

**Property Library for
the Industrial Formulation
IAPWS-IF97
for Steam and
Metastable Steam**

LibIF97_Meta

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Program Functions

Range of Validity

The International Association for the Properties of Water and Steam IAPWS issued the

"Release on the IAPWS Industrial Formulation 1997

for the Thermodynamic Properties of Water and Steam IAPWS-IF97"

in 1997 and revised it in 2007 [1], [2], [3]. It will be abbreviated as IAPWS-IF97. This industrial standard should be applied worldwide in acceptance and guarantees calculations of facilities and plants working with water or steam. The IAPWS-IF97 Formulation replaces the former Industrial Formulation IFC-67 [12].

The range of validity is divided into five calculation regions. Each of the calculation regions contains its own equation of state. They are described in detail in the official Release of the IAPWS [1] and in the publications by *Wagner et al.* [2] and [3].

The functions of the LibIF97_META property library are listed in the following section.

The range of validity is shown in Figure 1.1. It contains the IAPWS-IF97 regions 2, partly 3, 5, and 2M for metastable steam.

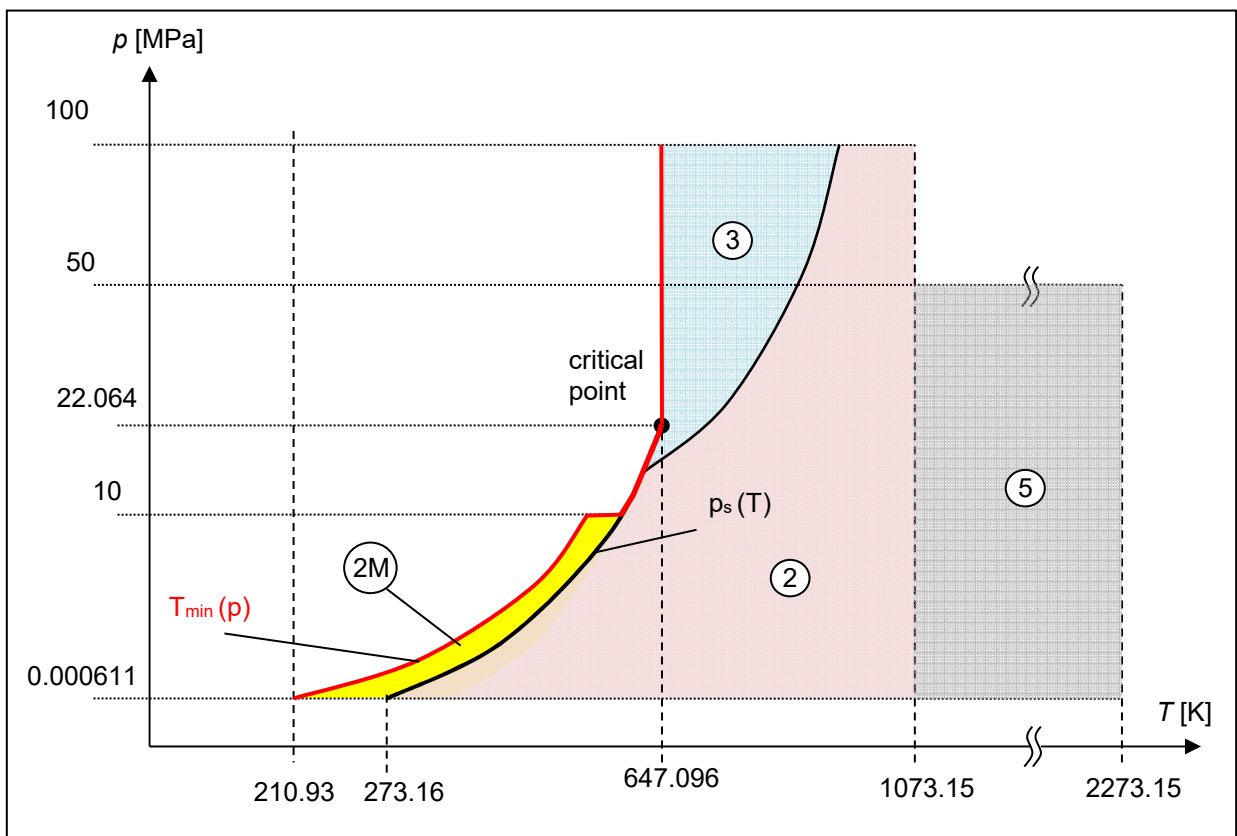


Figure 1.1 Range of Validity of the Property Library LibIF97_META

Functions

Functional Dependence	Function Name	Call as Function from DLL LibIF97	Property or Function	Unit of the Result
$a = f(p,t)$	a_pt_97_META	= APT97_META (P,T)	Thermal diffusivity	m ² /s
$\alpha_v = f(p,t)$	alphav_pt_97_META	= ALPHAVPT97_META (P,T)	Isobaric cubic expansion coefficient	1/K
$c_p = f(p,t)$	cp_pt_97_META	= CPPT97_META (P,T)	Specific isobaric heat capacity	kJ/(kg · K)
$\eta = f(p,t)$	eta_pt_97_META	= ETAPT97_META (P,T)	Dynamic viscosity	Pa·s
$h = f(p,t)$	h_pt_97_META	= HPT97_META (P,T)	Specific enthalpy	kJ/kg
