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OIL TREATMENT: Prevention is better than cure!

The daily handling with the oil treatment has confronted us frequently with problems which are no real problems in truth. For this reason we would like to give the user some practical hints concerning the oil treatment.

The comparison "fine, finer, finest" is often misunderstood just as to high β-rates or unnecessary high differential pressures.
This is the same as it is with your car. You need no formula one motor for your car to drive fast, safe and economical.

It is the same with the oil treatment!

Operating a motor-, turbine- or other oil treatment you have to know the following terms, like:

- what is filter fineness
- why filtering at all?
- what is oil pollution?
- which types of oil pollution are existing?
- which remedies lead to success?
- which types of filter or possibilities of filtration are existing?

In order to simplify the understanding between the theory and the practical application in the oil treatment we drew up a list about the connection (partly extracts out of the standard) between the pollution classes (NAS and ISO) and the oil-treatment that has to be carried out.

Beforehand it is important to mention:

Take care of your oil filling!

Through this the plant will have an increased operating time.
Do not wait until the plant stops only because there was no time to carry out the oil treatment in time. Possibly this could be very expensive. It is the same with your health:

Prevention is better than cure!

The first example should explain what is meant with the definition pollution classes. The pollution of the oil with solids is measured according to the pollution classes NAS 1638 or ISO 4406.

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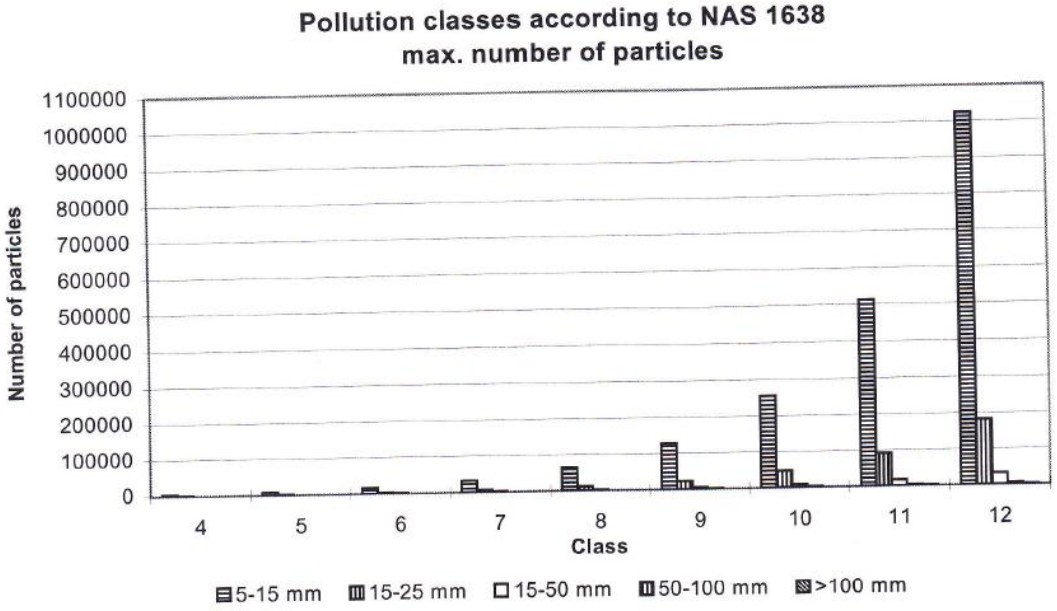
Pollution classes according to NAS 1638

Maximum number of particles in 100 ml oil treatment liquid
at particle size:

class	5-15 µm	15-25 µm	15-50 µm	50-100 µm	>100 µm
00	125	22	4	1	0
0	250	44	8	2	0
1	500	89	16	3	1
2	1000	179	32	6	1
3	2000	356	64	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	91200	16200	2880	512
12	1024000	182400	32400	5760	1024

In the first column are the separated classes. In the following columns the maximum number of solid particles, referred to 100 ml oil each time limited to a certain particle size (e.g. 5-15µm) is listed.

In order to illustrate the number of particles of the different classes, it is possible to show the table in the following diagram:



Looking at the diagram it is noticeable that with the advancing class the number of small particles (e.g.: 5-15 µm) increases rapidly. At the NAS class 12 it is clear to see that the amount of the other particles (15-25 µm, 25-50 µm, 50-100 µm and >100 µm) is relatively small. Looking at the single classes it means that in practice the sizes from 25 µm up can be ignored.

This is the same when looking at the pollution classes according to ISO 4406.

