F-Chart Software

No. 50, Spring 2026

EESy Solutions

Engineering Equation Solver Newsletter

Inside this issue:

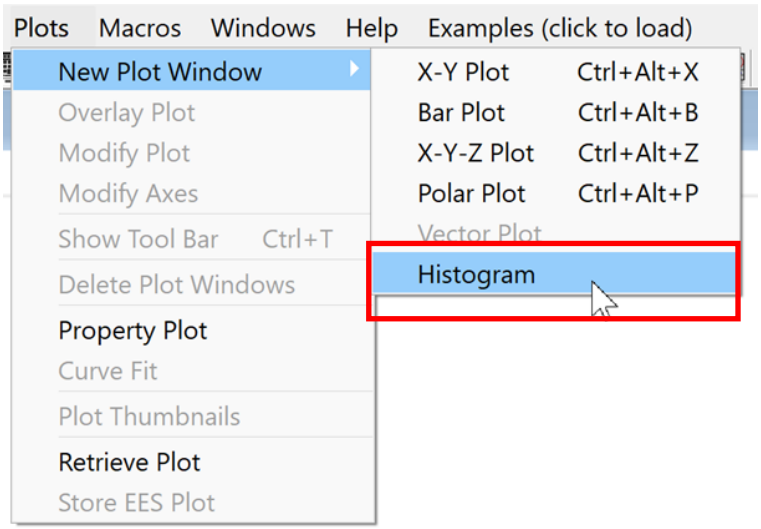
Welcome

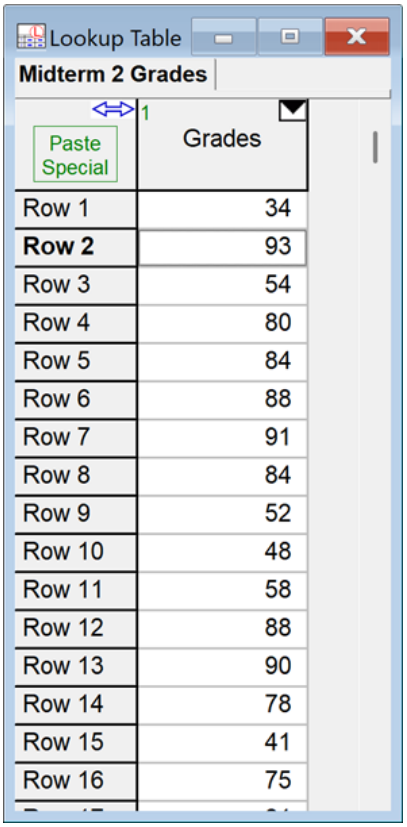
This is the 50th issue of EESy Solutions, a newsletter that provides news, tips, and other updates for users of the Engineering Equation Solver software. This issue describes some of the new features, updates, and improvements to the program. These include a new plot type (the Histogram), new refrigerant mixtures, improvements to the plot crosshairs, and additions to the Heat Transfer and Component Libraries.

EES has been commercially available for almost three decades and during that time it has been continuously maintained and improved. Previous issues of EESy Solutions can be found on https://fchartsoftware.com.

Histogram Plots

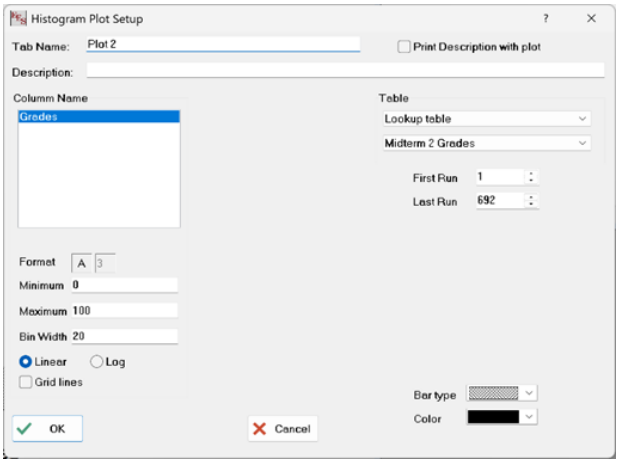
There are a number of different plot types provided by EES including 2D and 3D plots. In EES v12.174, histogram plots were added to the plot options. To make a histogram, place the data in an Array, Parametric Table, or Lookup Table. Then select New Plot Window from the Plots menu and select Histogram from the list of plot types.

