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

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The program libraries for calculating the thermophysical properties for water and steam, for mixtures with water and steam, and for other working fluids are designed for practical use by engineers who calculate heat cycles, steam or gas turbines, boilers, heat pumps, or other thermal or refrigeration processes. They can calculate thermodynamic properties, transport properties, thermodynamic derivatives and inverse functions. The following property libraries are being presented here: LibIF97 for water and steam, LibIF97_META for metastable steam, LibICE for ice, LibSeaWa for seawater, LibHuGas for humid combustion-gas mixtures also at high pressures, LibHuAir for humid air also at high temperatures and pressures, LibAmWa for ammonia/water mixtures in absorption processes and the Kalina process, LibWaLi for water/lithium bromide mixtures in absorption processes, LibIDGAS for combustion gas mixtures, LibIdGasMix for 25 ideal gases and their mixtures, LibRealAir for real dry air, LibCO2 for carbon dioxide including dry ice, LibNH3 for ammonia, LibR134a for the refrigerant R134a, LibPropane for propane, LibButane_Iso and LibButane_n for isobutane and n-butane, LibD4, LibD5, LibD6, LibMDM, LibMD2M, LibMD3M, LibMD4M, and LibMM for siloxanes used as ORC working fluids, LibC2H5OH for ethanol, LibCH3OH for methanol, LibH2 for hydrogen, LibN2 for nitrogen, and LibHe for helium. In addition, property libraries for a number of hydrocarbons are available. These libraries contain the most accurate algorithms currently available for calculating thermodynamic and transport properties. For extremely fast property computations in CFD or non-stationary process modelling, spline-based property libraries are available. The property libraries can be used in user-specific programs written in Fortran, C++, C#, Java, Pascal (Delphi), Python, Visual Basic or other programming languages under the operating systems Windows, Unix/Linux or Mac OS. In addition, add-ons for the use of these property libraries in Excel®, MATLAB®, Mathcad®, Engineering Equation Solver® (EES), Dymola® and SimulationX® (Modelica), and LabVIEW™ are available.