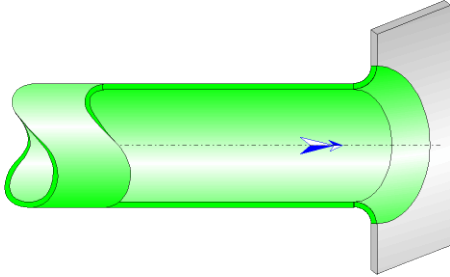




## Flush-mounted rounded discharge Circular Cross-Section (Pipe Flow - Guide)



### 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:

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Hydraulic diameter (m):

$$d_h = d$$

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Pipe cross-sectional area (m<sup>2</sup>):

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

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Mean velocity in pipe (m/s):

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

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Mass flow rate (kg/s):

$$G = Q \cdot \rho_m$$

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Reynolds number in pipe:

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

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

$$K_2 = 1 \quad ([1] \text{ §12.1})$$

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

$$K = K_2$$

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Total pressure loss (Pa):

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

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Total head loss of fluid (m):

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

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Hydraulic power loss (W):

$$Wh = \Delta P \cdot Q$$

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**Symbols, Definitions, SI Units:**

$d_h$	Hydraulic diameter (m)
$d$	Pipe diameter (m)
$A$	Pipe cross-sectional area (m <sup>2</sup> )
$Q$	Volume flow rate (m <sup>3</sup> /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) ( )
$\Delta P$	Total pressure loss (Pa)
$\Delta H$	Total head loss of fluid (m)
$Wh$	Hydraulic power loss (W)
$\rho_m$	Fluid density (kg/m <sup>3</sup> )
$\nu$	Fluid kinematic viscosity (m <sup>2</sup> /s)
$g$	Gravitational acceleration (m/s <sup>2</sup> )

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**Validity range:**

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

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**Example of application:**

HydrauCalc 2019b - [Flush-mounted rounded discharge - Pipe Flow - Guide (2012)]

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**Fluid characteristics**

Fluid: Water @ 1 atm [HC]  
Ref.: IAPWS IF97

Temperature: T 20 °C  
Pressure: P 1.013 bar

Density:  $\rho$  998.2061 kg/m<sup>3</sup>  
Dynamic Viscosity:  $\mu$  0.00100159 N.s/m<sup>2</sup>  
Kinematic Viscosity:  $\nu$  1.00340E-06 m<sup>2</sup>/s

Density  Dyn. Visc.  Kn. Visc.

Density (kg/m<sup>3</sup>) vs Temperature (°C)

logY

**Geometrical characteristics**

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Pressure loss  
 $\Delta P$  0.008281884 bar  
 $\Delta H$  0.0846 m of fluid

Complementary results

Designation	Symbol	Value	Unit
Hydraulic diameter	dh	0.0703	m
Pipe cross-section area	A	0.003881508	m <sup>2</sup>
Reynolds number	NRe	90251	
Coefficient of local resistance (§9.1.1)	K2	1	
Pressure loss coefficient (based on the mean pipe velocity)	K	1	
Hydraulic power loss	Wh	4.140942	W

## References:

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