

Lubricant Carry Over



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Q: What Factors affect the amount of carry-over from rotary compressors?

A: Here are the factors that affect carry over:

Operating temperature – Carry-over increases with higher discharge temperatures
Type of Lubricant – More on that later
Load/Unload of compressor – running fully loaded all the time – lower carry-over.
Quality and condition of separator

Also, some compressor models just have higher carry-over as a characteristic. It depends on the sizing and configuration of the separator. The drier will reduce the lubricant in plant air, but the make-up rate to the compressor is not reduced by a drier.

Q: What causes oil carry over on rotary screw air compressors?

A: The separator can only catch the mist or liquid, not the vapor. Fluids that have a higher volatility or vapor pressure will have a higher carry over down stream. One item that could cause oil carry-over is that someone could be filling the oil reservoir too high. If there is too much oil in the reservoir, it has no-where else to go but downstream until it gets back to the proper oil level.

Another common cause for high oil carry over is the separator has a hole in its media. Just simply

check the differential of the element (delta P) and if you read 0 psig on a new element or less than 1 psig on a in service filter this may be the first place to research.

A very common cause of excessive oil carry over is if the scavenge line has not been set properly. The scavenge line runs from the bottom of the separator element back into the air end. This is where all of the oil that is pulled out of the air is dropped, and then it is re-circulated. If line has angle cut on the pick-up end of the scavenge line it should be pushed down until it makes contact with the bottom of the separator element. If the line has a square cut it should be adjusted to 1/8" to 1/4" above the bottom of the element. The scavenge line should also be checked to see if it is plugged up or Y strainer screen needs to be cleaned.

Q: Can degradation of the lubricant cause excessive oil carry over?

A: Yes, as lubricant degrades, it breaks down into lower molecular weight "volatile" components. This will also result in a higher make up rate. If the fluid in question is a hydrocarbon, it may also form varnish. If it is a PAG, it will have only increased carry over, but no varnish.

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**Q: Does the type of oil used effect the carry over?
Such as POE, PAO, Diester or PAG?**

A: PAG's typically have a lower carry over than hydrocarbons. Reports from the field indicate that the carry over with PAG may be as low as 1/4th as much as a hydrocarbon.

Q: What role does viscosity play in oil carry over?

A: Lower viscosity grades, such as an ISO 32 will have a lower carry over than an ISO 46 of the same type, whether that type is PAG or PAO or other synthetic. This is not as significant an effect as the actual choice of PAG vs. other types of fluids.

Q: How does the temperature play a role in oil carry over?

A: As temperature increases, carry over increases significantly. This is for two reasons. First the actual volatility increases at higher temperature, just as water will evaporate more quickly at higher temperature than lower temperature. The second reason is that the higher temperature accelerates the decomposition of all types of fluids. Every 10 degrees C, or 18 degrees F doubles the rate of decompositions, also increasing carry over.

Q: What is the average carry over of most compressor lubricants?

A: A PAG/ester blend equivalent to the OEM fluids such as Sullube or Ultra Coolant has been measured to have a carry over of about 1 ppm.

This is equivalent to 2.5 gallons per year in a 100 hp compressor running 8000 hours per year.

Keep in mind that total fluid make up will also include any additional amount that the machine leaks. Hydrocarbon and PAO fluids vary but typically have 2 to 4 times the carry over rate, based on the volatility of the fluids.

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