



YOUR TRUSTED PARTNER FOR
ONSHORE WIND CONSTRUCTION

CHALLENGES IN ONSHORE WIND FARMS



YOUR TRUSTED PARTNER

Wind energy is a key driver in the global shift toward renewable power. In recent years, the onshore wind sector has experienced strong growth in the demand for **reliable and efficient construction solutions**.

Wind energy is generated by converting the kinetic energy of moving air into electricity using wind turbines. These turbines must withstand not only static loads but also dynamic forces caused by the rotation of the blades. Additionally, they operate in some of the harshest and most isolated environments on the planet.

To maximize the efficiency and reliability of wind turbines, Sika has developed a comprehensive portfolio of solutions for wind power construction. With deep expertise in construction technologies, Sika offers a complete suite of products and services for wind energy projects – from the foundation of the wind tower to the blades of the turbine.



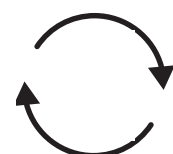
ACHIEVING RELIABLE LOAD TRANSFER

Onshore wind turbines face extreme static and dynamic forces, combined with challenging environmental conditions. Ensuring that towers remain stable under these stresses is a major challenge, especially as turbines grow taller and more powerful. Reliable load transfer from the tower to the foundation is critical to prevent structural failures and maintain safe operations.



DURABILITY AND LONG-TERM PERFORMANCE

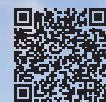
Wind turbine foundations and tower components are constantly exposed to harsh environmental conditions, including moisture, temperature fluctuations, and chemical agents. Over time, these factors can degrade materials, corrode reinforcement, and weaken the structural integrity of the wind farm. Maintaining long-term durability under such conditions is a critical challenge for onshore wind energy projects.



OPERATIONAL EFFICIENCY AND LIFECYCLE MANAGEMENT

Managing the ongoing operation of wind turbines over decades presents significant challenges. Damage to foundations due to dynamic loads and settlement, and unexpected component failures can impact energy production, safety, and overall efficiency. Ensuring reliable performance throughout the turbine's lifecycle requires careful planning and proactive management of long-term operational risks.

YOUR CHALLENGES, OUR SOLUTIONS



CONTACT YOUR
SIKA EXPERT FOR
ADDITIONAL
INFORMATION

1

Robust, fatigue-resistant grouting solutions engineered to deliver exceptional load transfer, fast installation, and long-term stability for steel and hybrid tower foundations. Built to perform in the demanding realities of modern wind farms.

ULTRA-HIGH PERFORMANCE SOLUTIONS FOR STEEL & HYBRID TOWERS

Cementitious grouts & mortars
Epoxy grouts & adhesives

2

Comprehensive systems for durable, sustainable, and high-performing concrete towers. Engineered to withstand harsh climates and dynamic loads while enabling greater hub heights and optimized long-term strength.

TAILOR MADE SOLUTIONS FOR CONCRETE TOWERS

Cementitious grouts & mortars
Epoxy adhesives
Concrete protection

3

High-performance protection systems that enhance structural integrity, safety, and service life. By reducing deterioration and repair needs, they support continuous energy production with minimal downtime and maximum reliability.

MAINTENANCE, REPAIR & LIFECYCLE EXTENSION

Concrete repair Corrosion protection
Crack repair Structural strengthening
Waterproofing

4

Next-generation admixture technologies designed to enhance strength, production efficiency, and long-term durability of precast tower segments and cast-in-place concrete. Perfect for building higher, stronger, and more resilient wind turbine structures.

ADVANCED ADMIXTURES FOR PRECAST SEGMENTS & FOUNDATIONS

Superplasticizers	Retarders & accelerators
Macro & micro fibers	Water reducers
Pumping agents	Mould release agents
Air entraining agents	Curing compounds

ULTRA-HIGH PERFORMANCE GROUTS FOR TOWERS

AS ONSHORE WIND TURBINES grow taller and more powerful, the demands placed on their foundations continue to rise.

At the heart of every safe and reliable installation lies a material that often goes unnoticed.

