# HydrauCalc

2023b Release

www.hydraucalc.com

# APPLICATION DESCRIPTION



HydrauCalc - © François Corre 2017-2023

# APPLICATION DESCRIPTION

HydrauCalc is a software application that allows accurate modeling and calculating of stabilized flows in piping elements as straight pipes, bends, changes of cross-section, tees, valves, orifices and more.

HydrauCalc is particularly suitable for pre-projects because it allows to estimate quickly the pressure losses of the components of a hydraulic installation, and thus to specify the characteristics of the pumps.

Friction Loss is calculated using the Darcy-Weisbach method, which provides accurate results for non-compressible fluids (liquids). This method also provides satisfactory results of reasonable accuracy for compressible fluids (gases) when the flow velocity is not very high.

HydrauCalc is mainly based on well-known and respected references in the field of fluid flow and pressure drop calculation.



# THE REFERENCES

# MAINLY REFERENCES

[1] Handbook of Hydraulic Resistance, I.E. Idelchik

[2] Internal Flow System, D.S. Miller

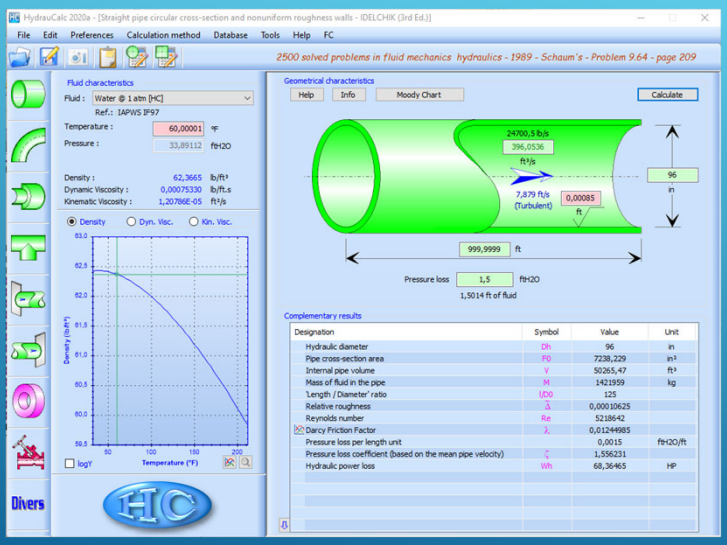
[3] CRANE - Flow of Fluids Through Valves, Fitting and Pipe - Technical Paper No. 410

[4] Pipe Flow - A Practical and Comprehensive Guide, D. C. Rennels, H. M. Hudson



# THE GRAPHICAL USER INTERFACE

# GRAPHICAL USER INTERFACE



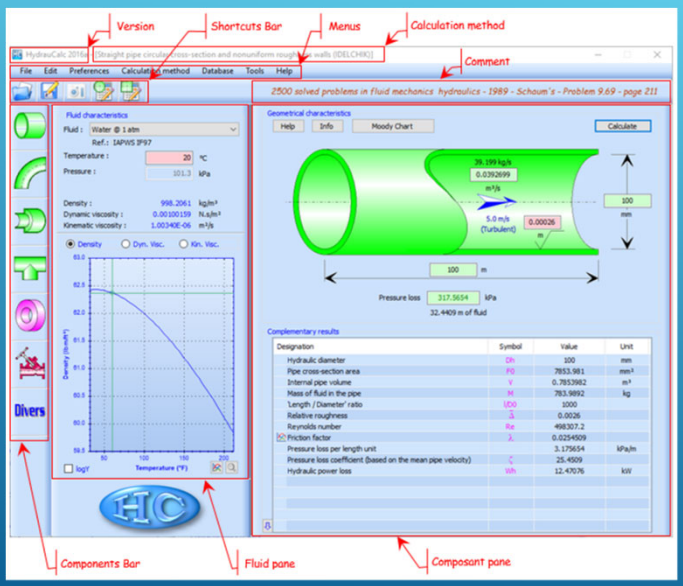

The graphical user interface is available in English, French or Spanish.

From this interface, the user selects the type of component he wants to calculate and the fluid carried in this component. It also provides the necessary input data (fluid and flow characteristics and component geometry).

This interface is intuitive and very easy-to-use.



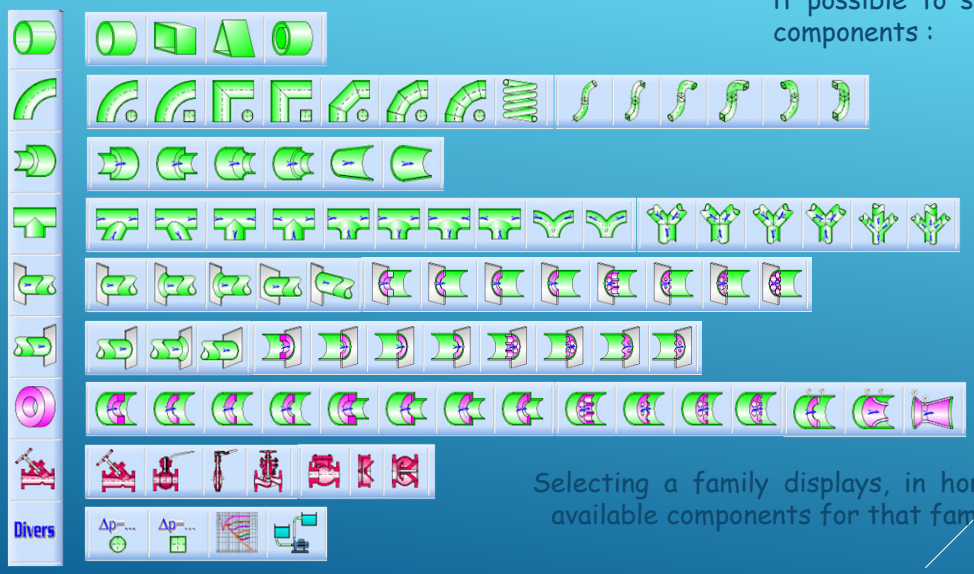
# GRAPHICAL INTERFACE STRUCTURE




The graphical interface is structured in four main parts:

- The components bar
- The fluid pane
- The component pane
- The upper part which includes:
  - The information about release and calculation method chosen
  - Menus and shortcuts bar
  - The display area for a possible comment

# COMPONENTS BARS



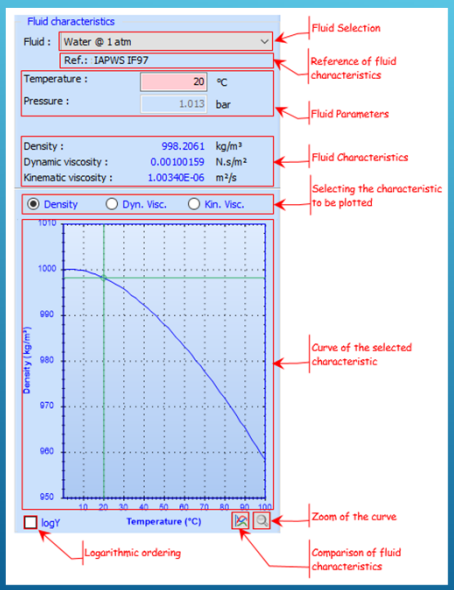

The vertical components bar makes it possible to select a family of components :

- straight pipes,
- bends,
- changes of cross-section,
- tees,
- pipeline entrances,
- pipeline discharges,
- restriction and measurement orifices,
- valves, ...

Selecting a family displays, in horizontal bars, the available components for that family.



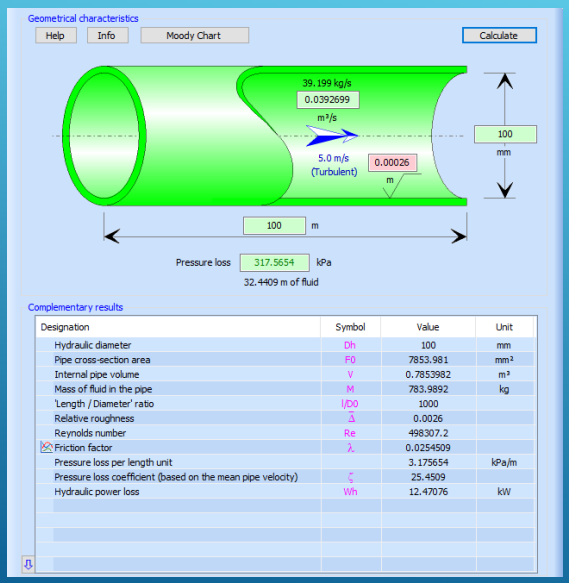
# FLUID PANE




The fluid pane mainly allows:

- Select the fluid
- Set the fluid according to the selected fluid type (temperature, pressure, salinity, quality, humidity, ...)
- Visualize the characteristics of the fluid (density, dynamic and kinematic viscosity)
- Visualize the evolution of the characteristics according to the temperature or the pressure (according to the type of selected fluid)

