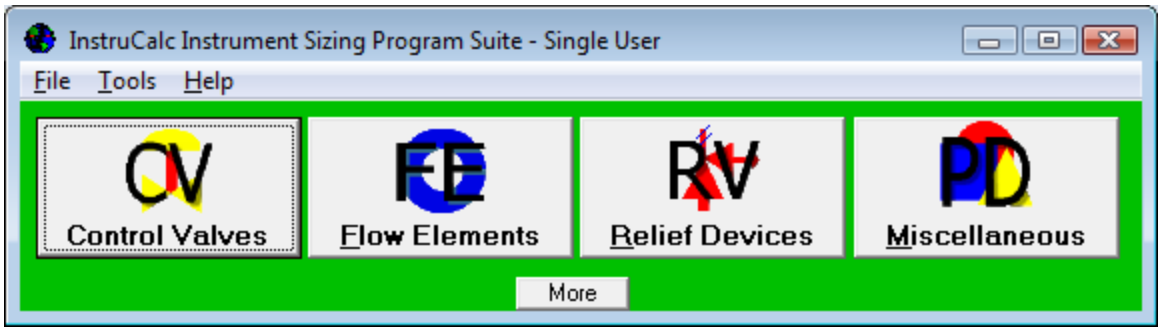
What INSTRUCALC does for you

InstruCalc is a set of engineering programs for calculating control valve, relief valve, pressure-relief devices and various flow elements. It also prepares data sheets and instrument summary reports. It is an engineering program rather than an application program inasmuch as it is capable of determining the basic engineering data and requirements for the equipment rather than just using the data to determine the size required.



It consists of more than 74 programs divided into **four** main parts as described on the following pages. Use InstruCalc to size more than 50 different instruments with an easy-to-use and accurate sizing program. The program not only calculates the sizes of control valves, flow elements, and relief devices, but it also produces data sheets for the calculated items.

All device calculation and data sheet information can be saved for later recall. Printouts can be obtained of calculations, data sheets, and instrument summary reports. Any type of engineering unit can be used in the calculations. All conversion factors are contained within the programs to change from one unit to another and to convert the values of the input data. Data can be imported and exported to and from the programs using ASCII files.

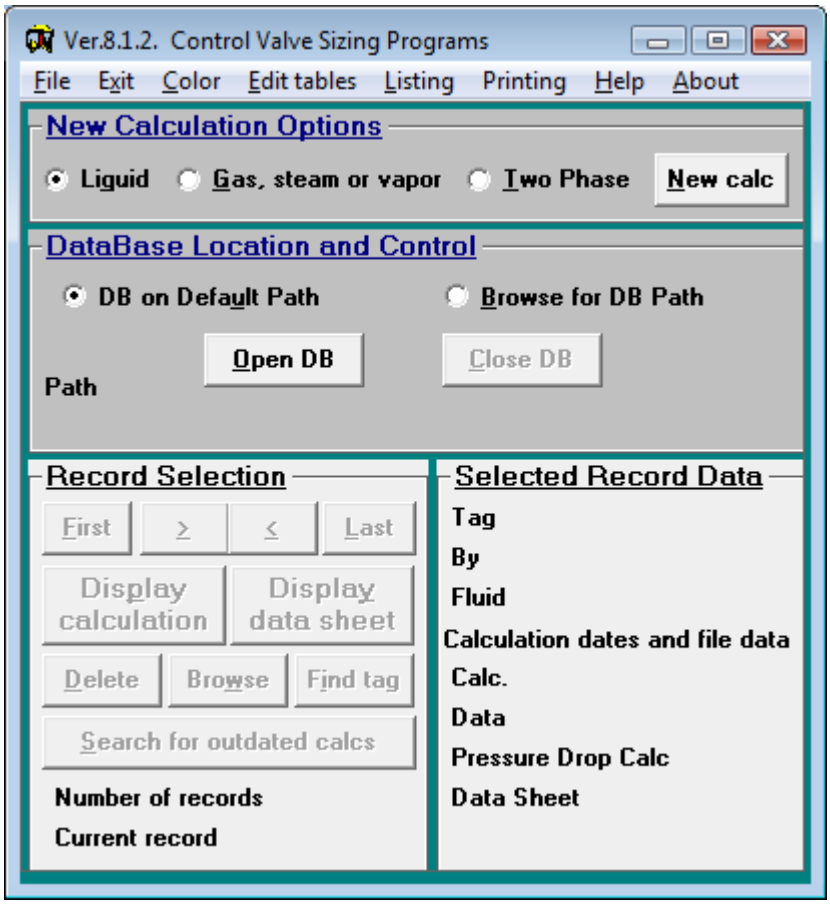
Calculations can be performed in US or SI units.

Each module of INSTRUCALC allows you to perform these functions:

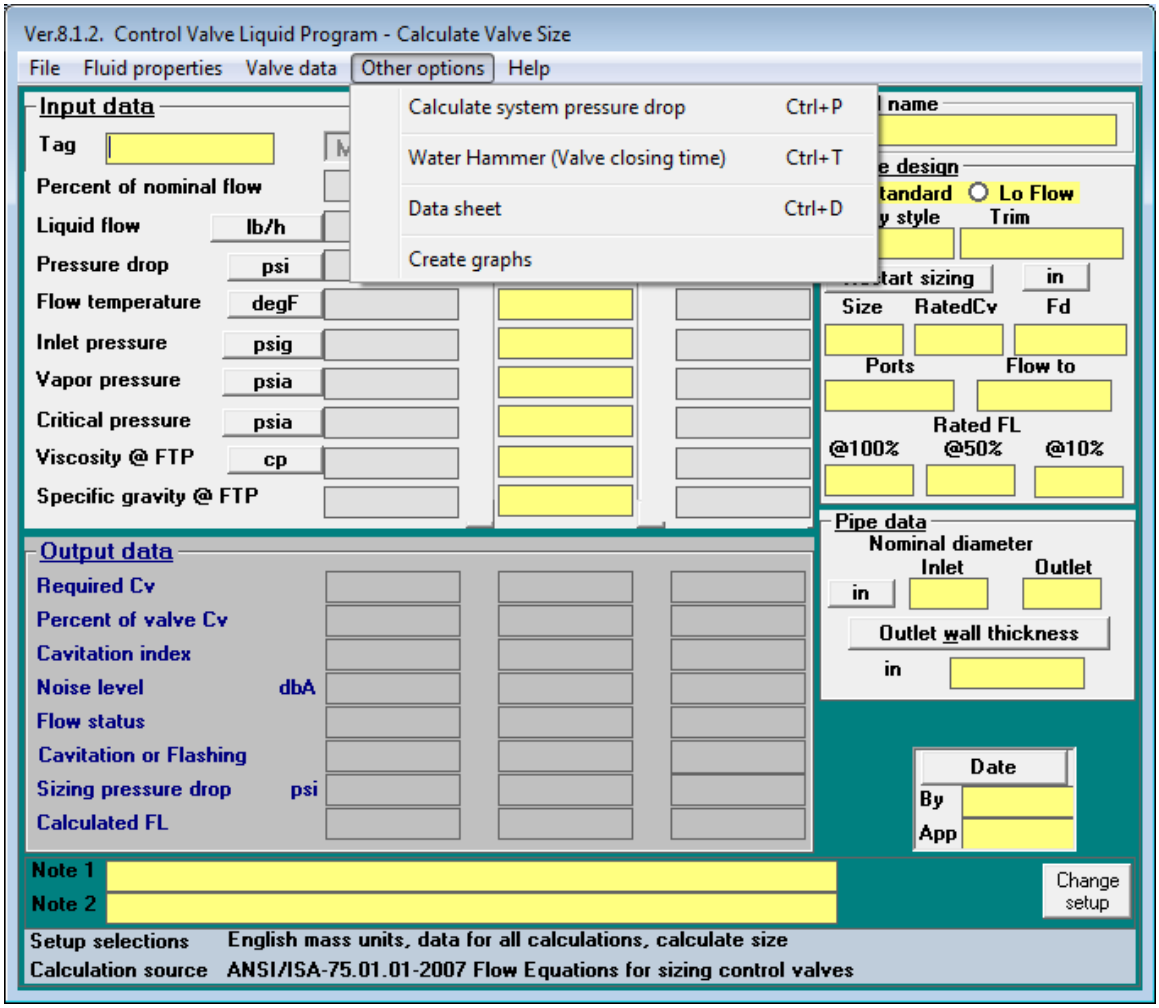
- Make calculations
- Prepare data sheets
- Prepare summary reports

In addition, control valve and flow element modules display and print graphs of the calculations.

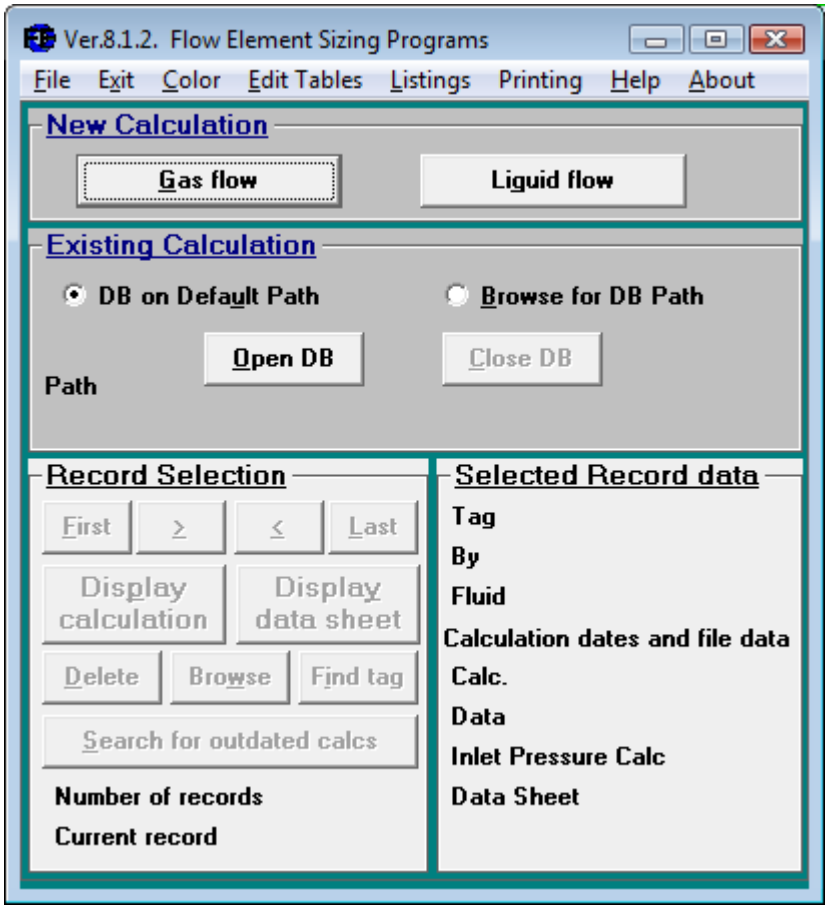
1. Control Valve Sizing Programs for liquid, gas, steam, and two-phase flow using the ISA formulas.



There are programs for calculating C_v and analyzing for cavitation within the valve, critical flow and flashing through the valve, and noise generated by the valve. The C_v is compensated where necessary for these and the piping geometry effects. Messages are displayed to guide you to an optimum valve selection. The programs will calculate, display and print graphs of the calculations.

