

Sizing of High-Pressure Tubing Systems

With the selection of the required valve orifice based on the coefficient of flow Kv, generally the inside diameter (ID) of the HP-tubing is defined. Nevertheless we recommend to check it as well.

The following maximum flow velocities (v) must not be exceeded:

for liquids: 7 m/sec.
for gases: 25 m/sec.

For return lines in the partially expanded state of the fluid, the following limits apply:

for liquids: 1,5 m/sec.
for gases: 6 m/sec.

To calculate the **allowable flow (Q) in m³/h**, the **flow velocity of the fluid (v) in m/sec.** and the minimum **inside diameter of the high pressure tubing (ID) in mm**, the following formulas apply:

Flow in m³/h :	$Q = \frac{ID^2 \times v \times 2,8}{1000}$
Flow Velocity in m/sec. :	$v = \frac{Q \times 1000}{ID^2 \times 2,8}$
Minimum Inside Diameter (ID) in mm :	$ID = \sqrt{\frac{Q \times 1000}{v \times 2,8}}$

Example for the sizing of a Tubing System

Flow Q = 0,4 m³/h

Flow velocity v = 7 m/sec.

$$ID = \sqrt{\frac{0,4 \times 1000}{7 \times 2,8}} = 4,52 \text{ mm} \quad \Rightarrow \text{SITEC - Catalogue bulletin 730.01}$$

The min. inside diameter ID must be 4,52 mm.

Therefore we may choose the tubings:

- 3/8" x 5,2 mm ID (730.1220) for pressures up to 2'000 bar or
- 9/16" x 4,8 mm ID (730.1120) for pressures up to 5'000 bar

or any other tubing with ID > 4,52 mm.