Temperature K
d_{vap} kg/m^3

Ideal Gas Viscosity

$\mu_{ig} = A + BT$

A = 0.000720275
B = 0.000037581

T = Temperature K
μ_{ig} $_c$P

Vapour Viscosity (Saturated Vapour)

$\mu_{vap} = A + BT + CT^2 + DT^3$

A = -0.32671694
B = 0.003456914
C = -1.1836E-05
D = 1.3599E-08

T = Temperature K
μ_{vap} $_c$P

Ideal Gas Thermal Conductivity

$K_{ig} = A + BT$

A = -0.011484
B = 0.000083646

T = Temperature K
K_{ig} W/m.K

Vapour Thermal Conductivity (Saturated Vapour)

$K_{gas} = A + BT + CT^2 + DT^3$

A = -0.52938315
B = 0.005516987
C = -1.8908E-05
D = 2.1859E-08

T = Temperature K
K_{gas} W/m.K

Vapour Speed of Sound (Saturated Vapour)

$\mu = A + BT + CT^2 + DT^3 + E/T$

A = 1815.1584
B = -10.48764
C = 0.03071408
D = -3.4566E-05
F = -106745.3

T = Temperature K
μ = m/s

TEMP °C	LIQUID ENTH kJ/kg	LATENT HEAT kJ/kg	SAT.VAP ENTH kJ/kg	LIQUID Cp J/g.K	ID.GAS Cp J/g.K
-50	36.22	231.60	267.82	1.2242	0.6934
-40	48.55	225.59	274.14	1.2423	0.7127
-30	61.07	219.31	280.38	1.2623	0.7316
-20	73.80	212.73	286.53	1.2846	0.7503
-10	86.77	205.79	292.56	1.3094	0.7687
0	100.00	198.44	298.45	1.3375	0.7869
10	113.53	190.61	304.15	1.3694	0.8048
20	127.41	182.20	309.61	1.4061	0.8226
25	134.49	177.74	312.23	1.4266	0.8314
30	141.67	173.09	314.76	1.4489	0.8402
40	156.41	163.09	319.50	1.4996	0.8576
50	171.70	151.96	323.67	1.5611	0.8749
60	187.68	139.32	327.00	1.6376	0.8921
70	204.53	124.51	329.03	1.7364	0.9092
80	222.52	106.27	328.79	1.8695	0.9263

TEMP °C	VAPOUR PRESS bara	LIQUID DENSITY kg/m3	LIQUID VISCOSITY cP	LIQ.THERM COND W/m.K	SURF TENSION mN/m
-50	0.295	1445	0.54	0.115	19.2
-40	0.512	1417	0.46	0.110	17.6
-30	0.844	1388	0.40	0.106	16.1
-20	1.327	1358	0.35	0.101	14.5
-10	2.005	1327	0.31	0.097	13.0
0	2.927	1295	0.27	0.093	11.6
10	4.144	1261	0.24	0.089	10.1
20	5.715	1225	0.21	0.084	8.76
25	6.652	1207	0.20	0.082	8.09
30	7.701	1187	0.19	0.080	7.42
40	10.167	1147	0.17	0.076	6.13
50	13.183	1102	0.15	0.072	4.89
60	16.824	1053	0.13	0.068	3.72
70	21.170	996	0.11	0.064	2.61
80	26.308	929	0.10	0.060	1.60

TEMP °C	SATVAP DENSITY kg/m^3	IDEAL GAS VISCOSITY cP	SATVAP VISCOSITY cP	IDEAL GAS THERM COND W/m.K	SATVAP THERM COND W/m.K	SPEED OF SOUND m/s
-50	1.650	0.0091	0.0072	141.8		
-40	2.767	0.0095	0.0080	143.6		
-30	4.426	0.0099	0.0089	145.0		
-20	6.787	0.0102	0.0105	0.0097	0.0101	146.1
-10	10.040	0.0106	0.0112	0.0105	0.0114	146.7
0	14.430	0.0110	0.0116	0.0114	0.0123	146.8
10	20.220	0.0114	0.0119	0.0122	0.0130	146.4
20	27.770	0.0117	0.0121	0.0130	0.0137	145.2
25	32.340	0.0119	0.0122	0.0135	0.0140	144.4
30	37.510	0.0121	0.0124	0.0139	0.0144	143.3
40	50.000	0.0125	0.0127	0.0147	0.0153	140.5
50	66.200	0.0129	0.0133	0.0155	0.0165	136.7
60	87.330	0.0132	0.0141	0.0164	0.0182	131.6
70	115.610	0.0136	0.0153	0.0172	0.0205	125.2
80	155.090	0.0140	0.0169	0.0181	0.0235	117.3

The correlations in this document should not be used outside the applicable ranges quoted. Please contact Mexichem for further advice.

Mexichem
Refrigerants

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