

Keywords: North Sea • Ormen Lange • SSV

Gas production at Ormen Lange:

Special valves rise to the North Sea challenge

Ormen Lange is Europe's third largest natural gas field and at the same time the largest and most demanding industrial project ever carried out in Norway. Read on as to how Schroeder Valves contribute to the most challenging project in the North Sea.

By Axel Muecher, Schroeder Valves GmbH

What makes Ormen Lange so challenging to exploit is its situation: the "long worm" lies 120 kilometres (75 miles) northwest of Kristiansund in the Norwegian continental shelf, where seabed depths vary between 800 and 1,100 metres (2,600 and 3,600 ft). Pipelines and installations had to be placed on the extremely steep and uneven area of the sea bed. In addition, the installations must withstand the exceptional currents that are characteristic of this part of the Norwegian Sea, as well as sub-zero temperatures on the sea bed, and extreme wind and wave conditions. All these put great demands on the technology used in the project.

No platform

Due to the conditions the development of Ormen Lange is different from all other offshore projects: There is not a single platform on the surface of the sea above the gas field. Instead, 12 subsea wellheads at three seabed templates have been installed on the ocean floor and connected directly by two x 762 mm (30 inches) pipelines to an onshore process terminal at Nyhamna on the Norwegian



The onshore test station at Nyhamna

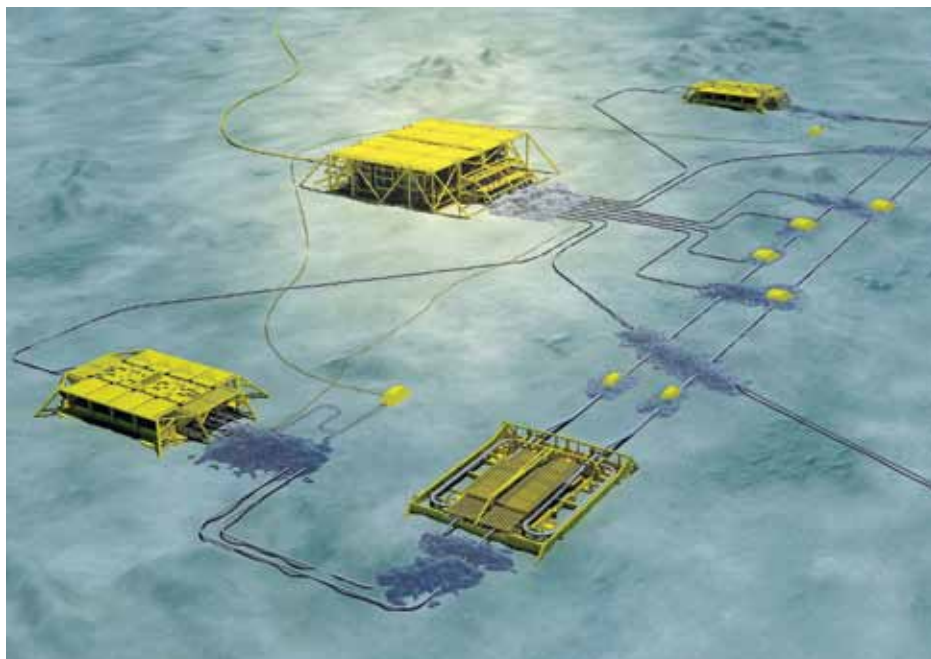


The Schroeder automatic recirculation valve SSV

coast. There the gas is purified, dried and compressed before it is exported through the world's longest subsea gas pipeline - Langeled pipeline - approximately 1,200 kilometres (750 miles) from Nyhamna to the reception centre in Easington on the east coast of the UK. This way the Ormen Lange plant exports 70 million cubic metres (scm) gas to the UK every day,

thus covering 20 percent of UK's demand for natural gas. And it will continue to do so for an expected 40 years.

The reservoir is approximately 40 kilometres (25 miles) long, 8 kilometres (5 miles) wide, and lies about 3,000 metres (9,800 ft) below sea level. Recoverable gas reserves are estimated at 397 billion scm. This was reason enough for the operator Norske Shell to take over the technologically extremely challenging development in 2007. Ever since gas production started in September 2007 the field has been recovered by pressure depletion only, but as production continues, natural pressure in the Ormen Lange reservoir will decline and a need for compression will arise. The customary concept today is to use a floating platform, fitted with compressors. But, the petroleum industry is now looking at new compressor technology for the Norwegian continental shelf.



Subsea future compression station at Ormen Lange (source: Statoil)

New solution for compression

Shell and the other license partners are currently investigating the possibility of implementing a subsea compressor for Ormen Lange. In order to find out whether it is technically and economically feasible to compress the gas at depths of 800 metres, they constructed a huge physical test station on the main land at Nyhamna.

One of the major problems is that all at the same time pressure must be generated and an antifreeze needs to be added to the wellstream before it enters the feed lines. Due to the low water temperatures the wellstream runs a risk of forming hydrates, which can clog the pipelines. On land, gas and antifreeze have to be separated again. As the whole compressor station will operate at the seabed in 800m water depth, high reliability resp. low breakdown susceptibility and a low maintenance design are major requirements for the equipment. Therefore the gas and condensate pumps, which play an essential role in the process, must not only be protected from total loss by dry running or back flow but also from wear and long-term damage caused by low load operation. This protection can be done by one single component, the so called automatic recirculation valve.

There are only very few producers in the world who can design this type of valve. The developers' choice fell on the company which holds the original design and has the most experience: the Germany-based Schroeder Valves GmbH. Schroeder automatic recirculation valves (SSV) could provide the protection functions and in full meet the requirements regarding reliability



Nyhamna from above

and low maintenance: As a result of the rotary bypass trim design they guarantee modulating and low-wear minimum flow control.

The SSV have a non return function in the main pumping direction which prevents pump damage by back flow from the process line at shut-off resp. standby. A multi-stage pressure reduction in the secondary outlet ensures low cavitation levels. The valves are further praised for low pressure loss in main direction and a high reliability with a long service life. As an additional benefit for the current application the valves are self actuated which means there's no need for an actuator, auxiliary power supply or any kind of control devices.

The valves, like all other equipment, are soon to be in operation in the test station at Nyhamna. Once the commissioning and testing of the pilot project has been conducted, the license partners at Ormen Lange will decide whether they are going to install the new technology on the seabed above the reservoir. This decision is expected in the course of 2012. If adopted, the compressor will be the first of its kind.

About the author

Axel Muecher is Managing Director of Schroeder Valves GmbH in Gummersbach, Germany. A graduate in economics from the University of Siegen, he took over the management of the family-run special valve manufacturer in 2005. Ever since he has annually increased the company's turnover by 10 percent. Due to their high quality and durability Schroeder Valves-Fittings are valued worldwide in the chemical and petrochemical industries, in power plant construction, in offshore industries, the paper industry and metallurgical industry, in the field of marine transport and in snow cannons.

