

In 1999 the "old" ISO 4406 was revised and the size ranges of the particle sizes undergoing analysis redefined. The counting method and calibration were also changed.

This is important for the user in his everyday work: Even though the measurement references of the particles undergoing analysis have changed, the cleanliness code will not change. When drafting the "new" ISO 4406 it was ensured that not all the existing cleanliness provisions for systems had to be changed.

- 1,300 - 2,500 particles > 4 μm<sub>(c)</sub>
- 160 - 320 particles > 6 μm<sub>(c)</sub>
- 10 - 20 particles > 14 μm<sub>(c)</sub>

Figure 10. Schroeder Patch Test Kit



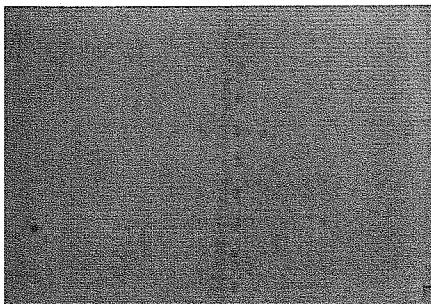
ISO 4406:  
1999  
continued

	"old" ISO 4406:1987	"new" ISO 4406:1999	
Size Ranges	> 5 μm > 15 μm		> 4 μm <sub>(c)</sub> > 6 μm <sub>(c)</sub> > 14 μm <sub>(c)</sub>
Dimension Determined	Longest dimension of a particle		Diameter of the area-equivalent circle
Test Dust	ACFTD dust	1-10 μm Ultrafine fraction	ISO 11171:1999
		SAE Fine, AC Fine	ISO 12103-1A1
		SAE 5-80 μm ISO MTD Calibration dust for particle counters	ISO 12103-1A2 ISO 12103-1A3
		SAE Coarse Coarse fraction	ISO 12103-1A4
Comparable Size Ranges	Old ACFTD Calibration	Comparable ACFTD dusts	New NIST calibration
		< 1 μm 4.3 μm 15.5 μm	4 μm <sub>(c)</sub> 6 μm <sub>(c)</sub> 14 μm <sub>(c)</sub>

Overview of the Changes

*ISO 4406 HRS*  
 13/9 27000  
 14/11 9000  
 15/12 3000

Figure 11. Microscopic Examination of an Oil Sample (100 ml) Magnification 100x (ISO 18/15/11)



If the number of particles counted in the sample is larger than 20, the result has to be reported with ≥.

Note: increasing the measurement reference by 1 causes the particle count to double.

Example: ISO class 18 / 15 / 11 says that the following are found in 1 ml of analyzed sample:

- 1,300 - 2,500 particles > 4 μm<sub>(c)</sub>
- 160 - 320 particles > 6 μm<sub>(c)</sub>
- 10 - 20 particles > 14 μm<sub>(c)</sub>

*320 - 640 > 4 μm*  
*80 - 160 > 6 μm*  
*10 - 20 > 14 μm*

Allocation of Particle Counts to Cleanliness Classes

No. of Particles/ml		Cleanliness Class
Over	Up to	
2,500,000		> 28
1,300,000	2,500,000	> 28
640,000	1,300,000	> 27
320,000	640,000	> 26
160,000	320,000	> 25
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
1.3	2.5	> 8

*MODE VALUES REQUIRE 16/14/11 OR BETTER*