

SOLKANE® - INFORMATION SERVICE

Solkane® 404A Thermodynamics

SOLVAY FLUOR GMBH

Technical Service - Refrigerants -

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1 Units and Symbols

Symbol	Unit	Meaning/Definition
<i>A, B</i>	[-]	Parameters of the Wagner equation
<i>C</i>	[-]	Parameter of the equation for density of boiling liquid
<i>D</i>	[kJ/(kgK)]	Parameter of the equation for specific heat capacity in an ideal gas state
<i>E, F, G</i>	[-]	Parameter of the Martin-Hou equation
<i>I</i>	[-]	Parameter of the equation for dynamic viscosity of vapour
<i>J</i>	[-]	Parameter for the boiling liquid enthalpy equation
<i>K</i>	[kJ/(kgK)]	Parameter for the boiling liquid entropy equation
<i>L</i>	[Pa s /K]	Parameter of the equation for dynamic viscosity of liquid
<i>M</i>	[W/(m K)]	parameter of the equation for thermal conductivity of the saturated liquid
<i>N</i>	[W/(m K)]	Parameter of the equation for thermal conductivity of the saturated vapour
<i>O</i>	[N/(m K)]	Parameter of the equation for surface tension
<i>P</i>	[kJ/(kg K)]	parameter of the equation for specific heat capacity of the saturated liquid
<i>R</i>	[bar m ³ /(kg K)]	Gas constant
<i>b</i>	[m ³ /kg]	Parameter of the Martin-Hou equation
<i>c</i>	[kJ/(kg K)]	Specific heat capacity
<i>e</i>	[kJ/kg]	Specific exergy
<i>h</i>	[kJ/kg]	Specific enthalpy
<i>k</i>	[-]	Parameter of the Martin-Hou equation
<i>p</i>	[bar]	Pressure
<i>r</i>	[kJ/kg]	Enthalpy of vaporisation
<i>s</i>	[kJ/(kg K)]	Specific entropy
<i>t</i>	[°C]	Temperature
<i>t</i>	[K]	Temperature
<i>v</i>	[m ³ /kg]	Specific volume
<i>η</i>	[Pa s]	Dynamic viscosity
<i>λ</i>	[W/(m K)]	Thermal conductivity
<i>ρ</i>	[kg/m ³]	Density
<i>σ</i>	[N/m]	Surface tension

Indices

'	Liquid
''	Vapour
<i>c</i>	critical value
<i>r</i>	reduced value
<i>i</i>	run index
<i>u</i>	ambient conditions
<i>p</i>	Isobar
<i>v</i>	Isochor
<i>0</i>	ideal gas

2 Introduction

The refrigerant Solkane[®]404A is a long-term replacement for R502 and R22 in low temperature refrigeration. As R502 consists of 48.8% R22 and 51.2% R115 by weight, its production has been stopped since several years in developed countries¹ because of its content of R115, a chlorofluorocarbon (CFC) with an ozone depletion potential (ODP) of 0.6. The ozone depletion potential of the hydrochlorofluorocarbon (HCFC) R22 is reduced to a fraction of the ODPs of chlorofluorocarbons. R22 is therefore regarded as an intermediate solution. The use of HCFCs will be gradually reduced and these products will finally be banned. By 2030 the production of HCFCs will be phased out in developed countries¹. Accelerated phase out scenarios may apply in selected countries especially in Europe.

Solkane[®]404A is a near-azeotrope blend with a temperature glide of approx. 0.8 K. It consists of 44 % R125 (CF₃CHF₂), 52 % R143a (CF₃CH₃) and 4 % R134a (CF₃CH₂F) by weight. The hydrofluorocarbons (HFC) R125, R143a and R134a contain only carbon, fluorine and hydrogen. They do not contribute to the depletion of the stratospheric ozone layer. The global warming potential is significantly reduced compared to the CFCs.

Solkane[®]404A can be used in new equipment and also in retrofitted R502 equipment.

Solkane[®]404A is non-flammable. Its toxicity is low and comparable to that of R502. The environmental behaviour and the handling of Solkane[®]404A are described in the material safety data sheet² and in the environmental compatibility brochure³.

¹ In the sence of Montreal Protocol (1995 Vienna meeting)

² Order by Fax : +49 (0) 511 857 2178

³ see Thermodynamics Solkane 507

3 Thermophysical Values

3.1 Physical Data

Chemical name	[-]	Pentafluoroethane/ 1,1,1-Trifluoroethane 1,1,1,2-Tetrafluoroethane
Chemical formula	[-]	CF ₃ CHF ₂ /CF ₃ CH ₃ /CF ₃ CH ₂ F
CAS No.	[-]	150743-07-0
Molecular weight	[kg/kmol]	97.6
Boiling point ¹	[°C]	-46.6
Temperature glide	[K]	0.8
Freezing point ¹	[°C]	-101
Critical temperature	[°C]	72.1
Critical pressure	[bar]	37.3
Saturated liquid density ²	[kg/m ³]	1044
Saturated vapour density ²	[kg/m ³]	65.27
Vapour pressure ²	[bar]	12.45
Enthalpy of vaporization ²	[kJ/kg]	140.1
Liquid thermal conductivity ²	[W/m K]	0.066
Surface tension of liquid ²	[N/m]	4.437 x10 ⁻³
Specific heat capacity of liquid ²	[kJ/(kgK)]	1.541
Specific heat capacity of vapour ²	[kJ/(kgK)]	1.200
Liquid viscosity ²	[Pa s]	0.1245 x10 ⁻³
Saturated vapour viscosity ²	[Pa s]	12.097 x10 ⁻⁶
Flammability limit in air ¹	[Vol.-%]	None ³

¹ at 1.013 bar

² at 25°C and saturated conditions

³ according to DIN 51649 and UL 2128

3.2 Basis of Thermodynamic Calculation

The thermodynamic calculation equations have been adapted to ISO/DIS 17584, as at 12/2003. They fulfil this standard with the exception of the thermal capacities in a saturated state of $0.62 < T_R < 0.90$ and in an overheated state of $0.05\text{MPa} < p < 2.5\text{MPa}$ and $T_{\text{max}} = 420\text{K}$.

The Wagner equation

$$\ln p_R = \left(A_1(1-T_R) + A_2(1-T_R)^{B_1} + A_3(1-T_R)^{B_2} + A_4(1-T_R)^{B_3} + A_5(1-T_R)^{B_4} + A_6 \right) / T_R \quad (1)$$

where $T_R = \frac{T}{T_c}$ and $p_R = \frac{p}{p_c}$

was chosen to describe the bubble and dew pressures. The constants and values for the critical pressure p_c and the critical temperature T_c are as follows:

	Boiling line	Dew line
A_1 [-]	-7.5388152	-7.7843482
A_2 [-]	3.11351196	4.5429514
A_3 [-]	-6.2846755	-10.59339
A_4 [-]	10.007636	16.350124
A_5 [-]	-9.016329	-12.872483
A_6 [-]	8.6689E-4	-5.51545E-4
B_1 [-]	1.5	1.5
B_2 [-]	2.0	2.0
B_3 [-]	2.5	2.5
B_4 [-]	3	3
T_c [K]	345.20	
p_c [bar]	37.29	

The density of the boiling liquid is described by the equation

$$\rho'_R = 1 + C_1(1-T_R)^{1/3} + C_2(1-T_R)^{2/3} + C_3(1-T_R) + C_4(1-T_R)^{4/3} \quad (2)$$

where $\rho'_R = \frac{\rho'}{\rho_c}$.

The constants and the value for the critical density are:

C_1 [-]	1.667096	C_4 [-]	1.185236
C_2 [-]	1.579917	ρ_c [kg/m ³]	486.53
C_3 [-]	-1.572306		

The specific heat capacity under ideal gas conditions is represented by the equation

$$c_p^0 = D_1 + D_2T + D_3T^2 + D_4T^3 + D_5/T \quad (3)$$

The coefficients are:

D ₁	[kJ/(kg K)]	2.68898E-01	D ₄	[kJ/(kg K ³)]	-1.32660E-09
D ₂	[kJ/(kg K ²)]	2.18304E-03	D ₅	[kJ/kg]	-4.83918E00
D ₃	[kJ/kg]	-6.45482E-08			

The equation of state according to Martin-Hou is

$$p = \frac{RT}{z} + \frac{E_1 + F_1T + G_1e^{-kT_R}}{z^2} + \frac{E_2 + F_2T + G_2e^{-kT_R}}{z^3} + \frac{E_3}{z^4} + \frac{E_4 + F_4T + G_4e^{-kT_R}}{z^5} \quad (4)$$

and is a good representation of the pV-T relationship for Solkane® 404A. The coefficients of the equation are:

E ₁	[-]	-1.4247258E-03	F ₂	[-]	2.9544375E-09
E ₂	[-]	-1.2414142E-06	F ₄	[-]	5.3982792E-14
E ₃	[-]	-3.3442886E-10	G ₁	[-]	-2.4724702E-02
E ₄	[-]	-2.0132025E-11	G ₂	[-]	-5.4532895E-05
F ₁	[-]	2.9147437E-6	G ₄	[-]	1.4649269E-09
B	[m ³ /kg]	-1.0932E-03	k	[-]	5.475
R	[bar m ³ /(kgK)]	8.518616e-04			

with $z = v - b$. The equation for specific heat capacity under ideal gas conditions (3) and the thermal equation of state (4) form the basis of the specific enthalpy and entropy calculation.

$$h = H_0 + (pv - RT) + D_1T + D_2 \frac{T^2}{2} + D_3 \frac{T^3}{3} + D_4 \ln T + \frac{E_1}{z} + \frac{E_2}{2z^2} + \frac{E_3}{3z^3} + \frac{E_4}{4z^4} + e^{-kT_R} \cdot (1 + k \cdot T_R) \cdot \left(\frac{G_1}{z} + \frac{G_2}{2z^2} + \frac{G_4}{4z^4} \right) \quad (5)$$

and

$$s = S_0 + R \ln \left(\frac{zp_l}{RT} \right) + D_1 \cdot \ln T + D_2T + D_3 \frac{T^2}{2} - \frac{D_4}{T} - \left(\frac{F_1}{z} + \frac{F_2}{2z^2} + \frac{F_4}{4z^4} \right) + \frac{k}{T_c} e^{-kT_R} \left(\frac{G_1}{z} + \frac{G_2}{2z^2} + \frac{G_4}{4z^4} \right) \quad (6)$$

with $z = v - b$ and $p_r = 1,013 \text{ bar}$.

For the boiling liquid, enthalpy and entropy are calculated with the following equations :

$$h' = J_1 + J_2(1 - T_R) + J_3(1 - T_R)^2 + J_4(1 - T_R)^3 + J_5(1 - T_R)^4 + J_6(1 - T_R)^5 \quad (7)$$

$$s' = 1 + K_1 t + K_2 t^2 + K_3 t^3 + K_4 t^4 \quad (8)$$

The temperature t for the calculation of the entropy is in °C and the parameters for both integrated formulas are :

J_1	[-]	328.83888	J_6	[-]	-31504.75
J_2	[-]	-1017.1928	K_1	[kJ/(kgK ²)]	4.9471214E-03
J_3	[-]	4316.4068	K_2	[kJ/(kgK ³)]	3.8853347E-06
J_4	[-]	-18140.945	K_3	[kJ/(kgK ⁴)]	9.6424012E-08
J_5	[-]	38511.725	K_4	[kJ/(kgK ⁵)]	-9.2780376E-10

If neither the kinetic nor the potential energies are taken into account, the specific exergy may be found by the following equation:

$$e = h - h_u - T_u(s - s_u) \quad (9)$$

where the subscript u indicates ambient conditions.

The saturation pressure of the substance at $T_u = 290$ K serves as the reference pressure.

The integration constants h_u and s_u are found by letting

$$h'_{(t=0^\circ\text{C})} = 200.0 \text{ kJ/kg}$$

$$s'_{(t=0^\circ\text{C})} = 1.000 \text{ kJ/(kgK)}$$

$$H_0 = 253.43$$

$$S_0 = -0.3164$$

to be

$$h_u = 224.02 \text{ kJ/kg}$$

$$s_u = 1.0832 \text{ kJ/(kg K)}$$

so the specific exergy is $e = 0$ according to existing agreements.

