



Filter Knowledge, Unfiltered

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ISO Updates to Multi-pass Oil Filter Test Procedures

The ISO (International Organization for Standardization) standard for multi-pass testing provides a common testing format for filter manufacturers to rate liquid filter performance. This standardization gives you the ability to reliably compare published filter (β) beta ratios among different brands of filters, rather than relying on micron ratings. ISO test standard 4572 was replaced in 1999 by ISO 16889, which reflects the improved technology available in particle counters and other test equipment. The newer particle counters provide more precise counting and greater detail -- reflecting a truer indication of filter performance. ISO only issues test procedures to standardize filter testing, which allows the results to be comparable. ISO does not actually perform any commercial product testing, nor do they specify filter performance requirements.

Better Test Dust: The old test dust (AC fine test dust or ACFTD) was "ball milled," which produced dust particles of varying size and shape. Particle distribution was often different from batch to batch. The accuracy of ACFTD distribution and previous automatic particle counting calibration procedures was questioned by the industry, due to lack of traceability and certification. ACFTD has not been produced since 1992. Now, the new test dust (ISO medium test dust) is "jet milled" to produce consistent particle size, shape, and distribution from batch to batch (see dust size comparison chart below). The old particle counter calibration was based on only one dimension of an irregularly-shaped particle (the longest cord). Today, the particle counter calibration is based on equivalent spherical area of an irregularly-shaped particle.

National Institute of Standards and Technology (NIST) provides calibration suspension, which is certified with X number of particles at a certain size. This is verified by NIST. The new way to list (β) beta ratios includes a subscript (c) to indicate NIST certified test suspension and assures you of traceability and repeatability. Overall, you can have strong confidence in liquid filter ratings resulting from tests per ISO 16889, as they are highly accurate. As always, keep in mind that beta ratings are laboratory measurements under steady flow conditions with artificial contaminants - the real proof of the performance is how clean the filter keeps the fluids in the application. The consistent use of a fluid analysis program that checks the cleanliness of the fluid will verify that proper filters are being used.

Test Dust Size Comparisons

ACFTD calibrated size (μm) per ISO 4402 corresponds to a NIST-calibrated size [$\mu\text{m}_{(c)}$] per ISO 11171

ACFTD	0.8	1	2	2.7	3	4.3	5	7	10	12	15	15.5	20	25	30	40
NIST	4	4.2	4.6	5	5.1	6	6.4	7.7	9.8	11.3	13.6	14	17.5	21.2	24.9	31.7

ISO 16889 recommends reporting beta ratings at:

Rating Efficiency

2	.....	50%
10	.....	90%
75	.....	98.67%
100	.....	99%
200	.....	99.5%
1000	.....	99.99%

Example: $\beta_4(c) = 200$ signifies that there are 200 times as many particles that are $4\mu\text{m}$ and larger upstream as downstream. This is 99.5% efficiency.

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