## Restrictor calculation

SFC KOENIG provides several restrictor options for different application requirements, and customers can select the restrictor's orifice size. This allows you to have complete design control – CV expansion and threaded restrictors are custom-made to meet your orifice performance requirements. As with any component in your system design, there are many technical factors to consider. This is one method for calculating orifice diameter for the SFC KOENIG restrictor products..

### Setting procedure

- This equation was derived by rearranging Bernoulli's Equation and using a Coefficient of Discharge (CD).
- The Coefficient of Discharge (CD) accounts for pressure losses resulting from factors such as orifice geometry, turbulence near the orifice hole, the length of the orifice hole, and flow dynamics.
- This equation for calculating the restrictor orifice diameters should be used as reference only. SFC KOENIG recommends that you perform testing in the actual application environment to determine the flow constant.
- This equation is intended as a guide for fluid applications only; it is not applicable for gas flow applications.

### Metric

To calculate restrictor orifice **diameter** in mm:

$$d\ \text{orifice} \approx \sqrt{2{,}144 \times Q \left( \sqrt{\frac{SG}{\Delta p}} \right)}$$

To calculate restrictor **flow rate** in l/min:

$$Q \approx \frac{d^2\ \text{orifice}}{2{,}144 \times \sqrt{\frac{SG}{\Delta p}}}$$

Where:

| | |
|---|---|
| d orifice | Orifice diameter, measured in mm |
| Q | Fluid flow rate, measured in liters/minute |
| $\Delta$ p | Fluid pressure difference across the restrictor, measured in bar |
| SG | Specific gravity of the fluid |
| 2,144 | Constant = Unit conversion factor x Cd |

To calculate orifice **length** in mm:

| RE Size [mm] | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|
| t [mm] | 0,67 | 0,76 | 0,97 | 0,89 | 0,81 | 1,14 | 1,14 |

L = [Ø x 0,207] + t
L = length of orifice [mm]
Ø = orifice diameter in [mm]
t = see chart above
Tolerance: +/– ((Ø x 0,021) + 0,13) [mm]

## Inches

To calculate restrictor orifice **diameter** in inches:

$$d\ orifice \approx \sqrt{\frac{Q}{20{,}89}\left(\sqrt{\frac{SG}{\Delta p}}\right)}$$

To calculate restrictor flow **rate** in gallons per minute:

$$Q \approx \frac{20{,}89 \times d^2\ orifice}{\sqrt{\frac{SG}{\Delta p}}}$$

Where:

| | |
|---|---|
| d orifice | Orifice diameter, measured in inches |
| Q | Fluid flow rate, measured in gallons per minute [GPM] |
| Δ p | Fluid pressure difference across the restrictor, measured in psi |
| SG | Specific gravity of the fluid |
| 20,89 | Constant = Unit conversion factor x Cd |

To calculate orifice **length** in inches:

| RE Size [Inch] | ,156" | ,187" | ,218" | ,250" | ,281" | ,312" | ,343" | ,375" | ,406" | ,437" | ,468" | ,562" |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| t [Inch] | ,027 | ,030 | ,035 | ,038 | ,033 | ,032 | ,045 | ,045 | ,045 | ,052 | ,052 | ,052 |

L = [Ø x 0,207] + t

L = length of orifice [Inch]

Ø = orifice diameter [Inch]

t = see chart above

Tolerance: +/– ((Ø x 0,021) + ,005) [Inch]

(Source: SFC Koenig)