Property Library for
Sulfur Dioxide

LibSO2

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Property Functions

Functional Dependence	Function Name	Call from Fortran Program	Property or Function	Unit of the Result
$c_p = f(p,t,x)$	cp_ptx_SO2	CP_PTX_SO2(P,T,X)	Specific isobaric heat capacity	kJ/(kg K)
$c_v = f(p,t,x)$	cv_ptx_SO2	CV_PTX_SO2(P,T,X)	Specific isochoric heat capacity	kJ/(kg K)
$h = f(p,t,x)$	h_ptx_SO2	H_PTX_SO2(P,T,X)	Specific enthalpy	kJ/kg
$\kappa = f(p,t,x)$	ka_ptx_SO2	KA_PTX_SO2(P,T,X)	Isentropic exponent	-
$p_s = f(t)$	ps_t_SO2	PS_T_SO2(T)	Vapor pressure from temperature	bar
$\rho = f(p,t,x)$	rho_ptx_SO2	RHO_PTX_SO2(P,T,X)	Density	kg/m^3
$s = f(p,t,x)$	s_ptx_SO2	S_PTX_SO2(P,T,X)	Specific entropy	kJ/(kg K)
$\sigma = f(t)$	sigma_t_SO2	SIGMA_T_CO(T)	Surface tension from temperature	N/m
$t = f(p,h)$	t_ph_SO2	T_PH_SO2(P,H)	Backward function: Temperature from pressure and enthalpy	°C
$t = f(p,s)$	t_ps_SO2	T_PS_SO2(P,S)	Backward function: Temperature from pressure and entropy	°C
$t_s = f(p)$	ts_p_SO2	TS_P_SO2(P)	Saturation temperature from pressure	°C
$u = f(p,t,x)$	u_ptx_SO2	U_PTX_SO2(P,T,X)	Specific internal energy	kJ/kg
$v = f(p,t,x)$	v_ptx_SO2	V_PTX_SO2(P,T,X)	Specific volume	m³/kg
$w = f(p,t,x)$	w_ptx_SO2	W_PTX_SO2(P,T,X)	Isentropic speed of sound	m/s
$x = f(p,h)$	x_ph_SO2	X_PH_SO2(P,H)	Backward function: Vapor fraction from pressure and enthalpy	kg/kg
$x = f(p,s)$	x_ps_SO2	X_PS_SO2(P,S)	Backward function: Vapor fraction from pressure and entropy	kg/kg

Units: t in °C

p in bar

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

Range of validity

Temperature range: from - 75.45 °C to 251.85 °C

Pressure range: from 1.66023×10^{-2} bar to 350 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:

<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 –1.

Wet steam region: Temperature ranges from t_{min} = - 75.45 °C to t_c = 157.49 °C

Pressure ranges from p_{min} = 1.66023×10^{-2} bar to p_c = 78.753 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.