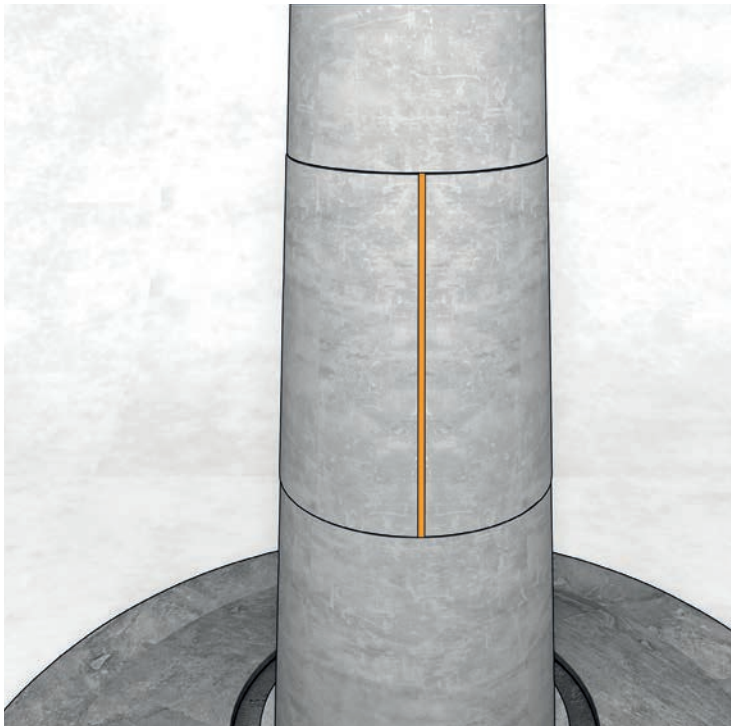
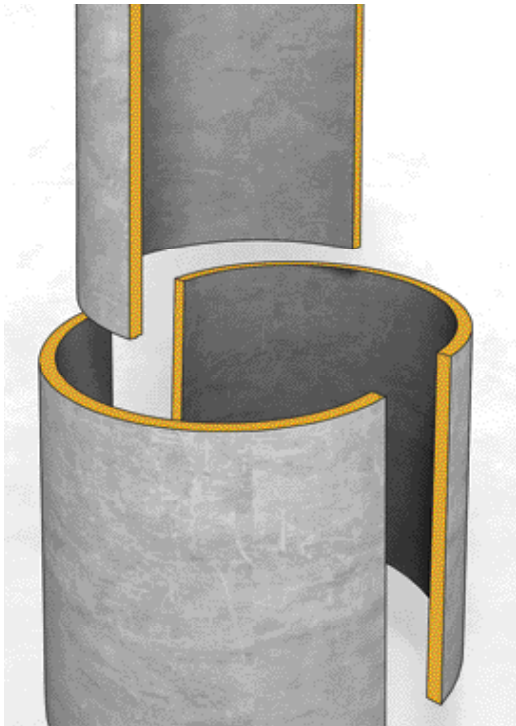
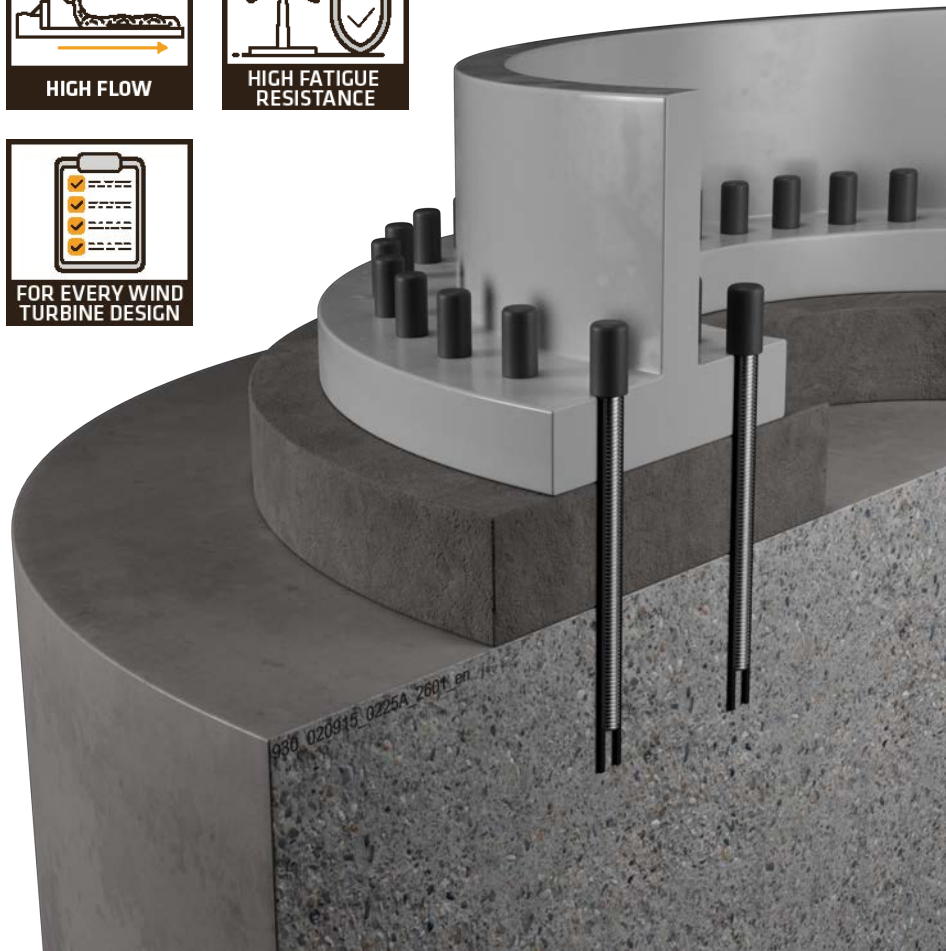
Ultra-high performance grout is the critical link between the wind turbine tower and its foundation. It ensures reliable load transfer, absorbs extreme static and dynamic forces, and provides the long-term stability every wind farm depends on.