$\kappa = f(p,t)$	kappa_pt_97_META	= KAPPAPT97_META (P,T)	Isentropic exponent	-
$\lambda = f(p,t)$	lambda_pt_97_META	= LAMPT97_META (P,T)	Thermal conductivity	W/(m K)
$\nu = f(p,t)$	ny_pt_97_META	= NYPT97_META (P,T)	Kinematic viscosity	m ² /s
$p = f(h,s)$	p_hs_97_META	= PHS97_META (H,S)	Backward function: Pressure from specific enthalpy and specific entropy	bar
$Pr = f(p,t)$	pr_pt_97_META	= PRPT97_META (P,T)	PRANDTL-Number	-
$p_s = f(t)$	ps_t_97_META	= PST97_META (P)	Saturation pressure	bar
$\rho = f(p,t)$	rho_pt_97_META	= RHOPT97_META (P,T)	Density	kg/m ³
$s = f(p,t)$	s_pt_97_META	= SPT97_META (P,T)	Specific entropy	kJ/(kg · K)
$t = f(h,s)$	t_hs_97_META	= THS97_META (H,S)	Backward function: Temperature from specific enthalpy and specific entropy	°C
$t = f(p,h)$	t_ph_97_META	= TPH97_META (P,H)	Backward function: Temperature from pressure and specific enthalpy	°C
$t = f(p,s)$	t_ps_97_META	= TPS97_META (P,S)	Backward function: Temperature from pressure and specific entropy	°C
$t_{\min} = f(p)$	tmin_p_97_META	= TMINP97_META (P)	Minimal temperature	°C
$t_s = f(p)$	ts_p_97_META	= TSP97_META (P)	Saturation temperature	°C
$u = f(p,t)$	u_pt_97_META	= UPT97_META (P,T)	Specific internal energy	kJ/kg
$v = f(p,t)$	v_pt_97_META	= VPT97_META (P,T)	Specific volume	m ³ /kg
$w = f(p,t)$	w_pt_97_META	= WPT97_META (P,T)	Isentropic speed of sound	m/s

Units: t in °C
 p in bar
 h in kJ/kg
 s in kJ/(kg K)

Range of validity of IAPWS-IF97 META

Temperature: from t_{\min} to 800 °C
Pressure: from 0.00611 bar to 1000 bar
High temperature region: to 2000 °C for pressures less than 500 bar

Note.

If the calculation results in -1, the values entered represent a state point outside the range of validity of IAPWS-IF97 META. 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.