

Sealing technology and service for the Goliat FPSO



In 2015 the Goliat FPSO was loaded in Ulsan/South Korea for transportation to Norway on the heavy-lift vessel „Dockwise Vanguard.“

The Goliat FPSO (Floating Production and Storage Offshore unit) is currently the most modern and largest facility of its kind worldwide. The characteristic cylindrical shape makes it ideal for the exceedingly hard wintery and icy conditions at the production location in the Barents Sea. The platform was developed by the Norwegian Sevan Marine and built by Hyundai Heavy Industry in South Korea. It is operated by Eni Norge, and Statoil Petroleum AS holds a share of 35 %.

The oil deposit in the Goliat field was already discovered in 2000. The reserves amount to approx. 174 million barrels of oil, which is characterized by its low sulphur content, and additional 8 billion cubic meters of gas. The two largest oil producing formations are found at depths of 1,100 to 1,800 meters.

Construction of Goliat began in 2010. After completion in the spring of 2015, Goliat was transported with the heavy-lift vessel „Dockwise Vanguard“ over 29,000 km from the South Korean Ulsan to the north of Norway in 60 days and was positioned 85 km to the northwest of Hammerfest as the first and northernmost platform. 14 hawsers keep the platform stabilized over the oil field with its 8 templates and 22 connected sources. The ocean at this point is 400 meters deep.

Goliat has a measured diameter of 100 meters, weighs 64,000 tons, can produce 100,000 barrels of oil per day and temporarily store up to 1 million barrels. Nearly 120 crew members make up the permanent staff. Two custom-built shuttle tankers, each with a capacity of 850,000 barrels, transport the „Goliat Blend“ oil grade to different European ports of destination.

Among other things, the platform has one of the most modern and reliable oil tanker loading systems. The installed hose reel with a diameter of nearly 13 meters is the largest ever built device of its kind. The power station set up in Hammerfest supplies Goliat's energy requirement over the worldwide longest submarine power cable with a capacity of up to 75 MW. Together with an efficient energy production on board it was possible to reduce CO₂ emissions by 50 %.

After various delays to the project, Goliat FPSO finally took up production in March 2016, currently set for 15 years.



Different versions of the EagleBurgmann H75 are the predominantly installed types on the Goliat. Pictured here is a H75VK double seal.



PDGS compressor seal for high pressure and low temperature applications.



Ready for delivery: NORSOK-compliant supply units of EagleBurgmann Norway for the Goliat platform.

Project award for EagleBurgmann

The Korean planner Hyundai Heavy Industry was contracted for the construction in 2010. One of the most important requirements was the obligatory application and implementation of the national Norwegian NORSOK standard.

EagleBurgmann was able to contribute valuable know-how here due to its many years of experience from past projects with Norwegian EPC.

As a result, EagleBurgmann Norway assumed a key role in the Goliat project in terms of sealing technology and accepted responsibility for the organization and processing. Contact between EagleBurgmann Korea and Hyundai was established early on, and just a few months later all technical and business details were clarified and EagleBurgmann was specified and contracted for Goliat.

For EagleBurgmann this meant supplying all compressor seals, pump seals and their appropriate supply systems for the entire FPSO. All seals were produced in Germany and the seal supply systems were manufactured at EagleBurgmann Norway in accordance with the NORSOK standard. The sealing technology was already delivered in the years 2011 and 2012.

Employed products

In total, nearly 80 mechanical seals of differing types were delivered for the Rotating Equipment of Goliat. The machines are employed in all areas of the platform, from crude oil production to drinking water supply.

Installed in the pumps of well-known manufacturers (Finder, Seepex, Egger, Amarinth, Netzsch, Clyde Union, Flowserve, Leistritz, Hamworthy and Marelli) are the following types of seals:

H75VN, H75FD, H75VKP-D, HRKS, Cartex-DN, Cartex-QN, as well as API-tex single and double seals. All double seals are supplied by EagleBurgmann NORSOK-compliant systems in accordance with API Plan 53B.

In addition, DGS and PDGS gas seals are operating in four Nuovo Pignone compressors. A SeccoMix dry-running agitator seal was supplied for an A&G machine.

Services on site

Because of the good collaboration during the project and construction phase, an outline agreement was concluded in 2014 with Eni Norway for services and spare parts deliveries. The contract runs until 2017 with renewal options up to 2021.

Since June 2015, one to two EagleBurgmann service engineers are continuously on board Goliat for more than 150 man days. They carry out commissioning and starting up of the different systems and machines and take care of maintenance and repair.

The employed seals are managed with the EagleBurgmann TotalSealCare service software „SealCarePro“. Repair and service procedures are seamlessly documented and monitored.

Result

EagleBurgmann was able to prove its competence as reliable partner for sealing technology in all phases of the Goliat project:

- International presence (Norway, South Korea)
- Sealing technology know-how and expertise
- Economical solutions for every application
- Technically perfected, standard-compliant products
- Optimal on-site services from experienced personnel

Selected application examples



Finder crude oil transfer pump sealed with H75FD/90-E3-A1 dual seals, supply in accordance with API Plan 53B.



Seepex displacement pump sealed with Cartex-DN dual seals.



Finder circulation pump for heat carrying medium sealed with H75FD/90-E3-A1 double seals, supply in accordance with API Plan 53B.



Finder drinking water pump with single seal H75VN/50-E93-A1, supplied in accordance with API Plan 11.



Finder cooling medium circulation pump sealed with single seal H75VN/90-E88-A1-OR, supplied in accordance with API Plan 11.



Finder hot water circulation pump. It is sealed with a single seal type H75VN/50-E87-A4-OR. Supply in accordance with API Plan 11.

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