For all types of onshore wind turbines with steel, hybrid and concrete towers, the right grout enables fast installation, high early strength, and durable performance, even under

demanding onshore conditions. Outstanding flowability, pumpability, and shrinkage-compensated formulations allow efficient application and long-lasting, fatigue-resistant foundations.

Hybrid and concrete towers require grout to be pumped over 100 m to internal joints, an extreme challenge that demands exceptional stability and long-distance pumpability. Sika's proven formulations ensure consistent performance at height, enabling safe and reliable installation for next-generation tower designs.

BENEFITS OF SIKA SOLUTIONS



Sika solution	Main Characteristics
SikaGrout®-9400	Ultra-high strength, fatigue resistant cement-based grout for onshore wind turbines with steel towers
SikaGrout®-9130	Ultra-high early and final strength, shrinkage compensated, cementitious grout for onshore wind turbines.
SikaGrout®-9320 BE	Ultra-high strength, fatigue resistant cement-based grout designed for steel & hybrid towers with reduced CO ₂ footprint
SikaGrout®-295	High performance, cementitious grout for onshore wind turbines with concrete towers
Sikadur®	Epoxy adhesives for precast segment bonding

16 STEPS TO SUCCESSFUL GROUTING

1

CONFIRM THE QUANTITY OF GROUT NEEDED

Count the number of bags to ensure that the right amount of grout is available before starting the mixing of the material. This value needs to be recorded by the grouting contractor before the procedure begins.

2

RECORD WEATHER CONDITIONS AND CHECK NECESSARY PROTECTION MEASURES FOR THE APPLICATION

During the application, the substrate and ambient temperatures should be recorded and controlled. Ambient humidity also needs to be taken into consideration for the water ratio and the curing methods. The values should be recorded by the grouting contractor before and during the grouting works.

If rain is expected, a shelter or tent must be installed before pouring the grout to avoid any rain damage.

3

TIMING AND PLANNING FOR BREAKS

Breaks should be planned so that there is no interruption in mixing; maintain a continuous pouring process per foundation and avoid stop-go during the application. The detailed plan should be indicated by the contractor for each specific project so that breaks are accommodated for.

4

CONFIRM POWER AND WATER SUPPLIES

Power for equipment should be approved for use for each project. Always conform to local laws and restrictions when using diesel powered equipment. When using an electric motor, check to see if the voltage requirement is available on the job site. Check to confirm if there is an adequate supply of clean water on the job site to fill the bowser or IBC containers.

5

SUBSTRATE PREPARATION

Cleaning the substrate with high water pressure. This is essential to ensure that no loose particles will block the areas where the grout needs to flow.

6

INSPECTION OF THE SUBSTRATE

The concrete substrate in the area to be grouted should be inspected in advance to check for cracks and other defects and should be repaired accordingly for each specific project.

