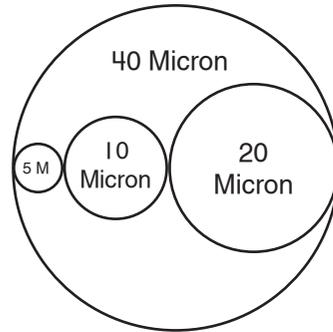
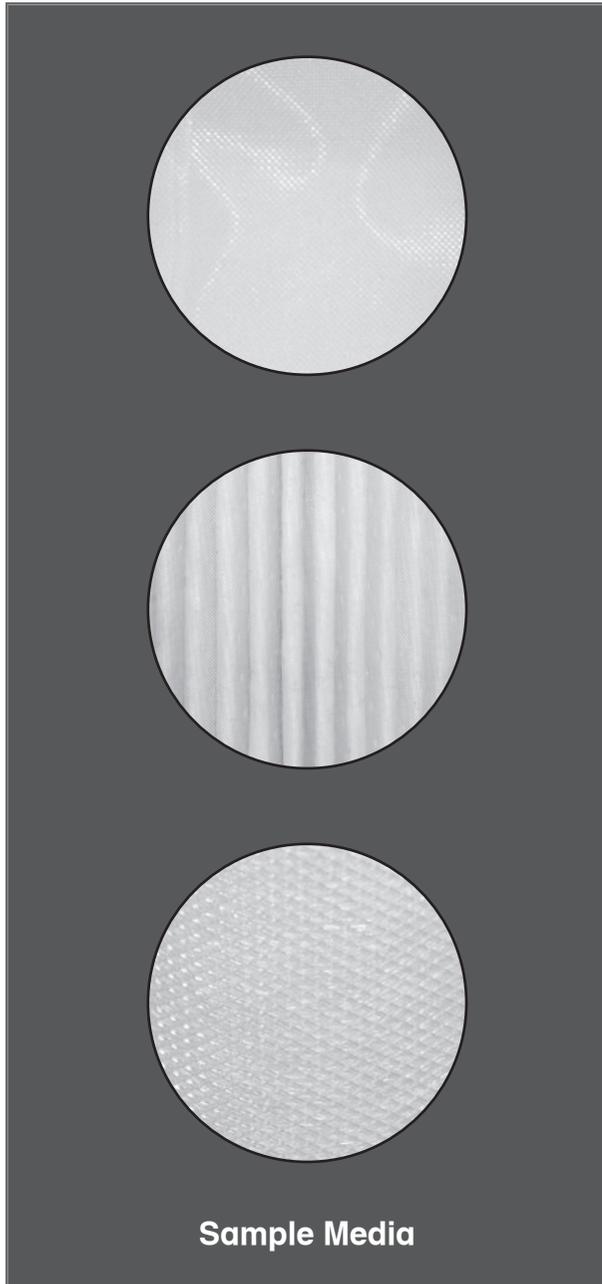


# Micron Rating

## The Micron Rating for Fluid Filters



### Relationship of Particle Sizes by Diameter

1 Micron = 1 Millionth of a Meter.

1 Micron = 1 Thousandth of a Millimeter.

1 Micron = 39 Millionth of an Inch (0.000039).

25.4 Micron = 1 Thousandth of an Inch (0.001).

40 Microns = Visible with Magnification.

40 to 90 Microns = Diameter of a Human Hair.

A micron rating for a fluid filter is a generalized way of indicating the ability of the filter to remove contaminants by the size of the particles. AIR FILTERS ARE NOT RATED BY MICRON SIZE. The micron rating does not properly or fully describe either the efficiency or the contaminant-holding capacity of the filter.

What does the word micron mean? It is a unit of linear measure in the metric system used to measure distance from one point to another. It is used like the inch, foot, centimeter and millimeter to measure the length, width, or diameter of objects.



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A filter that is marked “10 microns” has some capability in capturing particles as small as 10 microns. However, there is no one accepted method to measure and describe the size of particles that a filter can capture or the total amount of particles that the filter can hold. When you see the filter marked “10 microns”, you will not know exactly what this means unless you also have a description of the test and standards used to determine the filter rating.

