

Tips & Tabs is a free news letter for Private circulation to all our esteemed customers and friends in the industries.
Forward it to all those who are involved in machine maintenance, design and interested in technical matters.



Hymat Services

F-9, "KIRIT", Evershine Nagar, Malad (W), Mumbai – 400064

Tel. no. – 091-22-28814802 / Mobile – 09324414802, E Mail ID – hymatservices@yahoo.co.in

ISSUE NO – 5 Dated – 23-5-2014

What is NAS ?

NAS is oil cleanliness standard widely used for Hydraulic Systems.

Full form of NAS is – National Aero Space Standard.

Oil Filtration is a common practice among Hydraulic Engineers / Machine Operators and technicians. From decades oil is getting filtered as a normal practice but filtration was limited to removal of visible size of dust / particles from oil.

However for better motion and power control especially in Aero Space Applications, more and more precision types of valves and pumps coupled with electronics evolved, which improved the performance of machines, safety of operation, quality of finish products and increased production. These precision types components (Pumps & Valves etc.) required much cleaner oil than the earlier one in which only visible particles were removed.

Superior Quality of filtration demanded to remove micron size particles in oil. This resulted in to development of Micron size filtration systems.

Still the main problem was, as to how to measure and monitor these micron size particles which are not visible? This resulted into development of Particle Counters. Particle Counters actually measures the size and count the micron size particles.

Development of sophisticated filtration systems to remove micron size particles from oil and Particle Counters to measure and monitor them resulted in establishing Oil Cleanliness Standards like **NAS / ISO / Mil (Military) / NAVAIR (Navy Airforce)**.

What exactly is NAS Standard?

It is very easy to understand.

Step 1 - Take 100 ml of oil and count all solid particles present in it. (all visible as well as micron size. **All**.). Micron size counting can be done only by Particle Counter so you will need Particle Counter ☺ .

Step – 2 Now make group of these particles according to their size as follows and club together all particles **in the following range.:**

1. 5 to 15 Micron.
2. 15 to 25 Micron



Your Friendly Partner in:

1. *Oil Filtration with imported special filtration Trolley fitted with Laser Particle Counter & as per International standards like NAS / ISO.*
2. *Oil Testing & Contamination monitoring with Laser Particle Counter.*
3. *System Flushing as per International standards like NAS / ISO.*
4. *High Pressure Testing of Pipes and Tubes.*
5. *Accumulator Charging and Spares of Accumulators.*
6. *Supply of all Kinds of Lubricants(Oil & Grease) for all kinds of applications.*
7. *Single source of all kinds of Hydraulic components like Filters, Filter Elements, Breathers, Gauges, Accumulators, Pumps, Valves, Seals, etc.*
8. *Custom designing & of Power Packs.*
9. *Draftsman Services for all kinds of Engineering Drawings on CAD.*
10. *Consultation & Trouble Shooting of Hydraulic & Lubrication Problems.*

List of few Important Customers:

1. **L&T (Defense & Aero Space Projects).**
 2. **Reliance Industries.**
 3. **Indian Navy.**
 4. **Premium Drilling (USA)- Off Shore Platform.**
 5. **McDermott (Dubai) – Off Shore Platform.**
 6. **NOVA (Singapore) – Off Shore Platform.**
 7. **Godrej Boyce & Co. Ltd. – Aero Space Projects.**
 8. **Hyderabad Industries.**
 9. **Hindustan Copper.**
 10. **Geeta Engineering – Defense Projects.**
 11. **Yeoman Marine Services.**
 12. **Time Technoplast.**
 13. **Elley Electricals.**
 14. **BARC.**
 15. **Many Plastic Item Manufacturers(Injection & Blow Molding Machines).**
- Over All more than 200 satisfied and repeat Customers.**

Our Track Record:
So far Filtered more than 7,50,000 liters of oil for various applications....

3. 25 to 50 Micron.
4. 50 to 100 Micron
5. >100 Micron

NAS – 1638 has defined 14 levels of cleanliness –

1. NAS - 00
2. NAS - 0
3. NAS – 1
4. NAS – 2
5. NAS – 3
6. NAS – 4
7. NAS – 5
8. NAS – 6
9. NAS – 7
10. NAS – 8
11. NAS – 9
12. NAS – 10
13. NAS – 11
14. NAS – 12.

