RAK
Industrial Consulting

OIL REMOVAL

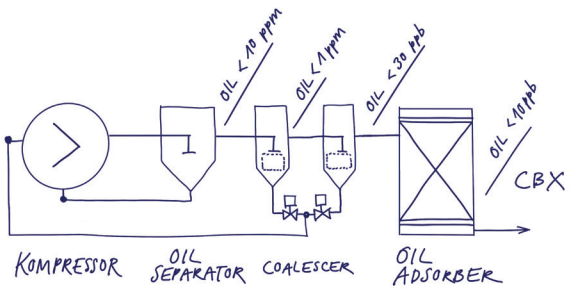
Cryogenic service & field engineering

For years RAK Industrial Consulting has focussed on international field engineering and service, construction and commissioning management of cryogenic plants for helium, neon and hydrogen. Our expert customer service with its wide range of repair, maintenance and servicing specialties makes us the ideal partner for successful and efficient cryogenic plant operation with 24-hour standby availability for malfunctions and emergencies.

Pipe inspection technology and removal of oil contamination for cryogenic plants

Problem of oil contamination
„Normal (according to engineering design data) " oil contamination of cryogenic plants is caused by oil lubricated compressor systems. The oil removal systems (compressor oil separator, external coalescer filter stages 1–5 and the oil adsorber filled with activated carbon) are not able to restrain all oil aerosol inside the gas flow.

The total oil amount collected inside the cryogenic piping and coldbox can easily reach 400 grams after 20 years of plant operation (~10 ppb* 70g/s*20 years).



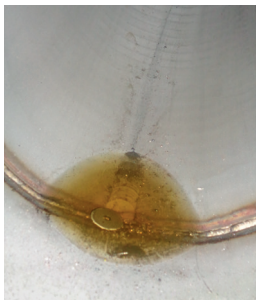
Problem: Loss of first heat exchanger transfer-performance ~12%.

Besides the "normal" oil contamination, oil can although be carried over from not correct working oil removal systems and pushed thru the high-pressure piping to the coldbox, where it lands inside the first heat exchanger.
Once enough heat exchanger surface is coated with oil (not clogging), heat transfer capacity decreases and gets misbalanced, performance losses occur.

Having oil carried over from oil lubricated compressor or pump systems to piping, coldbox, distribution boxes or other user interfaces, it mostly means that the plant operator has serious problems. Performance losses and damages to turbines, heat exchangers and other process related components can occur soon. Oil contamination of cryogenic plants mostly lead to longer down times. Detecting and removing of oil contaminated areas takes much time, and requires advanced knowhow and expensive equipment.

RAK is focused on this „normal (design data)" and on unexpected oil contamination of cryogenic systems by malfunctioning or wrongly executed mechanical service work at compressor oil removal systems.

Avoiding oil contamination
- Monitor and observe plant behavior and changes in process values
- gas analyzing values, it is suspicious when standard values suddenly change
- coalescer drain times, too long, too short
- difference of inlet and outlet temperatures of high-pressure and low-pressure pipe of coldbox, typically low-pressure piping going back from coldbox to compressor starts condensation
- changed process values (valve positions, temperatures, turbine pressures and speed
- annual check of oil removal system
- check of coalescer filter elements
- check of compressor oil separator filter element
- check of compressor oil filter
- replacement of oil adsorber activated carbon
- check of Coldbox inlet filters
- check of purifier inlet filters
- check of turbine inlet filters
- check of warm up and low flow piping and tubing around the coldbox



RAK Industrial consulting pipe inspection technology and removal of oil contamination for cryogenic plants services
- Performance of pipe inspections using endoscopy in cases of unexpected pressure loss or unusual plant behaviour
- summary of the actual condition for the process room for documentation purposes
- utilisation of state-of-the-art inspection technology
- endoscopy of pipelines up to 50 m including high-resolution photo or video recordings
- inspection of component interiors, valves, filters, vessels, etc.
- determination of the extent of oil contamination; preparation of a repair concept
- performance of the pipe and component cleaning work utilising state-of-the-art technology

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