



# Fosroc Solutions for On-shore Wind Turbines

[www.fosroc.com](http://www.fosroc.com)



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# ABOUT FOSROC INTERNATIONAL

Since the company's beginnings over 80 years ago, Fosroc has developed into an International leader in delivering Constructive Solutions for projects across a broad range of market segments including transport, utilities, industrial and general buildings.

Fosroc's commitment to customer service and technical support is second to none. We work closely with architects, structural engineers, contractors and owners to best understand their requirements. Together we can develop a bespoke solution for a construction project, adding value and becoming more than just a materials supplier, but a solution provider.

Fosroc has an extensive network of offices and manufacturing locations across Europe, the Middle East, Africa, India, North, South and East Asia, and is further represented in other regions across the world by distributor and licensee partners.

Selecting from the full portfolio of Fosroc products and services and integrating expert technical support, world class customer service and innovation, Fosroc goes beyond just product selling to ensure that we partner with our customers to deliver complete constructive solutions.

- > Admixtures
- > Adhesives
- > Protective Coatings
- > Concrete Repairs
- > Industrial Flooring
- > Grouts & Anchors
- > Joint Sealants
- > Surface Treatments
- > Grinding Aids
- > Waterproofing



## FOSROC DELIVER SOLUTIONS NOT JUST PRODUCTS

### CAD Details

A library of standard CAD details are available, bespoke CAD details can be created for your specific project

### Project Specifications

Dedicated specification managers on hand to assist with correct system choices and tailored solutions

### Site Support

Expert product and application support made available from our specialist teams.

### Seminar & Training

Comprehensive programme of seminars and training courses designed to expand and reinforce your knowledge.

Leader in delivering Constructive Solutions  
**Worldwide!**





The need for energy to meet increasing global demand is driving more and more innovative solutions. The world needs to utilise natural energy resources with solutions that can be installed quickly, close to where they are needed.

Wind turbines meet this requirement, and the growing industry demands products that ensure the successful and durable operation of these critical pieces of equipment.

Fosroc's experience in concrete and grouting enables us to provide bespoke solutions designed for practical application in challenging situations. We have been working in the wind industry for many years and have supplied most of the leading turbine manufacturers supporting projects in Europe, the Middle East, Africa, India, East Asia, Australasia, North & South America.





# CONTRACTOR SUPPORT

Fosroc runs certification schemes, sponsored by leading manufacturers, where contractors can learn the skills that they will need to correctly apply Conbextra grouts to the specifications laid down by the client. This is because the skills of the contractor are key to successful application of the products.

Fosroc travels the world supporting and overseeing application, providing contractors, engineers and clients with peace of mind.





# CONCRETE TECHNOLOGY

The construction of wind farms begins with casting the huge base foundations. These structures present a technical and practical challenge to engineers and contractors. Problems in casting bring high costs and problematic time delays.

Concrete bases require high strength concrete, Fosroc are familiar with providing admixtures that will help produce high strengths and control cracking even when cast in mass. The concrete must also be fluid to flow around the heavy reinforcement without the formation of voids and honeycombing.

Many wind farms are constructed in areas that are difficult to access, meaning that the concrete may have to spend a long time in transit before it is cast. Workability retention is critical in this situation, Fosroc admixtures can ensure that maximum retention is achieved.

Fosroc's range of admixtures and expert technicians can develop a site specific mix design to ensure that the concrete will achieve the design strengths required as well as meeting the challenge of application.

Fosroc can also offer high efficiency curing compounds, mould release oils, repair mortars, bonding agents and finishing mortars to create a durable and blemish free concrete finish.





# TAILOR MADE GROUTING SOLUTIONS

Because Fosroc understand grouts and understand wind turbines, we know that a single solution is not appropriate for all.

Fosroc's team of materials engineers have designed a range of cementitious grouts that meet the strength, depth, fatigue and durability requirements that are required by the major turbine manufacturers.

Depending on the product, strengths range above 120MPa . Grouts can flow to depths of 400mm and with annulus cross sections of many metres, with no cracking or shrinkage.

Fatigue resistance and durability results are excellent for Conbextra wind turbine grouts due to their high quality and excellent strengths. Conbextra grouts have been tested and validated at some of the world's leading material laboratories.