# COMPONENT PANE



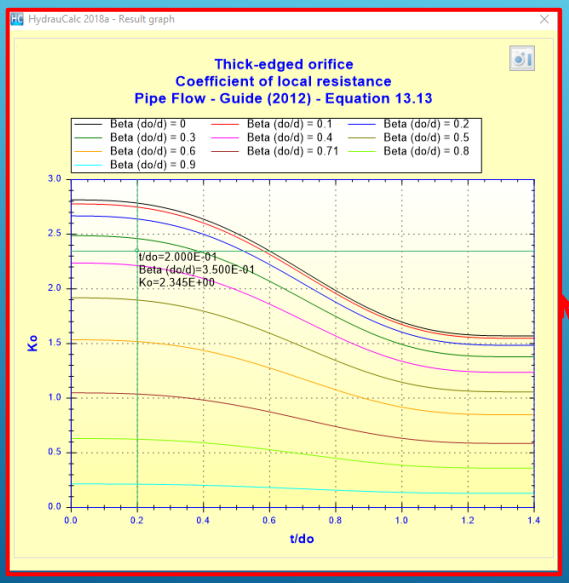

| Designation | Symbol | Value | Unit |
|---|---|---|---|
| Hydraulic diameter | Dh | 100 | mm |
| Pipe cross-section area | F0 | 7853.981 | mm² |
| Internal pipe volume | V | 0.7853982 | m³ |
| Mass of fluid in the pipe | M | 783.9892 | kg |
| 'Length / Diameter' ratio | l/D0 | 1000 | |
| Relative roughness | λ | 0.0026 | |
| Reynolds number | Re | 498307.2 | |
| Friction factor | λ | 0.0254509 | |
| Pressure loss per length unit | | 3.175654 | kPa/m |
| Pressure loss coefficient (based on the mean pipe velocity) | ζ | 25.4509 | |
| Hydraulic power loss | Wh | 12.47076 | kW |

The component pane allows you to:

- Define the geometry of the component according to the selected component type (inside diameter, length, roughness, ...)
- Define flow (volume flowrate)
- Execute the calculation of the component
- Visualize the results
- Display the Moody diagram corresponding to the calculation with the calculated point (case of friction loss)
- Access information about the component:
  - Help (technical documentation of the component)
  - Info (information on the use of the component)
  - Other eventually



# COMPLEMENTARY RESULTS

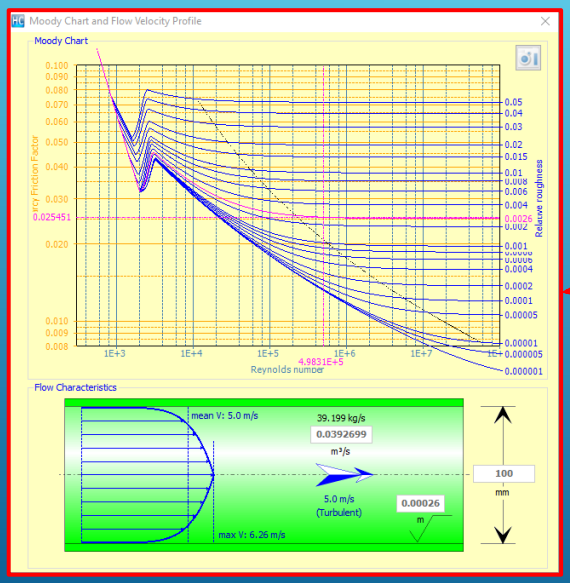



When, in the complementary results, the variable is preceded by the symbol , a simple click on this variable shows the evolution graph of the variable with the calculated point.

Example :

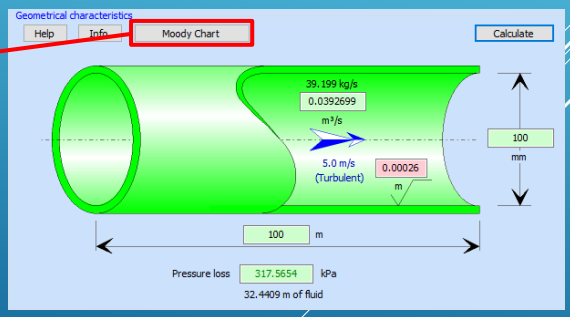
| Designation | Symbol | Value | Unit |
|---|---|---|---|
| Pipe cross-section area | A | 7853.981 | mm² |
| Orifice cross-section area | Ao | 962.1127 | mm² |
| Diameters ratio (Do/d) | β | 0.35 | |
| Cross-sections area ratio | Ao/A | 0.1225 | |
| Thickness to orifice diameter ratio | t/Do | 0.2 | |
| Pipe Reynolds number | NRe | 498307.2 | |
| Orifice Reynolds number | NReo | 1423735 | |
| Velocity in vena contracta | Vc | 65.43075 | m/s |
| Jet velocity ratio (Equation 13.4) | λ | 1.603054 | |
| Coefficient Cth (Equation 13.14) | Cth | 0.9763061 | |
| Coefficient of local resistance (Equation 13.13) | Ko | 2.34488 | |
| Pressure loss coefficient (based on the mean pipe velocity) | K | 156.2602 | |
| Hydraulic power loss | Wh | 76.56641 | kW |

# MOODY DIAGRAM



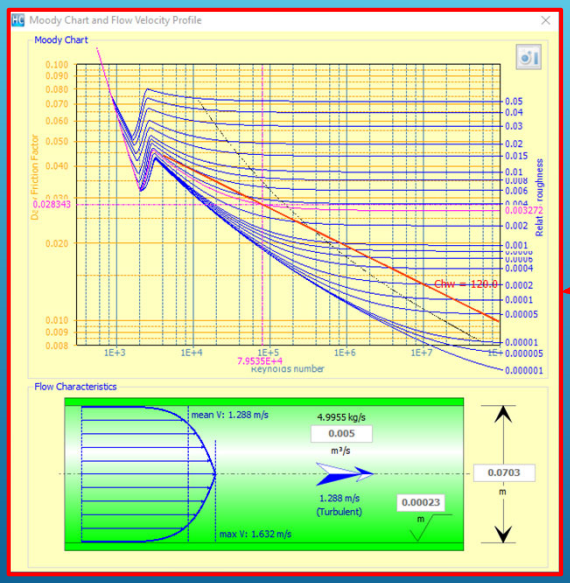

When the component is subjected to friction, the Moody diagram can be consulted to observe the operating point (as well as the flow velocity profile).

Example of a straight pipe:

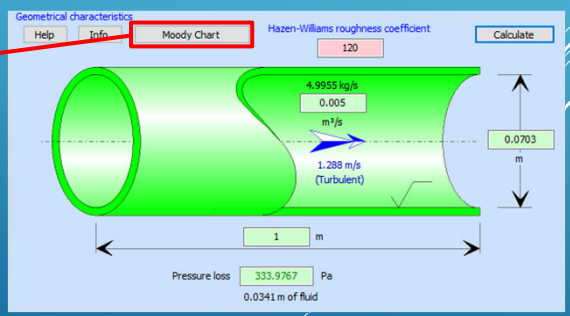




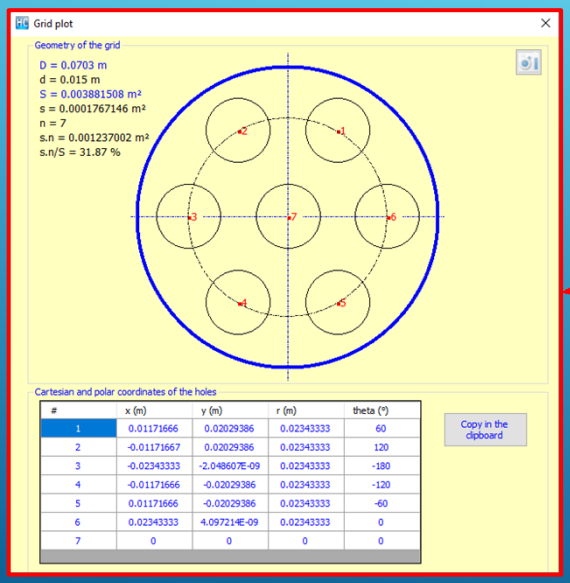

# MOODY DIAGRAM AND HAZEN-WILLIAMS FORMULA




For the "Hazen-Williams" calculation method for circular cross-section straight pipes, the Moody diagram shows the relationship between the roughness coefficient of the Hazen-Williams formula and the friction coefficient of Darcy. The diagram also shows the limits of applicability of the Hazen-Williams formula.



