DEPARTMENT OF HEALTH

Surface Water Filtration – Bag and Cartridge Filters

NONCOMMUNITY PUBLIC WATER SUPPLY PROGRAM

What are Bag and Cartridge Filters?

Bag and cartridge filters are disposable, replaceable filters that are used in a wide variety of industries because of their simplicity. The filter material acts as a physical barrier to particles in the water. As the filter operates, it collects particles on the upstream side of the filter until it is no longer effective and needs to be replaced. Generally, replacement is as easy as releasing any pressure in the filter housing, opening the cap, pulling out the old filter, and replacing with a new filter.

Bag filters are disposable fabric filters that are placed inside a particular filter housing fitted to the type of bag. They look like a giant sock, and water passes from the inside of the bag to the outside.

Cartridge filters are another form of disposable filter and are perhaps the most widely available in hardware and box stores. Like bag filters, they are placed into a fitted housing, but they are made of a rigid, pleated material.

Bag and cartridge filters come in a wide variety of sizes and pore sizes. The size of the filter dictates what housing it can fit into and how much surface area it has. Filters should only be used in housings fitted to the size of the filters to ensure proper sealing and prevent untreated water from bypassing the filter.

These filters remove particles primarily through a sieving mechanism, similar to a pasta strainer. The smaller the holes, or pores, the smaller the particles the filter is capable of removing. Pore sizes are often reported in micrometers (µm), also referred to as microns. The micron rating can either be reported as an "absolute" rating, meaning that all pores in the filter are smaller than the reported value, or a "nominal" rating, meaning that a majority of the pores are equal in size or smaller than the reported value. Absolute-rated filters tend to be of higher quality and are more effective at filtering.

Filters used for the removal of pathogens must undergo a testing and laboratory certification process to verify their ability to remove pathogens. This process results in a removal credit being granted to the filter specific to each class of pathogen. There are relatively few products on the market that have undergone this certification process and are also sized appropriately for small public water systems. Contact MDH for information on products that have undergone the required certification process and are appropriate for small systems.

Operation and Maintenance of Bag and Cartridge Filters

Bag and cartridge filters are easy to operate and change, but they require diligent monitoring. As the filter ages, it will plug up, decreasing the flow of water through the filter. Eventually a filter will rupture, allowing the free passage of all particles into the water sent to consumers. Plugging

or rupture can lead to situations where the facility either runs out of water or is no longer meeting the required level of filtration to remove potentially dangerous microorganisms. To prevent these situations, the turbidity and the pressure into and out of each filter should be monitored regularly.

Turbidity is a measure of the particulate content in the water; lower turbidity indicates clearer water. Generally, a properly operating filter will have lower turbidity on the outlet side than the inlet. If the outlet turbidity is greater or equal to the inlet turbidity, it may indicate that the filter needs to be changed.

As bag and cartridge filters clog, it becomes harder to push water through them, resulting in a drop in pressure across the filter. A new filter may easily allow the passage of water with minimal difference between the inlet and outlet pressure. As the filter ages, the difference between the inlet and outlet pressure will grow larger until it is no longer allowing any water flow, or until the filter ruptures. The point at which this occurs will be different for every water system depending on the type of filter, the quality of the water, and the amount of water used. It is imperative that the operator become familiar with their own system in order to assess when filters need to be changed. It is recommended that the inlet and outlet pressures of bag and cartridge filters used for pathogen removal credit be monitored daily while the system is producing water, and that the pressures of any pre-filters be monitored weekly.

Minnesota Department of Health
Noncommunity Public Water Supply Unit
PO Box 64975
St. Paul, MN 55164-0975
651-201-4700
health.drinking water@state.mn.us
www.health.state.mn.us

02/12/24
To obtain this information in a different format, call: 651-201-4700.