3.3 Transport Properties

3.3.1 Dynamic Viscosity of Saturated Liquid

The viscosity of the saturated liquid of Solkane[®]404A was measured within the temperature range of -50 to 60 °C. The following regression equation is valid for the liquid phase:

$$\ln\left(\frac{\eta'}{10^{-3}}\right) = L_0 + L_1 t + L_2 t^2 + L_3 t^3 \quad (10)$$

with t in °C and η' in 10^{-3} Pa s. The coefficients are:

$$\begin{array}{ll} L_0 = & -1.73999 \quad [\text{Pa s}] \\ L_1 = & -0.013554 \quad [\text{Pa s/K}] \\ L_2 = & -4.7589\text{e-}6 \quad [\text{Pa s/K}^2] \\ L_3 = & -1.0953\text{e-}7 \quad [\text{Pa s/K}^3] \end{array}$$

Saturated liquid viscosity η' in 10^{-3} Pa s

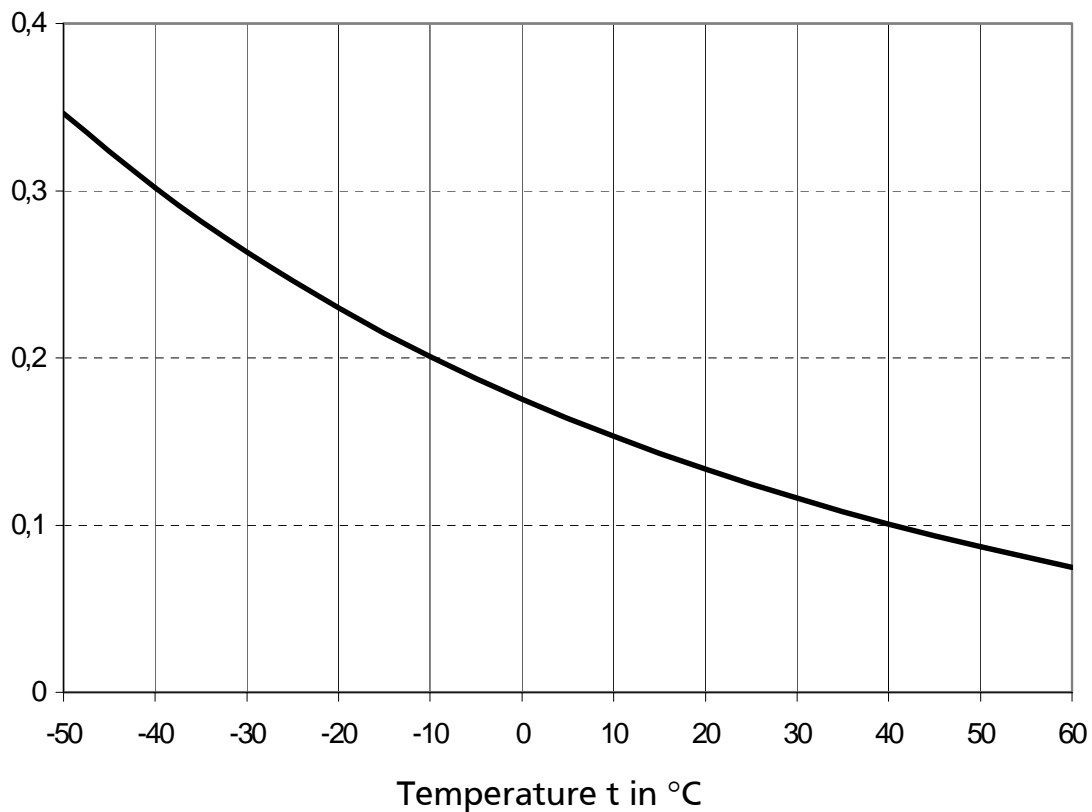


Figure 1: Dynamic viscosity of the saturated liquid

3.3.2 Dynamic Viscosity of Saturated and Superheated Vapour

The viscosity of the saturated and superheated vapour of Solkane®404A was measured in a temperature range of -50 to 50°C. The data can be represented by the following equations

$$\eta = \eta_0 + \Delta\eta \quad (11)$$

with

$$\eta_0 = 2.6696 \times 10^{-2} \times \frac{(MT)^{\frac{1}{2}}}{\sigma^2 \Omega_\eta T^*}, \quad T^* = \frac{kT}{\varepsilon} \text{ and}$$

$$\Omega(T^*) = \exp[0.45667 - 0.53955(\ln(T^*)) + 0.187265(\ln T^*)^2 - 0.03629(\ln T^*)^3 + 0.00241(\ln T^*)^4] \quad (12 \text{ a-c})$$

$$\Delta\eta = T_R^{2.2} \left[\ln(1.65 + \rho_{R0}^{0.8}) \right]^{1.6} \left[e^{\left(1 - \frac{0.78}{T_c}\right) \rho_{r0}} - 1 \right] (F \cdot z_c \cdot \zeta)^{-1}$$

$$z_c = \frac{p_c V_c}{RT_c} \quad \text{and} \quad \rho_{R0} = \frac{\rho - \rho_0}{\rho_c} \quad \text{and} \quad F = 1 \text{ for R404A as a light polar agent.} \quad (12 \text{ d-f})$$

In equation (12) the constants are as follows .

R the universal gas constant	= 8314	[J kmol ⁻¹ K ⁻¹]
ρ_c the critical density	= 484.50	[kg/m ³]
ρ_0 the density at 1.013bar and temperature as defined by T		[kg/m ³]
T_c the critical temperature	= 345.25	[K]

The constants of equation (11) where determined to be

$$\begin{aligned} \zeta &= 42429.18 \text{ [1/(Pa s)]} \\ \sigma &= 0.4968 \text{ [nm]} \\ \varepsilon/k &= 279.31 \text{ [K]} \end{aligned}$$

Saturated vapor viscosity $\epsilon\eta''$ in 10^{-6} Pa s

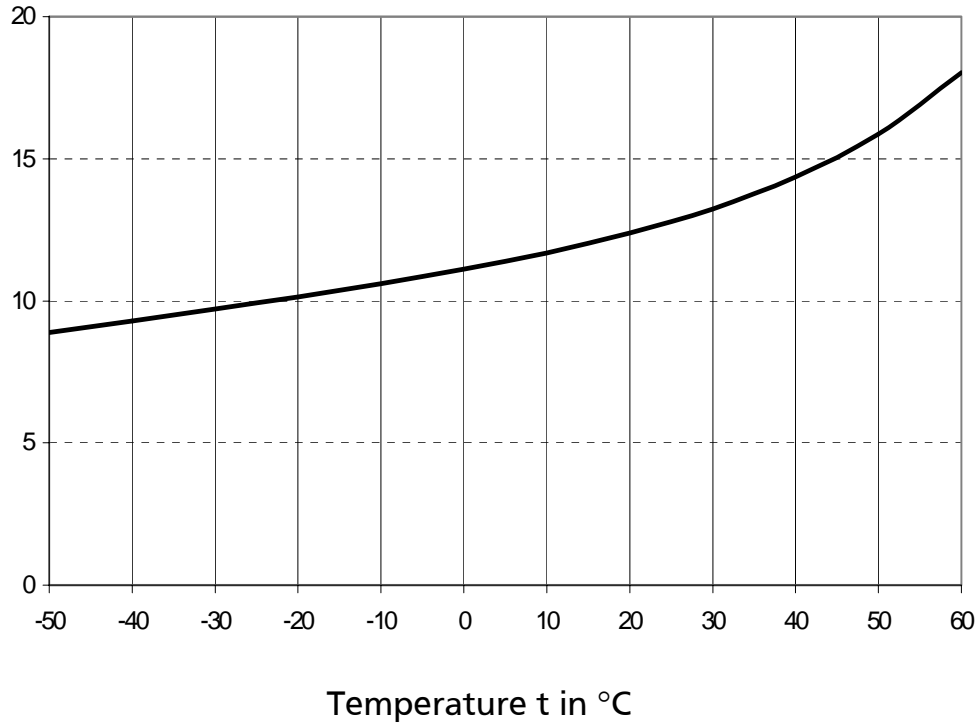


Figure 2: Dynamic viscosity of saturated vapour

3.3.3 Thermal Conductivity of Saturated Liquid

The thermal conductivity of saturated liquid can be expressed with the regression equation

$$\lambda' = M_0 + M_1 t \quad (13)$$

where t is in °C and λ' in $10^{-3}\text{W}/(\text{mK})$. The coefficients of the equation are:

$$M_0 = 76.009 \quad [10^{-3}\text{W}/(\text{mK})] \quad M_1 = -0.4024 \quad [10^{-3}\text{W}/(\text{mK}^2)]$$

Thermal conductivity of saturated liquid λ' in $10^{-3}\text{ W}/(\text{mK})$

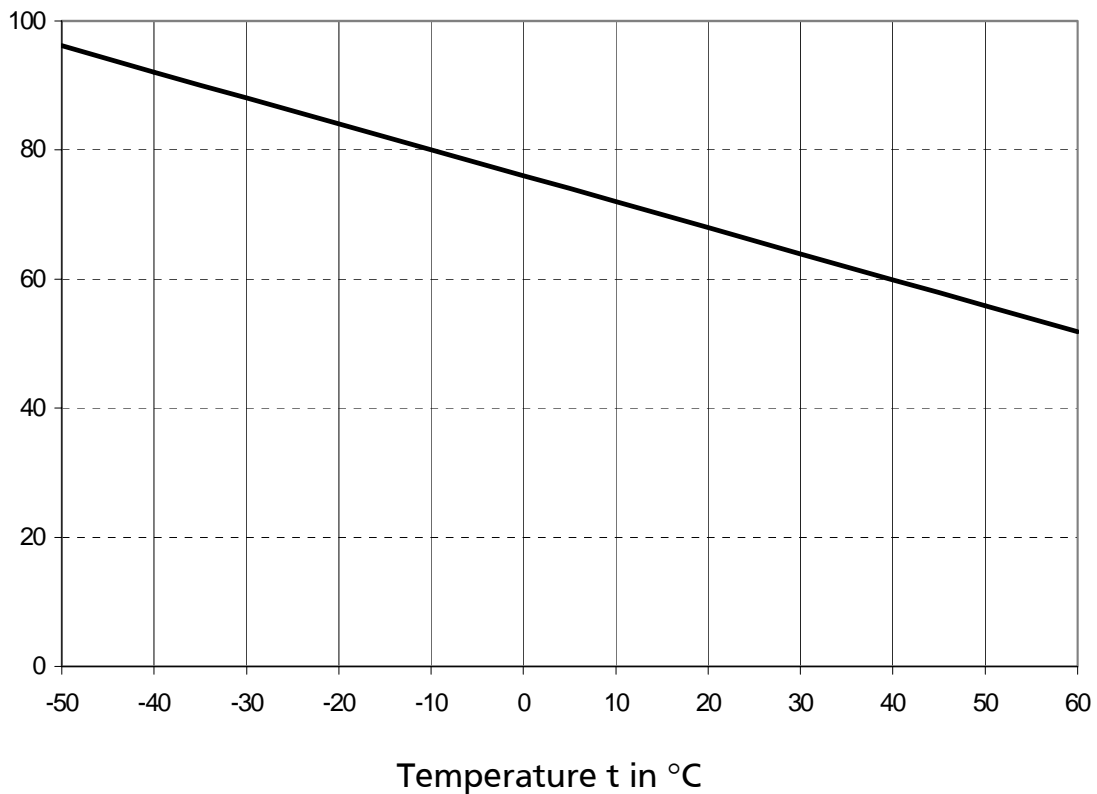


Figure 3: Thermal conductivity of saturated liquid

3.3.4 Thermal Conductivity of Saturated Vapour

The thermal conductivity of saturated vapour can be expressed using the regression equation

$$\lambda'' = N_0 + N_1 t + N_2 t^2 + N_3 t^3 + N_4 t^4 \quad (14)$$

where t is in °C and λ'' in 10^{-3} W/(m K). The coefficients of the equation are as follows:

$$\begin{aligned} N_0 &= 12.709 & [10^{-3}\text{W}/(\text{mK})] & & N_3 &= 1.0683\text{e-}5 & [10^{-3}\text{W}/(\text{m K}^4)] \\ N_1 &= 0.09932 & [10^{-3}\text{W}/(\text{mK}^2)] & & N_4 &= 5.7339\text{e-}8 & [10^{-3}\text{W}/(\text{m K}^5)] \\ N_2 &= 6.2261\text{e-}4 & [10^{-3}\text{W}/(\text{mK}^3)] & & & & \end{aligned}$$

Thermal conductivity of saturated vapour λ'' in 10^{-3} W/(mK)

