

## MEMBRANE FILTRATION

### *Hollow Fiber Membranes*

This is a new technology for removal of suspended solids from water. One of the primary applications for this technology is the production of drinking water; however, hollow fiber membrane systems are useful in industrial plants where potable quality water is required.

These membranes consist of thin polysulfone plastic filaments or strands with a diameter about the same as the diameter of a human hair (< 1 mm).

There are two design configurations: pressurized and submerged vacuum systems. In the pressurized units, flexible filaments are bundled into plastic housings as shown in Figure 3-4. In submerged vacuum systems, the membranes have one end sealed and may be fixed in a second header or move freely as shown in Figure 3-5.

### *How Hollow Fiber Membranes Work*

Hollow fiber membranes act as very fine filters with microscopic pores between 0.05 micron and 0.1 micron that allow water and some soluble contaminants to pass through the membrane wall. These membranes have pore sizes that are small enough to remove colloidal silica, but not small enough to remove dissolved silica. Figure 3-6 shows a photograph of a cross section of a single membrane from a scanning electron microscope (SEM).

These units may remove some soluble contaminants, depending on the membrane design. Hollow fiber membranes are typically used in influent water systems to supplement the filtration system. The current cost of this technology makes it uneconomical to substitute hollow fiber membranes for a raw-water clarifier. A typical application would be to remove colloidal silica upstream of a reverse osmosis (RO) unit.



**FIGURE 3-4**

Pressurized hollow fiber membrane elements  
(courtesy of Koch Membrane Systems).