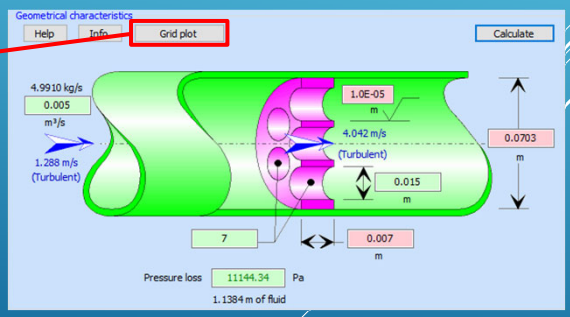
# GRID PLOT




| # | x (m) | y (m) | r (m) | theta (°) |
|---|---|---|---|---|
| 1 | 0.01171666 | 0.02029386 | 0.02343333 | 60 |
| 2 | -0.01171667 | 0.02029386 | 0.02343333 | 120 |
| 3 | -0.02343333 | -2.048607E-09 | 0.02343333 | -180 |
| 4 | -0.01171666 | -0.02029386 | 0.02343333 | -120 |
| 5 | 0.01171666 | -0.02029386 | 0.02343333 | -60 |
| 6 | 0.02343333 | 4.097214E-09 | 0.02343333 | 0 |
| 7 | 0 | 0 | 0 | 0 |

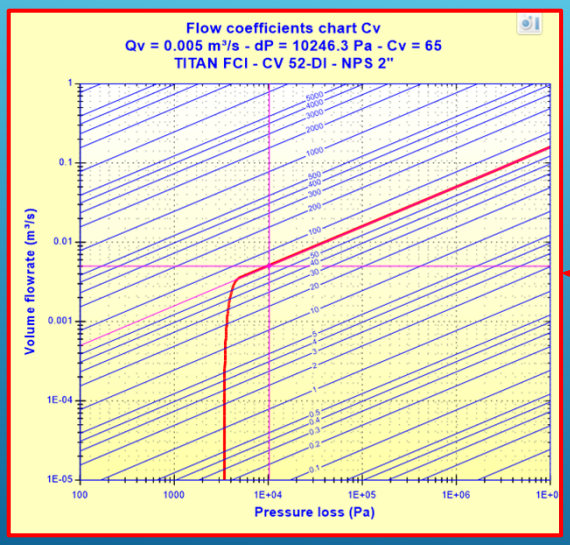
For "Grid" components (perforated plate), the application provides a grid plot with the coordinates of each hole.

Example of a perforated plate plot:



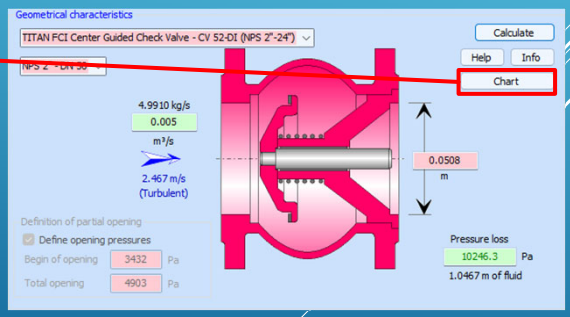



# FLOW COEFFICIENT CHART




For "Valve and Check valve" components, the application provides a diagram with plot of the working point.

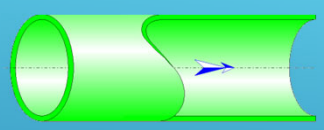
Example of check valve:



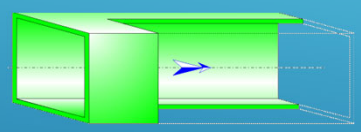
# THE COMPONENTS



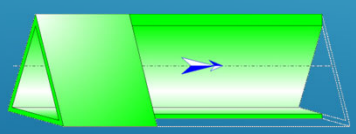
## STRAIGHT PIPES



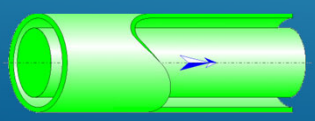
Circular cross-section



Rectangular cross-section



Triangular cross-section



Annular cross-section

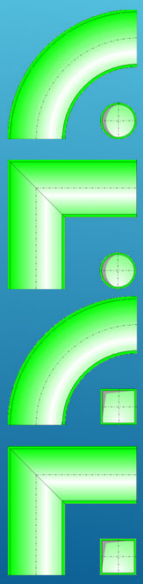
The proposed calculation methods:

- IDELCHIK
  - Uniform roughness walls (Nikuradze equation)
  - Nonuniform roughness walls (Colebrook-White equation)
  - Smooth roughness walls (Filonenko and Althsul equation)
  - Explicit Darcy friction factor
- MILLER
  - Roughness walls (Swamee-Jain equation)
  - Explicit Darcy friction factor
- HAZEN-WILLIAMS (only circular cross-section)
  - Roughness walls (Hazen-Williams equation)

The proposed calculations:

- Pressure loss
- Volume flowrate
- Length of pipe
- Inside diameter (circular cross-section)
- Height or width (rectangular cross-section)
- Height or base (triangular cross-section)

# BENDS



Smooth bend with circular cross-section

Miter bend with circular cross-section

Smooth bend with rectangular cross-section

Miter bend with rectangular cross-section

The proposed calculation methods:

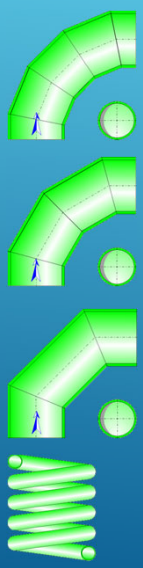
- IDELCHIK
- MILLER
- CRANE
- Pipe Flow Guide

The proposed calculations:

- Pressure loss
- Volume flowrate



# BENDS



Composite bend 90° with circular cross-section (4 x 22.5°)

Composite bend 90° with circular cross-section (3 x 30°)

Composite bend 90° with circular cross-section (2 x 45°)

Helical tube

The proposed calculation methods:

- IDELCHIK
- MILLER
- CRANE
- Pipe Flow Guide

The proposed calculations:

- Pressure loss
- Volume flowrate

# BENDS

S-shaped bends with circular cross-section (flow in one plane)

S-shaped bends with circular cross-section (flow in two perpendicular planes)

U-shaped bends with circular cross-section (flow in one plane)

The proposed calculation methods:

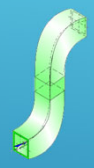
- IDELCHIK
- MILLER

The proposed calculations:

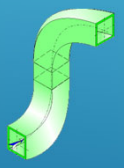
- Pressure loss
- Volume flowrate



# BENDS



S-shaped bends with rectangular cross-section (flow in one plane)



S-shaped bends with rectangular cross-section (flow in two perpendicular planes)

U-shaped bends with rectangular cross-section (flow in one plane)

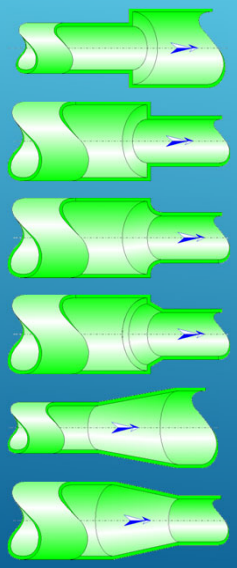
The proposed calculation methods:

- IDELCHIK
- MILLER

The proposed calculations:

- Pressure loss
- Volume flowrate

# CHANGES OF CROSS-SECTION



Sudden expansion

Sudden contraction sharp

Sudden contraction rounded

Sudden contraction bevelled

Gradual expansion

Gradual contraction

The proposed calculation methods:

- IDELCHIK
- MILLER
- CRANE
- Pipe Flow Guide

The proposed calculations:

- Pressure loss
- Volume flowrate

HydrauCalc - © François Corre 2017-2023



# ENTRANCE OF PIPELINE

Flush-mounted sharp-edged entrance

Flush-mounted rounded entrance

Flush-mounted bevelled entrance

Sharp-edged entrance mounted at a distance

Sharp-edged entrance mounted at an angle

The proposed calculation methods:

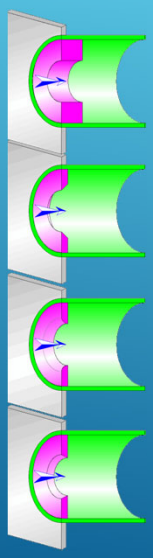
- IDELCHIK
- MILLER
- CRANE
- Pipe Flow Guide

The proposed calculations:

- Pressure loss
- Volume flowrate

HydrauCalc - © François Corre 2017-2023

# ENTRANCE OF PIPELINE



Entrance through a thick-edged orifice

Entrance through a sharp-edged orifice

Entrance through a round-edged orifice

Entrance through a bevel-edged orifice

**New R2023b**

The proposed calculation method:

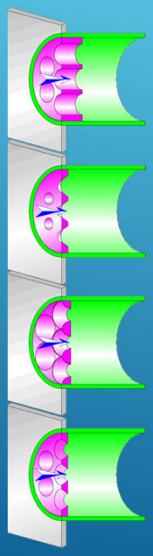
- IDELCHIK

The proposed calculations:

- Pressure loss
- Volume flowrate
- Orifice diameter



# ENTRANCE OF PIPELINE



Entrance through a thick-edged grid

Entrance through a sharp-edged grid

Entrance through a round-edged grid

Entrance through a bevel-edged grid

**New R2023b**

The proposed calculation method:

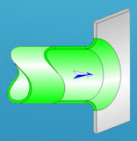
- IDELCHIK

The proposed calculations:

- Pressure loss
- Volume flowrate
- Holes diameter
- Holes number

# DISCHARGE OF PIPELINE

Flush-mounted sharp-edged discharge



Flush-mounted rounded discharge

Sharp-edged discharge mounted at a distance

The proposed calculation methods:

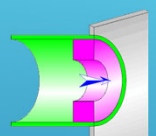
- IDELCHIK
- MILLER
- CRANE
- Pipe Flow Guide

The proposed calculations:

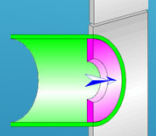
- Pressure loss
- Volume flowrate



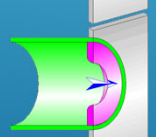
# DISCHARGE OF PIPELINE



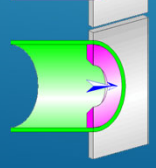
Discharge from a thick-edged orifice



Discharge from a sharp-edged orifice



Discharge from a round-edged orifice



Discharge from a bevel-edged orifice

New R2023b

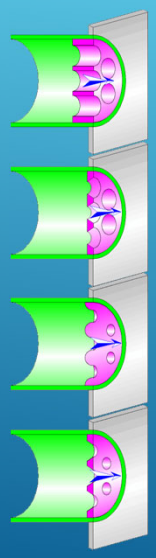
The proposed calculation method:

- IDELCHIK

The proposed calculations:

- Pressure loss
- Volume flowrate
- Orifice diameter

# DISCHARGE OF PIPELINE



Discharge from a thick-edged grid

Discharge from a sharp-edged grid

Discharge from a round-edged grid

Discharge from a bevel-edged grid

**New R2023b**

The proposed calculation method:

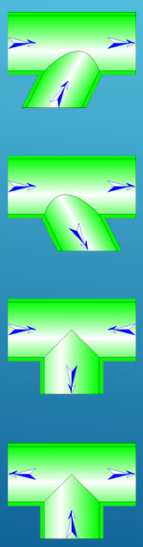
- IDELCHIK

The proposed calculations:

- Pressure loss
- Volume flowrate
- Holes diameter
- Holes number



# JUNCTIONS



Combining sharp-edged junction

Dividing sharp-edged junction

Symmetric combining sharp-edged T-junction

Symmetric dividing sharp-edged T-junction

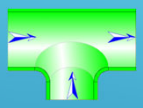
The proposed calculation methods:

- IDELCHIK
- MILLER
- CRANE

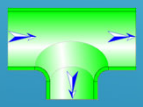
The proposed calculation:

- Pressure loss in each branch

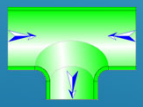
# JUNCTIONS (FOLLOWING)



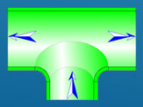
Combining radiused-edged T-junction



Dividing radiused-edged T-junction



Symmetric combining radiused-edged T-junction



Symmetric dividing radiused-edged T-junction

The proposed calculation methods:

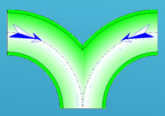
- MILLER
- Pipe Flow Guide

The proposed calculation:

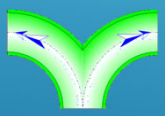
- Pressure loss in each branch



# T-JUNCTIONS WITH SMOOTH TURN THROUGH 90°



Symmetric combining T-junction with smooth turn through 90°



Symmetric dividing T-junction with smooth turn through 90°

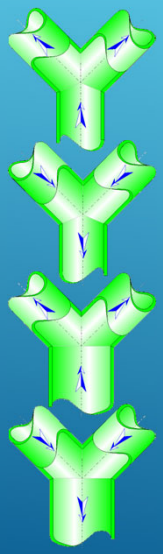
The proposed calculation method:

- IDELCHIK

The proposed calculation:

- Pressure loss in each branch

# Y-JUNCTIONS



Symmetrical dividing Y-junction
with branches of equal sections

Symmetrical combining Y-junction
with branches of equal sections

Symmetrical dividing Y-junction
with branches of unequal sections

Symmetrical combining Y-junction
with branches of unequal sections

The proposed calculation methods:

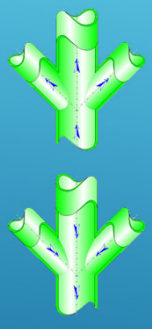
- IDELCHIK
- MILLER

The proposed calculation:

- Pressure loss in each branch



# FOUR-WAY JUNTIONS



Four-way dividing junction
with branches of unequal sections

Four-way combining junction
with branches of unequal sections

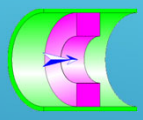
The proposed calculation method:

- IDELCHIK

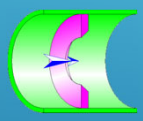
The proposed calculation:

- Pressure loss in each branch

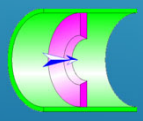
# RESTRICTION ORIFICES



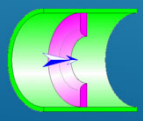
Thick-edged orifice



Sharp-edged orifice



Bevel-edged orifice



Round-edged orifice

The proposed calculation methods:

- IDELCHIK
- MILLER
- CRANE
- Pipe Flow Guide

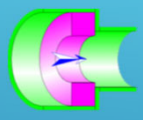
The proposed calculations:

- Pressure loss
- Volume flowrate
- Orifice diameter

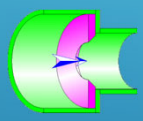


HydrauCalc - © François Corre 2017-2023

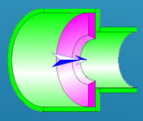
# RESTRICTION ORIFICES (FOLLOWING)



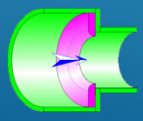
Thick-edged orifice
(in transition section)



Sharp-edged orifice
(in transition section)



Bevel-edged orifice
(in transition section)



Round-edged orifice
(in transition section)

The proposed calculation methods:

- IDELCHIK
- Pipe Flow Guide

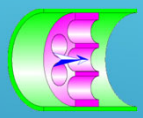
The proposed calculations:

- Pressure loss
- Volume flowrate
- Orifice diameter

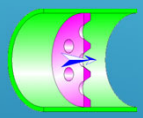


HydrauCalc - © François Corre 2017-2023

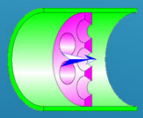
# GRIDS



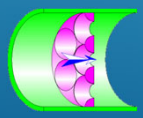
Thick-edged grid



Sharp-edged grid



Bevel-edged grid



Round-edged grid

The proposed calculation methods:

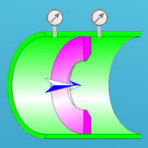
- IDELCHIK
- MILLER
- Pipe Flow Guide

The proposed calculations:

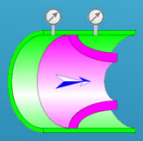
- Pressure loss
- Volume flowrate
- Holes diameter
- Holes number



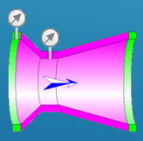
# MEASUREMENT ORIFICES



Orifice plate flowmeter



Nozzle and Venturi nozzle flowmeter



Venturi tube flowmeter

The proposed calculation methods:

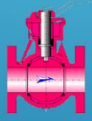
- ISO 5167:2003
- ISO 5167:1991
- CRANE 1999

The proposed calculations:

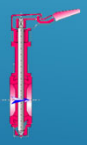
- Measured differential pressure
- Net pressure loss
- Volume flowrate
- Orifice diameter

# VALVES

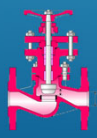
Y globe valve



Ball valve



Butterfly valve



Globe valve

The proposed calculation methods:

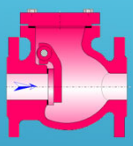
- IDELCHIK
- MILLER
- Manufacturers

The proposed calculations:

- Pressure loss
- Volume flowrate

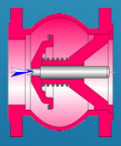


# CHECK VALVES



Swing check valve

Dual plate check valve



Axial check valve

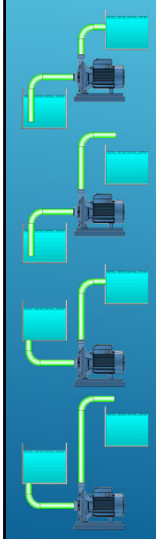
The proposed calculation method:

- Manufacturers

The proposed calculations:

- Pressure loss
- Volume flowrate

# PUMP QUICK DESIGN



Suction lift operation
Tank with pipe ending below the fluid level

Suction lift operation
Free flow from the pipe ending above the water level

Suction head operation
Tank with pipe ending below the fluid level

Suction head operation
Free flow from the pipe ending above the water level

The proposed calculation method:

- KSB Manufacturer

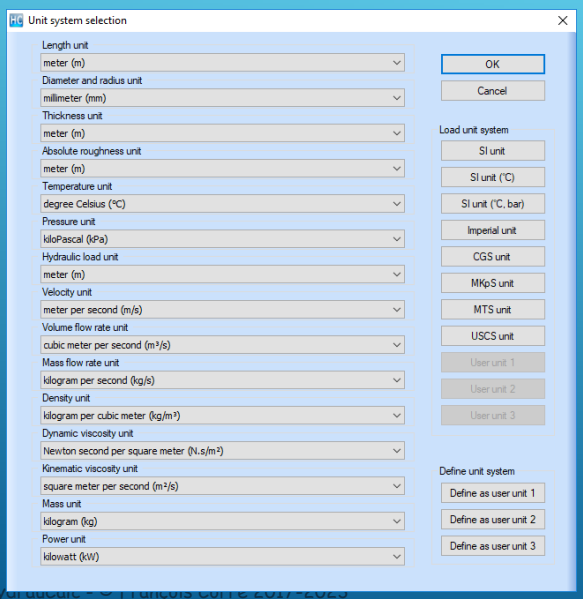
The proposed calculations:

- Total Dynamic Head (TDH)
- Net Positive Suction Head available ($NPSH_a$)
- Pressure loss in suction and discharge lines
- Pressures at the pump flanges



# THE MEASURE UNITS

# UNIT SYSTEM SELECTION



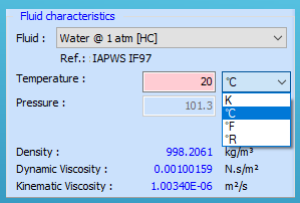

Units can be selected:

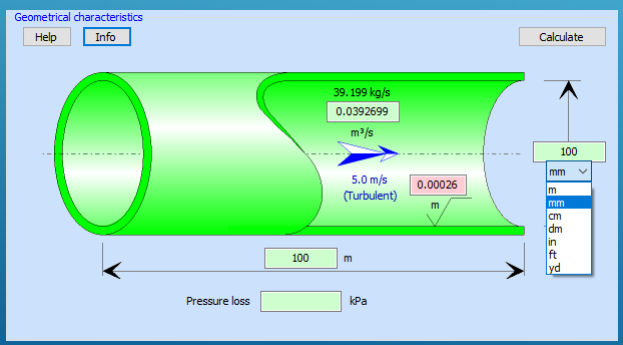
- individually
- by unit systems

The user can define his own systems of units (within the limit of three systems)



# UNITS MODIFICATION




The application has a dynamic unit conversion engine.

The units displayed in the Fluid Pane and Component Data Panes can be changed by simply clicking on the unit displayed.

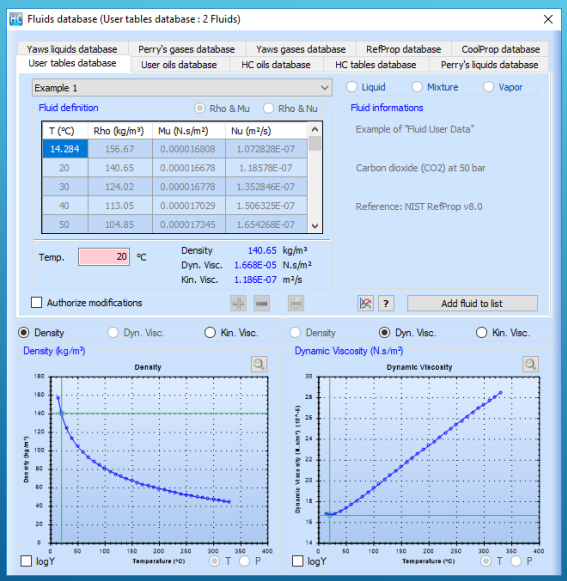
After selecting a new unit, the value entered in the input box is automatically converted to the new unit.

The results will be displayed in the current units.

# THE DATABASES



# DATABASE - FLUIDS

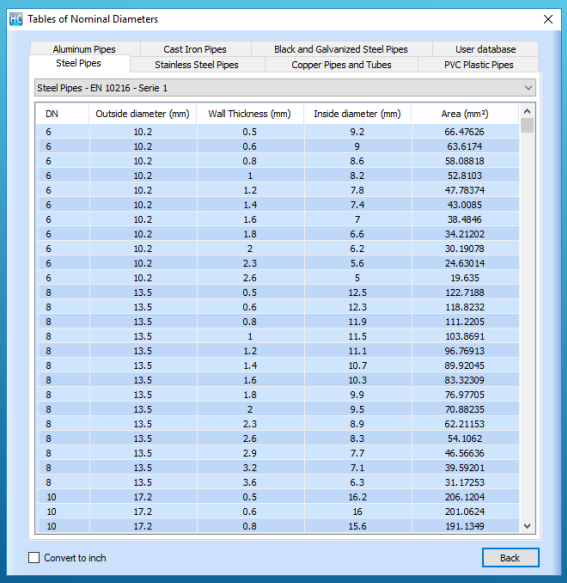



HydrauCalc has a fluid characteristics database consisting of several hundred fluids based on recognized references:

- Perry's Handbook
- Oil products
- Yaws Handbook
- Coolprop
- Refprop New R2023b

The user can also define his own fluids in the form of point tables as a function of temperature.

# DATABASE – PIPINGS




| DN | Outside diameter (mm) | Wall Thickness (mm) | Inside diameter (mm) | Area (mm²) |
|---|---|---|---|---|
| 6 | 10.2 | 0.5 | 9.2 | 66.47626 |
| 6 | 10.2 | 0.6 | 9 | 63.6174 |
| 6 | 10.2 | 0.8 | 8.6 | 58.08818 |
| 6 | 10.2 | 1 | 8.2 | 52.8103 |
| 6 | 10.2 | 1.2 | 7.8 | 47.78374 |
| 6 | 10.2 | 1.4 | 7.4 | 43.0085 |
| 6 | 10.2 | 1.6 | 7 | 38.4846 |
| 6 | 10.2 | 1.8 | 6.6 | 34.21202 |
| 6 | 10.2 | 2 | 6.2 | 30.19078 |
| 6 | 10.2 | 2.3 | 5.6 | 24.63014 |
| 6 | 10.2 | 2.6 | 5 | 19.635 |
| 8 | 13.5 | 0.5 | 12.5 | 122.7188 |
| 8 | 13.5 | 0.6 | 12.3 | 118.8232 |
| 8 | 13.5 | 0.8 | 11.9 | 111.2205 |
| 8 | 13.5 | 1 | 11.5 | 103.8691 |
| 8 | 13.5 | 1.2 | 11.1 | 96.76913 |
| 8 | 13.5 | 1.4 | 10.7 | 89.92045 |
| 8 | 13.5 | 1.6 | 10.3 | 83.32309 |
| 8 | 13.5 | 1.8 | 9.9 | 76.97705 |
| 8 | 13.5 | 2 | 9.5 | 70.88235 |
| 8 | 13.5 | 2.3 | 8.9 | 62.21153 |
| 8 | 13.5 | 2.6 | 8.3 | 54.1062 |
| 8 | 13.5 | 2.9 | 7.7 | 46.56636 |
| 8 | 13.5 | 3.2 | 7.1 | 39.59201 |
| 8 | 13.5 | 3.6 | 6.3 | 31.17253 |
| 10 | 17.2 | 0.5 | 16.2 | 206.1204 |
| 10 | 17.2 | 0.6 | 16 | 201.0624 |
| 10 | 17.2 | 0.8 | 15.6 | 191.1349 |

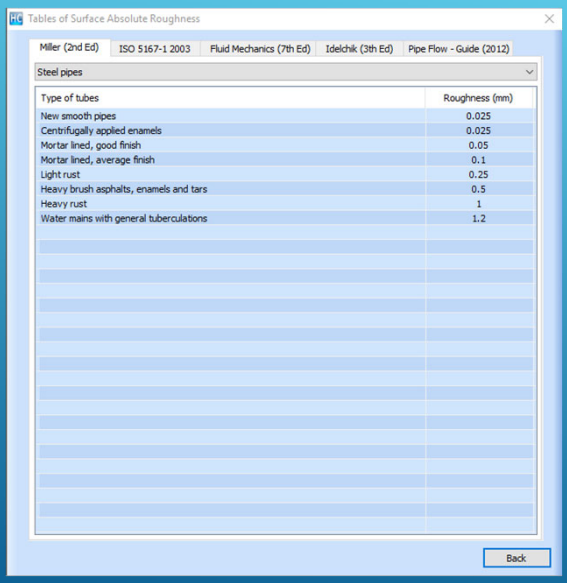
HydrauCalc has a database defining the diameters of the main pipe standards.

- Steel piping
- Stainless steel piping
- Copper piping
- PVC piping
- Aluminium piping
- Cast iron piping
- Black and galvanized steel piping

The user can also add his own diameter tables.