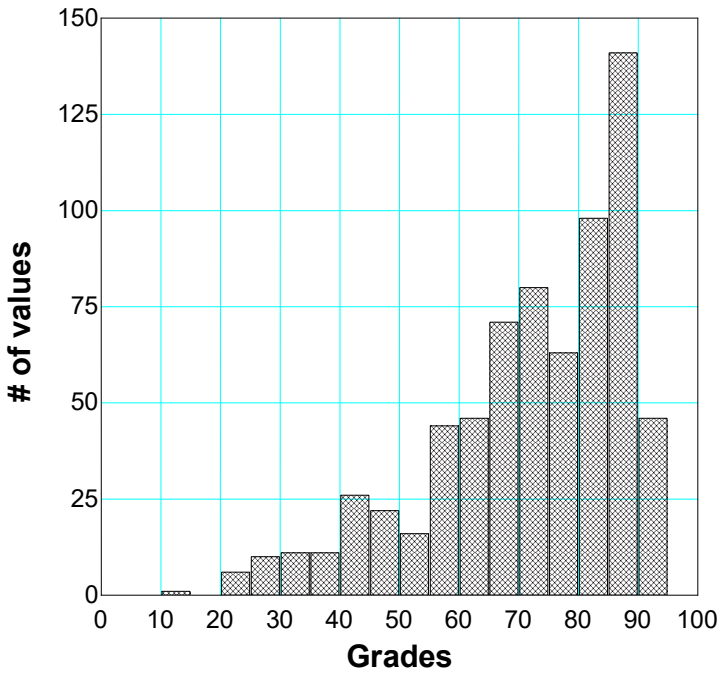




Histogram Plots (continued)

In the Histogram Plot Setup dialog you can select the table that contains the data, the span of the plot and the bin width as well as the fill type and color. The result will be a histogram of your data.



