# Technical Bulletin

## Oil Pollution Level and Measurements

### What is the oil pollution?

Oil pollution can be stucked gaseous in oil by bubbling or water mixed into oil as well as solid materails. Oil pollution may cause;

- Changing of viscosity, degredation of chemical structure and relatively decrease of oil lifetime,
- Damage of production equipments, corrosion presence, wearing and relatively decrease of oil lifetime.

### Pollutant Measurements of Oil

Optical particle counting devices are used to measure the level of contamination in oils. Generally, measurements are made according to two methods, ISO 4406 and NAS 1638.

**NAS 1638 Standards:** According to the number of particles larger than 5-15 µm, 15-25 µm, 25–50 µm, 50-100 µm and 100 µm in 100 ml oil, 14 scale classes between 00 and 12 were created. According to this scale, 00 is classified as very clean and 12 is classified as very dirty.For example, NAS 7 pollution level in 100 ml oil means;

- Between 5-15 µm, 16.001 to 32.000 particules
- Between 15-25 µm, 2.851 to 5700 particules
- Between 25-50 µm, 507 to 1.012 particules
- Between 50-100 µm, 91 ile 181 particules
- Bigger than 100 µm, 17 to 32 particules are exist.

**ISO 4406 Standards:** A scale of 4µm, 6µm and 14µm particles in 100 ml oil was created according to the number of particles.
For example, ISO 22/18/13 impurity level in 100 ml oil means;

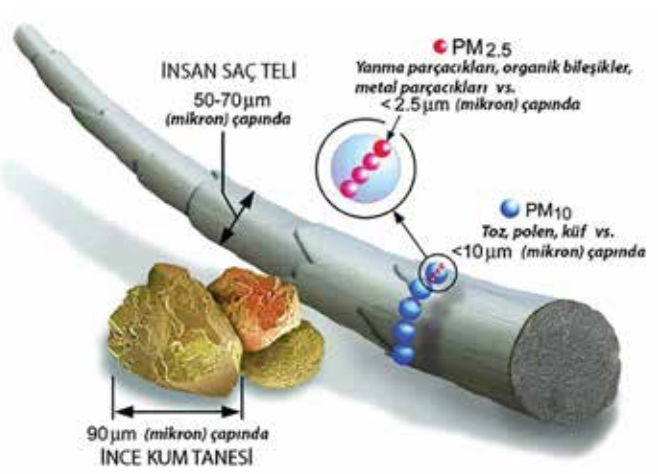
- Bigger than 4 µm, between 2.000.000 to 4.000.000 particules
- Bigger than 6 µm, between 130.000 to 250.000 particules
- Bigger than 14 µm, between 4.000 to 8.000 particules are

**ISO 4406 Kodları**

| Skala | 100 ml. numunedeki partikül miktarları | |
|---|---|---|
| 24 | 8,000,000 | 16,000,000 |
| 23 | 4,000,000 | 8,000,000 |
| 22 | 2,000,000 | 4,000,000 |
| 21 | 1,000,000 | 2,000,000 |
| 20 | 500,000 | 1,000,000 |
| 19 | 250,000 | 500,000 |
| 18 | 130,000 | 250,000 |
| 17 | 64,000 | 130,000 |
| 16 | 32,000 | 64,000 |
| 15 | 16,000 | 32,000 |
| 14 | 8,000 | 16,000 |
| 13 | 4,000 | 8,000 |
| 12 | 2,000 | 4,000 |
| 11 | 1,000 | 2,000 |
| 10 | 500 | 1,000 |
| 9 | 250 | 500 |
| 8 | 130 | 250 |
| 7 | 64 | 130 |
| 6 | 32 | 64 |

### Pollutants

Oil pollutants' particul sizes can be change between 0,5 µm and 100 µm.
For example; thin sand piece's diameter is 90 µm, hair is 50-70 µm,dust is 10 µm, burned pieces 2,5 µm.




| NAS classes (based on maximum contaminstion limits, particles per 100ml) | Size Range 5-15 µm | 15-25 | 25-50 | 50-100 | >100 µm |
|---|---|---|---|---|---|
| 00 | 125 | 22 | 4 | 1 | 0 |
| 0 | 250 | 44 | 8 | 2 | 0 |
| 1 | 500 | 89 | 16 | 3 | 1 |
| 2 | 1000 | 178 | 32 | 6 | 1 |
| 3 | 2000 | 356 | 63 | 11 | 2 |
| 4 | 4000 | 712 | 126 | 22 | 4 |
| 5 | 8000 | 1425 | 253 | 45 | 8 |
| 6 | 16000 | 2850 | 506 | 90 | 16 |
| 7 | 32000 | 5700 | 1012 | 180 | 32 |
| 8 | 64000 | 11400 | 2025 | 360 | 64 |
| 9 | 128000 | 22800 | 4050 | 720 | 128 |
| 10 | 256000 | 45600 | 8100 | 1440 | 256 |
| 11 | 512000 | 91000 | 16200 | 2880 | 512 |
| 12 | 1024000 | 182400 | 32400 | 5760 | 1024 |

Partikül Kirlilik Tayini için Mikroskop Seti

Optik Partikül Sayım Cihazı

**Important note:**

1. In the process from production to equipment; The level of contamination of the oils may increase during the filling, storage and transportation stages. For this reason, the most economical and reliable way to ensure the level of pollution required by the equipment manufacturer is to filter the product just before it is transferred to the equipment tank.
2. Difficulty in engine oil measurements. Because Optical Particle Counters do not distinguish some additives and pollutants from each other. In such cases, it is recommended to measure the pollution with a microscope according to DIN 51455 Standard.

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