

Ducorit®

- grouted connections of WTG tower flange to concrete gravity foundations

TW WindGroup

TW Densit

ITW Densit - your partner for grouted connections

Densit provides strong solutions for critical structural connections in on- and offshore wind turbine foundations.

The structural solutions are all based on Ducorit® - an Ultra High Performance Concrete (UHPC) material developed by ITW Densit.

Ducorit®

In the product range of Ducorit®, three products are optimal applicable and approved for use as structural connection between tower flange and foundation;
Ducorit® S5, Ducorit® S2, Ducorit® D4.

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

- Extremely high strength and outstanding fatigue properties
- Minimal shrinkage
- Strong bond between Ducorit® grout and steel
- High inner cohesion
- Low hydration heat
- Environmental friendly
- Easy to use and install

Technical data

	Ducorit® products
Compressive strength	90 - 200 MPa 13,500 - 29,000 psi
Modulus of elasticity	40 - 70 GPa 5,800 - 10,000 psi

Detailed data sheet

Compressive strength test

Approvals

Each Ducorit® product is approved by Materialprüfungsanstalt (MPA) meeting the requirements and specification in the DAfStb guideline on Vergussbeton and Vergussmortar.

The Ducorit® products hold a Statement of Conformity from Germanischer Lloyd (GL) stating that each product is approved for grouted connections in foundations of wind turbines.

Turnkey grouting services

ITW Densit provides turnkey grouting services, which include consultancy, planning, manufacturing and supplying Ducorit® material, installation, test sampling and documentation for any structural design or installation scheme.

Each project is handled by a ITW Densit 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 management systems.

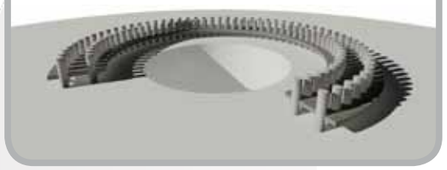
Mobile mixing and pumping equipment

Grouted connections of WTG tower flange to concrete gravity based foundations with Ducorit®

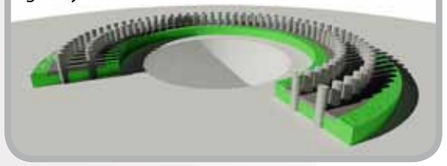
A technical short cut and cost reducing concept, reducing the stress and load on the gravity based foundation, by introducing an intermediate layer of Ducorit®, between the WTG bottom tower flange and the gravity based foundation with anchor bolts and plates.

The intermediate layer of Ducorit® allows the forces transferred from the flange, to be distributed onto a larger area of the concrete foundation, hence reduce the specification needed for the concrete used for the foundation.

The tower flange.



Ducorit® between the WTG tower flange and the gravity based foundation.



A short-cut in design:
New designs or modifications of nacelle and wing design could lead to increased load forces and in case of using standard tower or foundation design, the critical connection between the tower flange and the concrete foundation ends up with a re-design and manufacturing of both new tower flange and/or higher requirements of the concrete foundation, the ability to use already designed towers and foundations designs are cost beneficial by:

- Major part of the design documentation is already present and ready to use.
- Lean production of towers - no change is needed hence lower production cost.
- No change in specification of the foundation.

Upgrading of existing design:
If an increased safety factor is needed for the flange - connection to foundation, or the concrete foundation do not meet the required specification, the introduction of an intermediary layer of Ducorit® could be the solution and save the costs of re-building the foundation.

Other benefits:

- New tower design with larger flanges can be optimized for transport by reducing the width of the flange and use Ducorit® as an intermediate layer to distributed the forces onto a larger area of the concrete foundation.
- Ducorit® has higher specifications, when comparing to ordinary cement and epoxy grouts.
- Ducorit® absorbs geometric form deviations of both the flange and the concrete foundation, because Ducorit® provides full contact in the connection.

ITW Densit - your experienced partner for connecting offshore structures around the world

ITW DENSIT - part of ITW WindGroup
ITW Densit ApS is part of Illinois Tool Works (ITW) a global industrial company that operates over 800 businesses located in 52 countries worldwide.

ITW focuses on developing value-added products and innovative customer solutions to serve diverse end markets and customer segments. One area of such focus is the Wind Industry market where the company services global customers through its ITW WindGroup business.

ITW Densit ApS brings its unique global platform of Ducorit® grout solutions for offshore and onshore foundation installations through the ITW WindGroup into this market. As part of the ITW WindGroup ITW Densit ApS leverage global economies of scale, established distribution network and pricing to help its customers remain competitive in the marketplace.

ITW DENSIT ApS
Since 1983, ITW Densit has been specializing in the development, manufacture and supply of high-performance solutions based on its Ultra High Performance Cementitious (UHPC) Densit® materials. In addition to connecting offshore structures in the wind industry, UHPC Densit® materials are applied worldwide in other demanding areas such as the reinforcement of oil and gas platforms and security barriers and as wear and abrasion resistant solutions.

Quality assurance
ITW Densit is certified to ISO 9001, ISO 14001 and OHSAS 18001. The manufacturing and quality management of Ducorit® products hold a Shop Approval Certificate issued by Germanischer Lloyds Industrial Service.

GL OPERATING 24/7

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