

Oil Transfer Systems



ISO Standard for Particle Counting in Oil (Used by all oil analysis labs)		
Number of Particles per ml		
More than	Less than	ISO Code
80,000	160,000	24
40,000	80,000	23
20,000	40,000	22
10,000	20,000	21
5,000	10,000	20
2,500	5,000	19
1,300	2,500	18
640	1,300	17
320	640	16
160	320	15
80	160	14
40	80	13
20	40	12
10	20	11
5	10	10
2.5	5	9
1.25	2.5	8

With today's high particle counts (mostly silica sand) in new and used oils, and with servo valves and equipments super tight tolerances, lab testing and oil scrubbing is a must. Lab testing is done with a one milliliter sample of oil (two tenths of a teaspoon), one of the results of the lab testing is known as an ISO code. The ISO code is the overall cleanliness of the oil.

Caterpillar's oil analysis labs use a two number method to report the ISO, ex. - ISO 21/18. The first number refers to the number of particles 5 micron and larger in the sample of oil, while the second number refers to the number of particles 15 micron and larger. (See ISO Standard for Particle Counting Chart). Because it is necessary, Caterpillar cleans all new crankcase and hydraulic oil before in-house use at the factory and dealer level. Cat has a goal of 16/13 for new oils and 18/15 or cleaner for used hydraulic oil.

Each time the ISO code number improves by one number, the oil is twice as clean. So, for an example if the oil starts with an ISO 21/18 and is scrubbed to a ISO 18/15, the first number dropped three numbers and the oil is now six times cleaner. According to the support letter we received from the Caterpillar lab, you could improve engine and hydraulic life a minimum of 2 times and a maximum of 7 times for each drop in the ISO code number. This unbelievable equipment life increase is also stated by the SKF Bearing manufacturer service bulletin stating that if you keep your dirt particle size smaller than the oil film the bearing rides on, you can "achieve infinite life" on a bearing. Super clean all new oils and nearly stop wear on your engines. Super clean used hydraulic fluid (recycle) and continue to use 20,000+ hours with no ill effects (test to verify the quality), nearly stop wear on the hydraulic system and save thousands on the cost of the hydraulic fluid.

Another necessary point to know about the oil analysis test is the 5 micron box, this is the exact number of particles 5 micron and larger in a particular sample.

Particle Count (per 1ml)								ISO
>4μ	>6μ	>14μ	>20μ	>25μ	>50μ	>75μ	>100μ	ISO Code
14,369	2,260	503	134	53	9	2	1	21/18
2,495	274	136	76	49	15	2	1	18/15

11,874 reduction in particles per 1 milliliter by scrubbing the oil.

In the first sample the 4 micron (μ) count was 14,369 particles and in the second sample the 4 micron count was 2,495. By scrubbing the used hydraulic oil, 11,874 particles (4 micron and larger) were removed from 1 milliliter of oil (two tenths of a teaspoon). Or another way to look at this result, there is 3,785 milliliters in a gallon, so for each gallon of oil you have removed 44,943,090 particles or 2,471,869,950 per 55 gallon drum!