Property Library for Dodecamethyl-pentasiloxane (MD3M) $C_{12}H_{36}Si_5O_4$

LibMD3M

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Property Functions

1 Calculation Programs

"MD3M" means Dodecamethylpentasiloxane $(C_{12}H_{36}Si_5O_4)$

Functional Dependence	Function Name	Call from Fortran program	Property or Function	Unit of the result
$c_p = \mathrm{f}(p,t,x)$	cp_ptx_MD3M	CPPTXMD3M(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
$c_v = \mathrm{f}(p,t,x)$	cv_ptx_MD3M	CVPTXMD3M(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$\left(\dfrac{\partial p}{\partial T}\right)_v = \mathrm{f}(p,t,x)$	dpdtv_ptx_MD3M	DPDTVMD3M(P,T,X)	Derivative of pressure with respect to temperature (at constant specific volume)	kPa/K
$\left(\dfrac{\partial p}{\partial v}\right)_T = \mathrm{f}(p,t,x)$	dpdvt_ptx_MD3M	DPDVTMD3M(P,T,X)	Derivative of pressure with respect to specific volume (at constant temperature)	kPa/(m³/kg)
$\eta = \mathrm{f}(p,t,x)$	eta_ptx_MD3M	ETAPTXMD3M(P,T,X)	Dynamic viscosity	Pa·s
$h = \mathrm{f}(p,t,x)$	h_ptx_MD3M	HPTXMD3M(P,T,X)	Specific enthalpy	kJ/kg
$\kappa = \mathrm{f}(p,t,x)$	kappa_ptx_MD3M	KAPPAPTXMD3M(P,T,X)	Isentropic exponent	-
$\lambda = \mathrm{f}(p,t,x)$	lamda_ptx_MD3M	LAMPTXMD3M(P,T,X)	Thermal conductivity	W/(m·K)
$\nu = \mathrm{f}(p,t,x)$	nu_ptx_MD3M	NUPTXMD3M(P,T,X)	Kinematic viscosity	m²/s
$p_s = \mathrm{f}(t)$	ps_t_MD3M	PSTMD3M(T)	Vapor pressure from temperature	bar
$\rho = \mathrm{f}(p,t,x)$	rho_ptx_MD3M	RHOPTXMD3M(P,T,X)	Density	kg/m³
$s = \mathrm{f}(p,t,x)$	s_ptx_MD3M	SPTXMD3M(P,T,X)	Specific entropy	kJ/(kg K)
$t = \mathrm{f}(p,h)$	t_ph_MD3M	TPHMD3M(P,H)	Backward function: Temperature from pressure and enthalpy	°C
$t = \mathrm{f}(p,s)$	t_ps_MD3M	TPSMD3M(P,S)	Backward function: Temperature from pressure and entropy	°C
$t_s = \mathrm{f}(p)$	ts_p_MD3M	TSPMD3M(P)	Saturation temperature from pressure	°C
$u = \mathrm{f}(p,t,x)$	u_ptx_MD3M	UPTXMD3M(P,T,X)	Specific internal energy	kJ/kg
$v = \mathrm{f}(p,t,x)$	v_ptx_MD3M	VPTXMD3M(P,T,X)	Specific volume	m³/kg
$w = \mathrm{f}(p,t,x)$	w_ptx_MD3M	WPTXMD3M(P,T,X)	Isentropic speed of sound	m/s
$x = \mathrm{f}(p,h)$	x_ph_MD3M	XPHMD3M(P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg

Functional Dependence	Function Name	Call from Fortran program	Call in DLL LibMD3M as parameter	Property or Function	Unit of the result
$x = f(p,s)$	x_ps_MD3M	XPSMD3M(P,S)	C_XPSMD3M(X,P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg
$Z = f(p,t,x)$	Z_ptx_MD3M	ZPTXMD3M(P,T,X)	C_ZPTXMD3M(W,P,T,X)	Compression factor	-

Units: t in °C

p in bar

x in (kg of saturated steam)/(kg wet steam)

Range of validity

Temperature range: from t = 0°C to 400 °C
Pressure range: from p = 0.0000048971 bar to 300 bar

Reference state

h = 0 kJ/kg and s = 0 kJ/(kg K) at t_B = 229.88 °C on the boiling curve (x = 0; p_s = p_N = 1.01325 bar)

Details on the vapor fraction *x* and on the calculation of wet steam

The wet steam region is calculated automatically by the subprograms. For this purpose the following fixed details on the vapor fraction *x* are to be considered:

<u>Single-phase region</u>

If the state point to be calculated is located in the single-phase region (liquid or superheated steam) x = −1 must be entered as a pro-forma value.

