

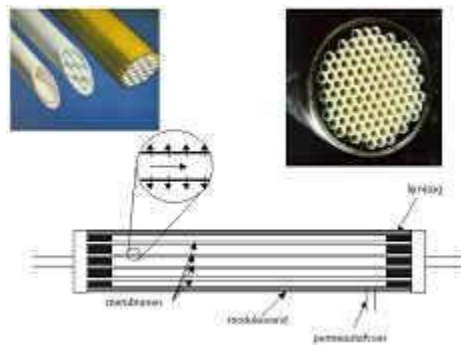
Tubular-shaped membranes

Membrane technology

Tubular membranes

Tubular membranes are not self-supporting membranes. They are located on the inside of a tube, made of a special kind of material. This material is the supporting layer for the membrane. Because the location of tubular membranes is inside a tube, the flow in a tubular membrane is usually inside out. The main cause for this is that the attachment of the membrane to the supporting layer is very weak.

Tubular membranes have a diameter of about 5 to 15 mm. Because of the size of the membrane surface, plugging of tubular membranes is not likely to occur. A drawback of tubular membranes is that the packing density is low, which results in high prices per module.

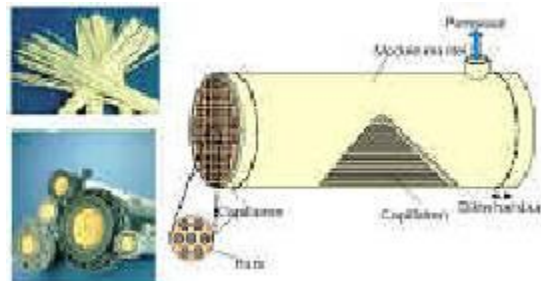


Tubular membranes

Capillary membranes

With capillary membranes the membrane serves as a selective barrier, which is sufficiently strong to resist filtration pressures. Because of this, the flow through capillary membranes can be both inside out and outside in.

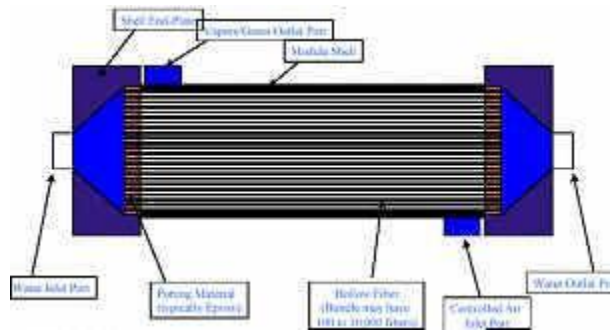
The diameter of capillary membranes is much smaller than that of tubular membranes, namely 0.5 to 5 mm. Because of the smaller diameter the chances of plugging are much higher with a capillary membrane. A benefit is that the packing density is much greater.



Capillary membranes

Hollow fiber membranes

Hollow fiber membranes are membranes with a diameter of below $0.1\ \mu\text{m}$. Consequently, the chances of plugging of a hollow fiber membrane are very high. The membranes can only be used for the treatment of water with a low suspended solids content. The packing density of a hollow fiber membrane is very high. Hollow fiber membranes are nearly always used merely for [nano filtration](#) and [Reverse Osmosis \(RO\)](#).



Hollow fiber membrane