



FILMTEC Membranes

Water Chemistry and Pretreatment: Colloidal and Particulate Fouling Prevention

Media Filtration

The removal of suspended and colloidal particles by media filtration is based on their deposition on the surface of filter grains while the water flows through a bed of these grains (filter media). The quality of the filtrate depends on the size, surface charge, and geometry of both suspended solids and filter media, as well as on the water analysis and operational parameters. With a well-designed and operated filter, a $SDI_{15} < 5$ can usually be achieved.

The most common filter media in water treatment are sand and anthracite. The effective grain size for fine sand filter is in the range of 0.35–0.5 mm, and 0.7–0.8 mm for anthracite filter. In comparison to single sand filter media, dual filter media with anthracite over sand permit more penetration of the suspended matter into the filter bed, thus resulting in more efficient filtration and longer runs between cleaning. The design depth of the filter media is a minimum of 31 inches (0.8 m). In the dual filter media, the filters are usually filled with 20 inches (0.5 m) of sand covered with 12 inches (0.3 m) of anthracite.

There are two types of filters employed, gravity and pressure filters. As the filter vessel for pressure filtration is designed for pressurization, a higher pressure drop can be applied for higher filter beds and/or smaller filter grains and/or higher filtration velocities. The design filtration flow rates are usually 4–8 gpm/ft² (10–20 m/h), and the backwash rates are in the range of 16–20 gpm/ft² (40–50 m/h). The available pressure is usually about 16 ft (5 m) of head for gravity filters, and 30 psi (2 bar) to more than 60 psi (4 bar) for pressure filters. For feed waters with a high fouling potential, flow rates of less than 4 gpm/ft² (10 m/h) and/or second pass media filtration are preferred. If the flow rate has to be increased to compensate for one filter that goes out of service, the flow rate increase must be gradual and slow to prevent the release of previously deposited particles.

During operation, influent water to be filtered enters at the top of the filter, percolates through the filter bed, and is drawn off through the collector system at the bottom. Periodically, when the differential pressure increase between the inlet and outlet of the pressure filter is 4–9 psi (0.3–0.6 bar), and about 4.6 ft (1.4 m) for the gravity filter, the filter is backwashed and rinsed to carry away the deposited matter. Backwash time is normally about 10 minutes. Before a backwashed filter is placed back into service, it must be rinsed to drain until the filtrate meets the specification.

Frequent shutdowns and start-ups should be avoided to minimize the release of previously deposited particulate matter. Design and operational details of media filtration are available in water treatment textbooks [/3, 4/](#).

FILMTEC™ Membranes

For more information about FILMTEC membranes, call the Dow Liquid

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