7

INSTALLATION AND CHECKING THE FORMWORK

Install the formwork and seal it. It should be watertight to avoid leaks.

8

PREPARATION OF THE EQUIPMENT

- Ensure that the equipment is functioning correctly.
- Verify that the right amount of grout and water is available. Account for at least 10 % of excess material.

- Check to see if the QC devices are ready.

- Check the hose, including its length, arrangement, and couplings. Do not use hydraulic hoses.

- Prepare the grout lines. You can lubricate them with cementitious slurry made of cement and water or a pre-batch slurry.

- Verify that the substrate is properly prepared and pre-wet before starting the pumping procedure.

- The mixing of the SikaGrout® must be done only with clean water, without any other additional products. Refer to the latest product data sheet of the grout before starting the mixing process.

- The SikaGrout® can be mixed with a low hand drill mixer for very small quantities or using a force action mixer. (Refer to the product data sheet for detailed instructions).

9

QUALITY CONTROL

The required QC protocol must be agreed before starting the grouting works with the supervisor responsible. The grouting contractor must fill in the quality control sheets during the grouting works.

10

GROUTING PROCESS: MIXING AND PUMPING

Mix the grout with the right amount of water according to the ambient conditions. Once a homogeneous mix is achieved, normally after 5 minutes of mixing, start pumping.

11

QUALITY CONTROL: FILL THE CHECK LIST

12

CURING OF THE GROUT

The application should be protected from wind, rain, frost and direct sunlight. The curing period is dependent on ambient conditions. The application should be moistened to avoid premature drying in warm, dry weather conditions. Once the grout is ready, cure it under a layer of water (recommended to be kept for at least 3 days).

Continue with this curing method until the final set of the grout (determined at the time at which one cannot penetrate the grout with a pointed trowel). Consider the strength development curve

at different temperatures to decide when the formwork can be removed or when the bolts can be stressed.

13

CLEANING TOOLS

Clean all tools and application equipment with water immediately after use. The hardened material may only be removed mechanically.

14

WASTE DISPOSAL

Dispose of unwanted material responsibly through licensed waste disposal contractors, in accordance with local legislation and/or regional authority requirements.

(For detailed information, refer to the material safety data sheet).

15

CONTINGENCIES: SOLUTION PROPOSALS

Check with Sika Specialists for further details.

16

FINAL INSPECTION

NEXT UP

MAINTENANCE, REPAIR & LIFECYCLE EXTENSION

Extending the service life of wind turbines is essential as renewable energy demand grows. Foundations face weather, dynamic loads, and long-term wear, making proactive maintenance key to preserving structural integrity and minimizing downtime. By protecting foundations early and effectively, operators reduce repair needs, lower lifecycle costs, and keep energy production running smoothly. With Sika's proven solutions for protection and repair, wind farms can operate safely, reliably, and sustainably for many years.

CONCRETE REPAIR SOLUTIONS

ONSHORE WIND TURBINE FOUNDATIONS endure extreme environmental conditions and continuous mechanical loads throughout their lifespan.

Over time, these factors can lead to structural deterioration, including cracking in concrete, corrosion of reinforcement, and overall weakening of foundation components. If left unaddressed, these issues can compromise structural integrity and safety, potentially reducing the turbine's operational efficiency and lifespan. Therefore, timely damage assessment and repair are essential to maintaining the foundation's strength and reliability.

Effective structural repair restores the foundation's stability, ensuring long-term performance and operational safety. By applying advanced repair and reinforcement techniques, existing damages can be mitigated while preventing future deterioration. This proactive approach not only enhances structural safety but also reduces maintenance costs and extends the service life of wind energy infrastructure. Regular monitoring and timely interventions are key to ensuring the continued efficiency and sustainability of onshore wind farms.



BENEFITS OF SIKA SOLUTIONS



Includes all material technologies and accessories.



Compatible with other Sika systems.



Comprehensive solutions for all types of damage – even the smallest cracks.



High quality materials offering long-lasting protection.

Sika solution	Main Characteristics
Sika MonoTop® Repair Mortars	1-component, fiber-reinforced, low shrinkage structural repair mortars for re-profiling damaged concrete and restoring structural integrity
Sikadur® Adhesives	2-component, epoxy-based adhesives to ensure structural bonding during repair
Sika Injection Resins	2-component, epoxy- and PU-based injection resins to structurally repair cracks

WATERPROOFING SOLUTIONS

WATERPROOFING IS ESSENTIAL TO ensuring the longevity, durability, and structural integrity of onshore wind turbine foundations.

