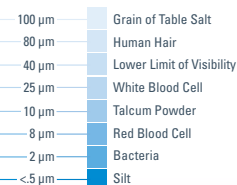


UNDERSTANDING BETA RATINGS OF LIQUID FILTERS

SIZES OF FAMILIAR PARTICLES IN MICRONS



Modern engines are developing at an unprecedented rate and frequently require highly efficient filtration. Liquid filters are engineered to meet the specific requirements of the equipment manufacturers and as such are required to have exacting efficiency ratings.

We all talk in micron sizing (1 micron = 1 millionth of a metre) but we need to understand that micron sizing is of little importance without some measure of the media's efficiency on a given particles size. It could be said that a roll of toilet paper may stop 10 micron particles, but at what efficiency or what percentage of 10 micron particles would that roll of paper stop?

To remove confusion manufacturers should always describe the performance of the media used inside an element by its 'Beta ratio'.

ISO 16889 (International Standard) lists eight common Beta ratios used to report filter efficiency, these are Beta 2, 10, 20, 75, 100, 200, 1000 & 2000. So what does each one mean and why have so many?

The ISO test method involves using particle counters and test fluid that has contaminants added to it.

Contaminants of a given known particle size are counted both before and after the filter.

When someone asks you for a 5 micron filter you should always ask them "At what Beta ratio?"

Clearly a media with a ratio of $\beta 1000$ is far more efficient than one with a rating of $\beta 2$ on that given particle size.

Your shirt sleeve may well have a Beta ratio higher than $\beta 2000$ on particles the size of marbles. The same sleeve may have a Beta ratio of less than $\beta 2$ on particles the size of talcum powder. Beta ratings can be used to explain the efficiency of filtration for all fluids, oil, diesel, petrol etc; it's simply a measurement.

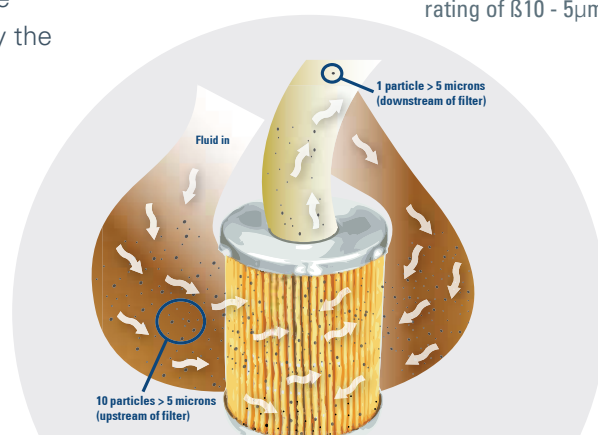
It is important that both the micron sizing and Beta ratio is matched to the application. Tighter and more efficient media than specified by the

manufacturer can result in shortened element life and greater pressure increases. In some extreme cases of mis-application this can even result in the unintentional removal of additives from oils. Less efficient media will generally result in a longer element life, but does so by allowing a higher percentage of contaminant to pass straight through the filter. This may result in a dramatic shortening of component life.

At Donaldson we have thousands of different oil, fuel and hydraulic filters engineered to the specific requirements of your equipment manufacturer. Please consult your Donaldson representative for specialist advice.

DID YOU KNOW

Based on the image shown below, the filter has only allowed 1 particle out of every 10 greater than 5 micron to pass through. So this filter will have a rating of $\beta 10 - 5\mu m$



Beta Ratio (β)	How Many Particles of a Given Size Will Pass Through the Filter?	Actual Filter Efficiency
2	1 out of every 2 particles	50%
10	1 out of every 10 particles	90%
20	1 out of every 20 particles	95%
75	1 out of every 75 particles	98.7%
100	1 out of every 100 particles	99%
200	1 out of every 200 particles	99.5%
1000	1 out of every 1000 particles	99.9%
2000	1 out of every 2000 particles	99.95%

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