<u>Wet-steam region</u>

If the state point to be calculated is located in the wet steam region, a value for *x* between 0 and 1 (x = 0 for saturated liquid, x = 1 for saturated steam) must be entered. In this case, the backward functions result in the appropriate value between 0 and 1 for *x*. When calculating wet steam either the given value for *t* <u>and</u> p = -1000 or the given value for *p* <u>and</u> t = -1000 and in both cases the value for *x* between 0 and 1 must be entered.
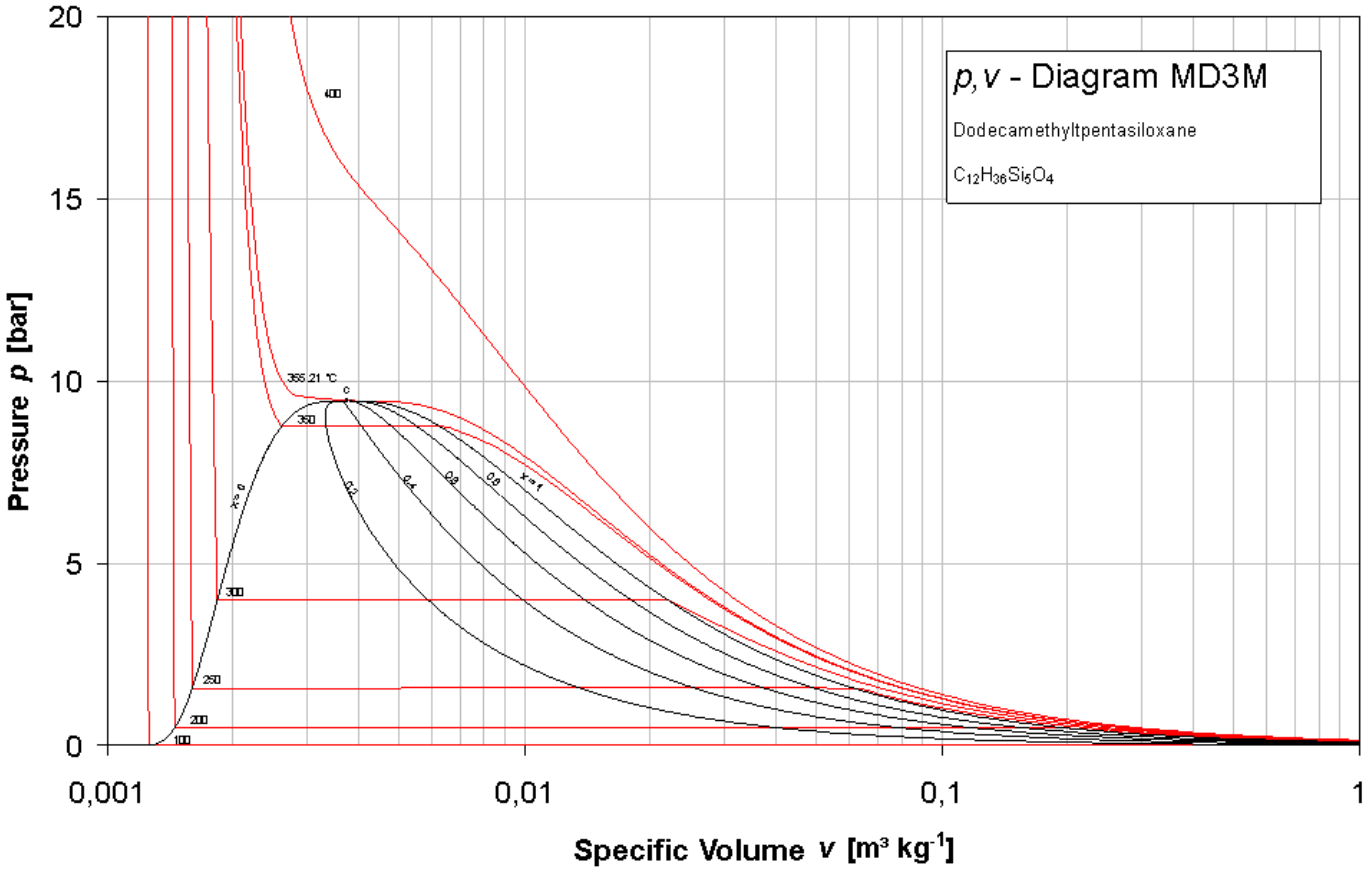
If *p* <u>and</u> *t* <u>and</u> *x* are entered as given values, the program considers *p* and *t* to be appropriate to represent the vapor pressure curve. If this is not the case the calculation for the property of the chosen function results in −1000.