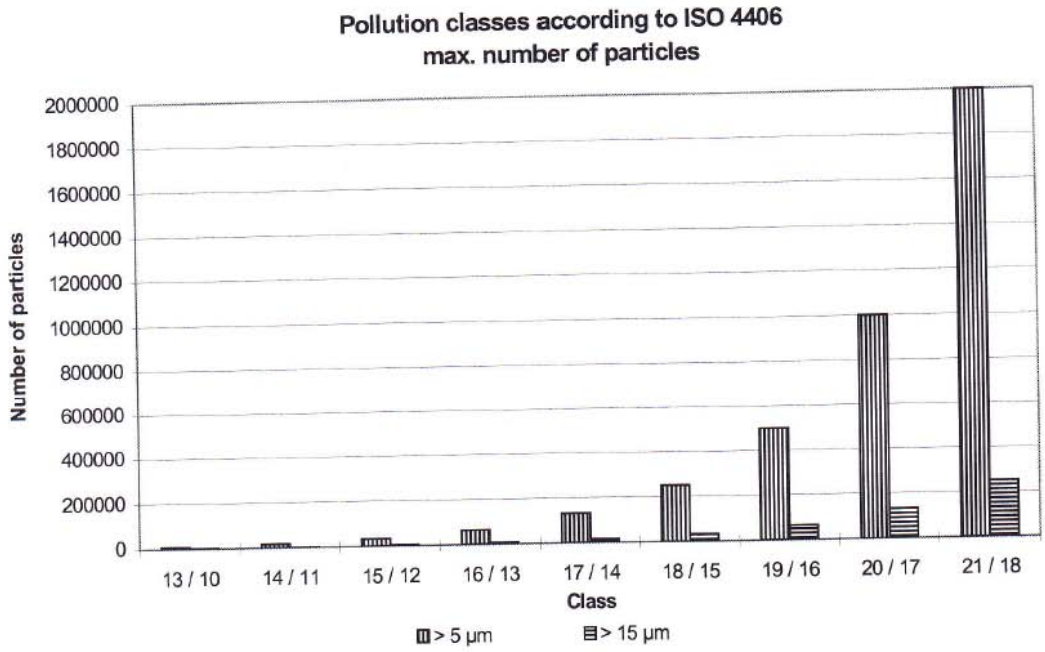
Pollution classes according to ISO 4406

Maximum number of particles in 100 ml at a particle size of:

class	> 5 µm	> 15 µm
13/10	8000	1000
14/11	16000	2000
15/12	32000	4000
16/13	64000	8000
17/14	130000	16000
18/15	250000	32000
19/16	500000	64000
20/17	1000000	130000
21/18	2000000	250000

In this table the pollution particles > 5 µm and > 15 µm are listed. The first column shows us the class (like it is at NAS) with the small difference, the first number is the class for all particles > 5 µm, the second number is the class for all particles > 15 µm.

For this a diagram similar to the NAS one:



Note:

The essential difference between these two standards NAS and ISO is that the NAS standard includes five particle sizes and the ISO standard only two (what is totally sufficient in practice).

It is left to each user which standard he prefers.

Table for the determination of the filter fineness and the filter efficiency (guiding values)

Permissible pollution class according to NAS 1638 and ISO 4406 5-15 µm	15-25 µm	group	Suggested filter fineness x in µm with β_x >= 100	Type of greasing-hydraulic system	Typical application
4 a. 5	3 a. 4 (13 / 9)	I	3 µm	Against fine pollution; for highly sensitive systems with a very high reliability	Aero-technology; Laboratory
6 a. 7	5 a. 6	II	3 - 5 µm	Against fine pollution; sensitive high capacity control and storage systems	Aero-technology; industrial robots; machines for tools; turbines, high speed motors; general: servo-systems
8 a. 9	7 a. 8 (17 / 13)	III	5 - 10 µm	High quality industrial hydraulic systems; machines, motors and turbines with a planned operating life and reliability	Hydraulics in the engineering industry; oil treatment for the construction of motors and turbines
9 a. 10	7 a.9 (18 / 14)	IV	10 - 20 µm	General hydraulics of medium scales	mobile hydraulics; units with continuous distribution valve steering
10 a. 11	9 a. 10 (19 / 15)	V	15 - 25 µm	Systems of bigger scales that operate mainly in the low-pressure range; design for a limited operating life	heavy machine hydraulics
12	11 a. 12 (20 / 17)	VI	20 - 40 µm	low-pressure systems in big scales only with a few requirements for the protection of abrasion. Partly water hydraulic systems in the high-pressure range with a high level of pollution with coarse-grained particles as well.	Other filtration to extend the operating life of microfilter; mining and special hydraulics

The table gives a survey for the practice depending on the existing plant.

It shows the allowed pollution and the suggested filter fineness.

With the help of these details it is now possible to fix the guiding values for the practice. These values should be exactly defined and controlled from time to time. Then the plant will run without any troubles and will have an extended operating life.

I. In order to give a statement about the type of oil pollution with solids (e.g. metal, plastic fiber, quartz) we recommend the advice and the examination of your oil supplier or an analysis by our company.

II. For a very clean, safe and easy determination of the purity class, the monitoring of the level of oil pollution in the plant (e.g. the increase of the oil pollution by a risen abrasion) and gathering the measured data or the administration of these data with a PC it is recommended to use our oil treatment service team.

III. When the oil pollution increases or for a new filling the filtration unit of the class OTS is suitable for the use in a by-pass circuit very well.

If you have any further questions or if you are interested in more detailed information please don't hesitate to contact us.

Eberhard Runge

ER – Consulting

info@erunge-consulting.de