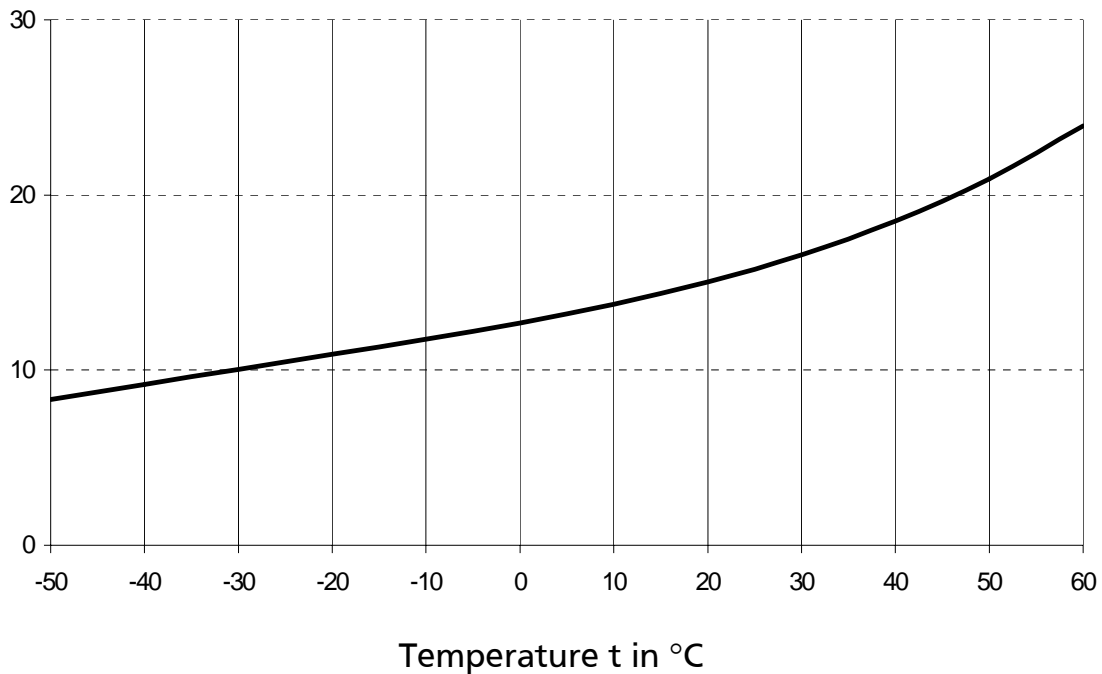


Figure 4: Thermal conductivity of saturated vapour

3.3.5 Surface Tension

The surface tension of the liquid can be expressed using the regression equation

$$\sigma = O_0 + O_1t + O_2t^2 + O_3t^3 \quad (15)$$

where t is in °C and σ in 10^{-3} N/m. The coefficients of the equation are:

$$\begin{array}{llll} O_0 = 7.5370 & [10^{-3}\text{N/m}] & O_2 = 1.6168\text{e-}4 & [10^{-3}\text{N}/(\text{mK}^2)] \\ O_1 = -0.1290 & [10^{-3}\text{N}/(\text{mK})] & O_3 = 1.5624\text{e-}6 & [10^{-3}\text{N}/(\text{mK}^3)] \end{array}$$

Surface tension σ in 10^{-3} N/m

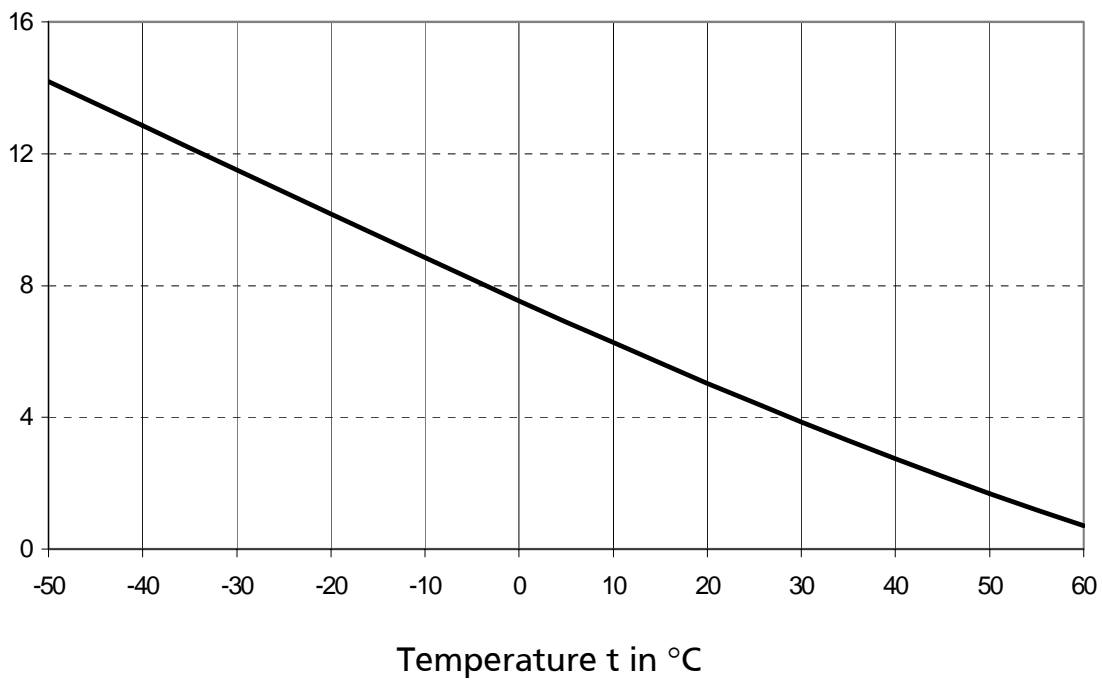


Figure 5: Surface tension

3.3.6 Specific Heat Capacity of Saturated Liquid

The specific heat capacity of saturated liquid can be expressed using the equation

$$c'_p = P_0 + P_1(1-T_R)^{1/9} + P_2(1-T_R)^{2/9} + P_3(1-T_R)^{3/9} + P_4(1-T_R)^{6/9} \quad (16)$$

where $T_R = \frac{T}{T_c}$, c'_p is in kJ/(kg K) and T is in K. The coefficients of the equation are as follows:

$$\begin{array}{ll} P_0 = 272.7746241 \text{ [kJ/(kgK)]} & P_3 = -872.727122 \text{ [kJ/(kgK)]} \\ P_1 = -1137.19404 \text{ [kJ/(kgK)]} & P_4 = 72.38836018 \text{ [kJ/(kgK)]} \\ P_2 = 1666.232657 \text{ [kJ/(kgK)]} & \end{array}$$

Specific heat capacity of saturated liquid c_p' in kJ/(kgK)

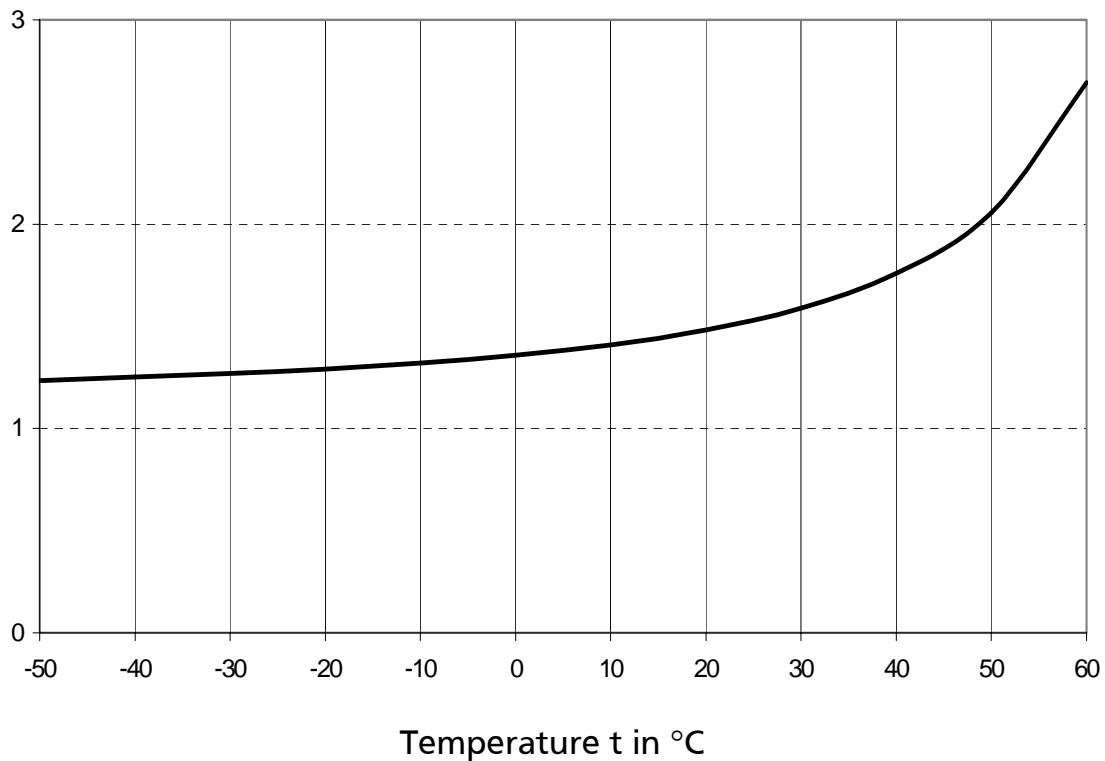


Figure 6: Specific heat capacity of saturated liquid

4 Compatibility of Materials

4.1 Elastomeres

The compatibility of the elastomeres that are normally used in refrigeration systems with Solkane® 404A is generally good. Cold extraction tests that were carried out on CR (chlorbutadiene rubber or Neoprene®), NBR (acrylonitrilebutadiene rubber) and HNBR (hydrated acrylonitrilbutadiene rubber) showed only slight swelling and yielded negligible amounts of extract. Fluorinated rubbers (FKM and FPM) are not recommended because of their considerable swelling and blistering when used with Solkane® 404A or with other HFC refrigerants. Ethylenepropylendiene rubber is only to be recommended where the presence of mineral oil in the refrigeration cycle can be excluded.

The effect of the lubricant that is used must not be ignored. Recommendations made by the lubricant and compressor manufacturers must be followed.

4.2 Thermoplastics

Experience with CFC and HCFC has shown that only a limited number of plastics are resistant to fluorinated refrigerants. Polytetrafluoroethylene, polyacetale and polyamide might be taken into account for the use with Solkane® 404A. It is again vital to take the effect of the lubricant into account.

4.3 Metals

Solkane® 404A is generally used in conjunction with lubricants (Ester oils, PAG-oils) in refrigeration technology. In combination both materials are compatible with the metals and alloys usually found in machines and apparatus. Only zinc, magnesium, lead and aluminium alloys with more than 2% magnesium by mass should be avoided. The water content of refrigeration oil depending on oil type should especially be taken into account. Values of not more than 50 ppm are to be aimed at.

5 Refrigerant Oils

Like all fluorinated hydrocarbons, Solkane[®]404A is immiscible with mineral oils. Ester oils (POE) are normally used as lubricants. The solubility of these oils in Solkane[®]404A is a function of temperature and composition. The following diagrams show the solubility properties of various lubricants with Solkane[®]404A. Highly viscous lubricants tend to give large miscibility gaps.

The precise miscibility gaps of the individual oils can be obtained from the lubricant manufacturers.

