

## Facts about flow

The concept of flow is used to describe the volume of liquid pumped within a given period of time and is designated by the letter Q.

Flow is calculated from the formula:  $Q = A \times v$

Q is the flow in cubic metres per second ( $m^3/s$ )

A is the area of the pipe in square metres ( $m^2$ )

v is the velocity of the liquid in the pipe in metres per second (m/s)

If you know the pipe diameter you can find the pipe cross-sectional area:

$$r = d/2$$

$$A = \pi \times r^2$$

Liquid flow is measured in:

- litres/min for small pumps
- $m^3/h$  for medium sized pumps
- $m^3/s$  for the largest pumps

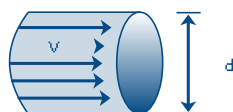
- The larger the flow, the larger the pump
- When pipe diameter decreases, liquid velocity increases.

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## Information about Flow

The cross-sectional dimensions of the pipe system are determined by the volume to be transmitted at a given velocity, v:

$$A = \frac{Q}{v} \quad \left[ \frac{m^3/s}{m/s} = m^2 \right]$$



### It is important to use the right pipe dimension.

Too small a pipe causes pipe noise; too big a pipe makes the installation too expensive.

Furthermore, a too small pipe causes unnecessary losses due to increased friction

### The actual flow in a pipe affects the liquid velocity.

#### Too high liquid velocity in a pipe causes flow noise from the pipe.

You probably know the noise from a radiator in a bedroom or hotel room, a kind of hissing, and if the liquid velocity is too high, the same kind of noise will come from the pipes.

#### Too high liquid velocity causes unnecessary losses in the system

Friction increases with the velocity, therefore unnecessary losses may occur in the system, affecting the efficiency of the complete system negatively.

Thus the diameter of a pipe is determined by the flow at a recommended maximum velocity.

### The following are recommendations for maximum flow velocity in pipes:

≤ 1 m/s in domestic applications

≤ 2 m/s in other applications

≤ 5 m/s in wastewater applications

Note that there is a minimum flow velocity in wastewater systems (to prevent settlement): ≥ 0.7 m/s for horizontal pipes and ≥ 1 m/s for vertical pipes.