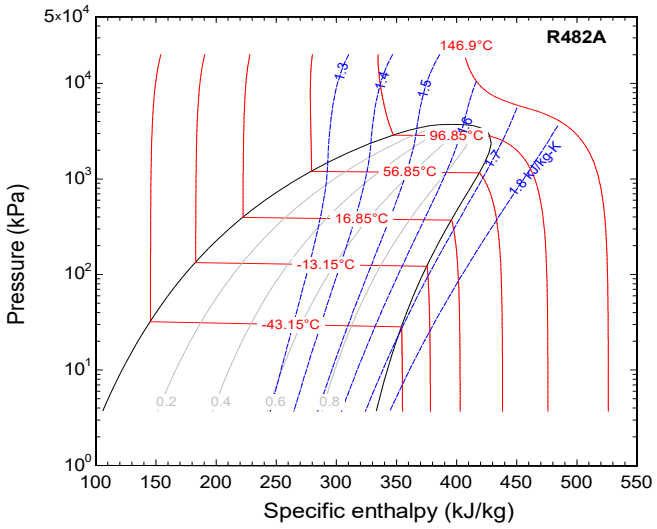


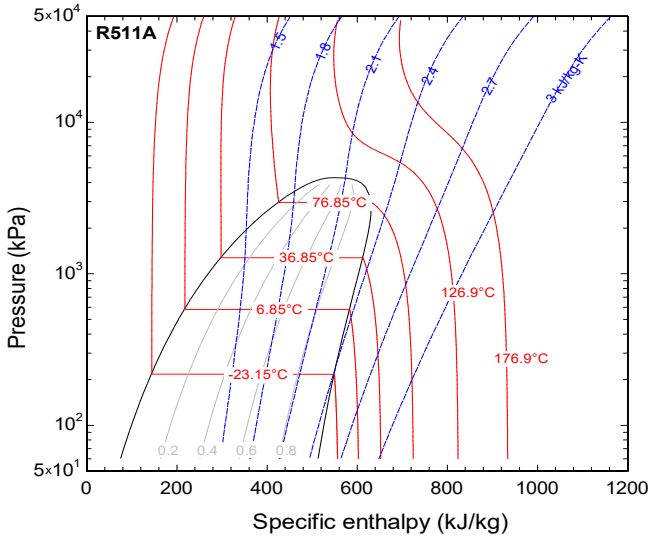
Refrigerant Mixtures

New refrigerants are continuously being developed and added to the ANSI/ASHRAE 34-2022 list of approved refrigerants. As data for these refrigerants are made available, many new pure substances as well as azeotropic and zeotropic blends are being added as built-in fluids in EES. In some cases these property data are not easily or publicly available elsewhere. The equation of state for R4xx (zeotropic blends) and R5xx (azeotropic blends) has been revised to improve the accuracy of the properties in the vicinity of the critical point. The following refrigerants have recently been added to EES:

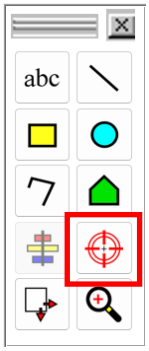
Pure substance: R1130(E), R1132(A), R1132(E)

Zeotropic blends: R465A, R472A, R473A, R474A, R475A, R477A, R479A, R480A, R482A



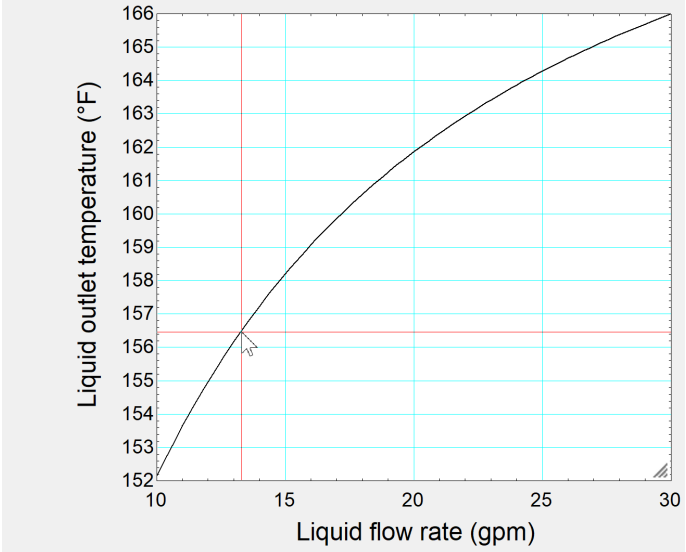


Plot Crosshairs

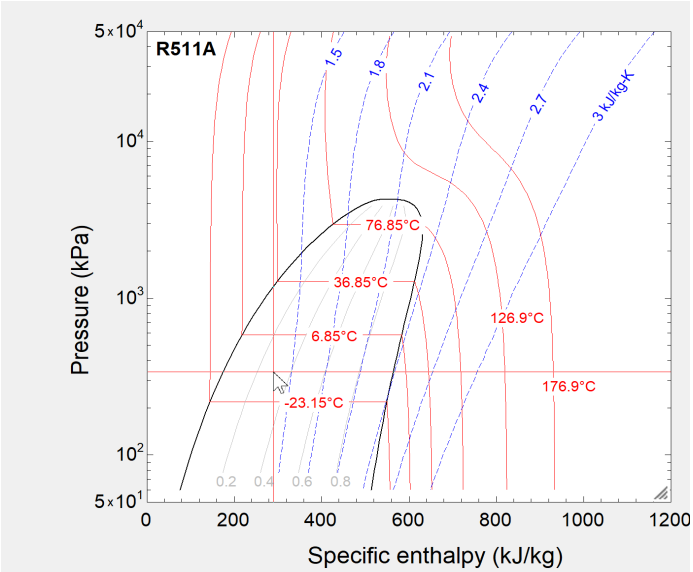


Clicking the crosshairs button in the plot window toolbar or holding the Shift and Ctrl keys down will change the cursor into crosshairs for 2-D plots.

