KCE
ThermoFluidProperties

Property Library for Octamethylcyclotetrasiloxane (D4) $C_8H_{24}O_4Si_4$

LibD4

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Property Functions

Calculation Programs

"D4" means Octamethylcyclotetrasiloxane **(** $C_8H_{24}O_4Si_4$ **)**

Functional Dependence	Function Name	Call from Fortran program	Property or Function	Unit of the result
$a = f(p,t,x)$	a_ptx_D4	APTXD4(P,T,X)	Thermal diffusivity	m^2/s
$c_p = f(p,t,x)$	cp_ptx_D4	CPPTXD4(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
$c_v = f(p,t,x)$	cv_ptx_D4	CVPTXD4(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$\left(\frac{\partial p}{\partial T}\right)_v = f(p,t,x)$	dpdtv_ptx_D4	DPDTVD4(P,T,X)	Derivative of pressure with respect to temperature (at constant specific volume)	kPa/K
$\left(\frac{\partial p}{\partial v}\right)_T = f(p,t,x)$	dpdvt_ptx_D4	DPDVTD4(P,T,X)	Derivative of pressure with respect to specific volume (at constant temperature)	kPa/(m^3/kg)
$\eta = f(p,t,x)$	eta_ptx_D4	ETAPTXD4(P,T,X)	Dynamic viscosity	Pa·s
$h = f(p,t,x)$	h_ptx_D4	HPTXD4(P,T,X)	Specific enthalpy	kJ/kg
$\kappa = f(p,t,x)$	kappa_ptx_D4	KAPPAPTXD4(P,T,X)	Isentropic exponent	-
$\lambda = f(p,t,x)$	lamda_ptx_D4	LAMPTXD4(P,T,X)	Thermal conductivity	W/(m·K)
$\nu = f(p,t,x)$	nu_ptx_D4	NUPTXD4(P,T,X)	Kinematic viscosity	m^2/s
$Pr = f(p,t,x)$	Pr_ptx_D4	PRPTXD4(P,T,X)	*Prandtl*-number	-
$p_s = f(t)$	ps_t_D4	PSTD4(T)	Vapor pressure from temperature	bar
$\rho = f(p,t,x)$	rho_ptx_D4	RHOPTXD4(P,T,X)	Density	kg/m^3
$s = f(p,t,x)$	s_ptx_D4	SPTXD4(P,T,X)	Specific entropy	kJ/(kg K)
$t = f(p,h)$	t_ph_D4	TPHD4(P,H)	Backward function: Temperature from pressure and enthalpy	°C
$t = f(p,s)$	t_ps_D4	TPSD4(P,S)	Backward function: Temperature from pressure and entropy	°C
$t_s = f(p)$	ts_p_D4	TSPD4(P)	Saturation temperature from pressure	°C
$u = f(p,t,x)$	u_ptx_D4	UPTXD4(P,T,X)	Specific internal energy	kJ/kg
$v = f(p,t,x)$	v_ptx_D4	VPTXD4(P,T,X)	Specific volume	m^3/kg

Functional Dependence	Function Name	Call from Fortran program	Property or Function	Unit of the result
$w = f(p,t,x)$	w_ptx_D4	WPTXD4(P,T,X)	Isentropic speed of sound	m/s
$x = f(p,h)$	x_ph_D4	XPHD4(P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg
$x = f(p,s)$	x_ps_D4	XPSD4(P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg
$Z = f(p,t,x)$	Z_ptx_D4	ZPTXD4(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 = 26.85°C to 399.85 °C
Pressure range: from p = 0.00001 bar to 300 bar

Reference state

h = 0 kJ/kg and s = 0 kJ/(kg K) at t_B = 175.354 °C on the boiling curve (x = 0; $p_s = p_N$ = 1.01325 bar)

Details on the vapor fraction *x*

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:

Single-phase region

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. Here the backward functions will also result in x = –1.

Wet-steam region

When calculating wet steam, a value 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. It is adequate to enter either the given value for t and p = –1000, or the given value for p and t = –1000, plus the value for x between 0 and 1. When p and t and x are entered as given values, the program will consider p and t to be appropriate to represent the saturation-pressure curve. If it is not the case the calculation for the property of the chosen function to be calculated results in –1000.

Wet steam region: Temperature range from t = 26.85 °C to t_c = 313.342 °C
Pressure range from p_s (26.85 °C) = 0.0014779 bar to p_c = 13.32 bar

Hint:

If the calculation results in –1000 (except for x), the values entered represent a state point beyond the range of validity of LibD4. 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.