AIR COMPRESSOR *FAD* - NOT Freely Air Delivered now.

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Abstract:-

Air compressor FAD means the Free Air Delivery quantity at the inlet of compressor. Actually, the air is not freely delivered but air struggles to deliver to compressor because of choked air intake filter. The Brief to the user industry and the compressor OEM is to retrofit Air intake Delta Pressure Gauge on the Compressor Panel. **We have seen practically around 3 % energy savings on daily condition monitoring the air compressor utility.**

EXISTING AIR COMPRESSOR CONDITION:-

The air compressors starved running is not noticed or noticed silently by the user. The air compressor vendors have given instructions to the user to change the air intake filter after say, 2500 hours and accordingly the industry is implementing this replacement. If the same industry condition monitors the air intake daily, then keep swapping the cleaned filter weekly, the industry will see to it that the air intake pressure drop is kept within the efficiency limits. **The reason is that the compressor console displays the air intake pressure drop as 0.05 Bar, and the user sees the near-zero Delta P reading, conveniently ignores this parameter. First the OEM must display this, as 500 milli Bar / 500 mm WC. And the user to be alerted to clean / change / swap the moment, drop crosses 100 mmWC.**

Compressor FAD & FREQUENT LOADING:-

We talk of the compressor efficiency as KW / CFM at rated pressure. Here the CFM is measured thro the FAD method by the time taken to fill the air receiver tank. But actually, the air intake filter acts as Restrictor and chokes the air flow in all the air compressors in RP, Screw and in Centrifugal compressors. During dynamic loading of compressors in peak hours, this makes the compressor to load and unload every minute and very poorly air is delivered to air receiver, taking more time. **Some industries are running additional compressor now without knowing that the air intake filter choke is the real culprit for the drop in the FAD.**

COMPRESSORS Case Study:- no. 3 & 4 showed > 500 MM – 20 Inches WC – 3 % energy loss !

COMPRESSOR AIR INLET FILTER 'U'TUBE READING WATER COLUMN IN MM				
SLNO	DESCRIPTION	COMPR-3	COMPR-4	COMPR-5
1	OLD FILTER DELTA P	500 *	500 *	320
2	FILTER removed (with out filter) Delta P	80	80	60
3	NEW FILTER INSTALLED - Delta P	140	90	90
Note:	OLD FILTER RUN HOURS HRS – 2400	NEW FILTER FIXED ON date:- xx April 2015.		

The above case study shows 3 compressors 55 KW BOP Reciprocating type machines, running fully for 360 days in a year. If the air intake filters are cleaned with proper cleaning procedures after taking to workshop every week and maintain the filter Delta P at say 5 inches WC, then the savings would be 3 % of each, running at 50 KW X LF 70 % X24 hours x 350 days = 9000 units savings per year x Rs.7 = RS.63,000/- saving. This can be achieved by installing Rs.5000/- Differential pressure gauge and condition monitoring the same daily or weekly to prevent further pressure drop above 5 inches WC.

Rs.5000 /- invested this month gives back to the industry Rs.60,000/- this year itself.

PRIORITY TO SAVINGS over SAFETY:-

But as a user, we have to keep the OEM manual as benchmark towards compressor safety. But if you are really interested in Energy savings in compressor, it is better to daily condition monitor the same and alter the frequency of swapping the air intake filters before air intake filter crosses double the Designed pressure drop. i.e. if the Delta P crosses 6 instead of 3 inches WC, the user to take immediate action to clean or swap.



1. 350 KW 2000 CFM screw compr. filter choked at 18 inches WC- 3 % energy loss - our case study.
2. 55 KW BOP RP compressor filter choked at 20 inches WC, losing 3 % energy – Our case study.
3. Centrifugal 500 KW 3000 CFM compressor filter choked > 10 " WC, 2% energy loss – our case study.

OEM VENDOR & COMPRESSOR SAFETY:-

OEM vendor states the compressor can withstand around 20 inches WC. It does not means the compressor is efficiently withstanding up to 20 Inches. Above 5 inches WC, level of inefficiency increases and says up to 3 % KWH energy losses. So user needs to be alert & take care not to raise the filter Delta P.


1. The same can be prevented by Air pre-filters daily cleanable and monitoring accurately.
2. This Delta P rugged gauge, installed at compressor panel, will locally alarm in daily routines.
3. **Existing Vacuum band indicator screwed below the air intake filter – Always shows Air OK & not seen.**

POINTER TO COMPRESSOR USERS & OEMs:-

Hence daily condition monitoring the compressor air intake yields quick results and 3 % saving in KWH. So, here it is suggested to OEM and the user to mandatorily fit in this 20 Inches WC pressure gauge to the existing and new compressor panels in India. This minute monitoring may look trivial to many of us, but if ignored, this leads to compressor starving for air and frequently hunting between no load to load.