Exposure to moisture, freeze-thaw cycles, and harsh environmental conditions can lead to concrete deterioration, reinforcement corrosion, and costly repairs. By implementing advanced waterproofing solutions, wind farm operators can proactively prevent water infiltration, protect against chemical and mechanical damage, and enhance the resilience of turbine foundations, ultimately reducing maintenance needs and maximizing operational efficiency.

Sika's comprehensive range of waterproofing technologies is designed to meet the demanding conditions of wind energy infrastructure. From flexible membrane systems and liquid-applied coatings to waterproofing admixtures, joint sealants, and high-performance injection grouts, our solutions provide superior protection against water ingress. Engineered for easy application and long-lasting durability, these watertight systems ensure seamless performance and extended service life, even in the most challenging environments.

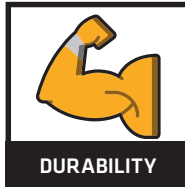
BENEFITS OF SIKA SOLUTIONS



Includes all material technologies and accessories.



Compatible with other Sika systems.

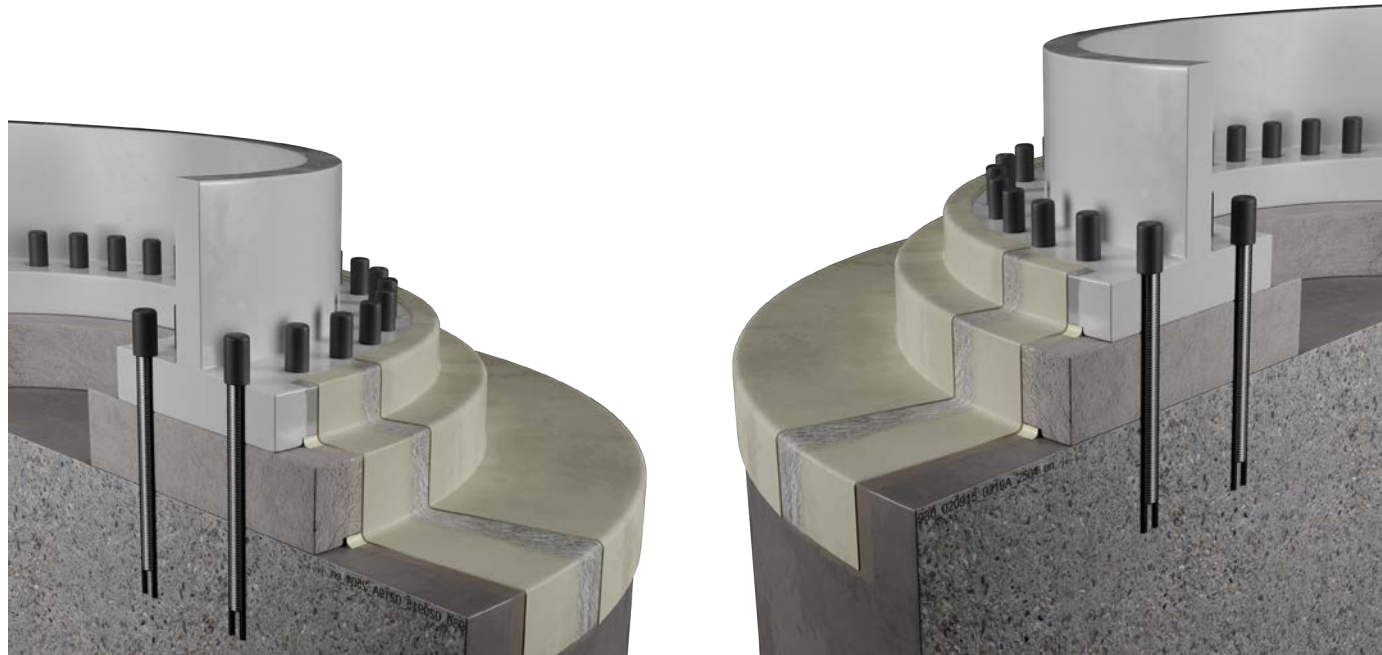


Resistant to harsh climatic conditions at wind farms.



No need for special equipment.