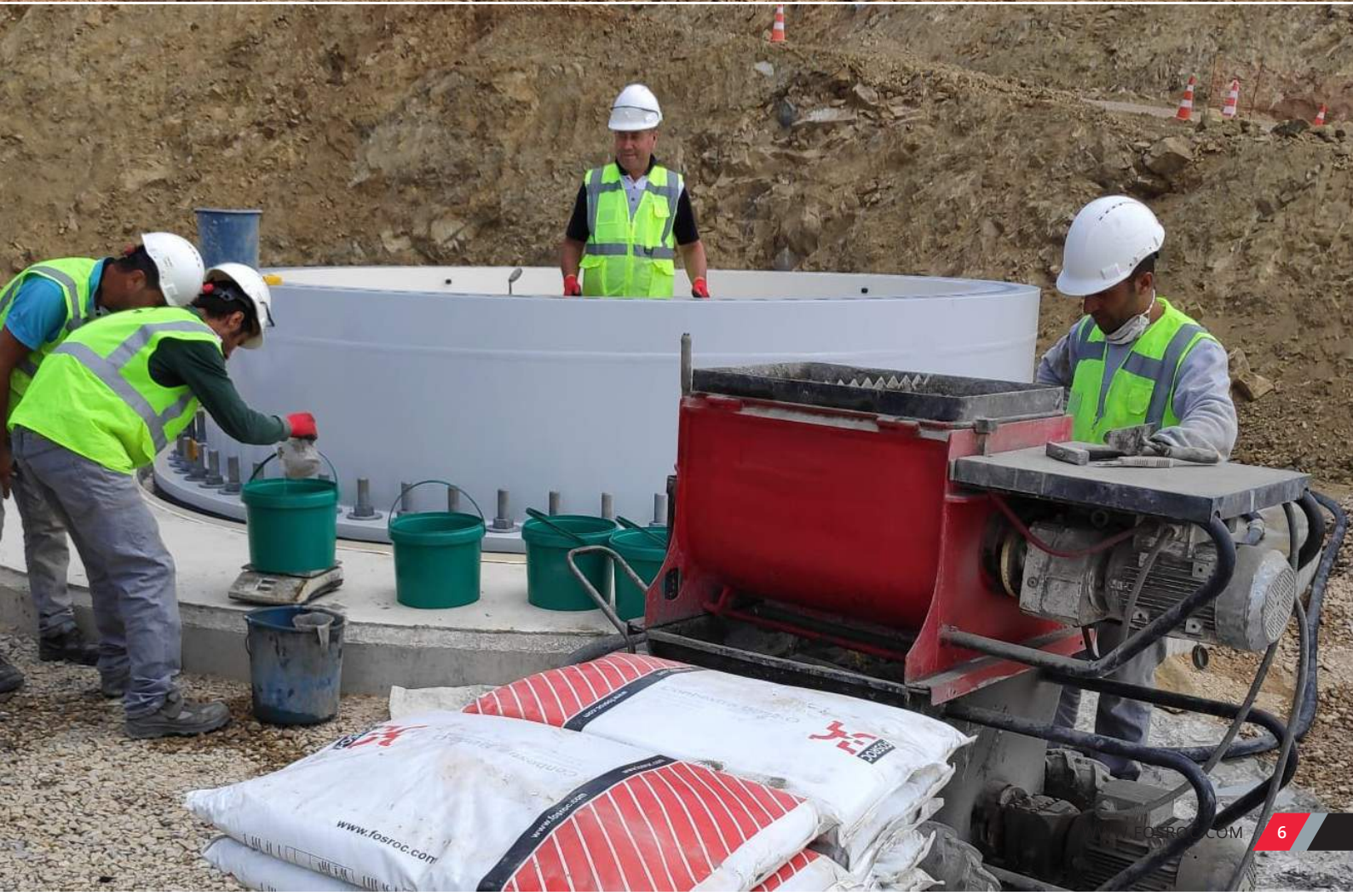
## FROM LAB TO SITE

Products that are market-leading in their application properties deliver the best real-life performance. Conbextra products have been developed and tested in conjunction with manufacturers and experienced applicators. Fosroc chemists and technical experts frequently visit turbine grouting projects to fully understand the challenges at site. This process creates products that are robust and will achieve the right results on site as well as in the laboratory.

Site conditions are frequently challenging applicators. Conbextra grouts have been finely balanced to create products that retain their flow and workability even in hot climates. When construction schedules are tight, it is good to know that Conbextra grouts gain strength rapidly to ensure tower construction can continue within a few days.











## CONCRETE SEGMENTAL TOWERS

Where concrete segmental towers are being used, Fosroc's experience in practicality and material handling is invaluable.

Our Epoxy sealer/adhesive can be used to create a very strong line to bond the segments together and prevent gout escaping when pumped under pressure.

We have bespoke grouts for the vertical sections of the rings, requiring lower strength but good workability.

Our grouts for the horizontal sections can be pumped as high as 100m without segregation, bleeding or voiding.



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# CONSTRUCTIVE SOLUTIONS IN ACTION

Fosroc has supplied to hundreds of wind farms in many countries on six continents. Our solutions are based around practicality and meeting the unique challenges that construction in a tough environment brings. Below is a small selection.



**Bothe, India**

The project in India used Conbextra BB92-O grout, specified for high strength and fatigue resistance. Materials were supplied from Fosroc's manufacturing base in Spain, training and local support was provided by the local Opco team in India.



**Pen y Cymoedd, UK**

This project in the south Wales Valleys spans 130 km<sup>2</sup> and the challenge was to cast over 50,000m<sup>3</sup> of concrete and transport it over hilly terrain. Fosroc Auramix 740SR was an ideal solution, providing workability retention for 4 hours with high early strengths.



**Ventica, Mexico**

A complete system of grouting has been applied to this precast tower. The sections were sealed and bonded using Nitobond PC20, epoxy adhesive and sealer. Sections were grouted using Conbextra BB92, selected for its strength and workability.



