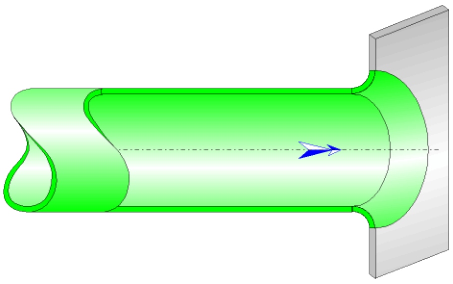
Flush-mounted rounded discharge
Circular Cross-Section
(Pipe Flow - Guide)



Model description:

This model of component calculates the minor head loss (pressure drop) generated by the flow in a flush-mounted rounded discharge of piping.

The head loss by friction in the piping is not taken into account in this component.

Model formulation:

Hydraulic diameter (m):

$$\boxed{d_h = d}$$

Pipe cross-sectional area (m²):

$$\boxed{A = \pi \cdot \frac{d^2}{4}}$$

Mean velocity in pipe (m/s):

$$\boxed{V = \frac{Q}{A}}$$

Mass flow rate (kg/s):

$$\boxed{G = Q \cdot \rho_m}$$

Reynolds number in pipe:

$$\boxed{N_{Re} = \frac{V \cdot d}{\nu}}$$

Local resistance coefficient ($N_{Re} \geq 10^4$):

$$\boxed{K_2 = 1}$$ ([1] §12.1)

Total pressure loss coefficient (based on mean velocity in pipe):

$$\boxed{K = K_2}$$

Total pressure loss (Pa):

$$\boxed{\Delta P = K \cdot \frac{\rho_m \cdot v^2}{2}}$$

Total head loss of fluid (m):

$$\boxed{\Delta H = K \cdot \frac{v^2}{2 \cdot g}}$$

Hydraulic power loss (W):

$$\boxed{Wh = \Delta P \cdot Q}$$

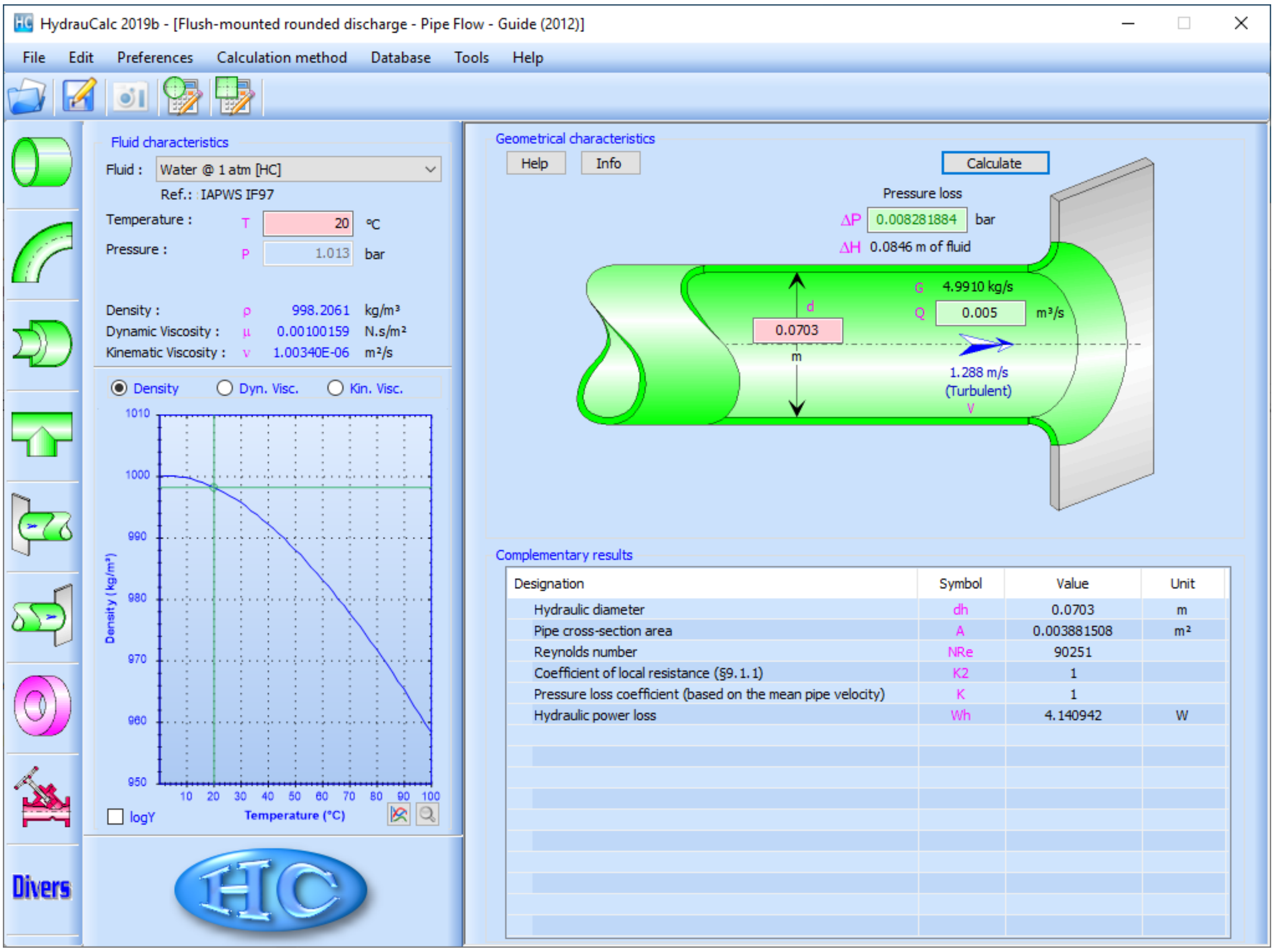
Symbols, Definitions, SI Units:

d_h	Hydraulic diameter (m)
d	Pipe diameter (m)
A	Pipe cross-sectional area (m²)
Q	Volume flow rate (m³/s)
G	Mass flow rate (kg/s)
V	Mean velocity in pipe (m/s)
N_{Re}	Reynolds number in pipe ()
K_2	Local resistance coefficient ()
K	Total pressure loss coefficient (based on mean velocity in pipe) ()
ΔP	Total pressure loss (Pa)
ΔH	Total head loss of fluid (m)
Wh	Hydraulic power loss (W)
ρ_m	Fluid density (kg/m³)
ν	Fluid kinematic viscosity (m²/s)
g	Gravitational acceleration (m/s²)

Validity range:

- turbulent flow regime in pipe ($N_{Re} \geq 10^4$)

Example of application:



References:

[1] Pipe Flow: A Practical and Comprehensive Guide. Donald C. Rennels and Hobart M. Hudson. (2012)