



## ISO 4406:1999 Codes – A three digit code indicating number of particles per milliliter greater than 4, 6, and 14 microns

Specifying proper filtration has become more difficult since the days of “nominal” rated filters. Rather than guessing on nominal, absolute, or Beta ratings, it makes more sense instead to specify how clean you want the oil to be and let the filter manufacturer provide the proper cartridge to attain that cleanliness. The International Standards Organization has developed a method of describing fluid cleanliness called ISO 4406 Solid Contamination Level Code, commonly referred to as the ISO Cleanliness Code. This method is based on particle counting and is expressed by a set of 3 code numbers, each ranging from 1 to 28. Each code number represents particle counts from .01 particles per milliliter of fluid to 2,500,000 particles per milliliter. The three code numbers are separated by a slash and are written as shown in the following example:

14 / 11 / 8. The first code number represents the particle count range of all particles greater than 4 microns in size, the second number represents the count range of particles greater than 6 microns, and the third number represents that of all particles greater than 14 microns. Table 1 shows the ISO 4406 code levels.

Prior to 1999, ISO Codes were expressed as only two numbers, such as “14 / 11”, which represented the number of particles greater than 5 microns and greater than 15 microns. Due to differences in test methods and test contaminants, the 6 and 14 micron sizes of the new revision correspond to the 5 and 15 micron sizes of the original standard.

Hydraulic equipment manufacturers can provide the level of fluid cleanliness required for proper operation of their equipment. More and more, diesel engine manufacturers are beginning to specify the level of fuel cleanliness required for modern diesel engines. Table 2 shows typical fluid cleanliness levels recommended for different types of applications.

Once the application conditions such as oil type, flow rate, operating temperature, reservoir size, etc. are provided, the proper filter housing and cartridge can be selected to meet a desired fluid cleanliness requirement.

ISO 4406 CODE LEVELS		
ISO Code	Number of Particles per ML	
	Minimum (included)	Maximum (excluded)
28	1300000	2500000
27	640000	1300000
26	320000	640000
25	160000	320000
24	80000	160000
23	40000	80000
22	20000	40000
21	10000	20000
20	5000	10000
19	2500	5000
18	1300	2500
17	640	1300
16	320	640
15	160	320
14	80	160
13	40	80
12	20	40
11	10	20
10	5.0	10
9	2.5	5
8	1.3	2.5
7	0.64	1.3
6	0.32	0.64
5	0.16	0.32
4	0.08	0.16
3	0.04	0.08
2	0.02	0.04
1	0.01	0.02

Table 1

Application	Operating Pressure Target Code		
	< 1,500 psi	1,500- 2,500 psi	> 2,500 psi
Servo Valve	16/14/12	15/13/11	14/12/10
Proportional Valve	17/15/12	16/14/12	15/13/11
Variable Volume Pump	17/16/13	17/15/12	16/14/13
Cartridge Valve	18/16/14	17/16/13	17/15/12
Fixed Piston Pump	18/16/14	17/16/13	17/15/12
Vane Pump	19/17/17	18/16/14	17/16/13
Pressure/ Flow Control Valve	19/17/14	18/16/14	17/16/13
Solenoid Valve	19/17/14	18/16/14	18/16/14
Gear Pump	19/17/14	18/16/14	18/16/14


**Table 2: Typical Cleanliness Recommendations**  
Reference: Fundamentals of Machinery Lubrication  
Training Course Manual, Noria Corporation

**EXAMPLE**

Particle Size (µm)	Fluid Tested per mL	ISO Code
>4	12545	21
>6	2750	19
>14	524	16

Reported out as ISO code 21/19/16

22	20000	40000
21	10000	20000
20	5000	10000
19	2500	5000
18	1300	2500
17	640	1300
16	320	640
15	160	320



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