



Understanding Beta Ratios

Courtesy of Baldwin Filters

Oil, fuel and hydraulic filters are designed to meet strict performance requirements to protect the engine, fuel or hydraulic system that they are used on. System components simply last longer if the correct filter is used to remove harmful contaminants from that system.

Beta ratio testing is an accurate and objective way to compare performance of liquid filters. This test measures the filter's ability to remove particles of given sizes from the fluid stream, thus identifying how efficient the filter is at removing specific sizes of contaminant particles. This testing is performed to an industry standard procedure.

The beta ratio is established by counting the number of particles of a specific size entering the filter, then dividing that by the number of the same size particle exiting the filter.

$$\beta = \frac{\text{Particles Upstream}}{\text{Particles Downstream}} = \frac{20,000 \text{ Particles}}{1,000 \text{ Particles}} = 20$$

The beta ratio of this filter is 20.

Use the following formula to convert the beta ratio to an efficiency.

$$\left(\frac{\beta - 1}{\beta} \right) \times 100 = \text{Efficiency}$$

The above filter beta ratio can be shown as $\beta_x = 20$ where "x" is the particle size in microns, or, it can be said that this filter is 95% efficient at removing "x" size particles.

To the right is a chart that includes common beta ratios and the efficiency % for each.

Beta Ratio (x = particle size in micron)	Efficiency
$\beta_x = 2$	50.0%
$\beta_x = 10$	90.0%
$\beta_x = 20$	95.0%
$\beta_x = 75$	98.7%
$\beta_x = 200$	99.5%
$\beta_x = 1000$	99.9%