

SteamTab™

THERMODYNAMIC AND TRANSPORT PROPERTIES OF WATER AND STEAM

SteamTab™ brings you a comprehensive set of water and steam properties — right in your spreadsheet.

With SteamTab™'s intuitive user-interface, the trouble of getting authoritative steam data is *completely* eliminated. You can finally turn your full attention to steam engineering.

Using SteamTab™ in a spreadsheet allows you to examine a large number of design scenarios for optimization and visualize the results in great looking tables and charts.

SteamTab could also be used to generate Mollier charts and steam tables in your own choices of units, graduations, or language.

SteamTab™ Products

SteamTab™ V3.0

uses the highly accurate international standard IAPWS-95 Formulation for General and Scientific Use.

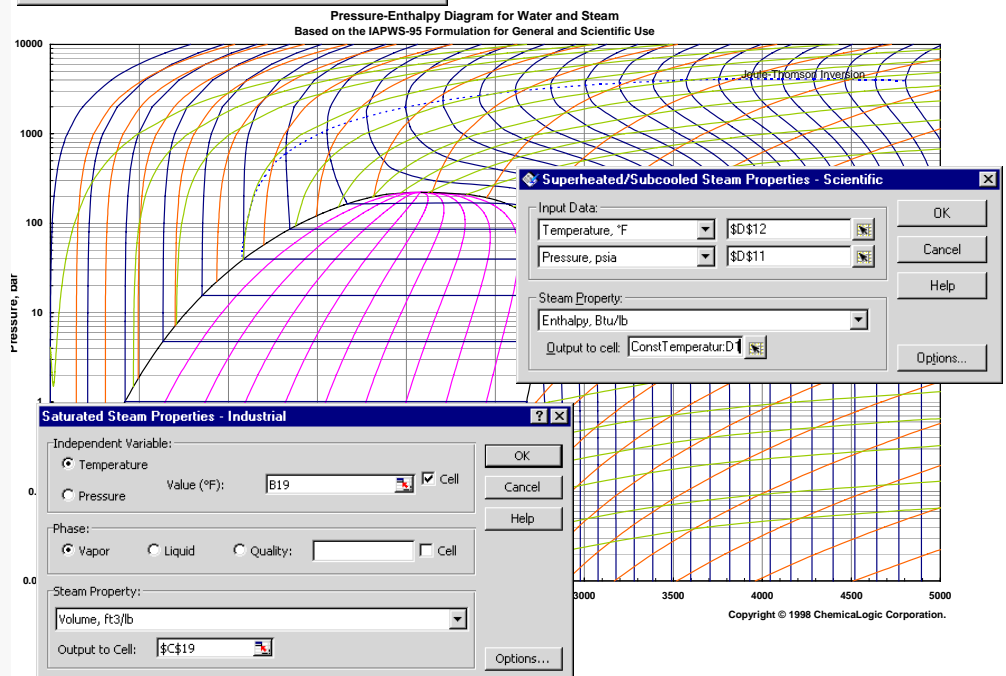
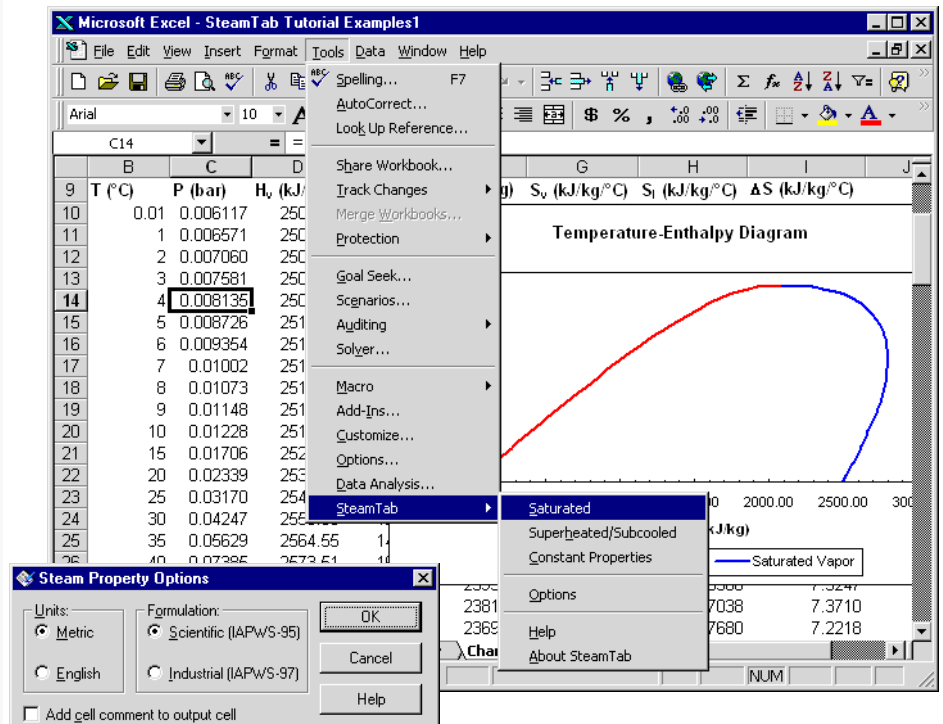
SteamTab Duo™ V3.0

contains both IAPWS-95 and the high-speed IAPWS-IF97 Industrial Formulation.