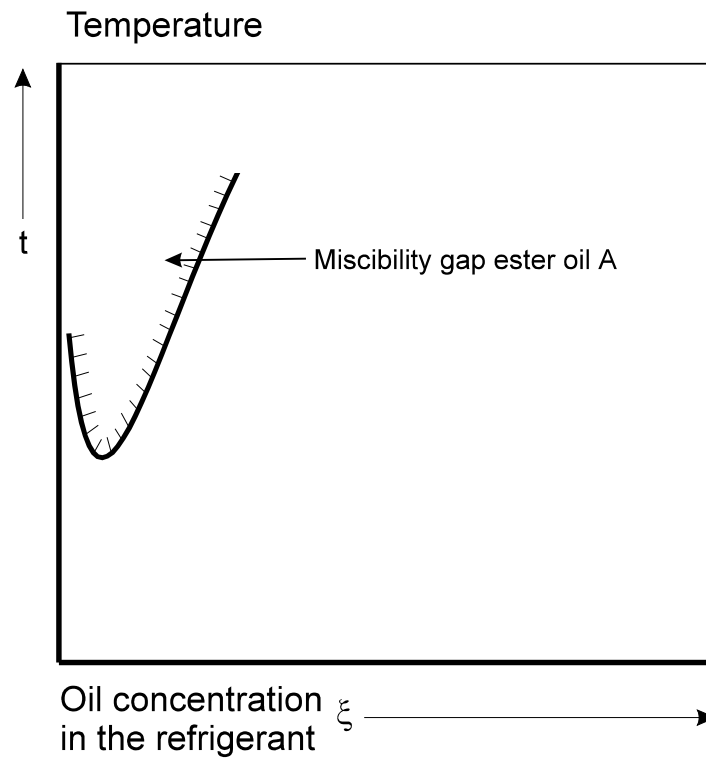


Figure 7: Miscibility behaviour of Solkane[®]404A and ester oil A

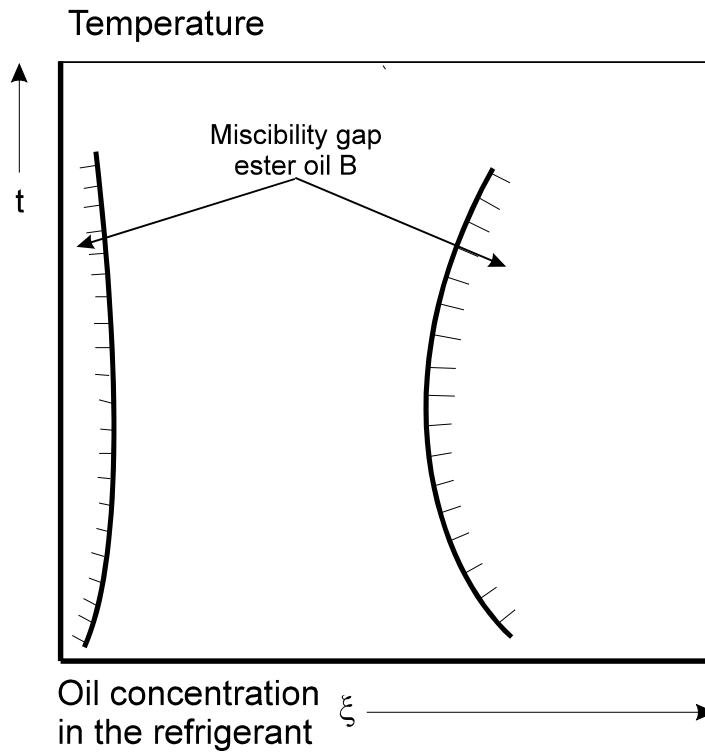


Figure 8: Miscibility behaviour of Solkane[®]404A and ester oil B

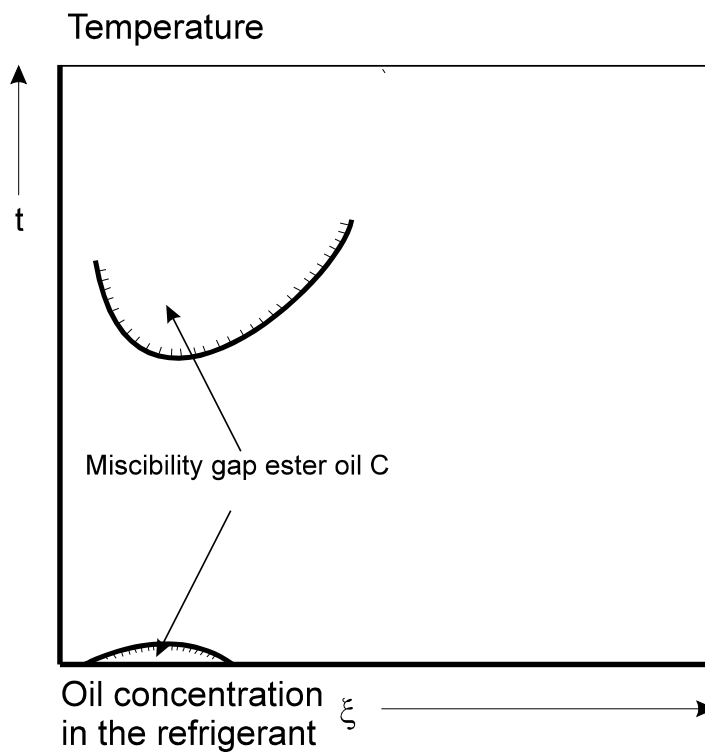


Figure 9: Miscibility behaviour of Solkane[®]404A and ester oil C

6 Flammability

The explosion limits of R143a are 7.1 - 20.9 % by volume in air. R125 and R134a have no explosion limits. When blended 46/52/4 percent by weight the outcoming mixture has no explosion limits. According to UL 2182 Solkane®404A is non-flammable.

7 Toxicity

The toxicity of R125 and R134a was extensively tested within the scope of the PAFT programme (Programme for Alternative Fluorocarbon Toxicity Testing). PAFT recommended an occupational exposure limit of 1000 ppm for both products. For R143a various manufacturers recommend a maximum exposure limit of 500 ppm related to an eight-hour working day. The toxicity of Solkane®404A can therefore be regarded as low and comparable to the toxicity of R502.

8 Vapour Table, Wet Vapour Range Solkane® 404A

t	p'	p''	v'	v''	ρ'	ρ''	h'	h''	r	s'	s''
[°C]	[bar]	[bar]	[dm ³ /kg]	[dm ³ /kg]	[kg/dm ³]	[kg/m ³]	[kJ/kg]	[kJ/kg]	[kJ/kg]	[kJ/kg K]	[kJ/kg K]
-60	0.498	0.475	0.742	371.99	1.348	2.688	122.48	331.69	209.21	0.680	1.667
-59	0.526	0.502	0.744	352.96	1.345	2.833	123.72	332.30	208.58	0.686	1.665
-58	0.556	0.531	0.745	335.09	1.342	2.984	124.95	332.91	207.96	0.692	1.663
-57	0.587	0.561	0.747	318.30	1.339	3.142	126.18	333.52	207.34	0.697	1.662
-56	0.619	0.592	0.748	302.52	1.336	3.306	127.41	334.13	206.72	0.703	1.660
-55	0.652	0.625	0.750	287.67	1.333	3.476	128.63	334.74	206.10	0.709	1.658
-54	0.687	0.659	0.752	273.70	1.330	3.654	129.86	335.35	205.49	0.714	1.657
-53	0.724	0.694	0.754	260.54	1.327	3.838	131.08	335.95	204.88	0.720	1.655
-52	0.762	0.731	0.755	248.14	1.324	4.030	132.30	336.56	204.26	0.725	1.653
-51	0.801	0.770	0.757	236.45	1.321	4.229	133.52	337.17	203.65	0.731	1.652
-50	0.842	0.810	0.759	225.42	1.318	4.436	134.74	337.77	203.03	0.737	1.650
-49	0.885	0.852	0.760	215.00	1.315	4.651	135.96	338.38	202.42	0.742	1.649
-48	0.930	0.895	0.762	205.17	1.312	4.874	137.18	338.98	201.80	0.748	1.648
-47	0.976	0.940	0.764	195.87	1.309	5.105	138.40	339.58	201.18	0.753	1.646
-46	1.024	0.987	0.766	187.08	1.306	5.345	139.63	340.18	200.55	0.759	1.645
-45	1.074	1.036	0.768	178.77	1.303	5.594	140.85	340.78	199.93	0.765	1.643
-44	1.126	1.087	0.769	170.90	1.300	5.852	142.08	341.38	199.30	0.770	1.642
-43	1.179	1.140	0.771	163.44	1.297	6.118	143.32	341.98	198.66	0.776	1.641
-42	1.235	1.194	0.773	156.38	1.294	6.395	144.55	342.57	198.02	0.781	1.640
-41	1.293	1.251	0.775	149.68	1.290	6.681	145.79	343.17	197.38	0.787	1.639
-40	1.353	1.309	0.777	143.33	1.287	6.977	147.03	343.76	196.73	0.792	1.637
-39	1.415	1.370	0.779	137.31	1.284	7.283	148.28	344.35	196.07	0.798	1.636
-38	1.479	1.433	0.781	131.59	1.281	7.600	149.53	344.94	195.41	0.803	1.635
-37	1.545	1.498	0.783	126.15	1.278	7.927	150.78	345.53	194.75	0.808	1.634
-36	1.614	1.566	0.784	120.99	1.275	8.265	152.04	346.12	194.08	0.814	1.633
-35	1.685	1.636	0.786	116.08	1.272	8.615	153.30	346.71	193.40	0.819	1.632
-34	1.758	1.708	0.788	111.41	1.268	8.976	154.57	347.29	192.72	0.825	1.631
-33	1.834	1.783	0.790	106.97	1.265	9.349	155.84	347.87	192.03	0.830	1.630
-32	1.913	1.860	0.792	102.74	1.262	9.734	157.12	348.45	191.34	0.836	1.629
-31	1.994	1.940	0.795	98.71	1.259	10.131	158.40	349.03	190.63	0.841	1.628
-30	2.077	2.022	0.797	94.87	1.255	10.541	159.68	349.61	189.93	0.846	1.627
-29	2.164	2.107	0.799	91.21	1.252	10.964	160.97	350.18	189.21	0.852	1.626
-28	2.253	2.195	0.801	87.72	1.249	11.400	162.27	350.76	188.49	0.857	1.625
-27	2.345	2.285	0.803	84.39	1.246	11.850	163.57	351.33	187.76	0.862	1.625
-26	2.439	2.379	0.805	81.21	1.242	12.313	164.87	351.90	187.03	0.867	1.624
-25	2.537	2.475	0.807	78.18	1.239	12.791	166.18	352.47	186.28	0.873	1.623
-24	2.638	2.574	0.809	75.28	1.236	13.283	167.50	353.03	185.54	0.878	1.622
-23	2.741	2.676	0.812	72.51	1.232	13.790	168.81	353.59	184.78	0.883	1.621
-22	2.848	2.782	0.814	69.87	1.229	14.313	170.14	354.16	184.02	0.888	1.621
-21	2.958	2.890	0.816	67.34	1.225	14.851	171.46	354.71	183.25	0.894	1.620