The coordinates at the intersection of the crosshairs can be viewed in the plot window status bar located at the bottom of the window. Plots generated with the Property Plot command will display all thermodynamic properties corresponding to the state fixed by the cursor position.



X=13.3 Y=156.5



h=289 kJ/kg P=338.6 kPa T=-10.57 C v=0.04059 m^3/kg x=0.2951 s=1.342 kJ/kg-K

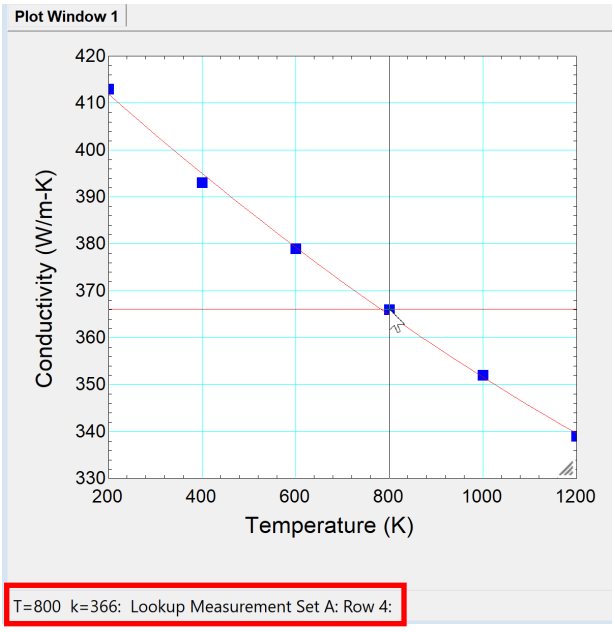
Improvements to Plot Crosshairs

Starting with v12.194 (Professional version), the crosshairs can be used to identify the origin of a plotted point in a table. Position the crosshairs over a plotted symbol and press and hold the left mouse button down. The status bar will show the coordinates of the point, the table that the data originated in and the row in that table.

Lookup Table 1: Measuremen...

Measurement Set A

	1 T [K]	2 k [W/m-K]
Row 1	200	413
Row 2	400	393
Row 3	600	379
Row 4	800	366
Row 5	1000	352
Row 6	1200	339



T=800 k=366: Lookup Measurement Set A: Row 4:

Improvements to Plot Crosshairs (continued)

