KCE
ThermoFluidProperties

Property Library for Iso-Butane

LibButan_Iso

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Property Functions Functions

Functional Dependence	Function Name	Call from Fortran program	Property or Function	Unit of the result
$a = f(p,t,x)$	a_ptx_BUTI	APTXBUTI(P,T,X)	Thermal diffusivity	m^2/s
$c_p = f(p,t,x)$	cp_ptx_BUTI	CPPTXBUTI(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
$c_v = f(p,t,x)$	cv_ptx_BUTI	CVPTXBUTI(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$\eta = f(p,t,x)$	eta_ptx_BUTI	ETAPTXBUTI(P,T,X)	Dynamic viscosity	Pa s
$h = f(p,t,x)$	h_ptx_BUTI	HPTXBUTI(P,T,X)	Specific enthalpy	kJ/kg
$\kappa = f(p,t,x)$	kappa_ptx_BUTI	KAPTXBUTI(P,T,X)	Isentropic exponent	-
$\lambda = f(p,t,x)$	lambda_ptx_BUTI	LAMPTXBUTI(P,T,X)	Thermal conductivity	W/(m K)
$\nu = f(p,t,x)$	ny_ptx_BUTI	NYPTXBUTI(P,T,X)	Kinematic viscosity	m^2/s
$p_{mel} = f(t)$	pmel_t_BUTI	PMELBUTI(T)	Melting pressure from temperature	bar
$p_s = f(t)$	ps_t_BUTI	PSTBUTI(T)	Vapor pressure from temperature	bar
$Pr = f(p,t,x)$	Pr_ptx_BUTI	PRPTXBUTI(P,T,X)	*Prandtl*-Number	-
$\rho = f(p,t,x)$	rho_ptx_BUTI	ROPTXBUTI(P,T,X)	Density	kg/m^3
$s = f(p,t,x)$	s_ptx_BUTI	SPTXBUTI(P,T,X)	Specific entropy	kJ/(kg K)
$t = f(p,h)$	t_ph_BUTI	TPHBUTI(P,H)	Backward function: Temperature from pressure and enthalpy	°C
$t = f(p,s)$	t_ps_BUTI	TPSBUTI(P,S)	Backward function: Temperature from pressure and entropy	°C
$t_{mel} = f(p)$	tmel_p_BUTI	TMELBUTI(P)	Melting temperature from pressure	°C
$t_s = f(p)$	ts_p_BUTI	TSPBUTI(P)	Saturation temperature from pressure	°C
$u = f(p,t,x)$	u_ptx_BUTI	UPTXBUTI(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_BUTI	VPTXBUTI(P,T,X)	Specific volume	m^3/kg
$w = f(p,t,x)$	w_ptx_BUTI	WPTXBUTI(P,T,X)	Isentropic speed of sound	m/s
$x = f(p,h)$	x_ph_BUTI	XPHBUTI(P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg
$x = f(p,s)$	x_ps_BUTI	XPSBUTI(P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg
$z = f(p,t,x)$	z_ptx_BUTI	ZPTXBUTI(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 t: from $t_{mel}(p)$ to 301.85 °C

Pressure p: from $p_t = 2.19 \times 10^{-7}$ bar to 350 bar

Reference state

h = 200 kJ/kg and s = 1 kJ/(kg K) at t = 0 °C on the boiling curve (x = 0)

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:

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.

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.

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.

Wet steam region: Temperature from t_t = –159.42 °C to t_c = 134.66 °C

Pressure from $p_t = 2.19 \times 10^{-7}$ bar to 36.29 bar

Note!

If the input values are located outside the range of validity, the result for the calculated function will always be –1000. You can find more exact details on every function and its corresponding range of validity in the enclosed program documentation in chapter 3.