

Espey WKA700 for sealing a screw compressor





Screw compressors

The great diversity of process-gas screw compressors and the ability to run under harsh process conditions for corrosive and erosive media leads more and more companies in the process and hydrocarbon industry to choose this kind of rotating machinery. Process-gas screw compressors are used in various industrial branches, such as mining industry, iron and steel mills, chemical plants, petrochemical industry, refineries and oil fields, and on- and offshore applications. For every application, screw compressors can be adjusted to suit to the particular process requirements.

Process description (example: acetylene production in the chemical industry)

The earth offers no natural acetylene sources; therefore, this gas has to be fabricated synthetically. Acetylene is made by hightemperature pyrolysis of natural gas. The emerged gas mixture is cooled down to a temperature below 200 °C (392 °F) to prevent the gas from decomposing into water and carbon and forms an acetylene-ethylene mixture from which acetylene is still fractioned. To provide further down-stream production lines, the acetylene is compressed by screw compressors. For cooling the screw compressor, water is injected, which vapourizes during compression and eliminates soot traces in the gas.

EagleBurgmann Espey GmbH Thomas Edison-Strasse 19 47445 Moers / Germany

Phone +49 2841 99827 0 Fax +49 2841 99827 56

info.espey@de.eagleburgmann.com www.eagleburgmann-espey.com

Problem and challenge

To serve the supplied process, each screw compressor needs 4 seals, 2 for the suction and 2 for the pressure side, allowing no process gas leakage and minimum barrier gas leakage to the atmosphere. The seals have to be designed to fit into existing machine spaces. The shaft diameters of both sides are nearly 180 mm (7.09"). The process medium is a mixture of vacuum gas CxHx and nitrogen. The rotor revolutions of male and female screws range between 6,000 and 4,000 min⁻¹. The medium pressures on the inlet side move between 0,2 and 0,4 bar (2.9 and 5.8 PSI) abs. with a temperature of 40 °C (104 °F). The pressures on the outlet side move between 1 and 1.033 bar (14.5 and 14.98 PSI) abs. with a temperature range between 55 and 85 °C (131 and 185 °F). The shafts' radial play in the sealing area is minimal, the axial play is around \pm 2,5 mm (0.1"). The seals have to be equipped with following ports: barrier gas port for nitrogen, steam inlet port, gassteam outlet port to atmosphere. The nitrogen barrier gas has a pressure of 0.9 bar (13.05 PSI) abs., the steam with a temperature of above 180 °C (356 °F) has a pressure of 1.52 bar (22.05 PSI) abs..

EagleBurgmann Espey solution

To fulfill the application requirements of no process gas and lowest barrier gas leakage to atmosphere, fitting into existing machine spaces and providing all necessary ports with regard to revolutions, design temperatures and operating pressures Espey designed the state-of-the-art carbon floating ring seal Espey WKA700 with numerous one-piece seal rings on the pressure and on the suction side. Espey WKA700 is based on a modular design, means that any seal parts can be combined in order to application requirements. The seal lengths are around 250 mm (9.84"). The seals are working failure-free and guarantee 8,000 operating hours without any maintenance.



Assembly screw shafts with installed carbon floating ring seals Espey WKA700



Installed carbon floating ring seals Espey WKA700

Operating conditions

Application: screw compressor Seal type: Espey WKA700 Medium: mixture of vacuum gas CxHx, nitrogen Operation temperature: above 180 °C (356 °F) Pressure abs.: 1.52 bar (22.05 PSI) Revolutions: 4,000...6,000 min⁻¹ Shaft diameter: nearly 180 mm (7.09") Radial play: minimal Axial play: ± 2.5 mm (0.1") Barrier gas: steam, nitrogen

EagleBurgmann Espey GmbH Thomas Edison-Strasse 19 47445 Moers / Germany

Phone +49 2841 99827 0 Fax +49 2841 99827 56

info.espey@de.eagleburgmann.com www.eagleburgmann-espey.com