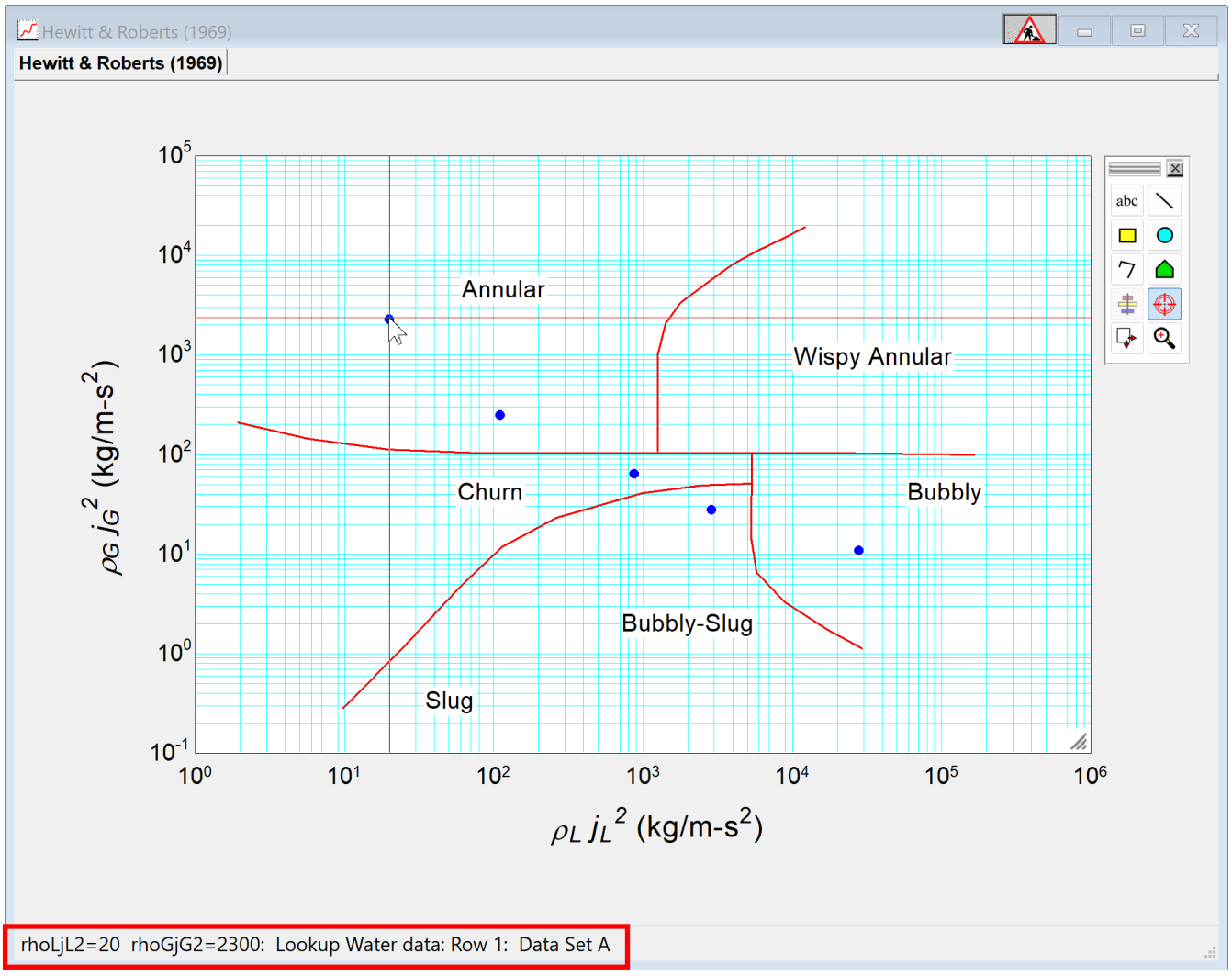
If there is one or more columns of strings in the table that contains the data being plotted, the crosshairs tool will also show the string that is contained in the first string column in the status bar, in addition to the coordinates of the selected point.

If the right mouse button is pressed, the table will be brought to the front with the row containing the data for the point highlighted.

