

Secutex® Soft Rock

Scour Protection for
Offshore Wind Farm

Project name
Offshore Windpark Amrumbank West, Germany

Client
E.ON New Build & Technology GmbH, Gelsenkirchen,
Germany

Construction company
Peter Madsen Rederi A/S, Flensburg, Germany

Designer
IMS Ingenieurgesellschaft mbH, Hamburg, Germany

Product
Secutex® Soft Rock R601





Fig. 1: Filling of the geotextile sand containers



Fig. 2: Storage on site

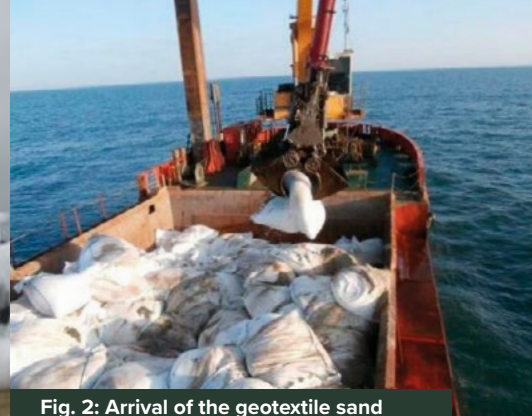


Fig. 2: Arrival of the geotextile sand containers at the installation site

Challenge

The Amrumbank West wind farm is located 35km north-west of Helgoland with water depths of -19 to -24m LAT. The near-surface subsoil consists mainly of sand with alternating proportions of fine, medium and coarse sand.

The foundation structures were designed as monopiles with a maximum diameter of 6m. The design wave for the sites was defined with $H_{m0} = 8.4m$, and the flow velocity averaged over the water depth with 0.8m/s (in each case 25 years return interval).

To optimise the length of the monopiles, scour protection was provided in the design.

Solution

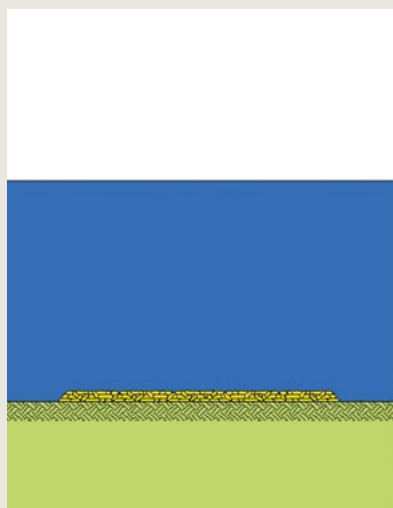
A solution with geotextile sand containers Secutex® Soft Rock was chosen as scour protection. Geotextile sand containers with a filling volume of $1m^3$ were used. These were filled with sand on the mainland. Each container filled with sand had a weight of 1,400kg.

In order to achieve complete coverage of the sea ground, a version with two layers of geotextile sandbags was required. The average height of an installed GSC is approx. 0.4m. Due to the two layers, the total height was approx. 0.8m.

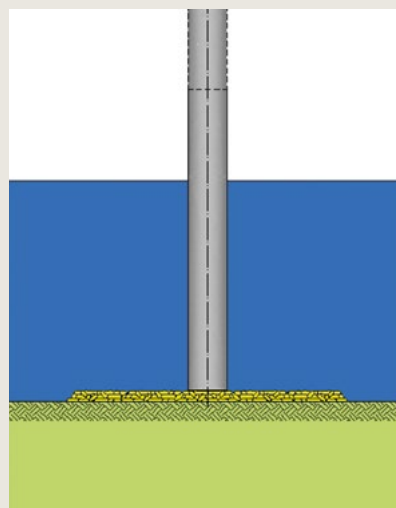
The choice of material for the scour protection (mineral or geotextile) does not influence the diameter of the scour protection and was in both cases $4 \times D = 24m$. A comparison of the envelope of the two scour protection variants resulted in $1,086m^3$ for the mineral scour protection and $362m^3$ for the geotextile variant. The geotextile scour protection therefore only required about one third of the material of a mineral scour protection.

Regarding the installation logistics, the comparison of the two concepts reveals decisive differences: With mineral scour protection, the filter layer should be installed before the foundation structure. After the installation of the monopile (pile driving), the installation of the cover layer follows. This should take place as soon as possible and therefore links the two processes very closely. However, it is not economically feasible to implement this process using the large special ships available on the market. The geotextile scour protection can be completely installed in advance of pile driving and is thus logistically detached from the main activities of building a wind farm. In the construction project described here, the installation of the geotextile scour protection system already started one year before the pile driving work.

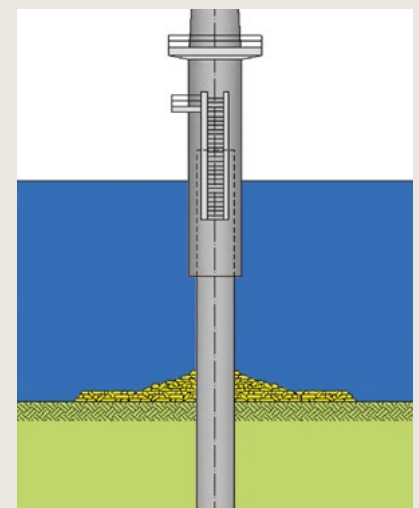
In December 2013 the storm tide „Xaver“ hit Amrumbank West. With wave heights of $H_s = 7.8m$ and $H_{max} = 20.46m$, the stability and effectiveness of the GSC were not endangered.



2 layers of Secutex® Soft Rock as effective scour protection



Monopile driving on the scour protection system



Adding singular GSC elements as „collar“

Fig. 4: Installation of the geotextile scour protection system

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