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

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Your Friendly Partner in:

1. ***Oil Filtration with imported special filtration Trolley fitted with Laser Particle Counter & as per International standards like NAS / ISO.***
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10. ***Consultation & Trouble Shooting of Hydraulic & Lubrication Problems.***

What is BETA Ratio ?

As you are aware, filters are used to remove solid particles from the Oil or any fluid. (Since we are discussing Hydraulics we will consider Oil as a fluid in this discussion.)

But how you make sure that it is effectively filtering the oil? Let us examine this aspect in this issue.

Now-a-days, it is common practice to designate / select the Filter Element based on Micron rating.

Let us compare two identically looking filter elements. One is offered as "X" micron **nominal rating** filter and another as "X" micron **absolute rating** filter. So what is the difference between the two?

Nominal rating Filter element is cheaper than the absolute Rating Filter Element. So as a buyer which one to choose? If you know the difference between Nominal rating and Absolute Rating you will be able to take right decision.

Let us understand the difference between these two ratings.

Nominal Rating is an arbiterily assigned rating suggested by the manufacturer. It has no back up test data or proof. Any filter element manufacturer can copy / manufacture the filter element but is not tested as per the International Testing standard. So most likely it may not filter the oil as effectively as it is expected by the user. Buyer save some money up front but pays heavily by hidden cost.

As against this Absolute rating is the rating which is backed up by the manufacturer by the test data and results. Testing the Filter Element needs Multi Pass Testing Set up which comprises the Particle counter to measure the X micron size particles introduced in oil under controlled conditions and are counted before and after filter.

Results of such Tests are published by the manufacturer as BETA Ratio/Rating for "X" size micron ratings. This is called Absolute rating.

What is Multi Pass Test & How this BETA Ratings are confirmed?

In a very crude manner let me try to explain it. In Multipass Test a very accurately measured Test dust is introduced in a set up in very clean oil. A small pump will pump this dirty oil through the Filter. Particle **sizes and quantity** are measured before and after filter. Than BETA Ratio of the filter **for "X" size micron** is

B_X = Particle Count before Filter / Particle Count after Filter.

List of few Important Customers:

1. ***L&T (Defense & Aero Space Projects).***
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e.g - Say 10 Micron size 10000 particles are measured before the filter and say 200 particles are measured after the Filter. Than Beta Ratio of that filter for 10 Micron size is expressed as

$$\mathbf{B_{10} = 10000 / 200 = 50.}$$

That means out of 10000 particles of 10 Micron size, 9800 particles are captured by the Filter and only 200 particles have passed through it.

It is easy to calculate the efficiency of the Filter from this BETA rating by the following Formula

$$N_{10}=(1-1/B_{10}) \text{ X } 100$$

So efficiency of the above mentioned Filter Element will be

$$N_{10} = (1-1/50) \text{ X } 100 = 98\%$$

That means this Filter will most effectively capture 10 Micron size particles.

But it is a common sense that particles smaller than 10 Micron size will pass through this Filter Element easily and bigger size particles will not. Thus you will find that there is more number of smaller than 10 Micron size particles after filter. Similarly there is less number of bigger than 10 Micron size particles after filter.

Thus for BETA ratio of Same Filter but for different size of particles will be different.

In above example say you find 1000 particles of 5 Micron (which is <10 Micron) after filter and 50 particles of 25 Micron (which is >10 Micron size) size after filter element. In that case BETA Ratio

for 5 Micron will be

$$B_5 = 10000/1000 = 10 \text{ &}$$
Efficiency will be
$$N_5 – (1-1/10)X100 = 90\%$$

And for 25 Micron will be

$$B_{25} = 10000 / 50 = 200 \text{ &}$$
Efficiency will be
$$N_{25} = (1 – 1/200) \text{ X } 100 = 99.5\%$$

Thus the same filter will have different BETA Ratios & different efficiencies for different size of particles. In this case

1. For <10 Micron size – BETA Ratio will be 10 & Efficiency will be 90%
2. For 10 Micron size – BETA Ratio will be 50 & Efficiency will be 98 % &
3. for > 10 Micron size - BETA Ratio will be 200 & Efficiency will be 99.5%

Filter testing is an expensive exercise and needs expertise thus there will be an additional cost & thus Filters with Absolute ratings will be expensive. However the upfront cost difference is in reality a fraction of the hidden cost.

Now remember when someone says that his filter is capable to filter say 25 Micron, it is better to ask for BETA Ratings / Ratio.

Presently Filter Elements with BETA 200 is commonly available for Industrial purpose and for specific requirement Filters with BETA 1000 or even greater are also available.

Following Table will give you the BETA Ratio and Efficiency at a glance.

	BETA Ratio for "X Microon size particles BX	Efficiency = "N"
1	75	98.66%
2	100	99.00%
3	200	99.50%
4	500	99.80%
5	1000	99.90%

When times are tough, and budgets are tight, you need to get the most out of your equipment and your people.
When engaging external assistance, you need to have the confidence that your consultants:

1. Can demonstrate the financial value that they can add
2. Have the right combination of technical, business analysis
3. Have requisite skills
4. Will get the job done and deliver solid, bottom line results
5. Will work effectively with you and your people
6. Represent good value for money

For an obligation free discussion about how we may be able to help you rise to today's challenges, call us now on - 9324414802 or mail us on hymatservices@yahoo.co.in

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