

# Proven Grouting Solutions for Offshore Foundations



# ITW Performance Polymers – Your Experienced Partner

## Densit

Densit® is a brand of ITW Performance Polymers. Since 1983, ITW Performance Polymers has been specializing in the development, manufacture and supply of high performance solutions based on its Ultra High performance Cementitious (UHPC) Densit material.

In addition to connecting offshore structures in the wind industry, UHPC Densit materials are applied worldwide in other demanding areas such as wear and abrasion resistant solutions, the reinforcement of oil and gas platforms, industrial flooring and pavement and security barriers.

## Quality Assurance

The various sites are certified to ISO 9001, ISO 14001 and OHSAS 18001. The manufacturing and quality management of Ducorit® products hold a Shop Approval Certificate issued by DNV-GL.



# Proven Grouting Solutions for Offshore Foundations

Ever since the start of offshore wind farm construction, ITW Performance Polymers' ultra high performance grout, Ducorit has been a crucial structural component of foundations for offshore wind turbines.

## Turnkey Grouting Services

ITW Performance Polymers has market leading experience in providing turnkey grouting services, which include consultancy, planning, manufacturing and supplying Ducorit material, installation, test sampling and documentation for any offshore structural design or installation scheme.

Each project is handled by a project manager and a leading supervisor to ensure that the project is carried out safely according to our ISO 9001, ISO 14001 and OHSAS 18001 quality management systems.

ITW Performance Polymers' offshore supervisors are skilled, experienced and dedicated to providing the best service. Throughout the grouting installation process, Ducorit samples are taken according to a strict quality plan for testing and documentation according to DNV-GL guidelines.

## Why Ducorit Grout?

Ducorit is a pumpable, ultra-high performance cementitious material especially developed for grouting offshore connections.

*Ducorit's properties make it a unique and strong solution for connecting structures offshore:*

- Extremely high strength and outstanding fatigue properties
- Minimal shrinkage
- Strong bond between Ducorit grout and steel
- Fast curing and strength development
- High inner cohesion, i.e. no mixing with sea-water
- Low hydration heat



## Turnkey Solutions

- Ducorit Products
- Equipment
- Personnel & Supervision
- Testing Facilities
- Project Management
- Transport & Storage

# More than 2,500 Grouted Connections in Offshore Foundations – Europe

- 56 2022:** Dolwin 6, Germany  
Jacket Sub Structure 10 pile
- 55 2022:** Dogger Bank Grouting, United Kingdom  
95 steel platform grouting operation
- 54 2020:** Fryslan Platform Grouting, the Netherlands  
89 concrete platform grouting operation
- 53 2018:** Borwin 3 Gamma Platform, Germany  
4-legged pile/sleeve
- 52 2017:** Borkum Riffgrund 2 Substation, Germany  
4-legged pile/sleeve
- 51 2017:** Walney 3 and 4, United Kingdom  
87 monopiles u/c
- 50 2016:** SS Nordsee 1, Germany  
4-legged jacket structure
- 49 2016:** OSS Veja Mate, Germany  
4-legged jacket structure
- 48 2016:** Dolwin Gamma, Germany  
2x9 pile/sleeve
- 47 2016:** Veja Mate, Germany  
67 monopiles
- 46 2016:** Wikinger, Germany  
70 4-legged jacket
- 45 2015/2016:** DanTysk, Germany  
Accommodation platform – 4-legged jacket
- 44 2015:** Gode Wind – Substation 1+2, Germany  
2 jackets OHVS 4 legged pile/sleeve
- 43 2015:** Baltic 2, Germany  
OHVS 4-legged pile/sleeve jacket
- 42 2014:** Baltic 2, Germany  
41 jackets/39 monopiles
- 41 2014:** Butendiek, Germany  
80 monopiles
- 40 2014:** Amrumbank, Germany  
80 monopiles
- 39 2014:** Borkum Riffgrund 1, Germany  
77 monopiles
- 38 2014:** Westermost Rough, United Kingdom  
35 monopiles
- 37 2013:** DanTysk, Germany  
80 monopiles
- 36 2013:** Northwind, Belgium  
72 monopiles
- 35 2013:** Nord See Ost, Germany  
Supply of materials
- 34 2012:** Globaltech 1, Germany  
80 tripods
- 33 2012:** Teeside, United Kingdom  
27 monopiles
- 32 2012:** Riffgat, Germany  
30 monopiles

