ThermoFluidProperties

Property Library for Isopentane

LibC5H12_Iso

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Property Functions

Functional Dependence	Function Name	Call from Fortran Program	Property or Function	Unit of the Result
$a = f(p,t,x)$	a_ptx_C5H12_ISO	A_PTX_C5H12_ISO(P,T,X)	Thermal diffusivity	m²/s
$c_p = f(p,t,x)$	cp_ptx_C5H12_ISO	CP_PTX_C5H12_ISO(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
$c_v = f(p,t,x)$	cv_ptx_C5H12_ISO	CV_PTX_C5H12_ISO(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$\varepsilon = f(p,t,x)$	eps_ptx_C5H12_ISO	EPS_PTX_C5H12_ISO(P,T,X)	Dielectric constant	-
$\eta = f(p,t,x)$	eta_ptx_C5H12_ISO	ETA_PTX_C5H12_ISO(P,T,X)	Dynamic viscosity	Pa . s
$h = f(p,t,x)$	h_ptx_C5H12_ISO	H_PTX_C5H12_ISO(P,T,X)	Specific enthalpy	kJ/kg
$\kappa = f(p,t,x)$	ka_ptx_C5H12_ISO	KA_PTX_C5H12_ISO(P,T,X)	Isentropic exponent	-
$\lambda = f(p,t,x)$	lam_ptx_C5H12_ISO	LAM_PTX_C5H12_ISO(P,T,X)	Thermal conductivity	W/(m . K)
$\nu = f(p,t,x)$	ny_ptx_C5H12_ISO	NY_PTX_C5H12_ISO(P,T,X)	Kinematic viscosity	m²/s
$p_{mel} = f(t)$	pmel_t_C5H12_ISO	PMEL_T_C5H12_ISO (T)	Melting pressure from temperature	bar
$Pr = f(p,t,x)$	pr_ptx_C5H12_ISO	PR_PTX_C5H12_ISO(P,T,X)	*Prandtl*-number	-
$p_s = f(t)$	ps_t_C5H12_ISO	PS_T_C5H12_ISO(T)	Vapor pressure from temperature	bar
$\rho = f(p,t,x)$	rho_ptx_C5H12_ISO	RHO_PTX_C5H12_ISO(P,T,X)	Density	kg/m^3
$s = f(p,t,x)$	s_ptx_C5H12_ISO	S_PTX_C5H12_ISO(P,T,X)	Specific entropy	kJ/(kg K)
$\sigma = f(t)$	sigma_t_C5H12_ISO	SIGMA_T_C5H12_ISO(T)	Surface tension from temperature	N/m
$t = f(p,h)$	t_ph_C5H12_ISO	T_PH_C5H12_ISO(P,H)	Backward function: Temperature from pressure and enthalpy	°C
$t = f(p,s)$	t_ps_C5H12_ISO	T_PS_C5H12_ISO(P,S)	Backward function: Temperature from pressure and entropy	°C
$t_{mel} = f(p)$	tmel_p_C5H12_ISO	TMEL_P_C5H12_ISO (P)	Melting Temperature from pressure	°C
$t_s = f(p)$	ts_p_C5H12_ISO	TS_P_C5H12_ISO(P)	Saturation temperature from pressure	°C
$u = f(p,t,x)$	u_ptx_C5H12_ISO	U_PTX_C5H12_ISO(P,T,X)	Specific internal energy	kJ/kg

Functional Dependence	Function Name	Call from Fortran Program	Property or Function	Unit of the Result
v = f(*p*,*t*,*x*)	v_ptx_C5H12_ISO	V_PTX_C5H12_ISO(P,T,X)	Specific volume	m³/kg
w = f(*p*,*t*,*x*)	w_ptx_C5H12_ISO	W_PTX_C5H12_ISO(P,T,X)	Isentropic speed of sound	m/s
x = f(*p*,*h*)	x_ph_C5H12_ISO	X_PH_C5H12_ISO(P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg
x = f(*p*,*s*)	x_ps_C5H12_ISO	X_PS_C5H12_ISO(P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg
z = f(*p*,*t*,*x*)	z_ptx_C5H12_ISO	W_PTX_C5H12_ISO(P,T,X)	Compression factor	-

Units:

t in °C
p in bar
x in (kg saturated steam)/(kg wet steam)

Range of validity

Temperature range: from - 160.5 °C to 226.85 °C
Pressure range: from 8.95275×10^{-10} bar to 1×10^{4} bar

Reference state

h = 0 kJ/kg and *s* = 0 kJ/(kg K) at *p* = 1,01325 bar on the saturated liquid line (x = 0)

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.

Wet-steam region

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* and p = -1000 or the given value for *p* and t = -1000 and in both cases the value for *x* between 0 and 1 must be entered.

If *p* and *t* and *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 –1.

Wet steam region: Temperature ranges from t_{min} = - 160.5 °C to t_c = 187.2 °C

Pressure ranges from p_{min} = 8.95275 x 10^{-10} bar to p_c = 33.7822 bar

Note:

If the input values are located outside the range of validity, the calculated function will always result in –1000. Please find more exact details on every function and its corresponding range of validity in the enclosed software documentation in Chapter 3.