Sika solution	Main Characteristics
Sikalastic®-625	High-performance, liquid-applied polyurethane waterproofing membrane
Sikaflex® PRO-3 Purform	Moisture-curing, elastic polyurethane sealant

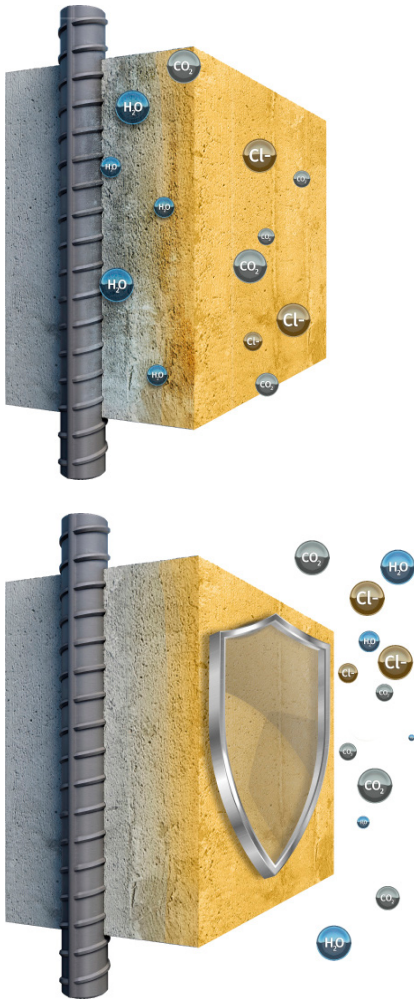


SOLUTIONS FOR CORROSION PROTECTION

STEEL REINFORCEMENT IS THE backbone of wind turbine foundations and precast tower elements, but it is also highly vulnerable to corrosion caused by carbonation, chloride ingress, and moisture penetration.

Once corrosion sets in, it can rapidly compromise structural integrity, safety, and service life, leading to costly repairs or even premature failure. Proactive corrosion protection is therefore critical in extending the lifespan of wind energy infrastructure, ensuring that turbines continue to perform reliably in demanding onshore environments.

Our advanced corrosion protection solutions provide a comprehensive approach to safeguarding steel reinforcement in concrete. From corrosion-inhibiting admixtures and protective coatings to galvanic anodes and hydrophobic treatments, these technologies effectively block aggressive agents, mitigate corrosion cells, and maintain the passive layer around steel bars. Designed for long-term durability, ease of application, and sustainability, our systems deliver a robust defense that ensures wind turbine foundations and tower components remain safe, resilient, and efficient throughout their entire service life.



BENEFITS OF SIKA SOLUTIONS



No need for special equipment.
Minimize downtime.



Offers maximized service life to structures.



Compatible with other Sika systems.



Solutions for every type of corrosion risk.
Low CO₂ footprint.
Available in different colors.

Sika solution	Main Characteristics
Sikagard®	Silane-based hydrophobic treatments and protective acrylic coatings with crack bridging
Sika® Ferrogard®	Galvanic anodes and surface-applied corrosion inhibitors

SOLUTIONS FOR STRUCTURAL STRENGTHENING

WITH THE GROWING DEMAND for renewable energy, extending the service life of existing wind turbines has become more important than ever.

Full replacements are costly and resource-intensive, while strengthening existing foundations offers a sustainable, economical, and efficient way to ensure continued reliability and safety. By reinforcing foundations, operators can maintain performance, adapt to higher loads, and support the transition toward a cleaner energy future.

Sika's advanced CFRP strengthening systems offer a proven solution for upgrading existing foundations with speed and efficiency. Lightweight yet extremely strong, these materials are easy to transport and install and they significantly reduce downtime during the strengthening process. Backed by a comprehensive portfolio and decades of global experience, Sika ensures that wind energy infrastructure remains strong, resilient, and ready for the future.



BENEFITS OF SIKA SOLUTIONS



Fast application and curing.
Minimal downtime for energy production.



Does not increase weight during strengthening.



Durable systems for extended service life.

Sika solution	Main Characteristics
Sika® CarboDur®	Carbon fiber plates for structural strengthening
SikaWrap®	Carbon fiber fabric for structural strengthening
SikaDur®	2-component epoxy adhesives for structural strengthening



SOLUTIONS FOR CONCRETE ADMIXTURES

PRECAST CONCRETE ELEMENTS PLAY a crucial role in the construction of concrete and hybrid wind turbine towers as well as their foundations, offering precision, efficiency, and durability.

