



Electronic Steam Tables and Property Libraries for Calculating Heat Cycles, Boilers, and Turbines

Water and Steam	Humid Combustion Gases	Humid Air
<p>Library LibIF97</p> <ul style="list-style-type: none"> Industrial formulation IAPWS-IF97 Supplementary backward equations IAPWS-IF97-S01, IAPWS-IF97-S03rev, IAPWS-IF97-S04 Development of further backward equations for critical and supercritical regions (region 3) <p>Thermodynamic and Transport Property Calculations</p> <p>Thermodynamic Properties</p> <ul style="list-style-type: none"> Saturation pressure p_s Saturation temperature T_s Density ρ Specific volume v Specific enthalpy h Specific internal energy u Specific entropy s Specific isobaric heat capacity c_p Specific isochoric heat capacity c_v Isentropic exponent κ Speed of sound w Specific exergy e Surface tension σ <p>Transport Properties</p> <ul style="list-style-type: none"> Dynamic viscosity η Kinematic viscosity ν Thermal conductivity λ Prandtl - number Pr <p>Thermodynamic Differential Quotients</p> <ul style="list-style-type: none"> All differential quotients can be calculated <p>Backward Functions</p> <ul style="list-style-type: none"> $T, v, x, s(p, h)$ $T, v, x, h(p, s)$ $p, T, v, x(h, s)$ 	<p>Library LibIdGas</p> <p>VDI-Guideline 4670 for low pressures, high temperatures</p> <p>Library LibHuGas</p> <p>Model: Ideal mixture of real fluids for high pressures, low temperatures</p> <ul style="list-style-type: none"> Ideal mixture of the real fluids CO₂ - Span and Wagner H₂O - IAPWS-95 N₂ - Span et al. O₂ - Schmidt and Wagner Ar - Tegeler et al. and the ideal gases: <ul style="list-style-type: none"> SO₂ CO Ne scientific equations (Bücker et al.) Consideration of - Dissociation from VDI-Guideline 4670 - Poynting effect 	<p>Library LibIdAir</p> <p>VDI-Guideline 4670 for low pressures, high temperatures</p> <p>Library LibHuAir</p> <p>Model: Ideal mixture of real fluids for high pressures, low temperatures</p> <ul style="list-style-type: none"> Ideal mixture of the real fluids dry air: Lemmon et al. steam and water: IAPWS-IF97 Consideration of - Dissociation from VDI-Guideline 4670 - Poynting effect

Add-In FluidEXL Graphics for Excel® including thermodynamic charts

LibIF97

LibHuGas

LibHuAir

The Add-In FluidEXL Graphics has been developed for calculating thermophysical properties in Excel®. Using the Add-In, a direct call to functions from the property libraries is possible. The calculated properties can be represented in thermodynamic charts.

FluidMAT for Mathcad®

Using the interface FluidMAT, the functions of property libraries can be called in Mathcad®.

Software for Pocket Calculators

Software for calculating thermodynamic and transport properties for

- Water and steam
- Combustion Gases and
- Humid air

on the following pocket calculators have been developed for daily use.

Program FluidDIA

Using FluidDIA, large size thermodynamic charts (up to A0) can be calculated and plotted in publishing quality.

- Charts for water and steam:
 - right-angled h, s - diagram
 - oblique angled h, s - diagram
 - T, s - diagram
 - $\log p, h$ - diagram
 - $h, \log p$ - diagram
 - $h, \log r$ - diagram
- Charts for humid air:
 - h, x - diagram for several pressures
- Charts for Ammonia
 - $\log p, h$ - diagram