For each of the above levels, NAS Standard has defined maximum **number** of particles permissible for the each of the above range. (5 to 15 Micron / 15 to 25 Micron / 25 to 50 Micron / 50 to 100 Micron and > 100 Micron).

If you see the following table it will be more clear:

	Maximum Number of particles permissible in 100 ml. of oil					
	5 to15 Micron	15 to25 Micron	25 to 50 Micron	50 to 100 Micron	>100 Micron	
NAS - 00	125	22	4	1	-	↑ C l e a n l i n e s s
NAS - 0	250	44	8	2	-	
NAS - 1	500	88	16	3	1	
NAS - 2	1000	178	32	6	1	
NAS - 3	2000	356	63	11	2	
NAS - 4	4000	712	126	22	4	
NAS - 5	8000	1425	253	45	8	
NAS - 6	16000	2800	506	90	16	
NAS - 7	32000	5700	1012	180	32	
NAS - 8	64000	11400	2000	360	64	
NAS - 9	128000	22800	4100	720	128	
NAS - 10	256000	45600	8100	1440	256	
NAS - 11	512000	91200	16200	2800	512	
NAS - 12	1024000	182000	32400	5800	1024	

↑
These are number of particles

Notes :

- (I) NAS Standard has defined maximum number of particles up to NAS – 12 level only. If number particles are more than NAS – 12 level, then also it will be considered as NAS – 12.)
- (II) For your kind information due to technical reasons this NAS standard is now obsolete but still popular and useful. A New similar standard AS4059 is implemented.

If you observe and study the above table carefully, you will see that for each NAS level the maximum permissible number of particles is defined. e.g.

(A) For NAS – 10 Level, 100 ml of oil must not have a single particle more than the maximum permissible numbers as shown in the table above. (Check the table above. **Figures are made red in colour.**)

1. 5 to 15 Micron – 2,56,000 number of particles.
2. 15 to 25 Micron – 45600 number of particles.
3. 25 to 50 Micron – 8100 number of particles.
4. 50 to 100 Micron – 1440 number of particles.
5. >100 Micron – 256 number of particles.

Thus for NAS – 10 Cleanliness level the entire range of particles MUST be within the maximum permissible level.

In above example Suppose if the number particles in one of the range exceeds the maximum permissible limit, say for > 100 Micron size, if number of particles are 257 instead of 256 (just 1 more particle than the maximum permissible 256 particles.) then also it will not be NAS – 10 level but it will be called NAS – 11 Level.

Same way this rule is applicable for all levels – from NAS – 00 to NAS – 12.

Important Observation : Check yourself. For each previous level, Particle count becomes half of the next level. E.g. number of particles in NAS – 11 is half of the number of particles in NAS – 12. See this trend for all levels.

(B) Let us see one more example

Say maximum number of particles in 100 ml Oil is observed are as follows :

1. 5 to 15 Micron – 64,000 number of particles.
2. 15 to 25 Micron – 11400 number of particles.
3. 25 to 50 Micron – 2000 number of particles.
4. 50 to 100 Micron – **820** number of particles.
5. >100 Micron – 64 number of particles.

Comparing this with the figures in the table, you will notice that number of particles for all range is within NAS – 8 level except 50 to 100 Micron range (**820 particles**) which is more than maximum permissible limit of NAS – 8 (**360 particles**) & even of NAS – 9 level (**720 particles**) therefore the cleanliness level will not be considered as NAS – 8 or NAS – 9 level but it will be NAS – 10 Level.

This is as simple as that.

Remember – Micron size particles are more harmful than visible size particles. Oil is damaged more by these micron size particles. Dirt Sensitive components wear faster by micron size particles than visible size particles.

Now I am sure you will take care of this while getting the oil filtered and insist to know the NAS level before and after filtration. Check how professional is your Oil Filtration Service Provider?

Author : Mr. V.S.Dave

Proprietor – Hymat Services

Help us to spread the word for TIPS & TABS. Forward this mail to all your friends and colleagues having same interest as yours. They will be delighted to receive this mail forwarded by you. Go ahead and send it to all of them.

If you are not interested in receiving this news letter please write " UNSCUSCRIBE" in subject line and send us a blank mail on hymatservices@yahoo.co.in