

Fact Sheet

Issue: 2 Volume: 1 Year: 2015

Nominal vs. Absolute Filter Ratings of Small System Filters

Key Words: Nominal, Absolute, Filter Ratings, Particle Size, Pore Size, Depth, Graded Density Depth, Pleated

Introduction

Different filters have various filter rating claims, but it can sometimes be confusing to determine what the filter ratings mean. If a filter is 0.2 μm nominal and another filter is 0.2 μm absolute rating, are the filters rated the same? The process used to test nominal or absolute ratings are not standardized. Therefore, it is not always possible to compare filter ratings from different manufacturers. This fact sheet will identify the differences between nominal and absolute filter ratings, the suitability of each one and identify the different types of filters, such as depth filters and surface filters.

Absolute Rating

What is Absolute Rating?

Absolute ratings identify the actual largest pore size of the filter, in theory. Therefore, filters must have a definable pore, if they have an absolute rating. One way to measure the absolute rating is to determine the smallest particles that are completely retained (100%) by the filter.

For example, a filter could be tested and determined that the filter is 0.2 μm absolute rating. This means that the filter's largest pore size is 0.2 μm ¹.

The absolute rating may vary, depending on the test organism/particle and its concentration, detection method and the filter's operating pressure. Although filters have a particular pore size, contaminants are not uniform and may pass through the rated pore size.

Absolute Rating Example:

A ceramic filter has an absolute filtration rate of 0.9 microns.

This means that the filter's largest pore size is 0.9 microns. Therefore, pathogens that are larger than 0.9 microns will likely be completely retained by the filter.

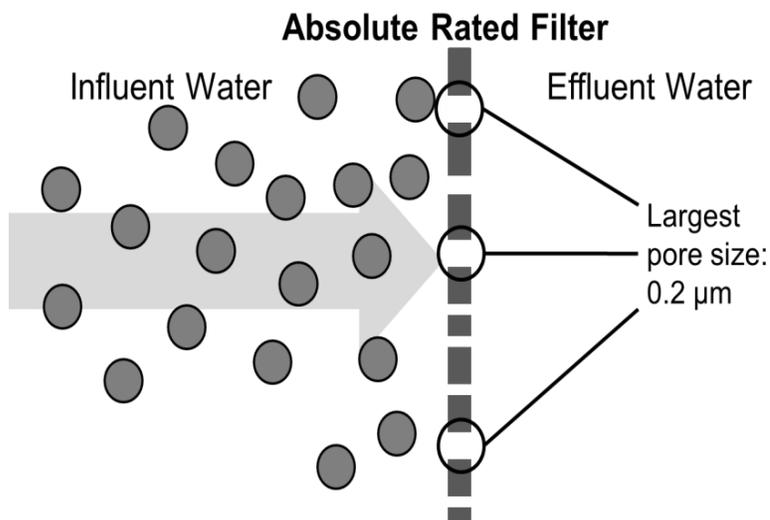


Figure 1. Schematic of Absolute Rated Filter

Nominal Rating

What is a Nominal Rating?

Nominal ratings identify the particle size that is retained by the filter at a particular filter efficiency. This could mean that the actual pores of the filters could be larger than the particle size that is being tested^{1, 2}.

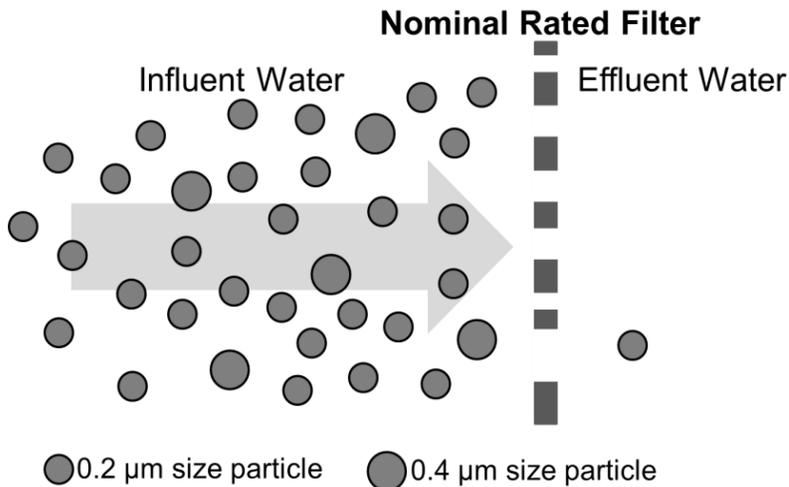


Figure 2. Schematic of Nominal Rated Filter

For example, a filter was able to remove 99.9% of test particles 0.2 µm particles or larger. Therefore, in a realistic setting, the filters can remove at least 99.9% of pathogens that are larger than 0.2 µm¹, assuming similar particle concentration and operating pressures.

The nominal rating is tested under specific operating pressures and particle concentrations, therefore the nominal rating may vary if these conditions change.

Nominal Rating Example:

A carbon filter has a nominal filtration rate of 0.5 microns and states 99.95% reduction of *Cryptosporidium* and *Giardia* cysts.

This means that the filter can remove at least 99.95% of 0.5 micron sized particles or larger.

What are the different types of filters?

Some filters have a thick filter material, in which particles are trapped within the filter material^{1,2}. These filters are called “Depth Filters” and particles typically get trapped within the filter material. Examples of depth filters are ceramic or fiber spun filters¹. Sometimes depth filters have decreasing pore sizes further inside the filter material, which allows for smaller sized particles to be trapped further inside the filter material². These filters are called “Graded Density Depth Filters”. Lastly some filters only trap particles on the surface of the filter material and are known as “Surface Filters”^{1, 2}. Examples of surface filters are pleated filters.

Reference

- 1 Brown, D. (2007) Some Important Words in Regards to Filter Ratings. Aquamarine Technologies, Inc.
- 2 Thusoo, V. (2002) Cartridge Filters & Ratings. Water Conditioning & Purification. 52-55.

For More Information

For further information and resources on drinking water research and water operator training programs, please visit our website: www.wcwc.ca

Walkerton Clean Water Centre
20 Ontario Road, P.O. Box 160
Walkerton, ON, N0G 2V0
519-881-2003 or toll-free 866-515-0550