SteamTab Quad™ V3.0 is implemented with all 4 sets of formulation:

- IAPWS-95 (New, Scientific)
- IAPWS-IF97 (New, Industrial)
- NBS/NRC-84 (Old, Scientific)
- IFC-67 (Old, Industrial)

SteamTab™ products support all 32-bit spreadsheet applications of Lotus 1-2-3 and Microsoft Excel for Windows 95,98, or NT4; each version of a spreadsheet requires a compatible version of SteamTab product.



If you ever had the need for steam properties, then you must have

SteamTab!

CHEMICALLOGIC

SteamTab™ Thermodynamic Properties of Water and Steam

SteamTab™ Features

- Direct “live” links to variable steam conditions by cell reference
- Built-in SteamTab™ worksheet functions, user-interface dialog-boxes and toolbars
- Choice of *Metric/SI* or *English* units
- Direct calculations of steam quality and two-phase steam properties
- Direct calculation of steam outlet conditions for isentropic, isenthalpic, constant internal energy or constant volume process
- Capability to generate your own steam property diagrams using the spreadsheet’s charting capability
- Save steam property values for export to other applications – limited only by the spreadsheet’s file transfer capability
- Spreadsheet examples for expander, compressor, pressure reducing, relative humidity, etc.

International Association for the Properties of Water and Steam (IAPWS) Formulations

IAPWS-95 Formulation for General and Scientific Use

The IAPWS-95 formulation, authored by W. Wagner, Chair for Thermodynamics, Ruhr University at Bochum, represents the most current and accurate embodiment of scientific understanding of water and steam properties. Replacing the NBS/NRC 1984 formulation, IAPWS-95 is the current international standard for properties of water and steam.

IAPWS-IF97 Formulation for Industrial Use

To satisfy the special need for computational speed in certain industrial applications, IAPWS adopted in 1997 an industrial formulation (IAPWS-IF97) that approximates the IAPWS-95 formulation numerically within certain tolerances.

The adoption of IAPWS-IF97 renders obsolete the 30-year old IFC-67 Formulation (as used in the ASME Steam Tables, 6th Edition). IAPWS recommends that beginning January 1, 1999, the IAPWS-IF97 should be used as the basis for contracts with respect to performance test calculations of those machinery and systems using steam.

SteamTab™ Products

SteamTab™ V3.0 bases its software implementation on the IAPWS-95 formulation for general and scientific use. The scientific formulation is valid in the entire stable fluid region of water. SteamTab imposes the following temperature and pressure restrictions:

Pressure (P, bar): $0 \leq P \leq 100,000$
Temperature (T, K): $190 \leq T \leq 5,000$

SteamTab Duo™ V3.0 includes both the IAPWS-95 and the IAPWS-IF97 formulations as user selectable options. The IAPWS-IF97 has the following range of applicability:

Pressure (P, bar): $0 \leq P \leq 1,000$
Temperature (T, K): $273.15 \text{ K} \leq T \leq 1,073.15$ (for $P \leq 1,000$)
 $1,073.15 \text{ K} \leq T \leq 2,273.17$ (for $P \leq 100$)

SteamTab Quad™ V3.0 is implemented with all 4 sets of formulation:

- IAPWS-95 (New, Scientific)
- IAPWS-IF97 (New, Industrial)
- NBS/NRC-84 (Old, Scientific)
- IFC-67 (Old, Industrial)

System Requirements

SteamTab™ V3.0 and SteamTab Duo™ V3.0 requires Microsoft Excel 95/97 or Lotus 1-2-3 V97/Millennium, for Windows 95/98/NT4; 800 to 1200 kilobytes of hard-disk space and a minimum of 8 MB of RAM.

Thermodynamic and Transport Properties Available in SteamTab™

Temperature, T
Pressure, P
Volume, V
Density, ρ
Compressibility factor, Z
Helmoltz free energy, A
Entropy, S
Internal energy, U
Enthalpy, H
Gibbs free energy, G
Heat capacity at constant volume, C_v
Heat capacity at constant pressure, C_p
Speed of sound, v
Coefficient of thermal expansion, $\alpha = \rho (\partial V / \partial T)_P$
Isothermal compressibility, $\kappa = -\rho (\partial V / \partial P)_T$
 $dp/dt, (\partial P / \partial T)_V$
 $dv/dt, (\partial V / \partial T)_P$
 $dv/dp, (\partial V / \partial P)_T$
Viscosity (dynamic), μ
Thermal conductivity, K
Surface tension, σ
Prandtl number
Static dielectric constant
Isothermal Joule-Thomson coefficient
Joule-Thomson coefficient
Quality