Vapour Table, Wet Vapour Range Solkane® 404A

t	p'	p''	v'	v''	ρ'	ρ''	h'	h''	r	s'	s''
[°C]	[bar]	[bar]	[dm ³ /kg]	[dm ³ /kg]	[kg/dm ³]	[kg/m ³]	[kJ/kg]	[kJ/kg]	[kJ/kg]	[kJ/kg K]	[kJ/kg K]
-20	3.071	3.002	0.818	64.92	1.222	15.405	172.80	355.27	182.47	0.899	1.619
-19	3.187	3.117	0.821	62.60	1.219	15.975	174.13	355.82	181.69	0.904	1.618
-18	3.307	3.235	0.823	60.38	1.215	16.562	175.47	356.38	180.90	0.909	1.618
-17	3.430	3.357	0.825	58.26	1.212	17.166	176.82	356.92	180.11	0.914	1.617
-16	3.556	3.482	0.828	56.22	1.208	17.787	178.17	357.47	179.30	0.920	1.616
-15	3.686	3.610	0.830	54.27	1.205	18.427	179.52	358.01	178.49	0.925	1.616
-14	3.820	3.742	0.832	52.40	1.201	19.084	180.88	358.55	177.68	0.930	1.615
-13	3.957	3.878	0.835	50.61	1.198	19.760	182.24	359.09	176.85	0.935	1.615
-12	4.098	4.018	0.837	48.89	1.194	20.456	183.60	359.63	176.02	0.940	1.614
-11	4.243	4.161	0.840	47.23	1.191	21.171	184.97	360.16	175.19	0.945	1.613
-10	4.391	4.308	0.842	45.65	1.187	21.906	186.34	360.69	174.34	0.950	1.613
-9	4.544	4.459	0.845	44.13	1.183	22.662	187.72	361.21	173.49	0.955	1.612
-8	4.700	4.614	0.848	42.66	1.180	23.439	189.10	361.73	172.64	0.960	1.612
-7	4.861	4.773	0.850	41.26	1.176	24.237	190.48	362.25	171.77	0.965	1.611
-6	5.025	4.936	0.853	39.91	1.172	25.057	191.86	362.77	170.91	0.970	1.610
-5	5.194	5.103	0.856	38.61	1.169	25.900	193.25	363.28	170.03	0.975	1.610
-4	5.367	5.274	0.858	37.36	1.165	26.766	194.64	363.79	169.15	0.980	1.609
-3	5.544	5.450	0.861	36.16	1.161	27.656	196.04	364.29	168.26	0.985	1.609
-2	5.726	5.630	0.864	35.00	1.157	28.570	197.43	364.79	167.36	0.990	1.608
-1	5.912	5.815	0.867	33.89	1.154	29.509	198.83	365.29	166.46	0.995	1.608
0	6.102	6.004	0.870	32.81	1.150	30.474	200.00	365.78	165.78	1.000	1.607
1	6.297	6.197	0.873	31.78	1.146	31.465	201.64	366.27	164.63	1.005	1.607
2	6.497	6.395	0.876	30.79	1.142	32.482	203.05	366.76	163.71	1.010	1.606
3	6.702	6.598	0.879	29.83	1.138	33.527	204.46	367.24	162.78	1.015	1.606
4	6.911	6.806	0.882	28.90	1.134	34.600	205.87	367.71	161.84	1.020	1.605
5	7.125	7.019	0.885	28.01	1.130	35.703	207.28	368.18	160.90	1.025	1.605
6	7.344	7.236	0.888	27.15	1.126	36.835	208.70	368.65	159.95	1.030	1.604
7	7.568	7.459	0.891	26.32	1.122	37.997	210.12	369.11	158.99	1.034	1.604
8	7.797	7.687	0.894	25.52	1.118	39.191	211.55	369.57	158.02	1.039	1.603
9	8.032	7.920	0.898	24.74	1.114	40.417	212.97	370.02	157.05	1.044	1.603
10	8.271	8.158	0.901	23.99	1.110	41.676	214.40	370.46	156.06	1.049	1.603
11	8.516	8.401	0.904	23.27	1.106	42.970	215.83	370.90	155.07	1.054	1.602
12	8.766	8.650	0.908	22.57	1.102	44.298	217.27	371.34	154.07	1.059	1.602
13	9.022	8.904	0.911	21.90	1.098	45.662	218.70	371.77	153.06	1.064	1.601
14	9.283	9.164	0.915	21.25	1.093	47.063	220.14	372.19	152.04	1.069	1.601
15	9.550	9.429	0.918	20.62	1.089	48.502	221.59	372.60	151.02	1.074	1.600
16	9.823	9.701	0.922	20.01	1.085	49.980	223.04	373.01	149.98	1.079	1.600
17	10.10	9.978	0.926	19.42	1.080	51.499	224.49	373.42	148.93	1.084	1.599
18	10.38	10.26	0.929	18.85	1.076	53.060	225.94	373.81	147.87	1.088	1.599
19	10.67	10.55	0.933	18.29	1.071	54.663	227.40	374.20	146.80	1.093	1.598

Vapour Table, Wet Vapour Range Solkane® 404A

T	p'	p''	v'	v''	ρ'	ρ''	h'	h''	r	s'	s''
[°C]	[bar]	[bar]	[dm ³ /kg]	[dm ³ /kg]	[kg/dm ³]	[kg/m ³]	[kJ/kg]	[kJ/kg]	[kJ/kg]	[kJ/kg K]	[kJ/kg K]
20	10.97	10.84	0.937	17.76	1.067	56.311	228.87	374.58	145.72	1.098	1.598
21	11.27	11.15	0.941	17.24	1.062	58.004	230.34	374.96	144.62	1.103	1.597
22	11.58	11.45	0.945	16.74	1.058	59.745	231.81	375.33	143.52	1.108	1.597
23	11.90	11.77	0.950	16.25	1.053	61.534	233.29	375.68	142.39	1.113	1.596
24	12.22	12.09	0.954	15.78	1.048	63.374	234.77	376.03	141.26	1.118	1.596
25	12.55	12.41	0.958	15.32	1.044	65.266	236.26	376.37	140.11	1.123	1.595
26	12.88	12.74	0.963	14.88	1.039	67.212	237.76	376.71	138.94	1.128	1.594
27	13.22	13.08	0.967	14.45	1.034	69.214	239.27	377.03	137.76	1.133	1.594
28	13.57	13.43	0.972	14.03	1.029	71.274	240.78	377.34	136.56	1.138	1.593
29	13.92	13.78	0.976	13.63	1.024	73.394	242.30	377.64	135.34	1.143	1.593
30	14.28	14.14	0.981	13.23	1.019	75.577	243.83	377.93	134.10	1.148	1.592
31	14.65	14.51	0.986	12.85	1.014	77.824	245.37	378.22	132.85	1.153	1.591
32	15.03	14.88	0.991	12.48	1.009	80.139	246.92	378.48	131.57	1.158	1.591
33	15.41	15.27	0.996	12.12	1.004	82.524	248.47	378.74	130.27	1.164	1.590
34	15.80	15.65	1.002	11.77	0.998	84.982	250.04	378.99	128.94	1.169	1.589
35	16.19	16.05	1.007	11.43	0.993	87.516	251.63	379.22	127.59	1.174	1.589
36	16.60	16.45	1.013	11.10	0.987	90.129	253.22	379.44	126.22	1.179	1.588
37	17.01	16.87	1.018	10.77	0.982	92.826	254.83	379.64	124.81	1.184	1.587
38	17.43	17.28	1.024	10.46	0.976	95.609	256.45	379.83	123.38	1.190	1.586
39	17.86	17.71	1.030	10.15	0.970	98.484	258.09	380.00	121.92	1.195	1.585
40	18.29	18.15	1.037	9.86	0.965	101.454	259.74	380.16	120.43	1.200	1.584
41	18.74	18.59	1.043	9.57	0.959	104.524	261.41	380.30	118.90	1.206	1.584
42	19.19	19.04	1.050	9.29	0.953	107.700	263.09	380.43	117.33	1.211	1.583
43	19.65	19.50	1.057	9.01	0.946	110.987	264.80	380.53	115.73	1.216	1.582
44	20.12	19.97	1.064	8.74	0.940	114.391	266.53	380.61	114.09	1.222	1.581
45	20.59	20.44	1.071	8.48	0.934	117.918	268.27	380.67	112.40	1.227	1.580
46	21.08	20.93	1.079	8.23	0.927	121.578	270.04	380.71	110.67	1.233	1.578
47	21.57	21.42	1.086	7.98	0.920	125.376	271.83	380.73	108.90	1.238	1.577
48	22.07	21.92	1.095	7.73	0.914	129.323	273.65	380.72	107.07	1.244	1.576
49	22.59	22.44	1.103	7.49	0.907	133.428	275.49	380.69	105.19	1.250	1.575
50	23.11	22.96	1.112	7.26	0.899	137.702	277.36	380.62	103.26	1.255	1.573
51	23.64	23.49	1.121	7.03	0.892	142.157	279.26	380.53	101.26	1.261	1.572
52	24.18	24.03	1.131	6.81	0.884	146.808	281.19	380.40	99.21	1.267	1.570
53	24.72	24.58	1.141	6.59	0.877	151.669	283.15	380.24	97.09	1.273	1.569
54	25.28	25.14	1.151	6.38	0.869	156.758	285.14	380.04	94.89	1.279	1.567
55	25.85	25.71	1.162	6.17	0.860	162.096	287.17	379.79	92.62	1.285	1.565
56	26.43	26.29	1.174	5.96	0.852	167.706	289.23	379.51	90.27	1.291	1.563
57	27.02	26.88	1.187	5.76	0.843	173.614	291.33	379.17	87.84	1.297	1.561
58	27.62	27.48	1.200	5.56	0.833	179.853	293.48	378.78	85.31	1.303	1.559
59	28.23	28.09	1.214	5.36	0.824	186.460	295.66	378.33	82.67	1.309	1.557

Vapour Table, Wet Vapour Range Solkane®404A

T	p'	p''	v'	v''	ρ'	ρ''	h'	h''	r	s'	s''
[°C]	[bar]	[bar]	[dm ³ /kg]	[dm ³ /kg]	[kg/dm ³]	[kg/m ³]	[kJ/kg]	[kJ/kg]	[kJ/kg]	[kJ/kg K]	[kJ/kg K]
60	28.85	28.71	1.229	5.17	0.814	193.480	297.88	377.82	79.93	1.316	1.554
61	29.48	29.34	1.246	4.98	0.803	200.967	300.15	377.23	77.07	1.322	1.551
62	30.12	29.99	1.263	4.78	0.792	208.987	302.47	376.56	74.08	1.328	1.549
63	30.78	30.65	1.283	4.60	0.780	217.626	304.84	375.79	70.95	1.335	1.545
64	31.45	31.32	1.304	4.41	0.767	226.989	307.26	374.90	67.65	1.342	1.542
65	32.12	32.00	1.328	4.22	0.753	237.216	309.73	373.89	64.16	1.348	1.538
66	32.82	32.70	1.355	4.02	0.738	248.497	312.25	372.72	60.47	1.355	1.534
67	33.52	33.41	1.386	3.83	0.722	261.092	314.84	371.36	56.52	1.362	1.529
68	34.24	34.14	1.422	3.63	0.703	275.382	317.48	369.75	52.26	1.369	1.523

9 Vapour Table, Superheated Range Solkane® 404A

0.81bar -50.00°C

t	v	h	S
°C	dm³/kg	kJ/kg	kJ/kgK
-50	225.42	337.77	1.6504
-45	231.26	341.56	1.6672
-40	237.04	345.39	1.6838
-35	242.78	349.25	1.7002
-30	248.48	353.15	1.7164
-25	254.14	357.09	1.7324
-20	259.77	361.07	1.7483
-15	265.37	365.09	1.7640
-10	270.94	369.15	1.7796
-5	276.49	373.24	1.7950
0	282.01	377.38	1.8103
5	287.52	381.56	1.8255
10	293.01	385.79	1.8405
15	298.49	390.05	1.8554
20	303.95	394.36	1.8703
25	309.39	398.71	1.8850
30	314.83	403.10	1.8996
35	320.25	407.53	1.9141

1.09bar -44.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
-44	170.90	341.38	1.6422
-40	174.46	344.49	1.6557
-35	178.87	348.42	1.6723
-30	183.24	352.37	1.6887
-25	187.57	356.36	1.7050
-20	191.87	360.38	1.7210
-15	196.14	364.44	1.7369
-10	200.37	368.53	1.7526
-5	204.59	372.66	1.7682
0	208.78	376.83	1.7836
5	212.95	381.04	1.7988
10	217.10	385.29	1.8140
15	221.24	389.58	1.8290
20	225.36	393.91	1.8439
25	229.47	398.28	1.8587
30	233.57	402.69	1.8733
35	237.65	407.14	1.8879
40	241.73	411.63	1.9024

1.43bar -38.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-38	131.59	344.94	1.6352
-35	133.67	347.35	1.6453
-30	137.11	351.37	1.6620
-25	140.51	355.42	1.6785
-20	143.87	359.50	1.6948
-15	147.19	363.61	1.7109
-10	150.49	367.75	1.7268
-5	153.77	371.93	1.7425
0	157.02	376.14	1.7580
5	160.24	380.39	1.7735
10	163.45	384.67	1.7887
15	166.65	388.99	1.8038
20	169.83	393.35	1.8188
25	172.99	397.74	1.8337
30	176.14	402.18	1.8485
35	179.28	406.65	1.8631
40	182.41	411.16	1.8776
45	185.53	415.72	1.8920

1.86bar -32.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-32	102.74	348.45	1.6291
-30	103.84	350.10	1.6359
-25	106.57	354.24	1.6527
-20	109.27	358.39	1.6693
-15	111.92	362.57	1.6856
-10	114.55	366.78	1.7018
-5	117.15	371.01	1.7177
0	119.73	375.27	1.7335
5	122.28	379.57	1.7490
10	124.81	383.89	1.7645
15	127.33	388.25	1.7797
20	129.83	392.65	1.7948
25	132.32	397.08	1.8098
30	134.79	401.55	1.8247
35	137.25	406.05	1.8394
40	139.70	410.59	1.8540
45	142.14	415.16	1.8685
50	144.57	419.78	1.8829

0.90 bar -48.00°C

t	v	H	S
°C	dm³/kg	kJ/kg	kJ/kgK
-48	205.17	338.98	1.6475
-45	208.37	341.27	1.6576
-40	213.66	345.12	1.6743
-35	218.90	349.00	1.6908
-30	224.10	352.91	1.7070
-25	229.26	356.87	1.7231
-20	234.39	360.86	1.7391
-15	239.49	364.89	1.7548
-10	244.56	368.96	1.7704
-5	249.61	373.07	1.7859
0	254.64	377.21	1.8012
5	259.65	381.40	1.8164
10	264.64	385.64	1.8315
15	269.61	389.91	1.8465
20	274.57	394.22	1.8613
25	279.52	398.58	1.8760
30	284.46	402.97	1.8907
35	289.38	407.41	1.9052