# DATABASE – WALL ROUGHNESS'S

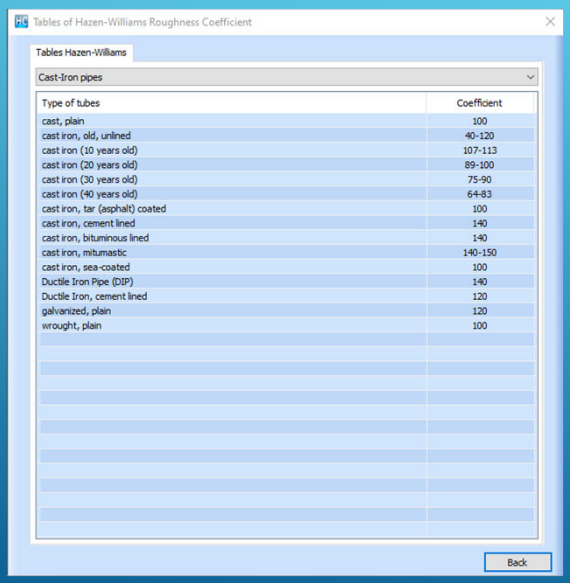



| Type of tubes | Roughness (mm) |
|---|---|
| New smooth pipes | 0.025 |
| Centrifugally applied enamels | 0.025 |
| Mortar lined, good finish | 0.05 |
| Mortar lined, average finish | 0.1 |
| Light rust | 0.25 |
| Heavy brush asphalts, enamels and tars | 0.5 |
| Heavy rust | 1 |
| Water mains with general tuberculations | 1.2 |

HydrauCalc has a database of values of absolute roughness of pipe wall from recognized references:

- MILLER
- ISO 5167-1 2003
- Fluid Mechanics – F. White
- IDELCHIK
- Pipe Flow Guide

# DATABASE - ROUGHNESS COEFFICIENT




| Type of tubes | Coefficient |
|---|---|
| cast, plain | 100 |
| cast iron, old, unlined | 40-120 |
| cast iron (10 years old) | 107-113 |
| cast iron (20 years old) | 89-100 |
| cast iron (30 years old) | 75-90 |
| cast iron (40 years old) | 64-83 |
| cast iron, tar (asphalt) coated | 100 |
| cast iron, cement lined | 140 |
| cast iron, bituminous lined | 140 |
| cast iron, mitumastic | 140-150 |
| cast iron, sea-coated | 100 |
| Ductile Iron Pipe (DIP) | 140 |
| Ductile Iron, cement lined | 120 |
| galvanized, plain | 120 |
| wrought, plain | 100 |

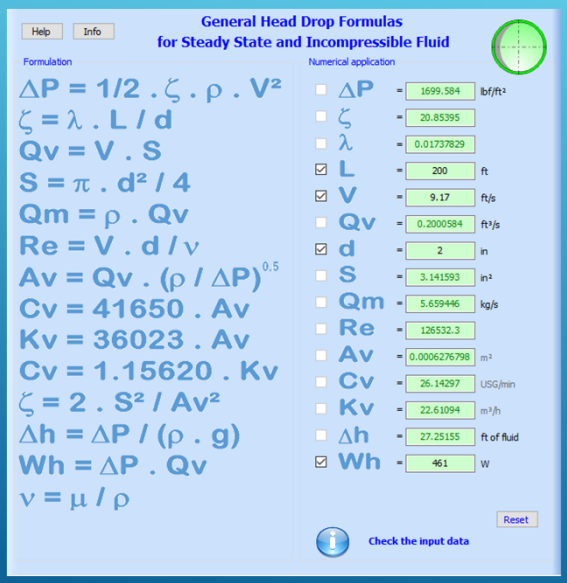
HydrauCalc has a database of values of Hazen-Williams roughness coefficient from:

- Hydraulic Tables by GARDNER S. WILLIAMS and ALLEN HAZEN - 2nd Ed. (1914)



# THE TOOLS

## TOOL – CALCULATOR FOR CIRCULAR CROSS-SECTIONS

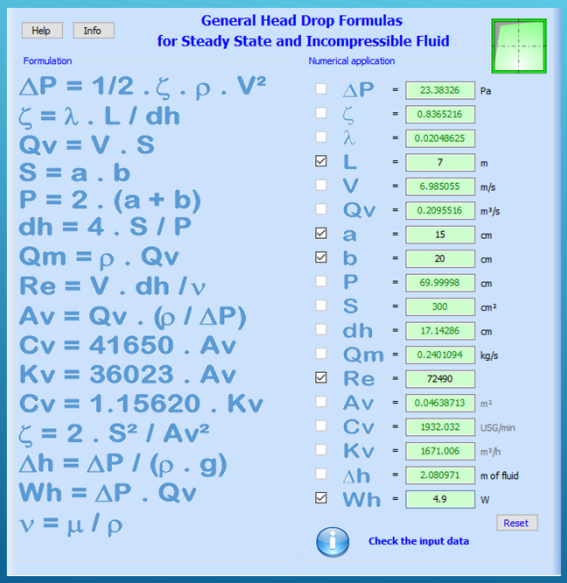



The application allows, from known input data and for circular cross-sections, to automatically calculate those that can be deduced.

It is thus possible to determine the volume flowrate corresponding, for example, to an imposed mean velocity, so as to inform the input data of the components.



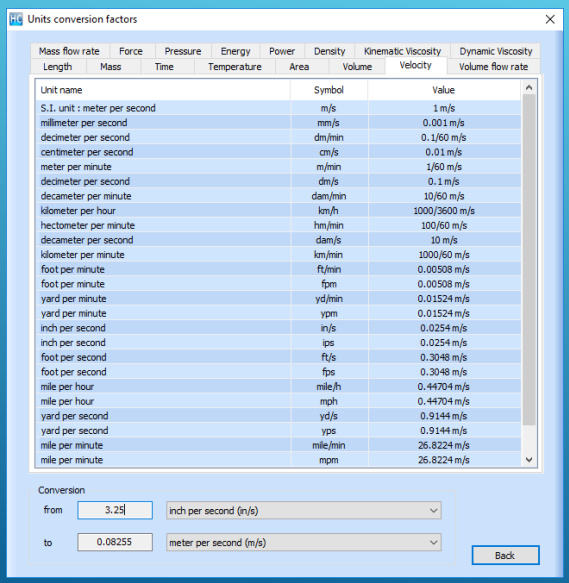
## TOOL – CALCULATOR FOR RECTANGULAR CROSS-SECTIONS




The application also makes it possible, from known input data and for rectangular cross-sections, to calculate those that can be deduced from it.

It is thus possible to determine the volume flowrate corresponding, for example, to an imposed Reynolds number, so as to inform the input data of the components.

# TOOL - UNITS CONVERSION

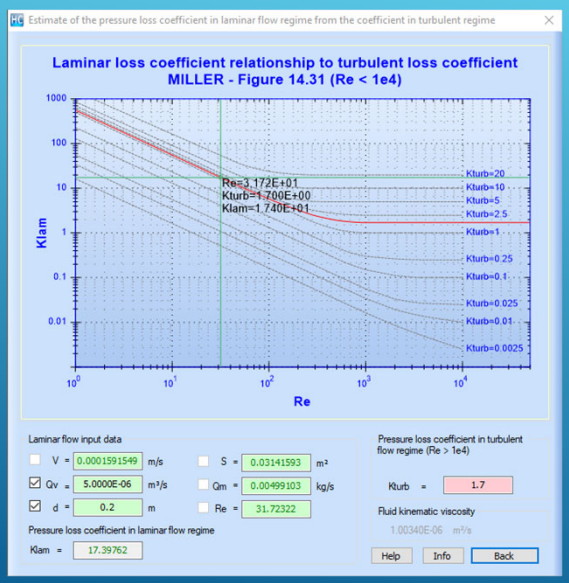



The application has a tool allowing:

- to view the conversion factors of the measurement units integrated in the application,
- to convert together units of measurement of the same physical size.



# TOOL - ESTIMATE PRESSURE LOSS COEFFICIENT IN LAMINAR FLOW

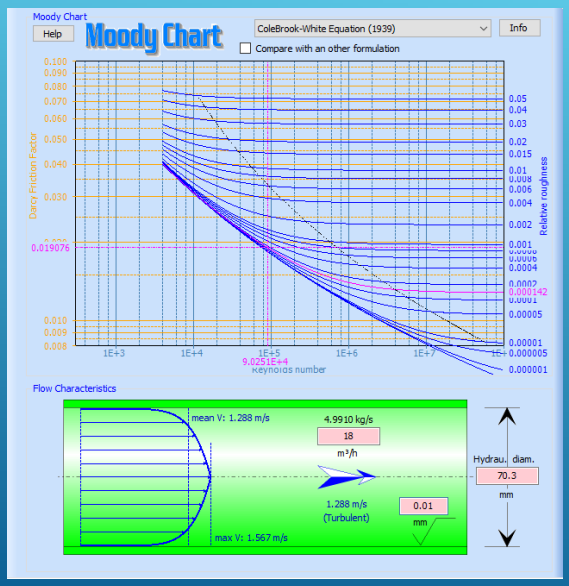



The application has a tool making it possible to obtain an estimate of the coefficient of pressure loss in the laminar flow regime, if the coefficient of pressure loss in the turbulent flow regime is known.