**Tan Phu Dong 2, Vietnam**

Situated in the Mekong Delta, the project posed a special engineering challenge as the foundations were placed in the tidal zone. Conbextra VG was selected because of its high resistivity and strength. Nitocote CM210 protects the foundations from seawater.



**Turbine Bases - Ireland**

Issues during casting created numerous shrinkage cracks and points of low cover. Fosroc was on hand to produce a scheme of repairs to inject cracks, repair weak concrete and re-finish the base with a protective cementitious slurry.



**Gangwon do, South Korea**

Fosroc's Team in Korea worked hard to train local applicators in the use of Conbextra VG and ensure it was imported successfully. Regular site visits through the application, made certain Fosroc's first project in South Korea was successful.





## PROTECTIVE COATINGS

Fosroc has a wide range of protective coatings suitable for use protecting concrete bases. They can be used above or below ground level, providing resistance and protection from water, chlorides, sulphates, carbonation even physical damage.

Coatings can provide an excellent enhancement to durability in harsh environments while simultaneously improving the visual finish.



## WATERPROOFING

If soil conditions are an issue, turbine bases can be protected with our range of liquid, adhesive or mechanically bonded membranes. They provide long-lasting protection from water and moisture-borne contaminants.

Waterproof substations with the unique waterproof membrane, Proofex Engage. Fosroc has a complete range of solutions to protect infrastructure from unexpected water infiltration that can lead to power outages.



## CONCRETE REPAIR

Fosroc are experts in repairing concrete with a range of cementitious or polymer products to repair nearly every issue.

Whether the damage is caused by long-term deterioration or is new as a result of casting, lifting or cracking. Mortars, injection resins, re-profiling products are all available to help restore the concrete to its intended state.



## SEALANTS

Interfaces between the tower and the grouts can be subject to moisture ingress which may prematurely shorten the life of the turbine or lead to costly repairs.

Fosroc Nitoseal range of sealants offer permanently flexible sealing, with a high adhesion and resistance. They can adhere to damp substrates and ensure maximum durability in fine details.



# PRODUCT RANGE SELECTOR

A selection of common Fosroc Grouting and Fixing Products and their application. More products are available, consult your local Fosroc Company.

Application	Product	Material Characteristics
Turbine Base Grouting	Conbextra BB95	Designed to meet SGRE specification Thickness 10-250mm Ultimate Strength > 110MPa Fatigue tested
Turbine Base Grouting	Conbextra BB92-O	Designed to meet SGRE specification Thickness 10-200mm Ultimate Strength > 90MPa Fatigue tested
Turbine Base Grouting	Conbextra VG	Designed to meet Vestas specification Thickness 25-400mm Ultimate Strength > 120MPa Fatigue tested
Turbine Base Grouting	Conbextra TA	Thickness 25-400mm Ultimate Strength > 120MPa DAfStb & Fatigue tested
Turbine Base Grouting & Concrete Tower Grouting	Conbextra BB92	Thickness 10-150mm Ultimate Strength > 90MPa
Concrete Tower Grouting of vertical joints	Conbextra JV	Cementitious Thickness 10-100mm Ultimate Strength > 85MPa
Concrete Tower Segmental Adhesive	Nitobond PC20	Epoxy Resin Ultimate Strength > 100MPa
Super Plasticiser for Concrete Bases	Auracast range	High Early Strengths Excellent Surface Finish
Curing Agent	Concure WB	High efficiency water based curing agent for concrete and cementitious grouts
Repair Mortars	Renderoc Range	Various thickness and strength repair systems for damaged concrete bases
Injection Resins	Nitofill LV	For permanent structural sealing and waterproofing of fine cracks
Waterproofing cementitious materials	Nitocote CM660 Brushbond FLX III	Withstand positive and negative water pressure
Waterproofing Polymer materials	Nitoproof 600	Flexible protective coating
Surface skim / Slurry Coating	Renderoc FC / Nitocote CM650	Protective system for application to concrete Providing impervious finish
Joint Sealant	Nitoseal MS300	Robust, permanently elastic waterproof seal Movement accommodation factor 50%

## A POWERFUL FUTURE

Fosroc is literally building the foundations for a green powered future.

Our product range, quality and service will ensure your projects are built to last and strengthen the works you construct. We are proud to partner and work with some of the leading producers of global wind energy and travel the world to support it.



Fosroc offers a full range of construction chemical solutions, helping to protect structures throughout the world. Please refer to our brochures, which include:



Details of your local Fosroc office can be found at [www.fosroc.com](http://www.fosroc.com)

**Important Note**

Fosroc products are guaranteed against defective materials and manufacture and are sold subject to its standard terms and conditions of sale, copies of which may be obtained on request. Whilst Fosroc endeavours to ensure that any advice, recommendation, specification or information it may give is accurate and correct, it cannot, because it has no direct or continuous control over where or how its products are applied, accept any liability either directly or indirectly arising from the use of its products, whether or not in accordance with any advice, specification, recommendation or information given by it.



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