

# Offshore Grout Seals

Trelleborg Ridderkerk BV



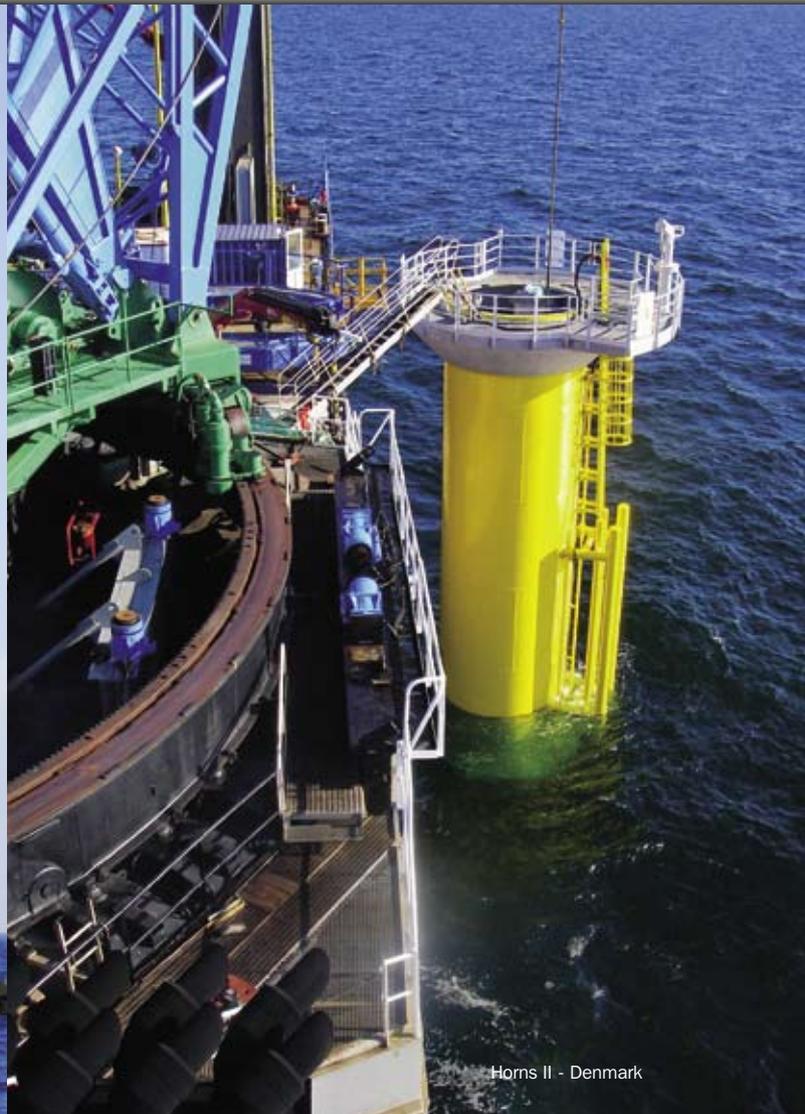
## Company

Trelleborg Ridderkerk is your partner in the design and production of engineered rubber products. Our focus is on the markets of civil engineering, offshore oil and gas, dredging, sewage, building and industry. Our products seal, damp and protect in demanding industrial environments

worldwide. Over 100 years we have provided our customers with tailor-made solutions based on leading rubber technology and unique applications expertise. Based on proven technology in civil and offshore we have developed and supplied grout seals for many offshore wind farms.



Beltwind - Belgium



Horns II - Denmark

## Introduction

Offshore wind farms are built using gravity base structures, monopiles or tripods. The design philosophy for wind farms is based on the installation methodology depending on soil properties, water depth and contractor experience. The wind turbines of the Egmond project for instance stand on a monopile. After driving the pile into the sea bed, the top will be five meters under the water table. A transition piece, around 25 metres high, is lowered over

the top of the pile and will be clearing the water by around 13 metres. The space between the pile and the transition piece is sealed by an inflatable grout seal of Trelleborg Ridderkerk. This seal is designed to close a substantial gap and simultaneously resist an internal pressure of few bars. Grouting the space above the grout seal, results in a very strong joint. Finally a floating crane is used to install the tower and the turbine.

## Specification

The seal should seal the gap between the transition piece and the pile, withstand pressure as well as compensate some misalignment.

## Testing

All seals are subjected to an extensive test program in order to qualify the design. All inflatable seals will be pressure tested in a dedicated test frame, preferably similar to the final situation.



## Design

Trelleborg Ridderkerk has designed two types of grout seals: active and passive types.

The passive seal, or self activating seal, is a full rubber lip seal, which seals initially by tight fitting. When the pressure on the lip increases, it will compress more and so the sealing properties will improve simultaneously. The choice of design and the material secures the correct functioning.

The active type is an inflatable seal, which consist of a fabric reinforced tube provided with a foot. In combination with steel strips the foot will be hold in place. The seals are activated by compressed air. Preferably the seal expands outward, because of the elasticity of the materials. In general the seal are provided with two air connections.

## Policy quality, environment, safety and health



Member of  
**EWEA**  
THE EUROPEAN WIND ENERGY ASSOC.

The policy of Trelleborg Ridderkerk BV is to design, produce and deliver rubber products which are in accordance with the customers' requests, needs and expectations. Our policy is based on the Trelleborg Group policy statement 'Code of Conduct', which is presented on the website [www.trelleborg.com](http://www.trelleborg.com).

During the development of products and processes the environment, safety and health are integral to the process.

Trelleborg Ridderkerk BV is using an integrated management system which complies with international standards such as ISO 9001, ISO 14001 and SCC\*\* 2008/05 Petrochemical.



Egmond - The Netherlands



Trelleborg Ridderkerk BV  
Verlengde Kerkweg 15, 2985 AZ Ridderkerk  
PO Box 4007, 2980 GA Ridderkerk, The Netherlands  
Tel: +31 180 49 55 55 Fax : +31 180 43 30 80  
[ridderkerk@trelleborg.com](mailto:ridderkerk@trelleborg.com) [www.trelleborg.com/ridderkerk](http://www.trelleborg.com/ridderkerk)