KCE
ThermoFluidProperties

Decamethylcyclopentasiloxane (D5)
$C_{10}H_{30}O_5Si_5$

LibD5

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Property Functions

Calculation Programs

"D5" means Decamethylcyclopentasiloxane **(** $C_{10}H_{30}O_5Si_5$ **)**

Functional Dependence	Function Name	Call from Fortran program	Property or Function	Unit of the result
c_p = f(p,t,x)	cp_ptx_D5	CPPTXD5(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
c_v= f(p,t,x)	cv_ptx_D5	CVPTXD5(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$\left(\frac{\partial p}{\partial T}\right)_v$ = f(p,t,x)	dpdtv_ptx_D5	DPDTVD5(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_D5	DPDTVD5(P,T,X)	Derivative of pressure with respect to specific volume (at constant temperature)	kPa/(m³/kg)
η = f(p,t,x)	eta_ptx_D5	ETAPTXD5(P,T,X)	Dynamic viscosity	Pa·s
h = f(p,t,x)	h_ptx_D5	HPTXD5(P,T,X)	Specific enthalpy	kJ/kg
κ = f(p,t,x)	kappa_ptx_D5	KAPPAPTXD5(P,T,X)	Isentropic exponent	-
λ = f(p,t,x)	lamda_ptx_D5	LAMPTXD5(P,T,X)	Thermal conductivity	W/(m·K)
ν = f(p,t,x)	nu_ptx_D5	NUPTXD5(P,T,X)	Kinematic viscosity	m²/s
p_s = f(t)	ps_t_D5	PSTD5(T)	Vapor pressure from temperature	bar
ρ = f(p,t,x)	rho_ptx_D5	RHOPTXD5(P,T,X)	Density	kg/m³
s = f(p,t,x)	s_ptx_D5	SPTXD5(P,T,X)	Specific entropy	kJ/(kg K)
t = f(p,h)	t_ph_D5	TPHD5(P,H)	Backward function: Temperature from pressure and enthalpy	°C
t = f(p,s)	t_ps_D5	TPSD5(P,S)	Backward function: Temperature from pressure and entropy	°C
t_s = f(p)	ts_p_D5	TSPD5(P)	Saturation temperature from pressure	°C
u = f(p,t,x)	u_ptx_D5	UPTXD5(P,T,X)	Specific internal energy	kJ/kg
v = f(p,t,x)	v_ptx_D5	VPTXD5(P,T,X)	Specific volume	m³/kg
w = f(p,t,x)	w_ptx_D5	WPTXD5(P,T,X)	Isentropic speed of sound	m/s

Functional Dependence	Function Name	Call from Fortran program	Call in DLL LibD5 as parameter	Property or Function	Unit of the result
x = f(p,h)	x_ph_D5	XPHD5(P,H)	C_XPHD5(X,P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg
x = f(p,s)	x_ps_D5	XPSD5(P,S)	C_XPSD5(X,P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg
Z = f(p,t,x)	Z_ptx_D5	ZPTXD5(P,T,X)	C_ZPTXD5(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 = 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 = 210.9 °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 = 346.342 °C
Pressure range from p_s (26.85 °C) = 0.001477917 bar to p_c = 11.6146 bar

Hint.

If the calculation results in –1000 (except for x), the entered values represent a state point beyond the range of validity of LibD5. 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.