

Offshore flange connections require reliable corrosion protection

An interview by Nils Emmerich with managing director and construction supervisor Dipl.-Ing. Klaus Deininger of KTW Umweltschutztechnik GmbH

NE: If you take a look at your homepage, you have previously only operated in the “onshore” segment. What is the reason behind the switch to this new area?

Dipl.-Ing. Klaus Deininger (KD):

Over the past few years we have sealed and repaired well over 2,500 wind turbine foundations. Offshore was never on the agenda. In February 2 years ago I received a call from Hamburg: “We have a problem.” One of our former clients remembered our constructive collaboration. So, chance also played a certain role.

NE: Obviously, you were able to solve this problem?

KD: A problem is rarely solved independently. When I arrived at the meeting, I met a team of 7 professionals. They had all taken the time to attend – but time was also of the essence. The construction of the wind farm with 54 monopile foundations was in full swing, but there was a corrosion problem with the screw connections on the first flange above the surface of the water. The 90% humidity of the salt water atmosphere led to extensive rust formation on the bolts and restricted their load-bearing capacity. Initial attempts to use conventional plastic coatings had failed.

I was able to draw a model of a special coating system out of my pocket, which allowed the entire flange to be enclosed. The initial consultation quickly developed into a brainstorming session by the engineers involved, which also covered the issues of the necessity of air conditioning as well as the regular accessibility of this kind of flange collar.



NE: What does “accessibility” mean?

KD: Screw connections on flanges of wind turbines with high dynamic loads needs to be checked at defined intervals. Checking the tension using various techniques and tools is then only possible after cutting open and re-bonding the sealing collar. So we decided on magnetic aprons, which enable the flange seal to be folded up for inspection purposes at any time.

NE: Did you install these flange collars yourself?

KD: Naturally not me personally; and of our roughly one dozen employees, who work at great heights on onshore towers, we were only able to qualify a select few to work as supervisors on the offshore turbines at short notice. Our client’s assembly teams completed the main part of the installation in day and night shifts. But, our company responded with great flexibility and took over all the pre-production work, which required a high number of staff and outstanding commitment. Because, offshore is something completely different.

NE: Why is offshore “completely different”?

KD: This was something that was said to me at the initial consultation. If you take the standard delivery times of our certified sealing system of about 4 weeks as an example, the requirement in the offshore sector is: yesterday! Naturally, we are not magicians but the offshore production was a top priority and employees had to be taken from other areas. And, we worked without a contract for a quarter of a year. I received the reassuring response: “The technicians in the offshore area are faster than our salespeople.”

NE: You mentioned a certified system?

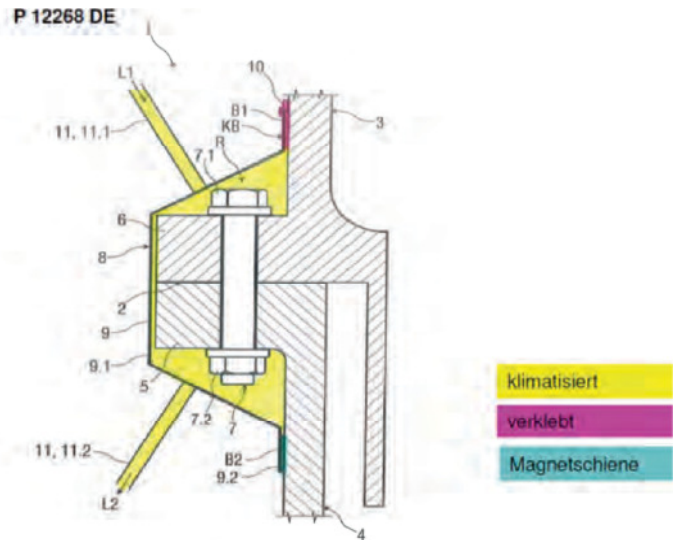
KD: Yes. Our highly elastic sealing system has been certified for soil and water protection by the Deutsches Institut für Bautechnik (DIBt) since 2015. And, without realizing it at the time, although the North Sea is not a groundwater catchment area, it virtually has to be considered a “biotope”. All components and their safety data sheets had to be



comprehensively reviewed in relation to their use. A series of elaborate onshore “mockup tests” on “1 to 1” models were also required to carefully prepare for the expensive offshore activities.

NE: Are your highly elastic flange collars in the offshore wind farm still being tested?

KD: The test phase has long since passed. The wind farm commenced operation over a year ago. Improvements to the air conditioning have also been implemented by specialist engineers. The client’s management board confirmed the stable operation for corrosion protection with an atmosphere free of seawater and humidity of less than 30%. The development of the sealing system also included a patent application, which was granted at the start of this year.



NE: That sounds good. What’s next?

KD: As other offshore wind farms with similar monopile constructions exist, we are very interested in cooperating in new projects. But, we are naturally not ignoring our onshore work and customers. Besides wind turbine foundations, we have also been refurbishing steel towers for around 6 years. The focus here is also on corrosion protection in the flange joint area.

Since 2018, we have also been refurbishing the transition point of the concrete adapter elements to the steel tower in hybrid towers with a 134-metre hub height. In addition to the highly elastic sealing of cracks in these areas, we offer effective methods for reinforcing support structures with carbon fibre-reinforced plastic (CFRP) sheeting in areas where spalling has already occurred at the transition points.