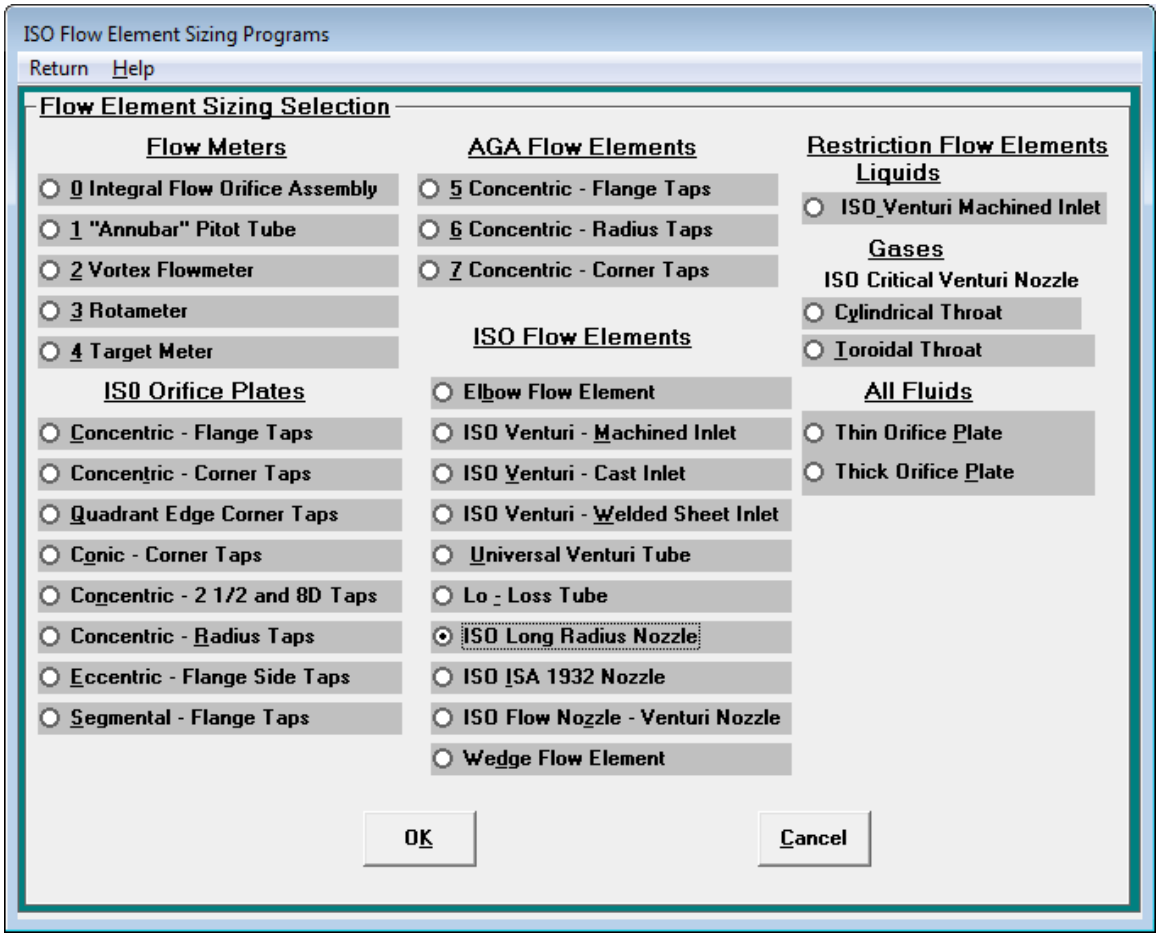

Ver.8.1.2. Control Valve Liquid Program - Calculate Valve Size
File
Fluid properties
Valve data
Other options
Help
Calculate system pressure drop Ctrl+P
Water Hammer (Valve closing time) Ctrl+T
Data sheet Ctrl+D
Create graphs
Input data
Tag
Percent of nominal flow
Liquid flow lb/h
Pressure drop psi
Flow temperature degF
Inlet pressure psig
Vapor pressure psia
Critical pressure psia
Viscosity @ FTP cp
Specific gravity @ FTP
name
e design
tandard
Lo Flow
y style
Trim
tart sizing
in
Size
RatedCv
Fd
Ports
Flow to
Rated FL
@100%
@50%
@10%
Pipe data
Nominal diameter
Inlet
Outlet
in
Outlet wall thickness
in
Output data
Required Cv
Percent of valve Cv
Cavitation index
Noise level dbA
Flow status
Cavitation or Flashing
Sizing pressure drop psi
Calculated FL
Date
By
App
Note 1
Note 2
Change setup
Setup selections English mass units, data for all calculations, calculate size
Calculation source ANSI/ISA-75.01.01-2007 Flow Equations for sizing control valves

2. Flow Element Sizing Programs for:

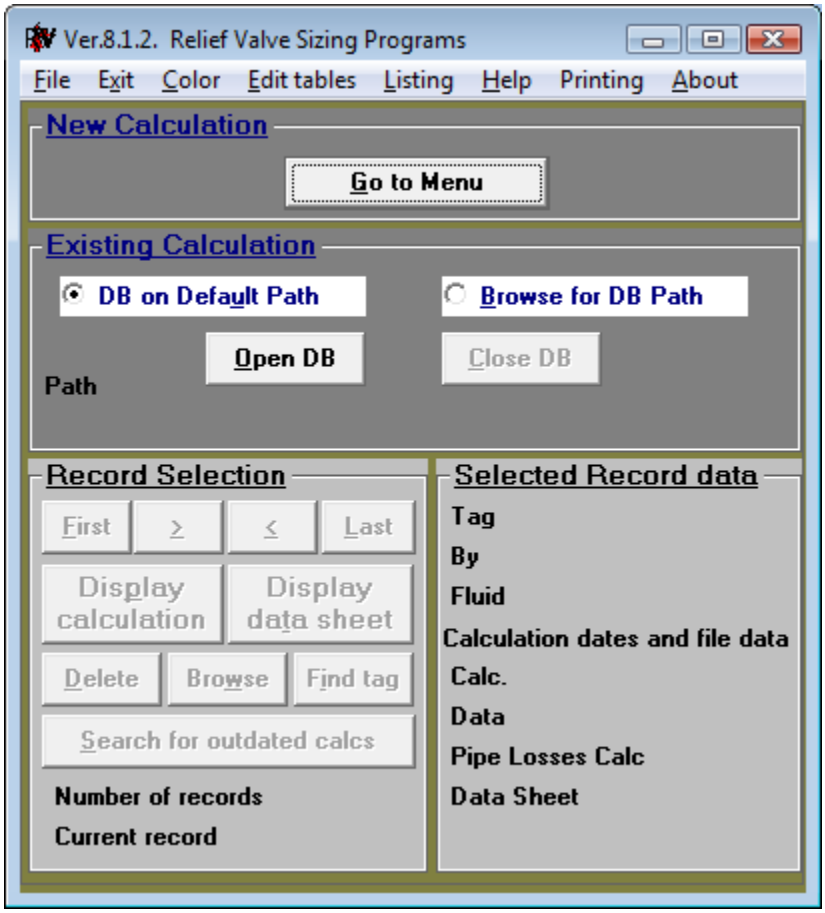


a) Calculations for flow meters such as **Integral Flow Orifice Assembly, Annubar Pitot tubes, Vortex Flowmeters, Rotameters** and **Target meters** for gas or liquid. Calculates either meter size or flow rate; permanent pressure and power loss and accuracy percentage. Supplies fluid properties at flow conditions; steam data; pipe sizes and provides material selection.
b) **ISO Orifice Plates**: Concentric, eccentric, segmental, quadrant edge, and conical plates; flange taps, corner taps, radius taps, 2 ½ and 8D taps. **ISO Flow Elements**: Elbow, flow nozzles, venturies, lo-loss tube and wedge flow; gas, steam, vapor, and liquids; flange, radius, pipe, and corner taps. Calculates orifice bore, differential range or flow rate; beta ratio, norm differential, max pressure and power loss, uncertainty percent. Added material yield strengths file. This was added to calculate orifice plate thickness automatically. The thickness is calculated for each orifice based on the pressure and temperature of the selected plate material. All compatible with ISO 5167. The programs will calculate, display and print graphs of the calculations.

