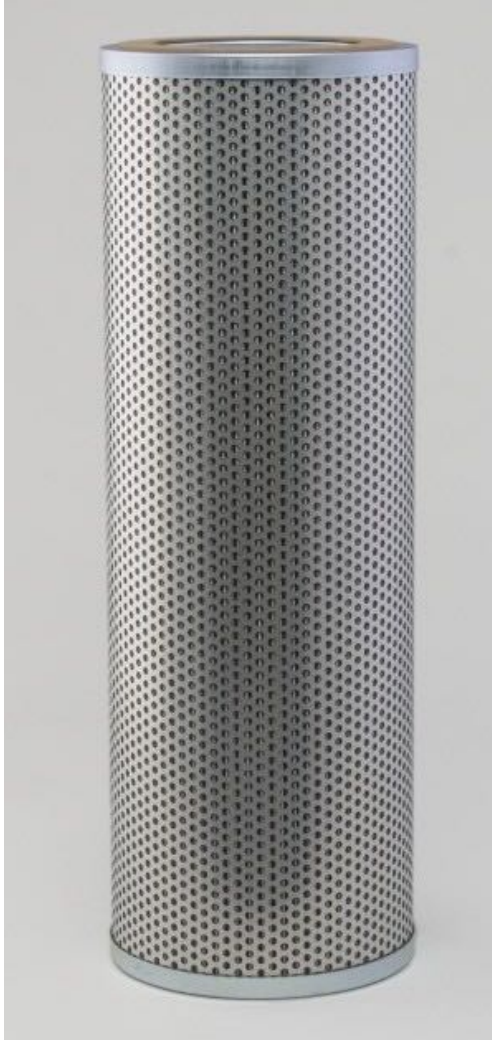


23µm BULK ASSEMBLY ELEMENT



Smart Filtration Solutions's 23µm Bulk Assembly Element fits Smart Filtration Pre-Filter Particulate Bulk Assembly.

Donaldson Synteq ® Synthetic Filter Media

Media Efficiency per ISO16889

$\beta_{23\mu m(c)} = 1000 / 99.90\%$ Efficiency

Donaldson-developed Synteq ® synthetic filter media has smooth, rounded fibers for low resistance to fluid flow. Synteq ® media is ideal for filtering synthetic fluids, water glycols, water/oil emulsions, HWCF and petroleum-based fluids.

| | |
|-----------------------------------|-------------------------------------|
| Max Flow Range: | 317 US GPM / 1200 LPM (Diesel Fuel) |
| Operating Temperature: | 40°F to 190°F / -40°C to 88°C |
| Outer Diameter: | 188.98 mm (7.44 inch) |
| Inner Diameter: | 123.44 mm (4.86 inch) |
| Length: | 558.8 mm (22.00 inch) |
| Manufacturer: | Donaldson Company, Inc. |
| Country of Origin: | Canada |
| Gross Weight in Kilograms: | 4.65 |

ISO=International Standards Organisation

NFPA = National Fluid Power Association



Understanding Liquid Filter Efficiency

This information is provided as an aid to understanding filter efficiency terminology based on current ISO, ANSI and NFPA test standards.

What Is a Beta Ratio?

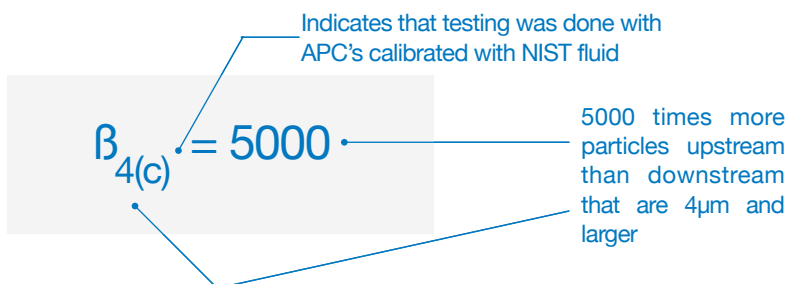
Beta ratio (symbolized by β) is a formula used to calculate the filtration efficiency of a particular fluid filter using base data obtained from multi-pass testing.

In a multi-pass test, fluid is continuously injected with a uniform amount of contaminant (i.e., ISO medium test dust) then pumped through the filter unit being tested. Filter efficiency is determined by monitoring fluid contamination levels upstream and downstream of the test filter at specific times. An automatic particle counter is used to determine the contamination level. Through this process an upstream to downstream particle count ratio is developed, known as the beta ratio.

The formula used to calculate the beta ratio is:

$$\text{Beta ratio}_{(x)} = \frac{\text{particle count in upstream fluid}}{\text{particle count in downstream fluid}}$$

where (x) is a given particle size



What is Efficiency?

The beta ratio is commonly used to calculate the filtration efficiency of a filter and can be converted into a percentage of efficiency at a given particle size.

The formula used to calculate efficiency is:

$$\text{Efficiency}_{(x)} = \frac{\beta - 1}{\beta}$$

where (x) is a given particle size

$$\beta_{4(c)} = 5000 \text{ is same as } 99.98\% \text{ @ } 4\mu\text{m}$$

$\beta 5000$ is 99.98% for particles $4\mu\text{m}$ and greater

How Big is a Micron?

Compare a micron size to these familiar particles.

| | |
|---------------------------|-------------------|
| Grain of table salt | 100 μm |
| Human hair | 80 μm |
| Lower limit of visibility | 40 μm |
| White blood cell | 25 μm |
| Talcum powder | 10 μm |
| Red blood cell | 8 μm |
| Bacteria | 2 μm |
| Silt | <5 μm |

| Beta Ratio (at given particle size) | Efficiency (at the same particle size) |
|--|---|
| 1.01 | 1.00% |
| 1.1 | 9.10% |
| 1.5 | 33.30% |
| 2 (Nominal) | 50.00% |
| 5 | 80.00% |
| 10 | 90.00% |
| 20 | 95.00% |
| 75 (Absolute) | 98.70% |
| 100 | 99.00% |
| 200 | 99.50% |
| 1000 | 99.90% |
| 2000 | 99.95% |
| 5000 | 99.98% |

- Without Beta Ratio / Efficiency information, Micron rating alone is meaningless.
- Focus must be on Beta Ratio, rather than just Efficiency %, as we can see above, 98.70% & 99.98% might not sound too big of a difference but in Filtration World, that's a huge difference.