1.19 bar -42.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
-42	156.38	342.57	1.6397
-40	158.02	344.14	1.6465
-35	162.09	348.09	1.6632
-30	166.11	352.06	1.6798
-25	170.09	356.07	1.6961
-20	174.04	360.11	1.7122
-15	177.96	364.18	1.7281
-10	181.84	368.29	1.7439
-5	185.71	372.44	1.7595
0	189.55	376.62	1.7749
5	193.37	380.84	1.7903
10	197.17	385.10	1.8054
15	200.96	389.40	1.8205
20	204.73	393.74	1.8354
25	208.49	398.11	1.8502
30	212.23	402.53	1.8649
35	215.97	406.99	1.8795
40	219.69	411.49	1.8940

1.57 bar -36.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-36	120.99	346.12	1.6330
-35	121.63	346.93	1.6364
-30	124.82	350.98	1.6533
-25	127.97	355.05	1.6699
-20	131.09	359.16	1.6862
-15	134.17	363.29	1.7024
-10	137.22	367.45	1.7184
-5	140.24	371.64	1.7341
0	143.24	375.87	1.7498
5	146.22	380.13	1.7652
10	149.18	384.43	1.7805
15	152.12	388.76	1.7957
20	155.05	393.13	1.8107
25	157.96	397.54	1.8256
30	160.86	401.98	1.8404
35	163.75	406.46	1.8551
40	166.63	410.99	1.8696
45	169.50	415.54	1.8841

2.02 bar -30.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-30	94.87	349.61	1.6272
-35	92.27	0.00	0.0000
-30	94.87	349.61	1.6272
-25	97.42	353.78	1.6442
-20	99.94	357.96	1.6609
-15	102.42	362.17	1.6773
-10	104.86	366.40	1.6936
-5	107.28	370.66	1.7096
0	109.68	374.94	1.7254
5	112.05	379.25	1.7411
10	114.40	383.60	1.7565
15	116.74	387.97	1.7719
20	119.06	392.38	1.7870
25	121.36	396.83	1.8021
30	123.65	401.30	1.8170
35	125.93	405.82	1.8317
40	128.20	410.37	1.8464
45	130.45	414.95	1.8609

0.99 bar -46.00°C

t	v	h	S
°C	dm³/kg	kJ/kg	kJ/kgK
-46	187.08	340.18	1.6448
-45	188.06	340.95	1.6482
-40	192.91	344.82	1.6649
-35	197.71	348.72	1.6815
-30	202.47	352.65	1.6978
-25	207.19	356.62	1.7140
-20	211.88	360.63	1.7300
-15	216.54	364.67	1.7458
-10	221.17	368.75	1.7615
-5	225.78	372.87	1.7770
0	230.36	377.03	1.7923
5	234.93	381.23	1.8076
10	239.47	385.47	1.8227
15	244.01	389.75	1.8377
20	248.52	394.07	1.8525
25	253.03	398.43	1.8673
30	257.52	402.84	1.8819
35	262.00	407.28	1.8965

1.31 bar -40.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
-40	143.33	343.76	1.6374
-35	147.09	347.73	1.6542
-30	150.80	351.73	1.6709
-25	154.48	355.76	1.6872
-20	158.11	359.81	1.7034
-15	161.72	363.91	1.7194
-10	165.30	368.03	1.7353
-5	168.85	372.19	1.7509
0	172.38	376.39	1.7664
5	175.89	380.62	1.7818
10	179.38	384.89	1.7970
15	182.85	389.20	1.8121
20	186.31	393.55	1.8271
25	189.75	397.94	1.8419
30	193.18	402.36	1.8566
35	196.61	406.83	1.8712
40	200.02	411.33	1.8857
45	203.42	415.88	1.9001

1.71 bar -34.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-34	111.41	347.29	1.6310
-30	113.78	350.56	1.6445
-25	116.71	354.66	1.6613
-20	119.60	358.79	1.6777
-15	122.46	362.94	1.6940
-10	125.29	367.13	1.7100
-5	128.09	371.34	1.7259
0	130.87	375.58	1.7416
5	133.62	379.86	1.7571
10	136.36	384.17	1.7724
15	139.07	388.52	1.7877
20	141.78	392.90	1.8027
25	144.46	397.32	1.8177
30	147.14	401.77	1.8325
35	149.80	406.26	1.8472
40	152.46	410.79	1.8618
45	155.10	415.36	1.8762
50	157.73	419.97	1.8906

2.19 bar -28.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-28	87.72	350.76	1.6255
-25	89.15	353.28	1.6357
-20	91.51	357.50	1.6525
-15	93.83	361.74	1.6691
-10	96.11	366.00	1.6854
-5	98.37	370.28	1.7016
0	100.60	374.58	1.7175
5	102.81	378.92	1.7332
10	105.00	383.28	1.7487
15	107.17	387.67	1.7641
20	109.32	392.10	1.7793
25	111.46	396.55	1.7944
30	113.59	401.04	1.8093
35	115.70	405.57	1.8242
40	117.80	410.13	1.8388
45	119.90	414.73	1.8534
50	121.98	419.36	1.8678
55	124.06	424.03	1.8822

Vapour Table, Superheated Range Solkane® 404A

2.38 bar -26.00°C

t	v	h	S
°C	dm³/kg	kJ/kg	KJ/kgK
-26	81.21	351.90	1.6238
-25	81.66	352.75	1.6272
-20	83.87	357.01	1.6442
-15	86.05	361.27	1.6609
-10	88.19	365.56	1.6773
-5	90.30	369.87	1.6936
0	92.38	374.20	1.7096
5	94.45	378.55	1.7254
10	96.49	382.94	1.7410
15	98.51	387.35	1.7564
20	100.52	391.79	1.7717
25	102.51	396.26	1.7868
30	104.48	400.77	1.8018
35	106.45	405.31	1.8167
40	108.40	409.88	1.8314
45	110.34	414.49	1.8460
50	112.28	419.13	1.8605
55	114.20	423.81	1.8748

3.00 bar -20.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
-20	64.92	355.27	1.6192
-15	66.74	359.66	1.6364
-10	68.53	364.05	1.6532
-5	70.28	368.46	1.6698
0	72.00	372.87	1.6861
5	73.71	377.31	1.7022
10	75.38	381.76	1.7181
15	77.04	386.24	1.7337
20	78.68	390.74	1.7492
25	80.31	395.26	1.7645
30	81.91	399.82	1.7797
35	83.51	404.40	1.7947
40	85.10	409.02	1.8095
45	86.67	413.67	1.8243
50	88.24	418.35	1.8389
55	89.79	423.06	1.8533
60	91.34	427.80	1.8677
65	92.88	432.58	1.8819

3.74 bar -14.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-14	52.40	358.55	1.6152
-10	53.62	362.18	1.6291
-5	55.11	366.71	1.6461
0	56.57	371.24	1.6629
5	58.01	375.78	1.6793
10	59.41	380.32	1.6955
15	60.80	384.88	1.7115
20	62.17	389.46	1.7272
25	63.52	394.05	1.7428
30	64.85	398.67	1.7581
35	66.17	403.31	1.7733
40	67.48	407.98	1.7883
45	68.78	412.68	1.8032
50	70.07	417.40	1.8179
55	71.35	422.16	1.8325
60	72.62	426.94	1.8470
65	73.88	431.75	1.8614
70	75.13	436.60	1.8756

4.61 bar -8.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-8	42.66	361.73	1.6116
-5	43.44	364.55	1.6222
0	44.71	369.23	1.6395
5	45.95	373.90	1.6564
10	47.15	378.57	1.6730
15	48.34	383.23	1.6894
20	49.50	387.91	1.7054
25	50.65	392.59	1.7213
30	51.77	397.29	1.7369
35	52.88	402.00	1.7523
40	53.98	406.73	1.7676
45	55.07	411.49	1.7826
50	56.15	416.27	1.7975
55	57.21	421.07	1.8123
60	58.27	425.91	1.8269
65	59.32	430.76	1.8414
70	60.36	435.65	1.8557
75	61.40	440.57	1.8700

2.57 bar - 24.00°C

t	v	h	S
°C	dm³/kg	kJ/kg	kJ/kgK
-24	75.28	353.03	1.6222
-20	76.95	356.47	1.6359
-15	78.99	360.78	1.6527
-10	81.00	365.09	1.6693
-5	82.98	369.43	1.6856
0	84.93	373.79	1.7017
5	86.86	378.17	1.7176
10	88.77	382.57	1.7333
15	90.66	387.00	1.7488
20	92.53	391.46	1.7641
25	94.39	395.95	1.7793
30	96.23	400.47	1.7944
35	98.06	405.03	1.8093
40	99.88	409.61	1.8240
45	101.69	414.23	1.8387
50	103.48	418.89	1.8532
55	105.27	423.57	1.8676
60	107.06	428.30	1.8819

3.23 bar - 18.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
-18	60.38	356.38	1.6178
-15	61.41	359.04	1.6282
-10	63.10	363.47	1.6452
-5	64.76	367.92	1.6619
0	66.39	372.37	1.6784
5	67.99	376.83	1.6946
10	69.57	381.31	1.7105
15	71.13	385.81	1.7263
20	72.67	390.34	1.7418
25	74.19	394.89	1.7572
30	75.70	399.46	1.7724
35	77.20	404.06	1.7875
40	78.68	408.70	1.8024
45	80.16	413.36	1.8172
50	81.62	418.05	1.8318
55	83.08	422.78	1.8463
60	84.52	427.53	1.8607
65	85.96	432.32	1.8750

4.02 bar - 12.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-12	48.89	359.63	1.6139
-10	49.47	361.46	1.6209
-5	50.89	366.04	1.6382
0	52.28	370.62	1.6551
5	53.64	375.19	1.6717
10	54.97	379.78	1.6880
15	56.28	384.37	1.7041
20	57.58	388.97	1.7199
25	58.85	393.60	1.7356
30	60.11	398.24	1.7510
35	61.36	402.90	1.7663
40	62.59	407.59	1.7814
45	63.81	412.31	1.7963
50	65.02	417.05	1.8111
55	66.22	421.82	1.8257
60	67.41	426.61	1.8402
65	68.60	431.44	1.8546
70	69.78	436.30	1.8689

4.94 bar -6.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-6	39.91	362.77	1.6105
-5	40.16	363.72	1.6141
0	41.37	368.46	1.6316
5	42.56	373.19	1.6487
10	43.71	377.90	1.6655
15	44.84	382.61	1.6820
20	45.95	387.32	1.6982
25	47.03	392.03	1.7141
30	48.10	396.76	1.7299
35	49.16	401.51	1.7454
40	50.20	406.26	1.7607
45	51.23	411.04	1.7759
50	52.24	415.84	1.7908
55	53.25	420.67	1.8056
60	54.25	425.52	1.8203
65	55.24	430.39	1.8348
70	56.22	435.30	1.8492
75	57.20	440.23	1.8635

2.78 bar - 22.00°C

t	v	h	S
°C	dm³/kg	kJ/kg	kJ/kgK
-22	69.87	354.16	1.6207
-20	70.65	355.89	1.6275
-15	72.58	360.24	1.6445
-10	74.47	364.59	1.6612
-5	76.33	368.96	1.6777
0	78.16	373.35	1.6939
5	79.97	377.75	1.7099
10	81.76	382.18	1.7257
15	83.53	386.63	1.7412
20	85.28	391.11	1.7567
25	87.01	395.62	1.7719
30	88.73	400.16	1.7870
35	90.44	404.72	1.8019
40	92.14	409.33	1.8168
45	93.82	413.96	1.8314
50	95.50	418.62	1.8460
55	97.17	423.32	1.8604
60	98.83	428.06	1.8747

3.48 bar - 16.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
-16	56.22	357.47	1.6165
-15	56.55	358.37	1.6199
-10	58.15	362.85	1.6371
-5	59.72	367.34	1.6540
0	61.26	371.82	1.6706
5	62.78	376.32	1.6869
10	64.27	380.83	1.7030
15	65.73	385.36	1.7189
20	67.18	389.91	1.7345
25	68.62	394.48	1.7500
30	70.03	399.08	1.7653
35	71.44	403.70	1.7804
40	72.83	408.35	1.7953
45	74.21	413.03	1.8102
50	75.58	417.74	1.8248
55	76.95	422.47	1.8394
60	78.30	427.25	1.8538
65	79.65	432.05	1.8681