Lookup Table 1: Water data

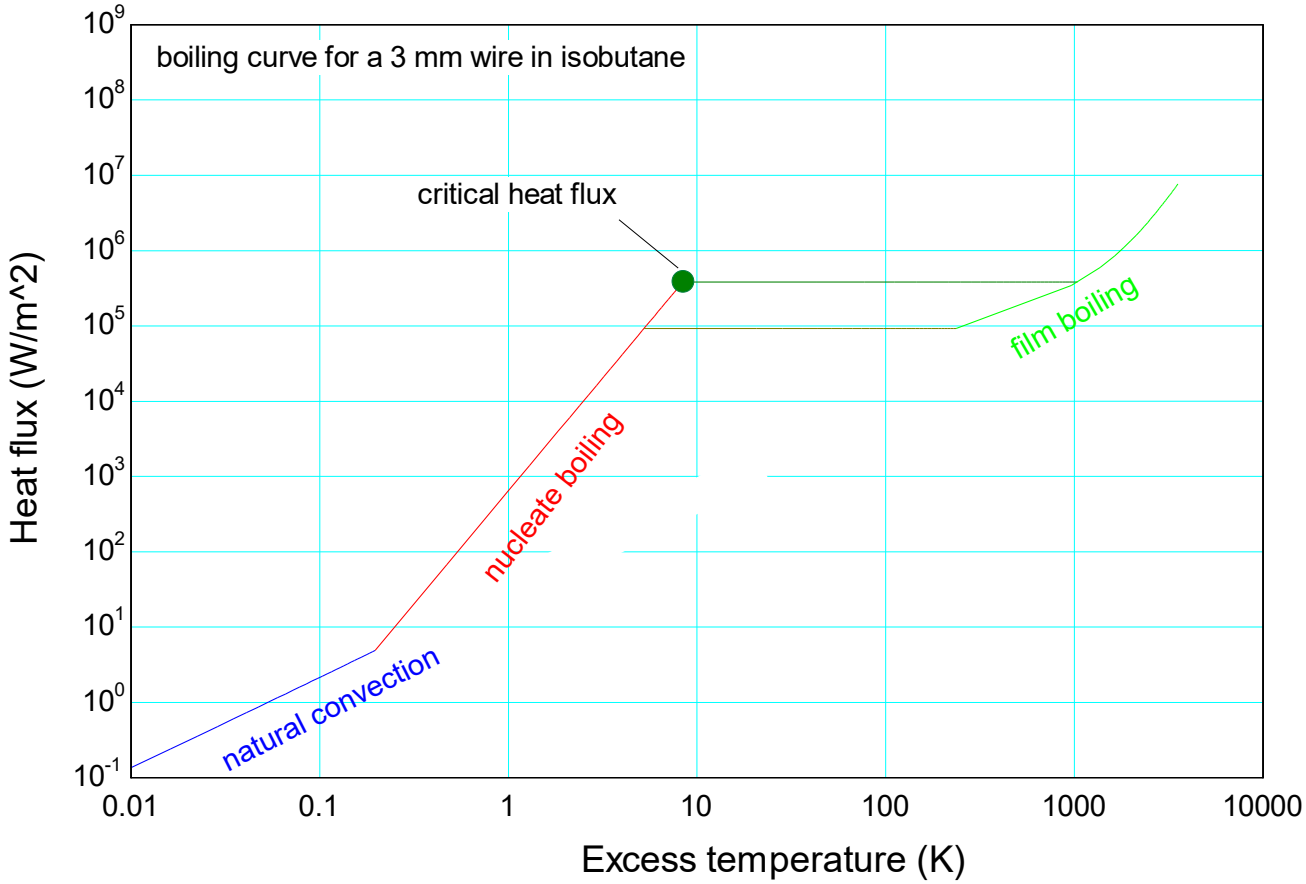
Water data

	1 Data set	2 rhoGjG2 [kg/m-s^2]	3 rhoLjL2 [kg/m-s^2]
Row 1	Data Set A	2300	20
Row 2	Data Set B	250	110
Row 3	Data Set C	65	876
Row 4	Data Set D	28	2870
Row 5	Data Set E	11	28000



Additions to the Heat Transfer Library

The libraries in EES are extensive and they are continuously being improved and extended. Recently, the Pool Boiling section of the Boiling and Condensation in the Heat Transfer Library has been augmented. Several correlations for nucleate pool boiling, critical heat flux in pool boiling, film boiling and the minimum film boiling temperature have been added. With these additions, it is possible to generate the entire pool boiling curve for an arbitrary fluid and geometry. This process is illustrated in a YouTube video available on our website.