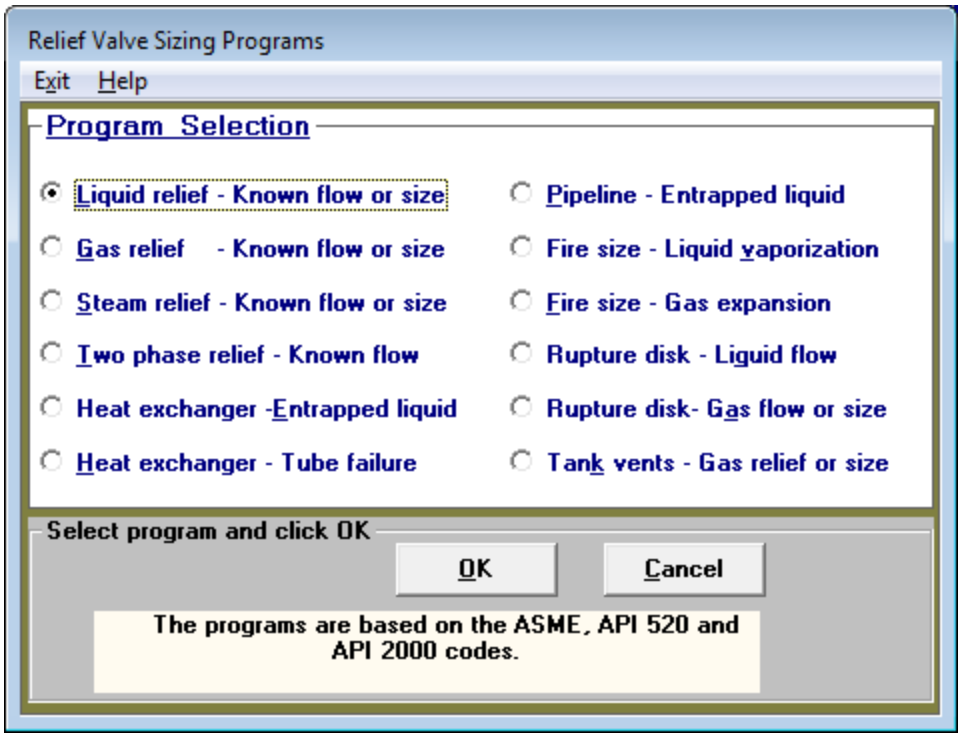
c) For **AGA flow elements**, concentric; flange taps, radius taps and corner taps suitable for use with all gaseous and liquid fluids that are considered to be clean, single phase, homogeneous and Newtonian. Calculates either orifice bore, flow rate or differential range; beta ratio, max pressure and power loss, uncertainty percent and normal differential. The programs will calculate, display and print graphs of the calculations.
d) Calculations for Restriction flow elements like concentric orifice plates, ISO venturi nozzles, and ASME long radius nozzles for liquid and gas. Calculates either element size, flow rate or discharge rate; beta ratio, max pressure loss, max power loss and flow status. Supplies fluid properties at flow conditions; steam data; pipe sizes and provides material selection. The programs will calculate, display and print graphs of the calculations.