Filter micron ratings are often based on one of these methods, but with many possible variations:

## A. Nominal Micron Rating (NMR)

NMR usually means the filter can capture a given percentage of particles of the stated size. For example, a filter might be said to have a nominal rating of 90% at 10 micron.

## B. Absolute Micron Rating (AMR)

AMR is a single pass test and is obtained by passing fluid containing glass beads through a flat sheet of filter material. Any beads that pass through are captured and measured.

## C. Multi-Pass Beta Rating (MPBR)

The MPBR has been accepted by many machinery manufacturers, as well as filter manufacturers (but not used in a public way by most of them to identify or specify their filters), especially for filters used in fluid power applications; hydraulics, controls, transmissions, power steering and so forth.

Single/Multi-Pass tests use contaminant specially graded by particle sizes added regularly in measured quantities to the fluid which is pumped continuously through the filter. Measured samples

of fluid are taken at timed intervals upstream and downstream of the filter. The contaminant in these samples is measured for particle sizes and the quantity of each size or ranges of sizes.

## Some suggestions:

1. Use filters of high quality.
2. Obtain filters by catalog listing, not just by “micron rating”. Other important qualities should also be considered.
3. Pay close attention to service intervals and good service practices for best economy of operation.

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## Filter Testing (from Racor brochure #7550).

The Diesel Fuel Filtration Industry has a guiding engineering society in every country that manufactures diesel engines or diesel fuel filters. In the United States, this is known as the SAE (Society of Automotive Engineers); in Europe, it is the ISO (International Standards Organization). Each society publishes test method procedures for: Filtration Efficiency, Filter Capacity or Life, Media Migration, and Water Separation.

The most recognized and utilized test methods are: SAE J905, SAE J1488, SAE J1839 (in North America), and ISO 4020 (in Europe and Asia). All of these test methods require complex and sophisticated test equipment and, therefore, are outside the scope of this publication.

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Most filter manufacturers follow these test methods, but several use test methods of their own design. The current SAE and ISO published test methods do not take the effects of engine vibration into consideration. They also measure capacity in grams of test dust collected instead of gallons of diesel fuel to determine filter life.

## Filtration Efficiency

Fuel filters are supplied for various applications and, therefore, there is a need for different levels of filtration efficiency in the removal or retention of particles. The hydraulic industry uses a rating method that uses the term "Beta Ratio" to describe a filtration efficiency level. The diesel fuel filtration industry generally uses simple filtration efficiency as the method of rating a fuel filter. Since there is no such thing as a fuel that provides absolute filtration of the particle sizes that are cause for concern, the industry uses terms like 96% at 5 microns. This term means, that when tested to SAE or ISO test methods the filter will retain 96% of all 5 micron size and larger particles.

Racor makes filters with various filtration efficiencies, but its standards for non-OEM (Original Equipment Manufacturer) are 2, 10, and 30 micron filter elements. The actual efficiency ratings for these are 98%, 95%, and 90% respectively. Racor also makes use of a 7 and 20 micron filter medium which are used to meet certain engine manufacturer's requirements for a final filter and a primary filter.

Racor's 2 micron filter medium should only be used in final or secondary filters where the fuel is first filtered by a primary filter. The primary filter for a 2 micron final filter should use a 10 micron medium. The exception in using a 2 micron filter in place of a primary filter is to obtain high-efficiency water separation, and is usually used in marine applications where the fuel supply may be cleaner but also may contain water more often. If the installation can allow the use of a filter large enough, then a 2 micron filter can serve in a system as the only filter in that system.

New high pressure common rail fuel injection systems require high efficiency in removal of small particles. The requirement is 95% for 3 micron particles. Racor fuel filters have a medium designed for these applications. Replacement elements should state, "For Use With Common Rail Fuel Injection Systems." Dirt levels in fuel also direct the level of efficiency required. Since the filters removes a percentage of dirt particles, it follows that when a much greater amount of dirt is present in the fuel, a greater number of particles will pass through the filter. Diesel engines used in earth moving or agriculture should use fuel filters that have higher efficiency than those for over-the-road or marine.

The planning must also take into consideration whether the filter is to be installed on the engine or the chassis and whether on the vacuum or pressure side of the system. Filter installations on the engine make the filter subject to high frequency vibrations which reduces the efficiency level, (as do spill port metering injection pumps).

**See Racor brochure #7550 for additional information.**