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Property Libraries for Working Fluids for Calculating Heat Cycles, Boilers, Turbines, Heat Pumps, and Refrigeration Processes

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The program libraries developed for calculating thermophysical properties of working fluids can be used in the daily work of an engineer who calculates heat cycles, steam or gas turbines, boilers, heat pumps or other thermal or refrigeration processes. Thermodynamic properties, transport properties, thermodynamic derivatives, and backward functions can be calculated. The following property libraries are being presented here: LibHuGas for humid combustion-gas mixtures calculated as an ideal mixture of real fluids, LibHuAir for humid air calculated as an ideal mixture of the real fluids dry air and water, LibAmWa for ammonia/water mixtures (IAPWS Guideline, 2001), LibWaLi for water/lithium bromide mixtures (formulation of Kim and Infante Ferrera, 2004), LibIDGAS for ideal-gas mixtures (VDI Guideline 4670), LibIdGasMix for 25 ideal gases and their mixtures, LibIF97 for water and steam from IAPWS-IF97, LibCO2 for carbon dioxide from Span and Wagner (1994), LibNH3 for ammonia from Tillner-Roth (1995), LibR134a for the refrigerant R134a from Tillner-Roth and Baehr (1994), LibPropane for propane from Lemmon et al. (2006), LibButane_Iso and LibButane_n for Isobutane and n-butane from Buecker et al. (2003), LibMM, LibD4, LibD5, LibMD4M for siloxanes as ORC working fluids (formulation of Colonna et al., 2006), LibCH3OH for methanol (formulation of de Reuck and Craven, 1993), LibHe for helium from McCarty and Arp (1990), LibH2 for hydrogen from Leachman et al. (2007). The libraries contain the most accurate algorithms for thermodynamic and transport properties. The following software solutions are presented: DLLs for Windows® applications, Add-In FluidEXL for Excel®, Add-On FluidLAB for MATLAB®, Add-On FluidMAT for Mathcad®, Add-On FluidEES for the Engineering Equation Solver EES®, Add-On FluidMOD for Modelica (Dymola®), and property libraries for pocket calculators. Student versions of all programs are available.