This method only applies to minor pressure losses (pipe fittings, valves, etc.) and is based on the following reference book:

- Internal Flow System, D.S. Miller

# TOOL – MOODY DIAGRAM

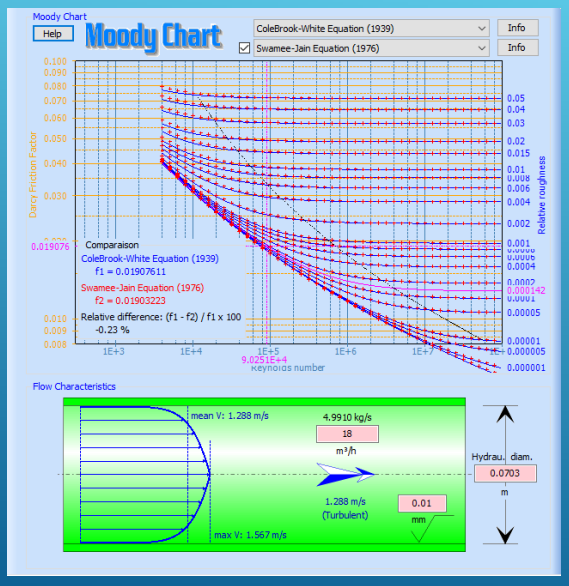



The application has a tool to calculate the coefficient of friction from more than 40 other formulations published by recognized scientists. The curves of iso-values of relative roughness are plotted in a Moody diagram and the calculated point is presented.

The velocity profile of the flow corresponding to the calculation point is also plotted in a pipe of same hydraulic diameter as that of the component.



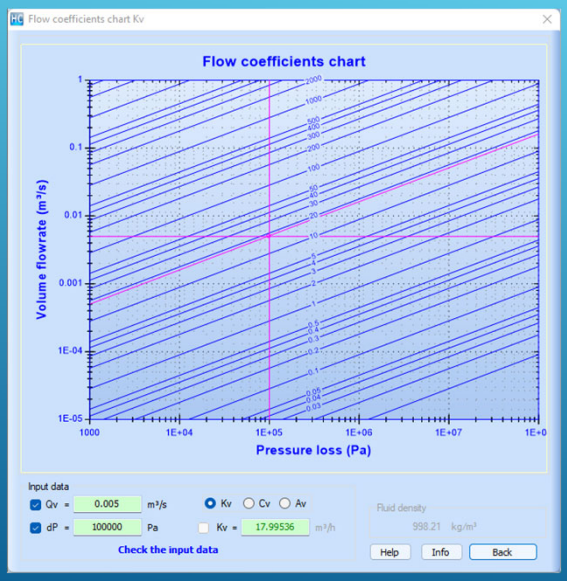
# TOOL – MOODY DIAGRAM (FOLLOWING)




This tool also makes it possible to compare two different formulations for determining the Darcy friction coefficient.

The relative difference found at the calculation point is calculated and displayed on the diagram.

# TOOL – VALVE SIZING CHART



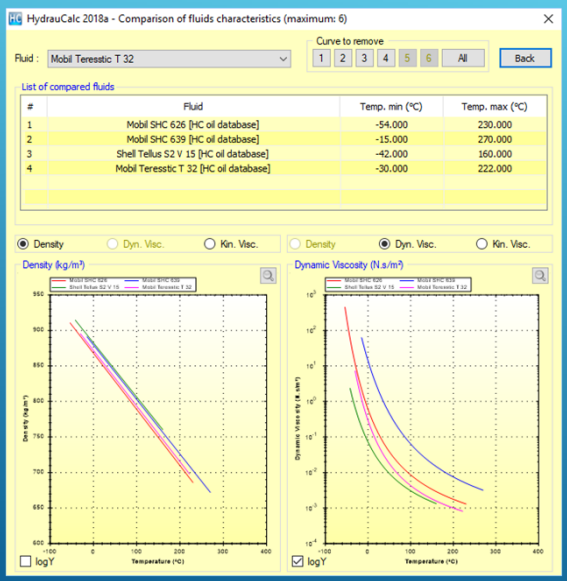

The application has a valve sizing aid chart.

The user selects the type of flow coefficient: Kv, Cv or Av.

It then selects two of the three input data (volume flow, pressure loss or value of the flow coefficient) in order to calculate the third.



# TOOL – FLUID COMPARATOR

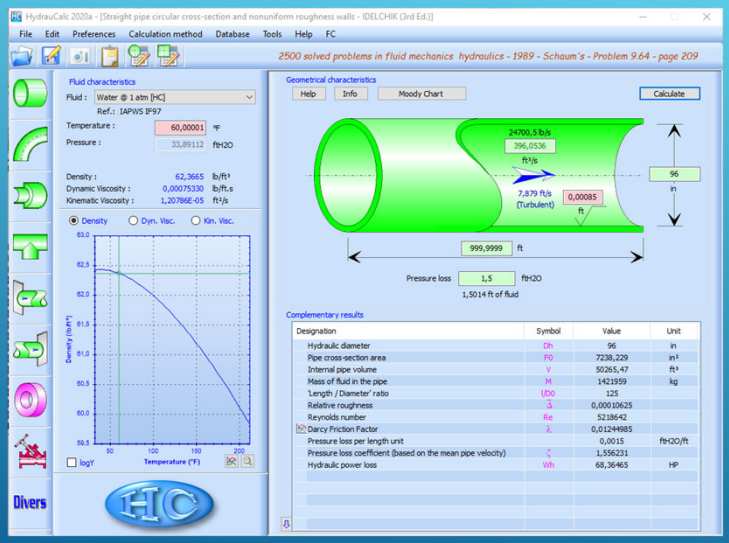



The application has a tool to compare the characteristics of the fluids integrated in the application or defined by the user (density, dynamic viscosity and kinematic viscosity).

# THE CALCULATION REPORT



# CALCULATION REPORT




To include a calculation result in a document, it is possible to copy the window using the button and paste it into the document.

The screenshot contains all the data used for the calculation and the results:

- in the title bar:
  - the release of the application,
  - the type of component calculated and the calculation method used,
- in the fluid pane:
  - the characteristics of the fluid used,
- in the component pane:
  - the input data of the component,
  - the desired main result (value in green colour),
  - the additional results from the calculation.

# THE DATA EXPORT



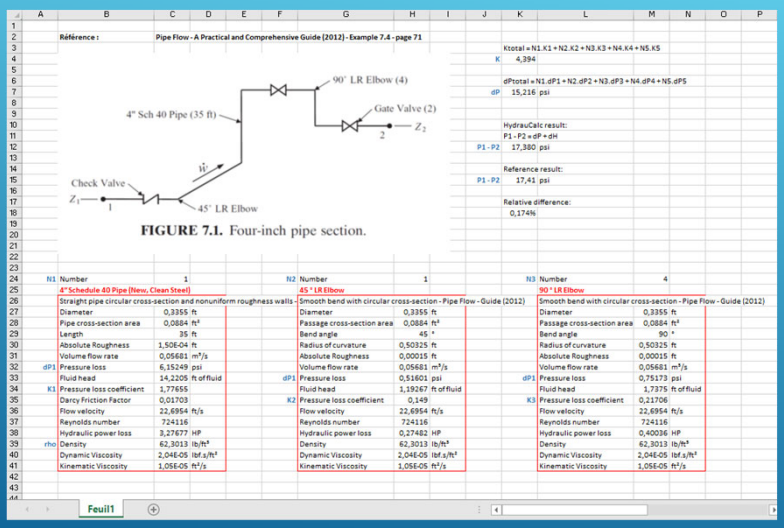
# DATA EXPORT

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 | | | | | | | |
| 2 | | | | | | | |
| 3 | | | | | | | |
| 4 | | Straight pipe circular cross-section and nonuniform roughness walls - IDELCHIK (3rd Ed.) | | | | | |
| 5 | | Diameter | 0,3333598 | m | | | |
| 6 | | Pipe cross-section area | 0,08728033 | m² | | | |
| 7 | | Length | 609,6 | m | | | |
| 8 | | Absolute Roughness | 4,60E-005 | m | | | |
| 9 | | Volume flow rate | 25,57719 | m³/s | | | |
| 10 | | Pressure loss | 1,00E+009 | Pa | | | |
| 11 | | Fluid head | 102191,5 | m of fluid | | | |
| 12 | | Pressure loss coefficient | 23,33955 | | | | |
| 13 | | Darcy Friction Factor | 0,01276324 | | | | |
| 14 | | Flow velocity | 293,0464 | m/s | | | |
| 15 | | Reynolds number | 1,00E+008 | | | | |
| 16 | | Hydraulic power loss | 2,56E+010 | W | | | |
| 17 | | Density | 997,9705 | kg/m³ | | | |
| 18 | | Dynamic Viscosity | 9,75E-004 | N.s/m² | | | |
| 19 | | Kinematic Viscosity | 9,77E-007 | m²/s | | | |
| 20 | | | | | | | |
| 21 | | | | | | | |

Feuille1 / Feuille2 / Feuille3

For each component, the input data and the main results can be copied to the clipboard, using the button , for reuse in another application, for example a spreadsheet.