However, to meet the demanding conditions of wind energy infrastructure, advanced concrete admixtures are essential in optimizing the performance of these precast components. By improving workability, strength development, and durability, admixtures enable superior crack resistance, reduced shrinkage, and enhanced load-bearing capacity, ensuring the long-term stability of wind turbine structures.

Sika's specialized admixtures such as high-range water reducers, accelerators, and durability-enhancing additives significantly improve concrete quality, production efficiency, and sustainability. These solutions allow for faster demolding, reduced curing times, and increased early strength, which are vital for the rapid and cost-effective production of precast components. Additionally, by enhancing freeze-thaw resistance, mitigating shrinkage, and reducing permeability, admixtures contribute to longer service life and reduced maintenance needs, ensuring reliable performance in even the harshest environmental conditions.



BENEFITS OF SIKA SOLUTIONS



FASTER PRODUCTION
High early strength for rapid demolding.



SUPERIOR WORKABILITY
Optimized mixing and placement performance.



ENHANCED DURABILITY
Improved resistance to cracking and shrinkage.



LONGER SERVICE LIFE
Improved performance with fibers and reduced permeability.

Sika solution	Main Characteristics
Sika® ViscoCrete®	Superplasticizer to improve workability and increase strength and durability of high performance concrete
SikaPump®	Pumping agent to enhance pumpability and reduce pumping pressure, especially in case of difficult mix designs and unfavourable grading curves
Sika® ViscoFlow®	Superplasticizer for production of mass concrete and realization of extended workability times
SikaFume®	Additive based on silica fume to enhance durability
SikaFiber®	Micro- and macrofibers for enhanced durability and reinforcing of concrete



REPAIR RESINS FOR COMPOSITE STRUCTURES



SIKA'S FAST LAMINATING RESINS allow for repairs even at low temperatures.

Sikadur® Blade Repair Kit

Sikadur® Blade Repair Kits are high performance, 2-component epoxy, hand laminating, resin systems used for structural laminate repairs of wind turbine blades. The rheology is designed to ensure excellent fibre wetting, while also exhibiting good non-draining properties for vertical applications.

ADVANTAGES

- Good fibre impregnation and non-draining properties
- Fast strength build up during cure
- Application temperature from 5°C
- High glass transition temperature
- Crystallisation resistant for use at low temperatures
- Lightweight, low waste Mixpack packaging
- Pre-measured quantities (no weighing of components)
- Approved by DNV GL

RECOMMENDED SIKA PRODUCTS

Sikadur® Blade Repair-30

2-component epoxy, hand laminating resin system with 30 minute pot life.

Sikadur® Blade Repair-90

2-component epoxy, hand laminating resin system with 90 minute pot life.



Structural composite damage.



Chamfering of damaged area.



Application of fiber patch and adding Sikadur® Blade Repair Resin.



Add fiber patch to build up laminate.



Spreading of resin.



Curing by heater blanket for at least one hour at 80°C.



Application movie >
[wind.sika.com/
Sikadur® Blade
Repair Kit](http://wind.sika.com/Sikadur® Blade Repair Kit)



FILLERS FOR PROFILING AND SURFACE FINISHING



SIKA'S FAST SURFACE FILLERS are approved by leading OEM's and significantly reduce repair downtime.

SikaForce®-7800

SikaForce®-7800 is a fast curing polyurethane surface filler, specifically developed for re-profiling damaged rotor blade components prior to the application of a top coat.

ADVANTAGES

- Excellent mixing, application, tooling and sanding properties
- Very good adhesion to fibreglass surfaces
- Non-sag up to 20 mm layer thickness
- Two color coded speed versions available
- Application window from 5°C – 30°C
- Fast sanding time
- Offered in convenient co-axial cartridges for use in a standard caulking gun
- Compatible with all leading top coats

RECOMMENDED SIKA PRODUCTS

SikaForce®-7800 Red

2-component, polyurethane surface filler for use in warmer, ambient conditions up to 30°C.

SikaForce®-7800 Blue

2-component, polyurethane surface filler for use in cooler conditions down to 5°C.



Application movie >
[wind.sika.com/
SikaForce®-7800
Red](http://wind.sika.com/SikaForce®-7800-Red)



Application movie >
[wind.sika.com/
SikaForce®-7800
Blue](http://wind.sika.com/SikaForce®-7800-Blue)



Damaged coating.