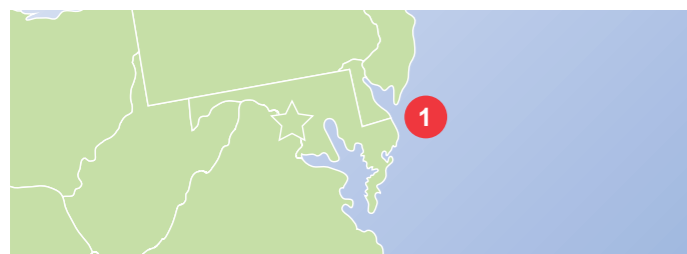


- 31 2012:** Meer Wind, Germany  
80 monopiles
- 30 2012:** Anholt, Denmark  
111 monopiles
- 29 2011:** Lincs, United Kingdom  
75 monopiles
- 28 2011:** London Array, United Kingdom  
177 monopiles
- 27 2011:** Walney 2, United Kingdom  
51 monopiles
- 26 2010/2011:** Sheringham Shoal, United Kingdom  
90 monopiles
- 25 2010/2012:** BARD Offshore 1, Germany  
80 tripods
- 24 2010:** Baltic 1, Germany  
21 monopiles
- 23 2010:** Walney 1, United Kingdom  
51 monopiles
- 22 2009/2010:** Belwind, Belgium  
56 monopiles
- 21 2009/2010:** Greater Gabbard, United Kingdom  
140 monopiles

- 20 2009:** Thanet, United Kingdom  
100 monopiles
- 19 2008/2009:** Alpha Ventus, Germany  
6 tripods
- 18 2008:** Gunfleet Sands, United Kingdom  
48 monopiles
- 17 2008:** Hooksiel, Germany  
1 tripod
- 16 2008:** Thornton Bank, Belgium  
6 undercasting of towers
- 15 2008:** Horns Rev 2, Denmark  
92 monopiles
- 14 2008:** Rhyl Flats, United Kingdom  
25 monopiles
- 13 2007:** Robin Rigg, United Kingdom  
60 monopiles
- 12 2007:** Lynn & Inner Dowsing, United Kingdom  
54 monopiles
- 11 2006:** Princess Amalia, the Netherlands  
60 monopiles
- 10 2006:** Burbo Bank, United Kingdom  
25 monopiles

- 9 2006:** Egmond aan Zee, the Netherlands  
36 monopiles
- 8 2005:** Barrow, United Kingdom  
30 monopiles
- 7 2004:** Kentish Flats, United Kingdom  
30 monopiles
- 6 2003:** Arklow Bank, Ireland  
7 monopiles
- 5 2003:** North Hoyle, United Kingdom  
30 monopiles
- 4 2002:** Samsø, Denmark  
10 monopiles
- 3 2002:** Horns Rev 1, Denmark  
80 monopiles
- 2 2001:** Yttre Stengrund, Sweden  
5 monopiles
- 1 2000:** Utgrunden, Sweden  
7 monopiles

# More than 300 Grouted Connections in Offshore Foundations – Asia and North America



- 7** **2022:** Formosa 2, Taiwan  
47 4-legged jackets
- 6** **2021/2022:** Greater Changhua, Taiwan  
111 3-legged jackets
- 5** **2021/2022:** Yunlin, Taiwan  
80 MP/TP's
- 4** **2021:** Akita Noshiro, Japan  
33 MP/TP
- 3** **2020:** TPC Changhua, Taiwan  
21 4-legged jackets
- 2** **2019:** Formosa 1, PH2, Taiwan  
20 MP/TP
- 1** **2015/2016:** Block Island, USA  
5 4-legged jacket structure

## Additional references outside Europe

- 2016/2017:** Huaneng, China  
2 4-legged booster station
- 2016/2017:** South Grid, China  
17 4-legged jackets
- 2015:** CGNPC, China  
1 4-legged booster station
- 2015:** Taipower, Taiwan  
1 MP/TP MET mast
- 2015:** TGC, Taiwan  
1 MP/TP MET mast
- 2014:** COOEC, China  
1 3-legged jacket