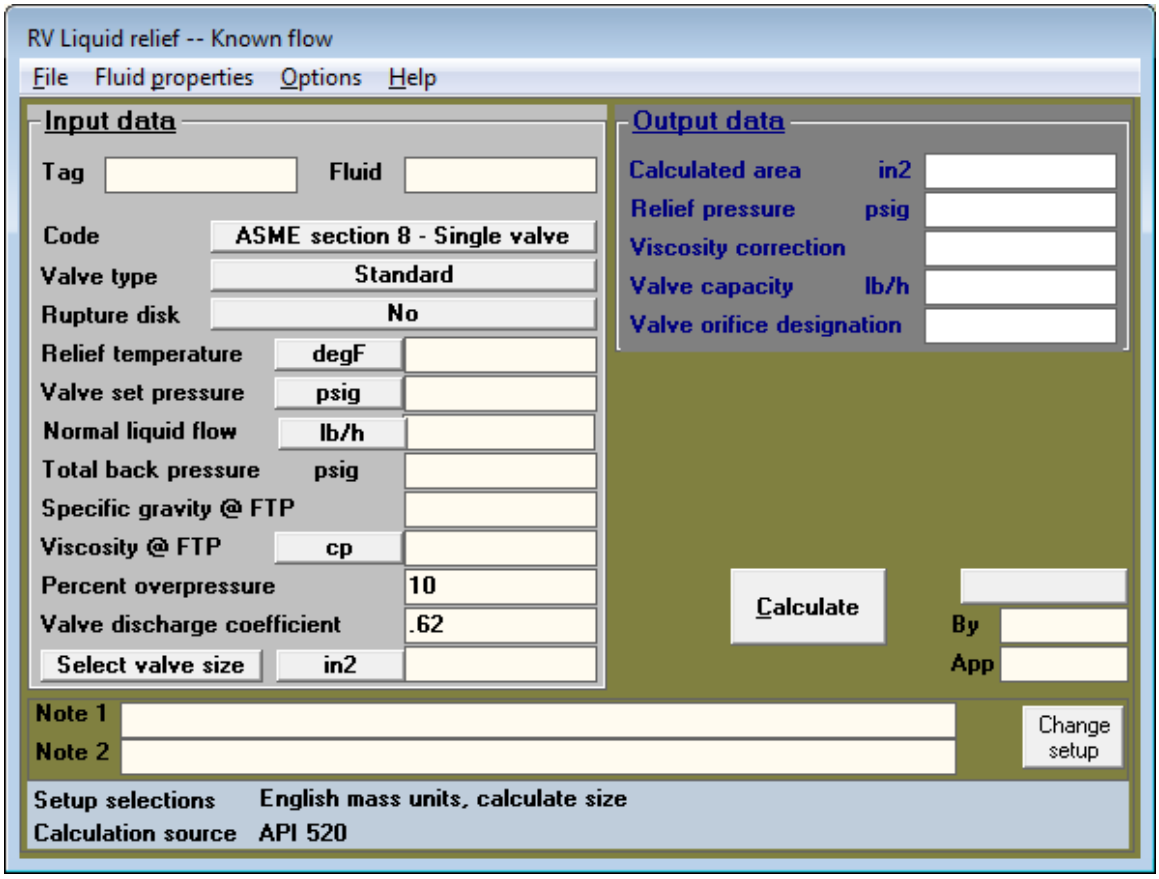


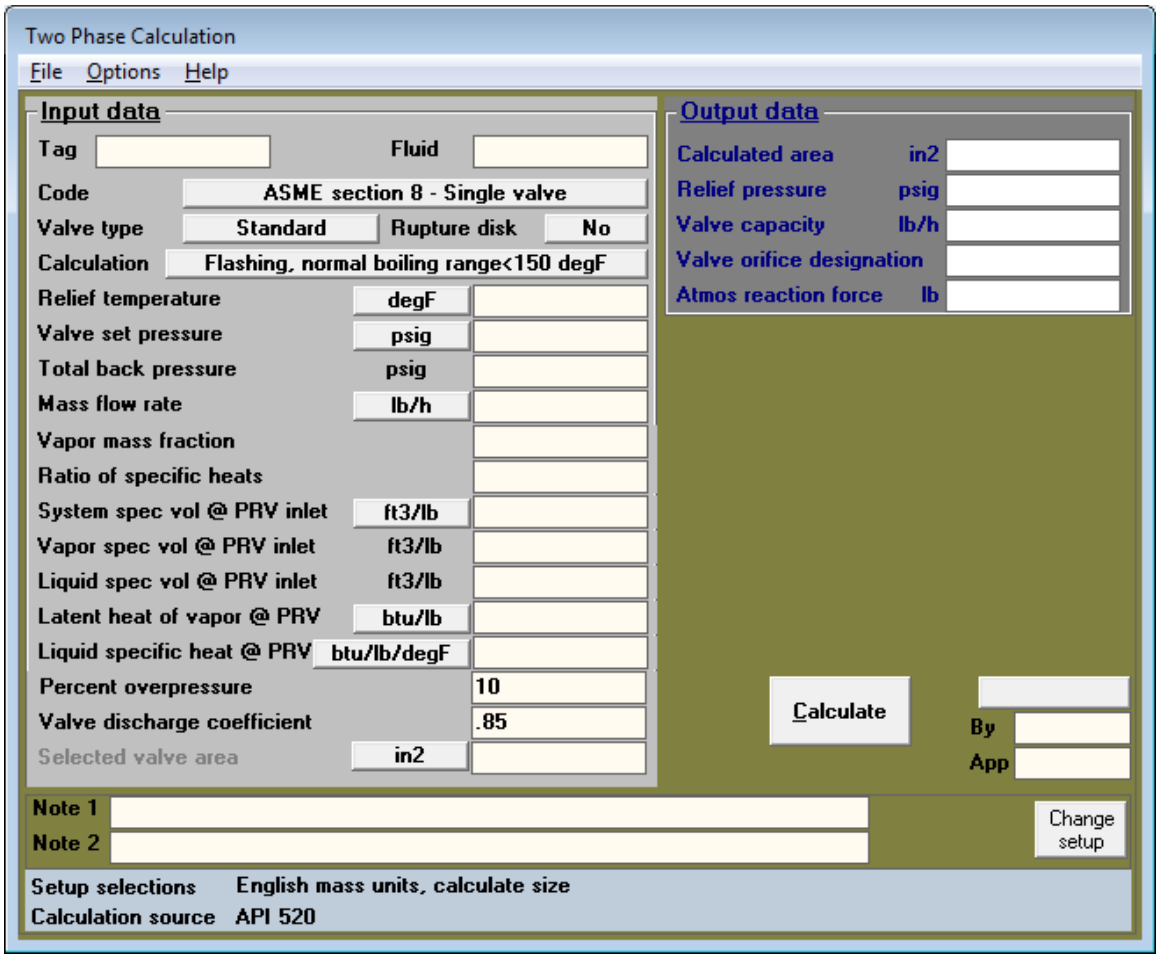
3. Relief Devices for pressure-relief devices, rupture discs, and breather valves. Liquid and gas application.