4.31 bar - 10.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-10	45.65	360.69	1.6127
-5	47.01	365.33	1.6302
0	48.33	369.95	1.6473
5	49.63	374.57	1.6641
10	50.90	379.19	1.6805
15	52.14	383.82	1.6967
20	53.37	388.46	1.7127
25	54.57	393.11	1.7284
30	55.76	397.78	1.7439
35	56.94	402.47	1.7593
40	58.10	407.18	1.7744
45	59.25	411.91	1.7894
50	60.39	416.67	1.8043
55	61.52	421.46	1.8190
60	62.65	426.27	1.8335
65	63.76	431.11	1.8480
70	64.87	435.99	1.8623
75	65.97	440.89	1.8765

5.27 bar - 4.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
-4	37.36	363.79	1.6094
0	38.29	367.64	1.6236
5	39.43	372.42	1.6410
10	40.54	377.18	1.6579
15	41.61	381.94	1.6746
20	42.67	386.69	1.6909
25	43.71	391.45	1.7070
30	44.72	396.21	1.7229
35	45.73	400.98	1.7385
40	46.71	405.77	1.7539
45	47.69	410.57	1.7691
50	48.65	415.39	1.7841
55	49.61	420.24	1.7990
60	50.55	425.11	1.8138
65	51.49	430.00	1.8283
70	52.42	434.92	1.8428
75	53.34	439.87	1.8571
80	54.25	444.85	1.8713

Vapour Table, Superheated Range Solkane® 404A

5.63 bar -2.00°C

T	v	h	S
°C	dm³/kg	kJ/kg	kJ/kgK
-2	35.00	364.79	1.6084
0	35.45	366.74	1.6155
5	36.54	371.59	1.6331
10	37.61	376.42	1.6503
15	38.64	381.22	1.6672
20	39.65	386.02	1.6837
25	40.64	390.82	1.6999
30	41.61	395.61	1.7158
35	42.56	400.42	1.7316
40	43.50	405.24	1.7471
45	44.43	410.07	1.7624
50	45.34	414.92	1.7775
55	46.25	419.79	1.7924
60	47.14	424.68	1.8072
65	48.03	429.59	1.8219
70	48.91	434.53	1.8364
75	49.78	439.49	1.8507
80	50.64	444.48	1.8650

6.81 bar 4.0°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
4	28.90	367.71	1.6054
5	29.10	368.73	1.6091
10	30.06	373.77	1.6270
15	30.98	378.77	1.6445
20	31.88	383.73	1.6616
25	32.75	388.67	1.6783
30	33.61	393.60	1.6947
35	34.44	398.52	1.7108
40	35.26	403.45	1.7266
45	36.06	408.37	1.7423
50	36.85	413.31	1.7576
55	37.63	418.25	1.7728
60	38.40	423.22	1.7878
65	39.16	428.20	1.8027
70	39.91	433.19	1.8174
75	40.65	438.21	1.8319
80	41.39	443.26	1.8463
85	42.12	448.32	1.8605

8.16 bar 10.0°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
10	23.99	370.46	1.6025
15	24.85	375.73	1.6210
20	25.67	380.92	1.6388
25	26.46	386.06	1.6562
30	27.23	391.16	1.6732
35	27.97	396.24	1.6898
40	28.70	401.30	1.7061
45	29.40	406.34	1.7221
50	30.10	411.39	1.7378
55	30.78	416.44	1.7533
60	31.45	421.49	1.7686
65	32.11	426.55	1.7837
70	32.77	431.62	1.7985
75	33.41	436.71	1.8133
80	34.05	441.82	1.8278
85	34.68	446.94	1.8422
90	35.30	452.09	1.8565
95	35.92	457.26	1.8707

9.70 bar 16.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
16	20.01	373.01	1.5996
20	20.63	377.43	1.6148
25	21.36	382.85	1.6331
30	22.07	388.19	1.6509
35	22.75	393.47	1.6682
40	23.41	398.71	1.6850
45	24.05	403.92	1.7015
50	24.67	409.10	1.7177
55	25.28	414.27	1.7336
60	25.87	419.44	1.7492
65	26.46	424.60	1.7646
70	27.03	429.77	1.7798
75	27.60	434.95	1.7948
80	28.15	440.13	1.8095
85	28.70	445.33	1.8242
90	29.25	450.54	1.8386
95	29.79	455.77	1.8529
100	30.32	461.02	1.8671

6.00 bar 0.00°C

T	v	h	S
°C	dm³/kg	kJ/kg	kJ/kgK
0	32.81	365.78	1.6074
5	33.87	370.71	1.6252
10	34.90	375.60	1.6426
15	35.89	380.46	1.6597
20	36.86	385.31	1.6764
25	37.80	390.15	1.6927
30	38.73	394.98	1.7088
35	39.64	399.83	1.7247
40	40.54	404.68	1.7403
45	41.42	409.54	1.7557
50	42.29	414.41	1.7709
55	43.15	419.30	1.7859
60	43.99	424.22	1.8007
65	44.84	429.15	1.8154
70	45.67	434.11	1.8300
75	46.49	439.09	1.8444
80	47.31	444.09	1.8587
85	48.13	449.13	1.8728

7.24 bar 6.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
6	27.15	368.65	1.6044
10	27.89	372.75	1.6190
15	28.79	377.83	1.6368
20	29.66	382.86	1.6541
25	30.50	387.86	1.6710
30	31.32	392.84	1.6876
35	32.12	397.81	1.7038
40	32.91	402.77	1.7198
45	33.67	407.74	1.7355
50	34.43	412.70	1.7510
55	35.17	417.68	1.7663
60	35.91	422.67	1.7814
65	36.63	427.68	1.7963
70	37.35	432.70	1.8111
75	38.05	437.74	1.8257
80	38.76	442.80	1.8401
85	39.45	447.89	1.8544
90	40.14	453.00	1.8686

8.65 bar 12.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
12	22.57	371.34	1.6016
15	23.07	374.55	1.6128
20	23.88	379.84	1.6310
25	24.64	385.06	1.6487
30	25.39	390.24	1.6659
35	26.11	395.37	1.6827
40	26.81	400.49	1.6991
45	27.49	405.58	1.7153
50	28.16	410.67	1.7311
55	28.81	415.76	1.7468
60	29.46	420.84	1.7621
65	30.09	425.94	1.7773
70	30.72	431.04	1.7923
75	31.33	436.16	1.8071
80	31.94	441.29	1.8217
85	32.54	446.43	1.8362
90	33.14	451.60	1.8505
95	33.73	456.79	1.8647

10.26 bar 18.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
18	18.85	373.81	1.5987
20	19.15	376.07	1.6064
25	19.88	381.61	1.6251
30	20.57	387.05	1.6432
35	21.23	392.42	1.6608
40	21.87	397.73	1.6779
45	22.49	403.00	1.6946
50	23.10	408.24	1.7109
55	23.68	413.47	1.7270
60	24.26	418.68	1.7427
65	24.82	423.88	1.7582
70	25.37	429.08	1.7735
75	25.92	434.29	1.7886
80	26.45	439.51	1.8034
85	26.98	444.73	1.8181
90	27.50	449.97	1.8327
95	28.02	455.22	1.8470
100	28.53	460.49	1.8612

6.40 bar 2.00°C

T	v	h	S
°C	dm³/kg	kJ/kg	kJ/kgK
2	30.79	366.76	1.6064
5	31.40	369.76	1.6172
10	32.39	374.72	1.6349
15	33.34	379.64	1.6521
20	34.27	384.54	1.6690
25	35.18	389.43	1.6855
30	36.07	394.31	1.7018
35	36.94	399.19	1.7177
40	37.79	404.08	1.7335
45	38.63	408.97	1.7490
50	39.46	413.88	1.7643
55	40.28	418.79	1.7794
60	41.09	423.73	1.7943
65	41.89	428.69	1.8091
70	42.68	433.66	1.8237
75	43.46	438.66	1.8381
80	44.24	443.69	1.8525
85	45.01	448.74	1.8667

7.69 bar 8.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
8	25.52	369.57	1.6035
10	25.88	371.65	1.6109
15	26.75	376.82	1.6289
20	27.59	381.92	1.6465
25	28.41	386.99	1.6637
30	29.20	392.03	1.6804
35	29.97	397.05	1.6968
40	30.72	402.06	1.7130
45	31.46	407.06	1.7288
50	32.18	412.07	1.7444
55	32.90	417.08	1.7598
60	33.60	422.10	1.7750
65	34.29	427.13	1.7900
70	34.97	432.18	1.8048
75	35.65	437.24	1.8195
80	36.31	442.32	1.8340
85	36.97	447.43	1.8483
90	37.63	452.56	1.8625

9.16 bar 14.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	KJ/kgK
14	21.25	372.19	1.6006
15	21.41	373.28	1.6044
20	22.20	378.68	1.6230
25	22.95	384.00	1.6410
30	23.67	389.25	1.6584
35	24.37	394.45	1.6755
40	25.05	399.63	1.6921
45	25.71	404.78	1.7084
50	26.35	409.91	1.7245
55	26.98	415.04	1.7402
60	27.60	420.16	1.7557
65	28.21	425.29	1.7710
70	28.81	430.42	1.7860
75	29.40	435.57	1.8009
80	29.98	440.72	1.8156
85	30.55	445.90	1.8302
90	31.12	451.09	1.8446
95	31.69	456.29	1.8588

10.84 bar 20.00°C

t	v	h	s
°C	dm³/kg	kJ/kg	kJ/kgK
20	17.76	374.58	1.5977
25	18.48	380.27	1.6169
30	19.16	385.82	1.6354
35	19.81	391.29	1.6532
40	20.44	396.68	1.6706
45	21.04	402.02	1.6875
50	21.63	407.33	1.7041
55	22.20	412.61	1.7203
60	22.75	417.87	1.7362
65	23.29	423.11	1.7518
70	23.83	428.36	1.7672
75	24.35	433.60	1.7824
80	24.86	438.85	1.7973
85	25.37	444.10	1.8121
90	25.87	449.37	1.8267
95	26.37	454.64	1.8411
100	26.85	459.94	1.8554
105	27.34	465.25	1.8696

Vapour Table, Superheated Range Solkane® 404A

11.45 bar 22.00°C

<i>T</i>	<i>v</i>	<i>h</i>	<i>S</i>
°C	dm³/kg	kJ/kg	kJ/kgK
22	16.74	375.33	1.5966
25	17.16	378.81	1.6084
30	17.84	384.50	1.6273
35	18.48	390.07	1.6455
40	19.09	395.56	1.6632
45	19.68	400.98	1.6804
50	20.25	406.36	1.6971
55	20.80	411.70	1.7135
60	21.34	417.01	1.7296
65	21.87	422.30	1.7454
70	22.38	427.59	1.7609
75	22.88	432.87	1.7762
80	23.38	438.15	1.7912
85	23.87	443.44	1.8061
90	24.35	448.73	1.8208
95	24.82	454.04	1.8353
100	25.29	459.35	1.8496
105	25.75	464.69	1.8638

13.43 bar 28.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
28	14.03	377.34	1.5932
30	14.30	379.81	1.6014
35	14.92	385.83	1.6211
40	15.52	391.68	1.6399
45	16.07	397.40	1.6581
50	16.61	403.04	1.6756
55	17.12	408.60	1.6927
60	17.62	414.10	1.7094
65	18.10	419.57	1.7257
70	18.57	425.01	1.7416
75	19.03	430.42	1.7573
80	19.47	435.83	1.7727
85	19.91	441.22	1.7879
90	20.34	446.62	1.8028
95	20.76	452.01	1.8176
100	21.18	457.41	1.8322
105	21.59	462.83	1.8466
110	22.00	468.25	1.8608

15.65 bar 34.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
34	11.77	378.99	1.5893
35	11.89	380.31	1.5936
40	12.49	386.75	1.6143
45	13.05	392.94	1.6339
50	13.57	398.95	1.6527
55	14.06	404.82	1.6707
60	14.53	410.60	1.6882
65	14.98	416.29	1.7051
70	15.41	421.93	1.7217
75	15.83	427.52	1.7379
80	16.24	433.08	1.7537
85	16.64	438.62	1.7693
90	17.04	444.14	1.7846
95	17.42	449.65	1.7997
100	17.79	455.15	1.8145
105	18.16	460.66	1.8292
110	18.53	466.17	1.8437
115	18.89	471.68	1.8580