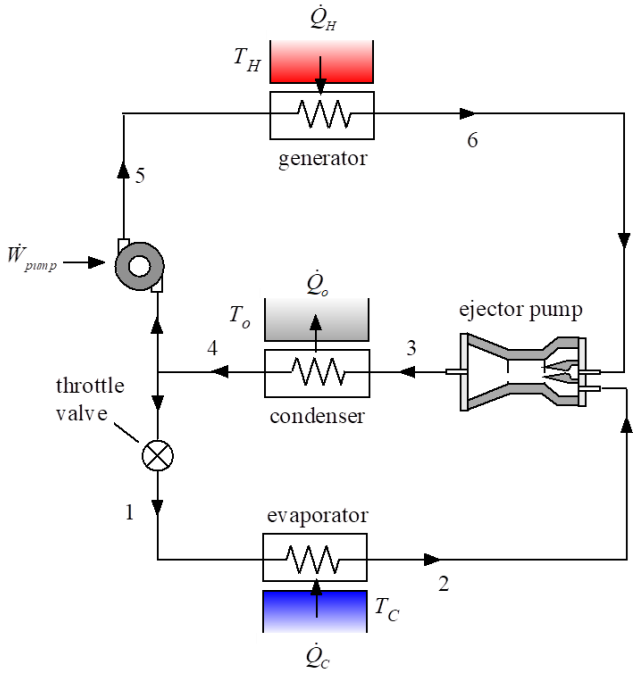
Additions to the Component Library

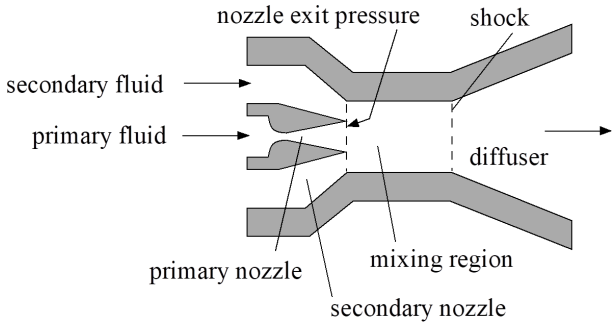
The Component Library provides functions and procedures that simulate a wide range of components commonly found in thermal energy systems such as heat exchangers, turbines, pumps, etc. The Component Library is constantly being improved and augmented. Over the past several months significant improvements have been made to the Nozzles and Diffusers section of the component library. Specifically, the procedure CDNozzle1_CL provides a model of a converging-diverging (CD) nozzle with isentropic flow and no shocks. The procedure CDNozzle2_CL provides a model of a converging-diverging nozzle in which a normal shock occurs between the nozzle throat and the outlet. The procedure Shock_CL models flow through a normal shock. Each of these procedures will work with either ideal gas or real gas fluids.

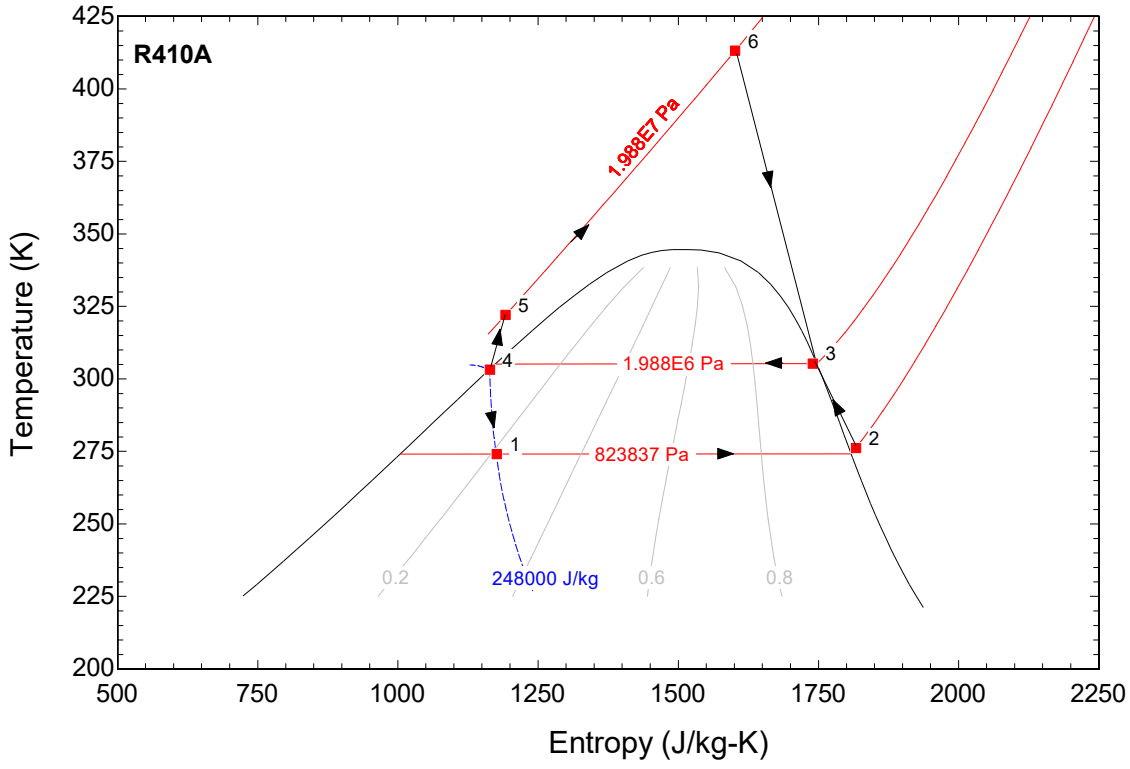
Additions to the Component Library (continued)