# DATA EXPORT

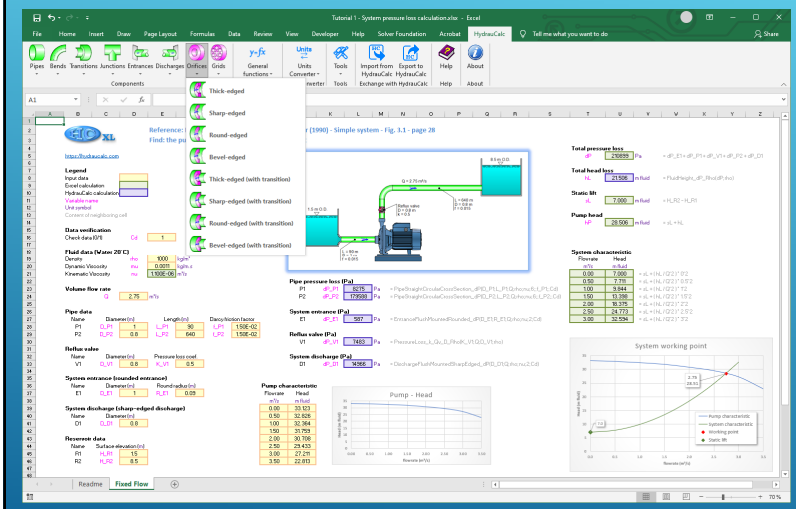



Exporting the main data and results to a spreadsheet allows you to perform additional calculations such as:

- Calculation of the total pressure loss of the circuit by summing the pressure losses of each component.
- Search for the flow circulating in the circuit from the sum of the pressure loss coefficients and using the solver integrated into the spreadsheet.



# Data exchange with HydrauCalcXL



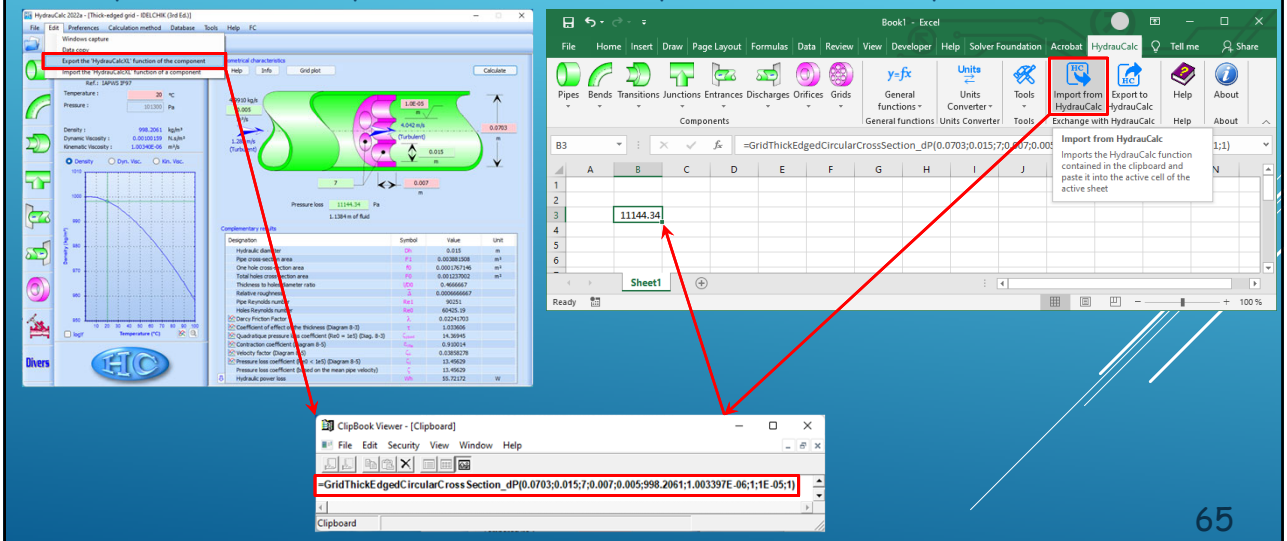

HydrauCalcXL Add-in is a library of functions that has been developed to calculate the pressure losses of hydraulic components in Microsoft Excel®. This library allows the direct call of functions relating to the calculation of pressure losses. It comes from the HydrauCalc application.

The HydrauCalcXL functions can be used via the user interface of Excel, like the own integrated functions of Excel.

# Data export to HydrauCalcXL

1 - Export function to Clipboard

2 - Import function from Clipboard

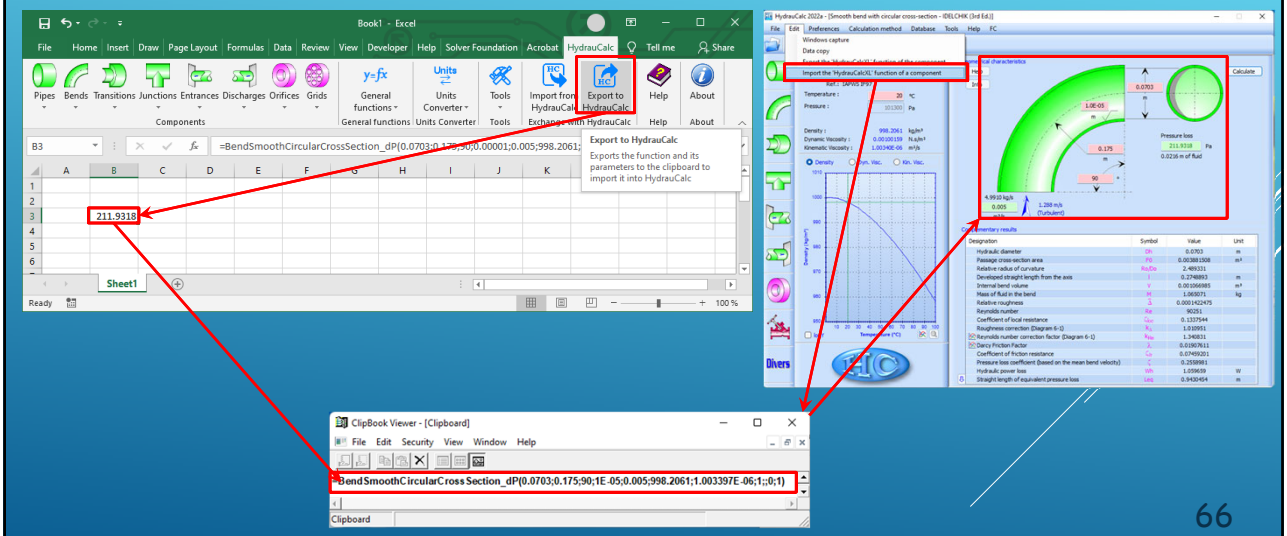





# Data import from HydrauCalcXL

1 - Export function to Clipboard

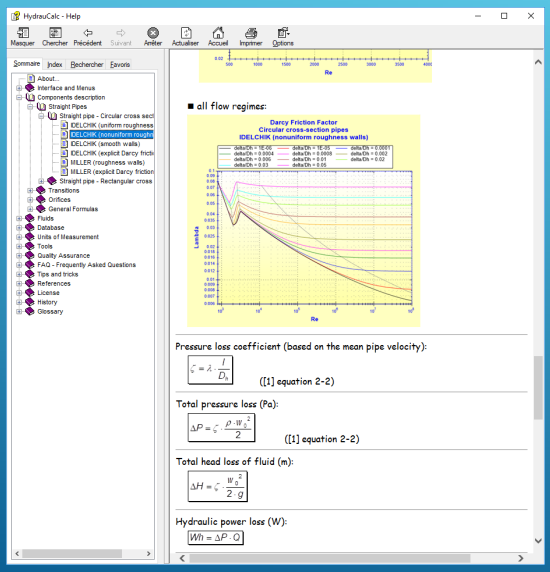
2 - Import function from Clipboard



# THE ASSURANCE QUALITY



# TECHNICAL DOCUMENTATION




In general, each component has several calculation methods that come from different reference works. For all components, each calculation method is detailed in a technical document including:

- A description of the method used
- The mathematical formulation of the model
- The nomenclature used for the equations
- The range of the formulation
- An example of an application
- The bibliographic reference (s) used for modelling

## COMPONENTS MODEL VALIDATION

HydrauCalc comes with a document that provides a comparison of software results with a series of examples published in well-known and respected references. Examples of hydraulic analysis include calculations of flow, pressure drop and pipe sizing for compressible and incompressible fluids.

The results obtained by the HydrauCalc application are very close to the published results.

At each new software release, a series of tests is performed to check the non-regression of the software features.



# HydrauCalc

**2023b Release**

www.hydraucalc.com