18.15 bar 40.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
40	9.86	380.16	1.5845
45	10.44	387.17	1.6067
50	10.97	393.79	1.6273
55	11.46	400.14	1.6468
60	11.92	406.30	1.6655
65	12.36	412.32	1.6834
70	12.77	418.23	1.7007
75	13.17	424.06	1.7176
80	13.55	429.82	1.7341
85	13.92	435.54	1.7501
90	14.28	441.22	1.7659
95	14.63	446.88	1.7813
100	14.98	452.51	1.7966
105	15.31	458.13	1.8115
110	15.65	463.75	1.8263
115	15.97	469.36	1.8408
120	16.29	474.98	1.8552
125	16.61	480.60	1.8694

12.09 bar 24.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>S</i>
°C	dm³/kg	kJ/kg	kJ/kgK
24	15.78	376.03	1.5955
25	15.92	377.22	1.5995
30	16.59	383.07	1.6190
35	17.22	388.77	1.6376
40	17.83	394.36	1.6556
45	18.40	399.87	1.6731
50	18.96	405.32	1.6901
55	19.50	410.73	1.7067
60	20.02	416.10	1.7229
65	20.53	421.44	1.7389
70	21.03	426.78	1.7545
75	21.51	432.10	1.7699
80	21.99	437.42	1.7851
85	22.46	442.74	1.8000
90	22.92	448.06	1.8148
95	23.38	453.40	1.8294
100	23.83	458.74	1.8438
105	24.27	464.10	1.8581

14.14 bar 30.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
30	13.23	377.93	1.5920
35	13.87	384.16	1.6124
40	14.45	390.17	1.6317
45	15.01	396.03	1.6503
50	15.54	401.77	1.6682
55	16.04	407.42	1.6855
60	16.53	413.01	1.7024
65	17.00	418.54	1.7189
70	17.45	424.04	1.7351
75	17.90	429.51	1.7509
80	18.33	434.96	1.7664
85	18.75	440.40	1.7817
90	19.17	445.83	1.7968
95	19.58	451.27	1.8116
100	19.98	456.70	1.8263
105	20.38	462.14	1.8408
110	20.77	467.59	1.8551
115	21.15	473.05	1.8693

16.45 bar 36.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
36	11.10	379.44	1.5878
40	11.58	384.79	1.6050
45	12.14	391.19	1.6253
50	12.66	397.37	1.6446
55	13.15	403.38	1.6630
60	13.61	409.26	1.6808
65	14.05	415.05	1.6981
70	14.48	420.77	1.7149
75	14.89	426.44	1.7312
80	15.29	432.06	1.7473
85	15.68	437.65	1.7630
90	16.06	443.22	1.7784
95	16.43	448.77	1.7936
100	16.80	454.32	1.8086
105	17.16	459.86	1.8233
110	17.51	465.40	1.8379
115	17.86	470.95	1.8523
120	18.20	476.50	1.8665

19.04 bar 42.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
42	9.29	380.43	1.5826
45	9.64	384.81	1.5965
50	10.19	391.73	1.6181
55	10.68	398.31	1.6383
60	11.14	404.64	1.6574
65	11.57	410.80	1.6758
70	11.98	416.82	1.6934
75	12.37	422.75	1.7106
80	12.75	428.60	1.7273
85	13.11	434.39	1.7436
90	13.47	440.13	1.7595
95	13.81	445.85	1.7751
100	14.14	451.53	1.7904
105	14.47	457.20	1.8055
110	14.79	462.86	1.8204
115	15.11	468.51	1.8350
120	15.42	474.16	1.8495
125	15.72	479.81	1.8638

12.74 bar 26.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>S</i>
°C	dm³/kg	kJ/kg	kJ/kgK
26	14.88	376.71	1.5944
30	15.41	381.51	1.6104
35	16.04	387.36	1.6295
40	16.64	393.07	1.6479
45	17.20	398.68	1.6657
50	17.75	404.22	1.6829
55	18.27	409.69	1.6998
60	18.78	415.13	1.7162
65	19.28	420.53	1.7323
70	19.76	425.92	1.7481
75	20.23	431.28	1.7636
80	20.69	436.64	1.7789
85	21.14	442.00	1.7940
90	21.59	447.36	1.8088
95	22.03	452.72	1.8235
100	22.46	458.09	1.8380
105	22.89	463.48	1.8523
110	23.31	468.87	1.8665

14.88 bar 32.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
32	12.48	378.48	1.5907
35	12.86	382.33	1.6032
40	13.45	388.54	1.6232
45	14.00	394.55	1.6423
50	14.52	400.41	1.6605
55	15.02	406.17	1.6782
60	15.50	411.84	1.6954
65	15.96	417.45	1.7121
70	16.40	423.02	1.7284
75	16.83	428.54	1.7444
80	17.25	434.05	1.7601
85	17.67	439.53	1.7755
90	18.07	445.01	1.7907
95	18.46	450.48	1.8057
100	18.85	455.95	1.8204
105	19.24	461.42	1.8350
110	19.61	466.90	1.8494
115	19.99	472.38	1.8636

17.28 bar 38.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
38	10.46	379.83	1.5862
40	10.70	382.61	1.5951
45	11.27	389.28	1.6162
50	11.80	395.66	1.6361
55	12.28	401.82	1.6551
60	12.74	407.83	1.6733
65	13.18	413.73	1.6908
70	13.60	419.54	1.7079
75	14.01	425.28	1.7245
80	14.40	430.97	1.7407
85	14.78	436.62	1.7566
90	15.15	442.25	1.7722
95	15.51	447.85	1.7875
100	15.86	453.44	1.8026
105	16.21	459.02	1.8175
110	16.55	464.60	1.8321
115	16.88	470.18	1.8466
120	17.22	475.76	1.8609

19.97 bar 44.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm³/kg	kJ/kg	kJ/kgK
44	8.74	380.61	1.5806
45	8.86	382.15	1.5854
50	9.43	389.46	1.6082
55	9.93	396.30	1.6293
60	10.40	402.84	1.6490
65	10.83	409.16	1.6679
70	11.24	415.32	1.6859
75	11.62	421.36	1.7034
80	11.99	427.30	1.7204
85	12.35	433.17	1.7369
90	12.70	438.98	1.7530
95	13.03	444.76	1.7688
100	13.36	450.50	1.7843
105	13.68	456.22	1.7995
110	13.99	461.92	1.8145
115	14.30	467.61	1.8292
120	14.60	473.29	1.8438
125	14.89	478.98	1.8581

Vapour Table, Superheated Range Solkane® 404A

20.93 bar 46.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>S</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
46	8.23	380.71	1.5784
50	8.70	386.91	1.5977
55	9.22	394.10	1.6198
60	9.69	400.89	1.6403
65	10.12	407.40	1.6597
70	10.53	413.71	1.6782
75	10.91	419.87	1.6960
80	11.28	425.91	1.7133
85	11.63	431.87	1.7300
90	11.97	437.76	1.7464
95	12.30	443.60	1.7623
100	12.62	449.41	1.7780
105	12.93	455.18	1.7933
110	13.23	460.93	1.8085
115	13.53	466.66	1.8233
120	13.82	472.38	1.8380
125	14.11	478.10	1.8524
130	14.39	483.82	1.8667

24.03 bar 52.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
52	6.81	380.40	1.5703
55	7.18	385.72	1.5866
60	7.71	393.73	1.6108
65	8.17	401.09	1.6327
70	8.59	408.04	1.6531
75	8.97	414.70	1.6724
80	9.33	421.15	1.6908
85	9.68	427.45	1.7085
90	10.00	433.62	1.7256
95	10.31	439.71	1.7423
100	10.62	445.73	1.7585
105	10.91	451.69	1.7744
110	11.19	457.61	1.7899
115	11.47	463.49	1.8052
120	11.74	469.36	1.8202
125	12.00	475.20	1.8350
130	12.26	481.03	1.8495
135	12.51	486.86	1.8639

27.48 bar 58.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
58	5.56	378.78	1.5590
60	5.84	383.12	1.5721
65	6.40	392.44	1.5998
70	6.87	400.60	1.6238
75	7.28	408.10	1.6455
80	7.65	415.20	1.6657
85	7.99	422.00	1.6849
90	8.31	428.59	1.7031
95	8.62	435.02	1.7207
100	8.90	441.33	1.7377
105	9.18	447.54	1.7543
110	9.45	453.68	1.7704
115	9.71	459.76	1.7862
120	9.96	465.79	1.8016
125	10.21	471.79	1.8168
130	10.45	477.76	1.8317
135	10.69	483.72	1.8464
140	10.92	489.65	1.8608

21.92 bar 48.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>S</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
48	7.73	380.72	1.5759
50	7.98	384.01	1.5862
55	8.52	391.65	1.6096
60	9.01	398.74	1.6311
65	9.44	405.48	1.6511
70	9.85	411.97	1.6702
75	10.23	418.27	1.6884
80	10.60	424.43	1.7060
85	10.94	430.49	1.7230
90	11.28	436.47	1.7396
95	11.60	442.38	1.7558
100	11.91	448.25	1.7716
105	12.22	454.08	1.7871
110	12.51	459.88	1.8024
115	12.80	465.66	1.8174
120	13.09	471.43	1.8321
125	13.37	477.19	1.8467
130	13.64	482.94	1.8610

25.14 bar 54.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
54	6.38	380.04	1.5670
55	6.51	381.97	1.5729
60	7.09	390.74	1.5994
65	7.57	398.54	1.6227
70	8.00	405.80	1.6440
75	8.39	412.69	1.6639
80	8.75	419.32	1.6828
85	9.09	425.76	1.7009
90	9.41	432.06	1.7184
95	9.72	438.25	1.7353
100	10.02	444.35	1.7518
105	10.30	450.39	1.7678
110	10.58	456.37	1.7836
115	10.85	462.32	1.7990
120	11.11	468.23	1.8141
125	11.37	474.12	1.8290
130	11.62	480.00	1.8437
135	11.87	485.86	1.8581

28.71 bar 60.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
60	5.17	377.82	1.5542
65	5.82	388.64	1.5864
70	6.32	397.51	1.6125
75	6.75	405.46	1.6355
80	7.13	412.86	1.6566
85	7.48	419.89	1.6763
90	7.80	426.66	1.6951
95	8.10	433.23	1.7131
100	8.39	439.66	1.7304
105	8.66	445.98	1.7472
110	8.93	452.20	1.7636
115	9.18	458.36	1.7796
120	9.43	464.46	1.7952
125	9.67	470.52	1.8105
130	9.91	476.55	1.8255
135	10.14	482.55	1.8403
140	10.36	488.53	1.8549
145	10.58	494.50	1.8693

22.96 bar 50.00°C

<i>T</i>	<i>v</i>	<i>h</i>	<i>S</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
50	7.26	380.62	1.5733
55	7.85	388.89	1.5987
60	8.35	396.38	1.6213
65	8.80	403.39	1.6422
70	9.21	410.08	1.6618
75	9.59	416.55	1.6806
80	9.95	422.85	1.6985
85	10.29	429.02	1.7159
90	10.62	435.09	1.7327
95	10.94	441.09	1.7491
100	11.25	447.03	1.7651
105	11.54	452.92	1.7808
110	11.83	458.78	1.7962
115	12.12	464.61	1.8113
120	12.39	470.42	1.8262
125	12.66	476.22	1.8409
130	12.93	482.01	1.8553
135	13.19	487.80	1.8696

26.29 bar 56.00°C

<i>t</i>	<i>v</i>	<i>h</i>	<i>s</i>
°C	dm ³ /kg	kJ/kg	kJ/kgK
56	5.96	379.51	1.5632
60	6.47	387.27	1.5867
65	6.98	395.69	1.6118
70	7.42	403.33	1.6342
75	7.82	410.50	1.6550
80	8.19	417.34	1.6745
85	8.53	423.95	1.6930
90	8.85	430.38	1.7109
95	9.15	436.69	1.7281
100	9.45	442.89	1.7449
105	9.73	449.01	1.7611
110	10.00	455.07	1.7771
115	10.27	461.07	1.7926
120	10.52	467.05	1.8079
125	10.78	472.99	1.8230
130	11.02	478.91	1.8377
135	11.26	484.82	1.8523
140	11.50	490.72	1.8667

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