Also, procedure EjectorPump_CL models an ejector pump, which is a device that uses a high pressure primary flow to elevate the pressure of a low pressure secondary flow. The ejector pump uses two nozzles, a mixing region and a diffuser, and usually involves a shock.

The ejector pump can be used to replace the compressor in a vapor compression refrigeration cycle. An ejector pump refrigeration cycle model in EES is developed in a YouTube video on our website.







Selected Recent Changes to EES

- Guess values entered with the $VarInfo directive will be automatically updated when the Update Guesses command or the $Update Guesses directive is applied if the /U option is provided.
- Thermodynamic and transport property data for **R472A**, **R482A**, **R473A**, **R474A**, **R475A**, **R477A**, **R479A**, **R1130(E)**, **R1132(E)**. **and R1132(A)** are now available.
- Functions EOS_Tmin, EOS_Tmax, and EOS_Pmax return the minimum temperature, maximum temperature and maximum pressure allowed by the equation of state for the specified substance.
- A freehand sketch tool has been added to the Diagram window toolbar.
- The Syntax Highlight On/Off switch in the Preferences dialog acts as a master switch that determines whether syntax highlighting is enabled for new and existing files.
- The Vector Plot dialog has been revised. The Undo Plot button removes the last plotted point allowing corrections to be made to the plotting parameters.
- An icon has been added at the right of the plot window title bar to toggle the visibility of the plot window toolbar.
- Property data for solid N2O for temperatures between 100 K and 182.3 K have been added to the Incompressible Substance Library.
- The lower temperature limits for ideal gas property data for H2, CO2, CO, N2, H2O, and O2 have been reduced from 200 K to 50 K. The lower limit for Ar is 10 K.
- Ideal gas property data for C7H16 have been added.
- When there are many tables in the Parametric or Lookup Table window, it is now possible to navigate using the arrow, home and end keys.
- The $PropertyPlot directive and the PropPlot macro command can create plots of incompressible substance properties versus temperature.
- The LOG macro command can be followed by keywords ON, OFF or CLEAR. The CLEAR option will clear the macro log file.
- The vapor pressure of water-based solutions can be plotted as a function of temperature and concentration with the Property Plot command.
- The status of Check Boxes (checked or unchecked) and the selected button number for a Radio Button Group in the Diagram window can be determined using the GetDiagramAttribute function.

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Instant Update & Technical Service

EES uses a different model for updating than most other programs. Each time that there is a change in the EES program, either to correct a problem or to add a new feature, the version number is incremented by 0.001 and the latest version of EES is placed on our website. EES has become very robust and stable. There have been many new versions of EES released with new capabilities since the last EESy Solutions was distributed

Any user who has a current subscription to our Instant Update & Technical Service (IUTS) or Academic Update Service (AUS) can download the current version. All new Commercial and Professional licenses of EES are provided with a one year subscription of this service. The cost to continue IUTS or AUS after the first year is ~20% of the current cost of the program per year, provided that it is renewed within 12 months after expiration. Contact us if you wish to re-subscribe to IUTS or AUS.