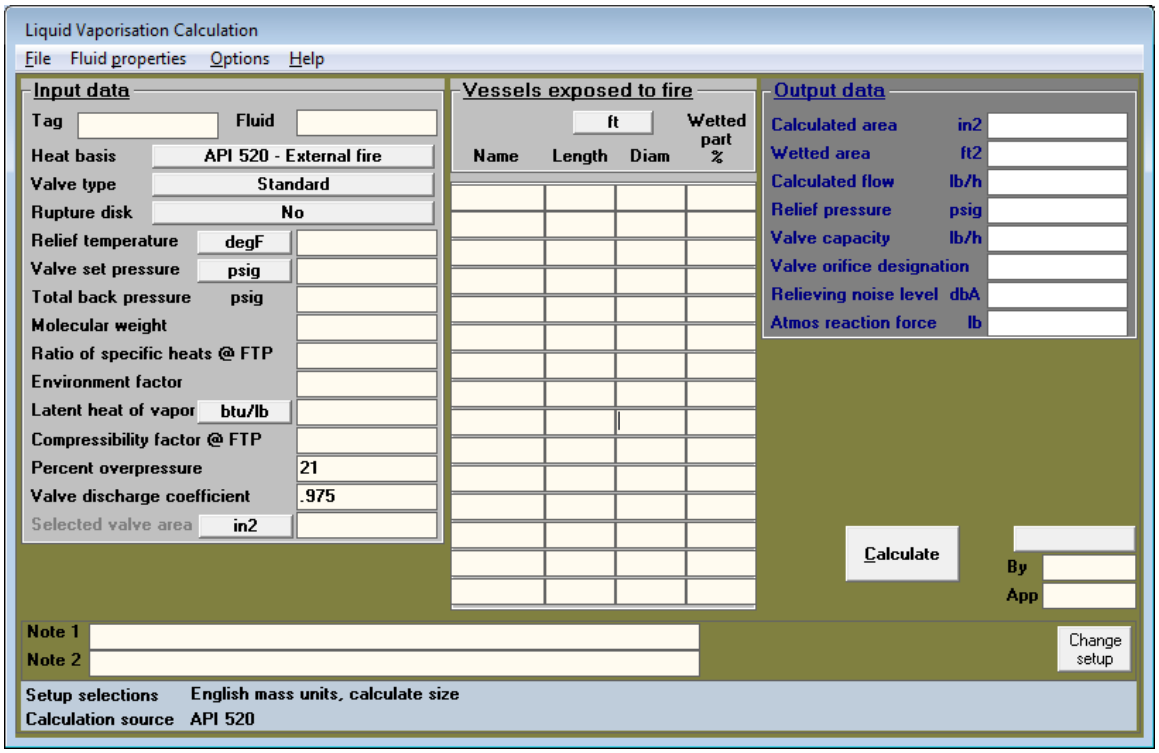


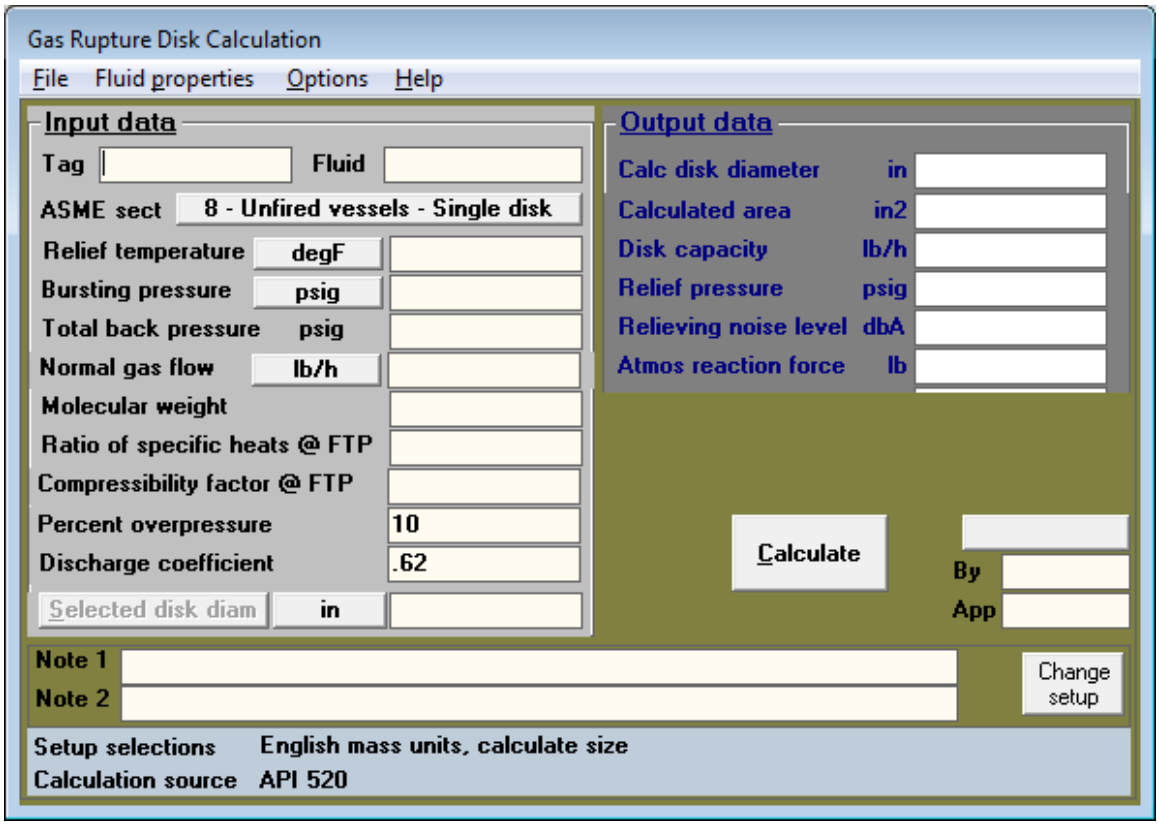
Calculates API or ASME size for known flow, thermal expansion, and external fire. The external fire program has the option of either the API or the NFPA heat input methods. It also calculates the maximum flowrate for the selected valve and the maximum back pressure, which maintains the required flow as well as the relieving forces.


Relief Valve Sizing Programs
Exit Help
Program Selection
Liquid relief - Known flow or size
Gas relief - Known flow or size
Steam relief - Known flow or size
Two phase relief - Known flow
Heat exchanger -Entrapped liquid
Heat exchanger - Tube failure
Pipeline - Entrapped liquid
Fire size - Liquid vaporization
Fire size - Gas expansion
Rupture disk - Liquid flow
Rupture disk- Gas flow or size
Tank vents - Gas relief or size
Select program and click OK
OK
Cancel
The programs are based on the ASME, API 520 and API 2000 codes.

