

New safety standards for nuclear power station Unterweser, Germany

High quality, custommade
VAG valves regulate the supply
of cooling water

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7/09



When the nuclear power station Unterweser was connected to the grid in 1978, it was the largest in the world. Some 10 billion KWH of electricity is generated here every year by a pressurized water reactor. The nuclear reactor, also known as Esenshamm or Kleinensiel, takes up a prominent place among the 17 German nuclear reactors.

Because it is located near the mouth of the river Weser, which empties into the North Sea, the operator, E.ON Kernkraft GmbH, finds itself fighting the brackish water that mixes in with its cooling water. This mixture of sweet and salt water is very corrosive. Concrete, pipelines and valves used to supply the water are constantly exposed to this medium and their service life threatened by corrosion.

Project overview

Project: Overhaul water intake basin
nuclear power station Unterweser

Armaturen: 6 EROX®-Q Sluice Gate DN 1000
first custom version with duplex stainless
steel in a special welded structure
according to IS 1601 und AS 4

Project completion date: August 2007

Client: E.ON Kernkraft GmbH

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Heavy barnacle growth after just two years of operation.



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Thirty years of non-stop operation with corrosive brackish water have left their mark on the water intake basin of one of Germany's oldest nuclear power stations.

In order to meet all of the safety and other requirements, preparations for the 2007 overhaul project began already in the spring of 2005.

In addition to overhauling the corroded concrete, Jörg Möller, responsible for valves at the power station, also planned to replace all of the old, cast-iron valves. Thirty years of exposure to brackish water and the resulting corrosion had left considerable marks.

How could this problem be minimized in the future? Had more resistant material been developed in the meantime? What progress had been made in valve technology? And how can the new, distinctly higher requirements be met?

Jörg Möller turned to the leading manufacturer of components for nuclear power stations: VAG-Armaturen GmbH. The power station operator already had good experience with the previous valves supplied by the valve manufacturer in Mannheim.

VAG's experts recommended using duplex stainless steel 1.4462 for the gate valves. The material had just proven its durability in a materials test that had run for several months under local conditions. The only thing left to do now was to design the VAG EROX-Q Sluice Gate Valve to prevent microbiologically influenced stress corrosion cracking. VAG recommended full penetration welding or, as an alternative, circumferentially welded joints and an electropolished door.

Next, the extensive testing, certification and approval processes were started to make sure the new valves would meet the new safety standards.

'VAG have been a very reliable partner,' says Möller, 'They have a lot of experience with the approval procedures that are specific to nuclear technology. For the first time, we received approval for Class 4 sluice gates.'

At the beginning of 2007, everything was ready: Production could start once the preliminary testing documents had been approved. VAG and the customer's representative, AREVA, carefully supervised the production and welding operations that were part of the unique valves' manufacturing process.

The valves were tested, inspected and delivered in June 2007, and in August 2007, two of the six VAG EROX-Q Sluice Gates were installed and put into operation by Kraftanlagen Heidelberg GmbH.

These two large valves will supply the secondary cooling water. The addition of a 14-meter long stem extension with position indicator makes it easy to operate the valves, which are installed deep in the water intake basins. The remaining valves were put into storage for the next phase of the overhaul project.

'We are happy that we were able to complete all of the preliminary testing, documentation, inspection and approval steps within the tight schedule', explains Jörg Möller. 'We wouldn't have made it had it not been for the good collaboration and personal contribution of everyone involved.'

In September 2009, the cross-channel was inspected and the 'new' valves tested (right photo). Barnacles had settled on the valves in large numbers, but they hadn't damaged them and were easily rinsed off with a pressure washer. The experts agree: after two years of brackish water and barnacles, the Sluice Gate Valves are in excellent condition.

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