# Supervisors & Equipment

**ITW Performance Polymers supplies highly skilled and experienced offshore supervisors and state of the art equipment solutions for offshore wind projects.**

Our supervisors have gathered many years of experience- through our extensive reference list from all around the world. We ensure supervisors who are highly skilled communicators with good understanding of offshore work processes. They work closely with clients on board and apply a solution oriented work approach for optimal problem solving. Pioneering this business has enabled us to offer the most experienced supervisors in the business and ensure correct application of products every time.

In addition to our unique supervisors, we also provide specialized equipment as part of our turnkey solutions. We strive to eliminate as many obstacles as possible for our clients. Therefore, we have developed a fully containerized mixing system which ensures no dust emission, no deck cleaning and compact deck space.

Furthermore, our new waste reduction system ensures a very significant reduction in material waste, which means a significant cost reduction in waste handling for the client.



# Foundation Types

**The most significant foundation types in the offshore wind industry at the moment are monopile transition pieces and jackets.**

## Monopiles

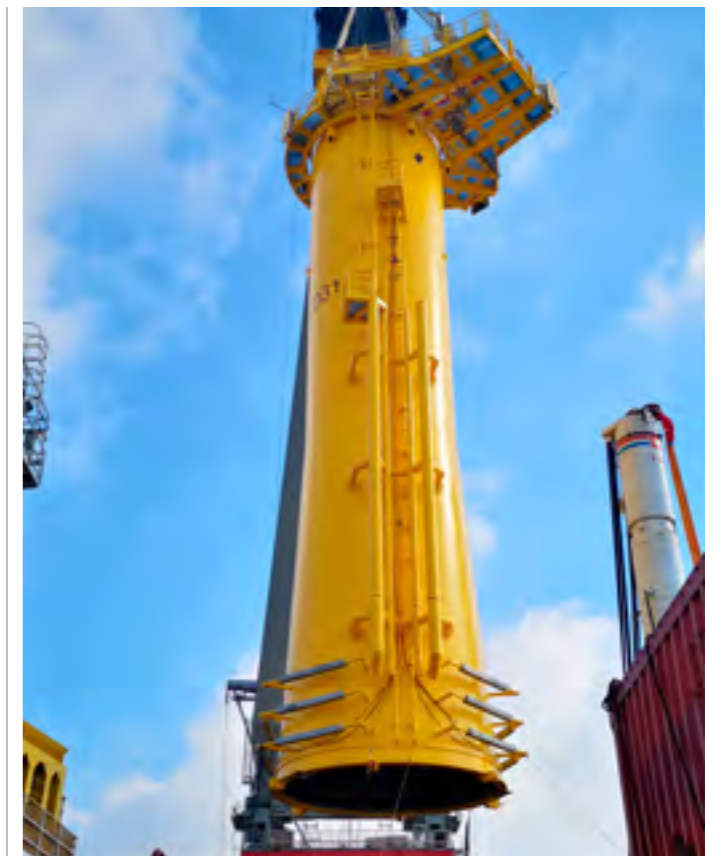
The monopile foundation concept is a proven, efficient and economical solution for connecting towers to foundations, as the concept enables the verticality of the base to be adjusted. A monopile foundation consists of a steel pile driven into the seabed and a transition piece slid onto or into the pile. The space between pile and transition piece is grouted with Ducorit which is mixed and pumped through flexible hoses into the annulus.

Applying Ducorit for the grouting of a transition piece to a monopile makes it easy to adjust the verticality of the tower and turbine in the event of an inclination in the monopile.

## Jacket Foundations

As wind farms are gradually being moved to deeper waters, jacket foundations are likely to become more common, as the jacket foundations enable wind turbine installations at more challenging water depths than the monopile tp's.

A recent example of this is the Wiking offshore wind farm project. Here, the installations were done at water depths between 37 and 43 meters, which required cutting edge installation technology. ITW Performance Polymers successfully grouted 70 challenging jacket installations with Ducorit S2, proving the Ducorit material's versatile capabilities once again.



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