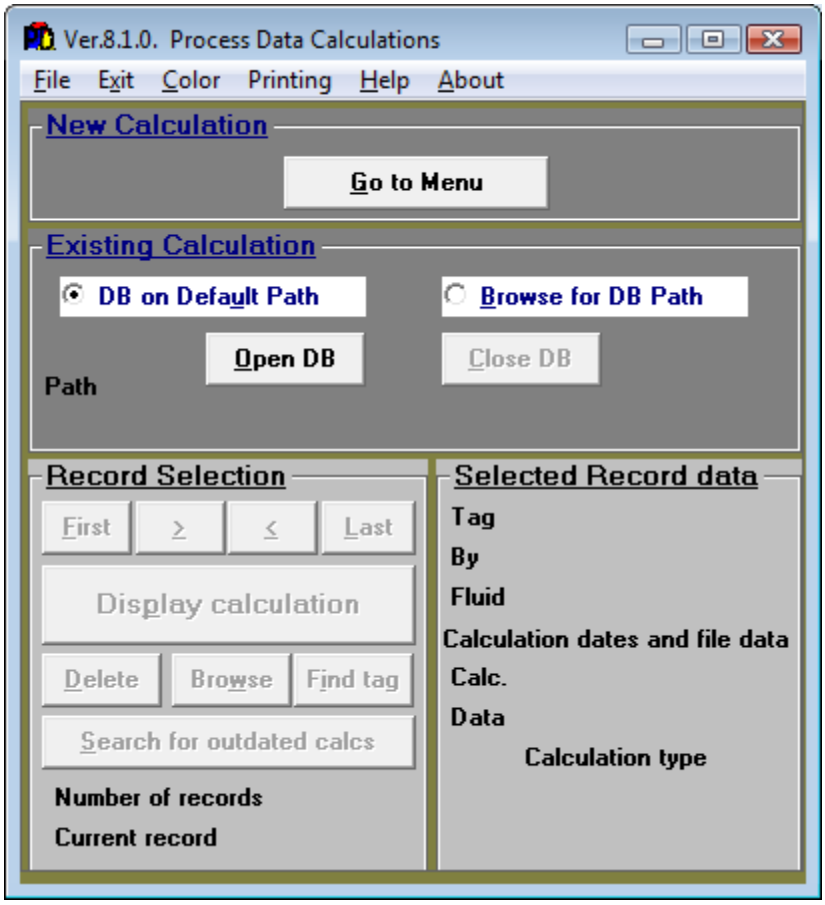

RV Liquid relief -- Known flow
File Fluid properties Options Help
Input data
Tag
Fluid
Code
ASME section 8 - Single valve
Valve type
Standard
Rupture disk
No
Relief temperature
degF
Valve set pressure
psig
Normal liquid flow
lb/h
Total back pressure
psig
Specific gravity @ FTP
Viscosity @ FTP
cp
Percent overpressure
10
Valve discharge coefficient
.62
Select valve size
in2
Output data
Calculated area
in2
Relief pressure
psig
Viscosity correction
Valve capacity
lb/h
Valve orifice designation
Calculate
By
App
Note 1
Note 2
Change setup
Setup selections
English mass units, calculate size
Calculation source
API 520


Two Phase Calculation
File Options Help
Input data
Tag
Fluid
Code
ASME section 8 - Single valve
Valve type
Standard
Rupture disk
No
Calculation
Flashing, normal boiling range<150 degF
Relief temperature
degF
Valve set pressure
psig
Total back pressure
psig
Mass flow rate
lb/h
Vapor mass fraction
Ratio of specific heats
System spec vol @ PRV inlet
ft3/lb
Vapor spec vol @ PRV inlet
ft3/lb
Liquid spec vol @ PRV inlet
ft3/lb
Latent heat of vapor @ PRV
btu/lb
Liquid specific heat @ PRV
btu/lb/degF
Percent overpressure
10
Valve discharge coefficient
.85
Selected valve area
in2
Output data
Calculated area
in2
Relief pressure
psig
Valve capacity
lb/h
Valve orifice designation
Atmos reaction force
lb
Calculate
By
App
Note 1
Note 2
Change setup
Setup selections
English mass units, calculate size
Calculation source
API 520

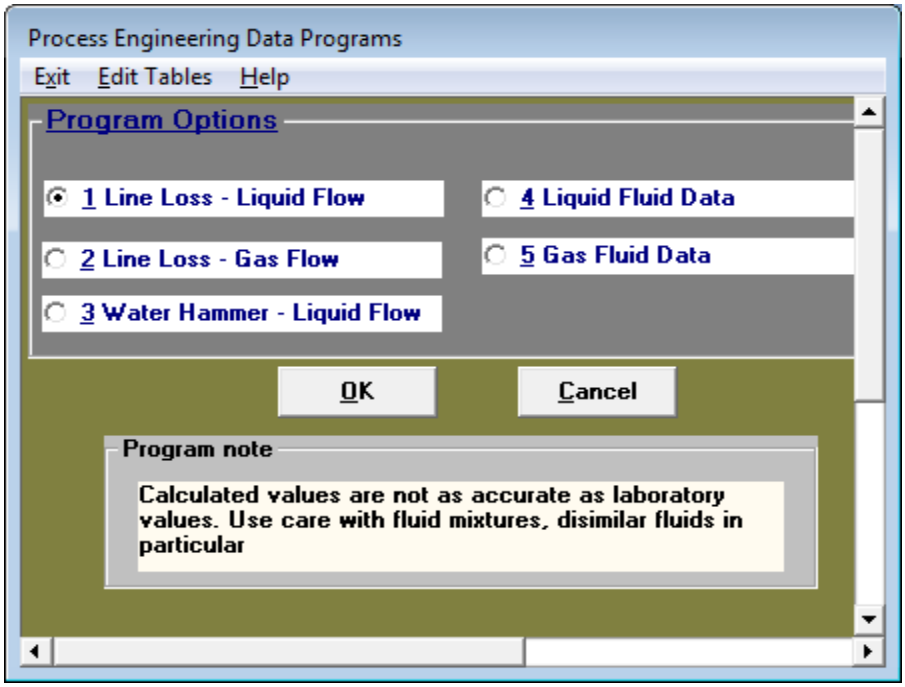

Liquid Vaporisation Calculation
File Fluid properties Options Help
Input data
Tag
Fluid
Heat basis
API 520 - External fire
Valve type
Standard
Rupture disk
No
Relief temperature
degF
Valve set pressure
psig
Total back pressure
psig
Molecular weight
Ratio of specific heats @ FTP
Environment factor
Latent heat of vapor
btu/lb
Compressibility factor @ FTP
Percent overpressure
21
Valve discharge coefficient
.975
Selected valve area
in2
Vessels exposed to fire
ft
Name
Length
Diam
Wetted part %
Output data
Calculated area
in2
Wetted area
ft2
Calculated flow
lb/h
Relief pressure
psig
Valve capacity
lb/h
Valve orifice designation
Relieving noise level
dbA
Atmos reaction force
lb
Calculate
By
App
Note 1
Note 2
Change setup
Setup selections
English mass units, calculate size
Calculation source
API 520