Wet steam region: Temperature range from $t = 0\ °C$ to $t_c = 355.21\ °C$
Pressure range from $p_s\ (0\ °C) = 0.00078994$ bar to $p_c = 9.45229$ bar
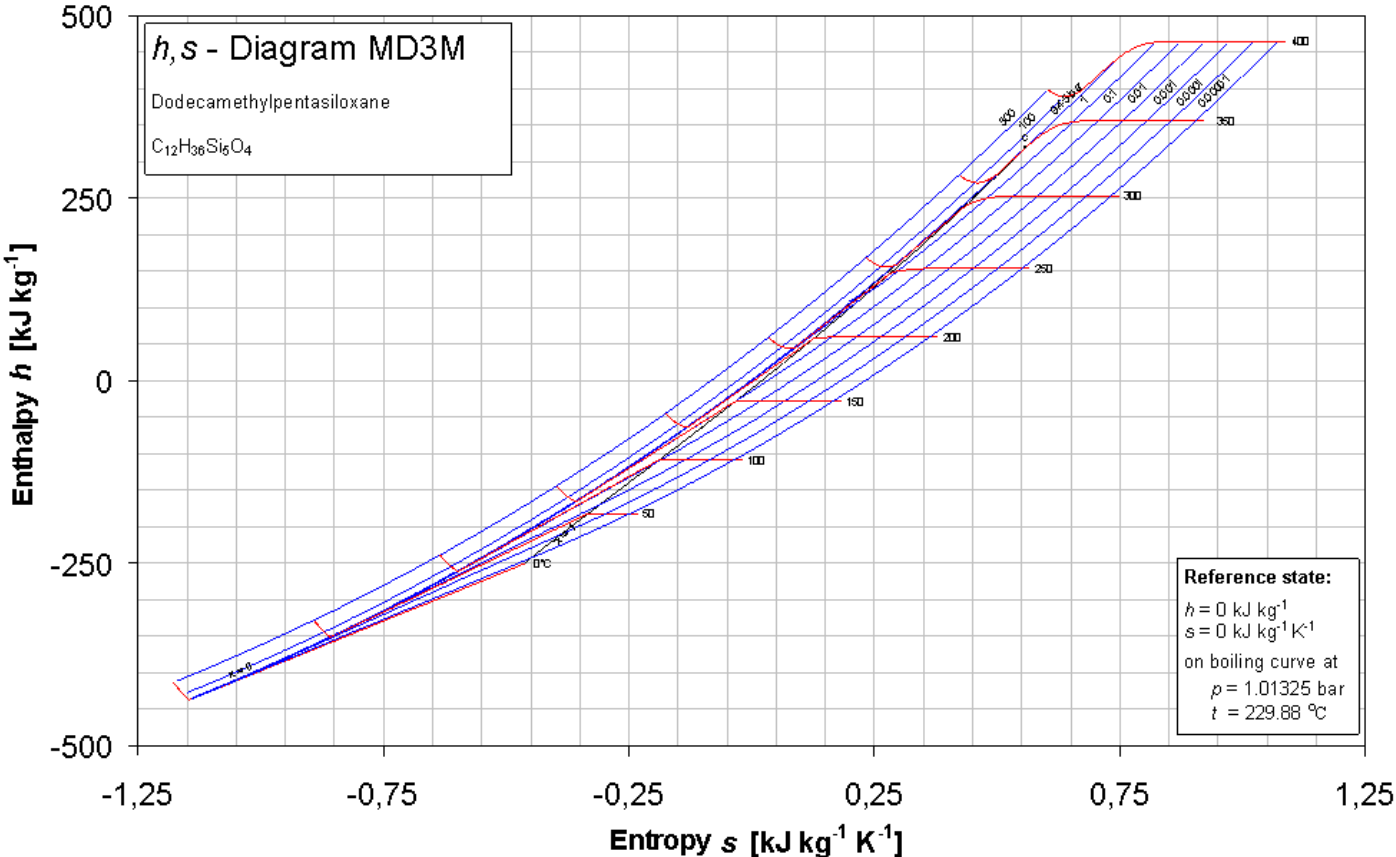
Note.

If the calculation results in −1000, the values entered represent a state point beyond the range of validity of MD3M. For further information on each function and its range of validity see Chapter 3. The same information may also be accessed via the online help pages.

p,v-Diagram

h,s-Diagram

h,s - Diagram MD3M

Dodecamethylpentasiloxane

$C_{12}H_{36}Si_5O_4$

Reference state:
$h = 0$ kJ kg^{-1}
$s = 0$ kJ kg^{-1} K^{-1}
on boiling curve at
$p = 1.01325$ bar
$t = 229.88$ °C

T,s-Diagram

T,s - Diagram MD3M

Dodecamethylpentasiloxane

$C_{12}H_{36}Si_5O_4$

Reference state:
$h = 0$ kJ kg^{-1}
$s = 0$ kJ kg^{-1} K^{-1}
on boiling curve at
$p = 1.01325$ bar
$t = 229.88$ °C