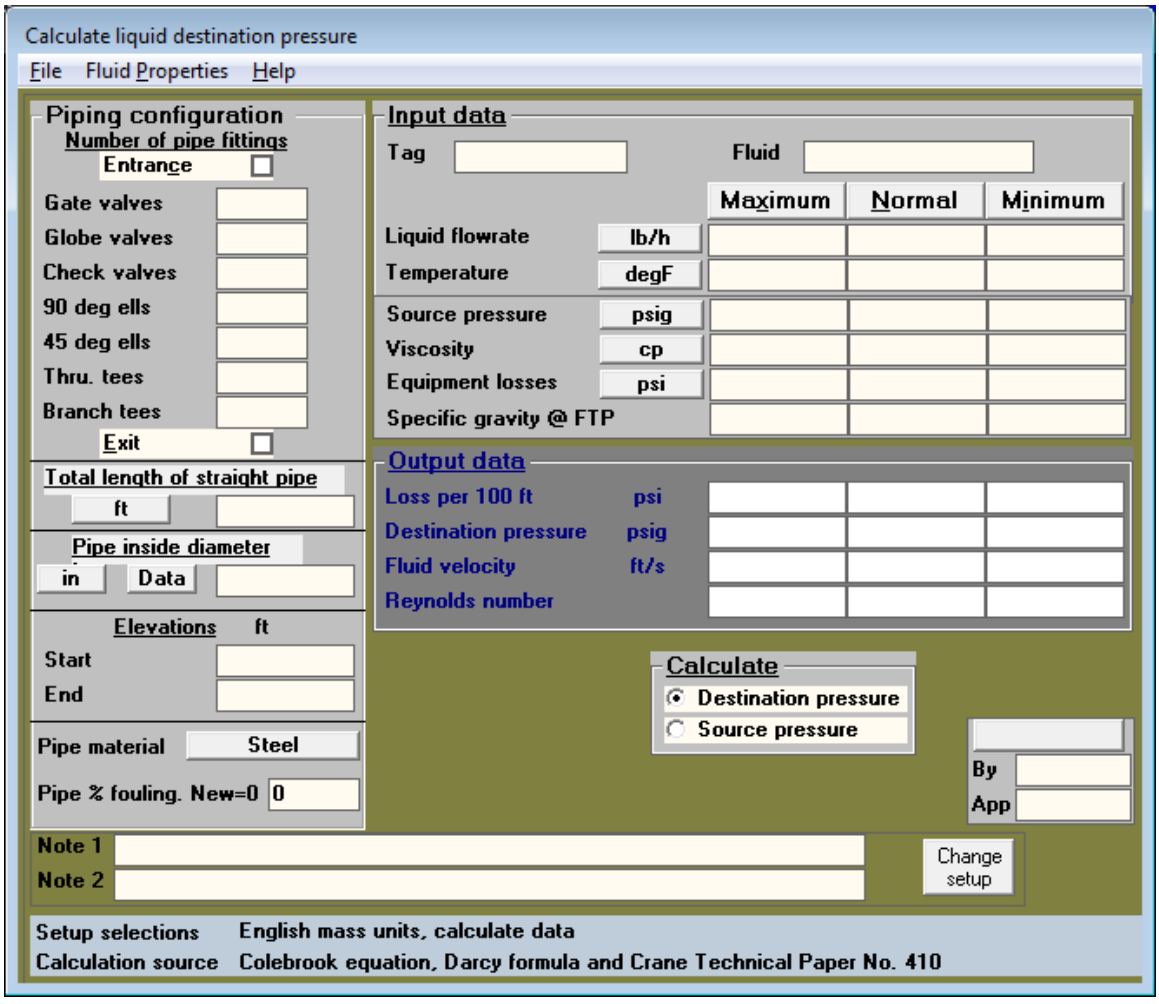

Gas Rupture Disk Calculation
File Fluid properties Options Help
Input data
Tag
Fluid
ASME sect
8 - Unfired vessels - Single disk
Relief temperature
degF
Bursting pressure
psig
Total back pressure
psig
Normal gas flow
lb/h
Molecular weight
Ratio of specific heats @ FTP
Compressibility factor @ FTP
Percent overpressure
10
Discharge coefficient
.62
Selected disk diam
in
Output data
Calc disk diameter
in
Calculated area
in2
Disk capacity
lb/h
Relief pressure
psig
Relieving noise level
dbA
Atmos reaction force
lb
Calculate
By
App
Note 1
Note 2
Change setup
Setup selections
English mass units, calculate size
Calculation source
API 520

4. Process (Engineering) Data Calculations is a set of programs that determines line pressure drops for gas and liquids, a water hammer program for determining closing times for valves in long liquid filled lines, and process data programs for liquid and gas that will provide process data from the data bank at the pressure and temperature entered.



The available data is molecular weight; specific gravity at pressure and temperature; specific gravity at base conditions; viscosity at pressure and temperature; vapor pressure; density at pressure and temperature; critical pressure; critical temperature; normal boiling point; liquid bulk modulus; liquid flash point; ratio of specific heats; compressibility factor; and latent heat of vaporization.


Process Engineering Data Programs
Exit
Edit Tables
Help
Program Options
1 Line Loss - Liquid Flow
2 Line Loss - Gas Flow
3 Water Hammer - Liquid Flow
4 Liquid Fluid Data
5 Gas Fluid Data
OK
Cancel
Program note
Calculated values are not as accurate as laboratory values. Use care with fluid mixtures, disimilar fluids in particular


Calculate liquid destination pressure
File
Fluid Properties
Help
Piping configuration
Number of pipe fittings
Entrance
Gate valves
Globe valves
Check valves
90 deg ells
45 deg ells
Thru. tees
Branch tees
Exit
Total length of straight pipe
ft
Pipe inside diameter
in
Data
Elevations
ft
Start
End
Pipe material
Steel
Pipe % fouling. New=0
0
Input data
Tag
Fluid
Maximum
Normal
Minimum
Liquid flowrate
lb/h
Temperature
degF
Source pressure
psig
Viscosity
cp
Equipment losses
psi
Specific gravity @ FTP
Output data
Loss per 100 ft
psi
Destination pressure
psig
Fluid velocity
ft/s
Reynolds number
Calculate
Destination pressure
Source pressure
By
App
Note 1
Note 2
Change setup
Setup selections
English mass units, calculate data
Calculation source
Colebrook equation, Darcy formula and Crane Technical Paper No. 410