Sanding of surface.



Flushing of SikaForce®-7800 to ensure homogeneous mixing.



Application of SikaForce®-7800 on prepared surface.



Spreading of product.



Sanding of repaired area.





REPAIR COATING FOR STEEL TOWERS



THE EASIEST AND FASTEST WAY to restore “damaged” corrosion protection of off- and onshore structures back to OEM conditions.

SikaCor® SW-1000 RepaCor

Onshore and, particularly, offshore protective coating systems for steel structures must meet demanding performance requirements in regards to corrosion protection. In addition, they must also exhibit ease of application in a range of difficult conditions, including climate and accessibility.

SikaCor® SW-1000 RepaCor is the perfect product for simple, high performance and durable corrosion protection repair jobs. It is an innovative 2-pack coating / putty for maintenance or repair of (mechanically) damaged coated areas.

The product is ideally suited for corrosion protection for on- and offshore wind turbines or for hydraulic engineering (sluice gates, steel sheet piles etc.).

ADVANTAGES

- Easy-to-use packaging in a coaxial cartridge for difficult repair jobs



Application movie >

[wind.sika.com/
SikaCor® SW-1000
RepaCor](http://wind.sika.com/SikaCor-SW-1000-RepaCor)

- Early water resistance and under water cure
- Surface tolerant – can be used on many substrates as manual derusting, stainless steel, galvanization or aluminium, even on foreign coatings (except siloxane based coatings)
- Corrosion protection at 500 µm, similar to original shop coating
- Single layer coating
- Diffusion resistant
- Increased coating strength attributed to plate like glass flakes

RECOMMENDED SIKA PRODUCTS

Topcoat

SikaCor® SW-1000 RepaCor can be overcoated with common 2-pack PUR topcoats to match particular color shades.

SikaCor® EG-5

2-pack, acrylic polyurethane top coat.

Sika Permacor®-2230 VHS

2-pack, very high solid, acrylic polyurethane top coat.

Sika Permacor®-2330

2-pack, high color retention, acrylic polyurethane top coat.



Cleaning of damaged surface.



Surface preparation.



Preparation of cartridge.



Product application.



Application by putty.



Application by brush.





WAIPIPI WIND FARM, SOUTH TARANAKI, NEW ZEALAND

NZ PROJECT REFERENCE



PROJECT DESCRIPTION

The Waipipi Wind Farm is located in South Taranaki. With 31 Wind Turbines installed at 95m high and each blade at 63m long, they will generate enough power for 65,000 homes, reduce up to 250,000 tonnes of carbon, equivalent to removing approximately 55,000 petrol cars from New Zealand Roads.

<https://www.genesisenergy.co.nz/>

PROJECT REQUIREMENT

A specialist grout involving strict requirements for fatigue tested grout (conforming to Siemens Gamesa specifications) was required to be installed underneath turbine towers to withstand load and fatigue around hold down bolts at the turbine base.

CHALLENGES

The main challenge for this project was possible supply delays due to the Covid pandemic. Main contractor Higgins Contracting Ltd and Sika worked diligently to ensure the imported specialist grout was supplied on time with minimal delay to the project timeline.



SIKA SOLUTION

SikaGrout-3200, a fatigue certified onshore wind tower precision grout, was the ideal solution. It's shrinkage compensation properties and high early and final strengths made it the right choice for the onshore steel wind tower structural filling of joints and under grouting base plates. Sika specialist applicators Concrete Doctor Ltd would facilitate application to Siemens Gamesa requirements.

PRODUCTS USED

SikaGrout®-3200

PROJECT SIZE

33 tonne

PROJECT PARTICIPANTS

Main Contractor:	Higgins Contracting Ltd
Specialist Contractor:	Concrete Doctor Ltd
Sika Contact:	Grant Reid



Scan QR Code for more
information or visit www.sika.co.nz

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WE ARE SIKA

Sika is a specialty chemicals company with a globally leading position in the development and production of systems and products for bonding, sealing, damping, reinforcing, and protection in the building sector and industrial manufacturing. Sika has subsidiaries around the world and produces innovative technologies for customers worldwide. In doing so, it plays a crucial role in enabling the transformation of the construction and transportation sector toward greater environmental compatibility.



SIKA (NZ) LTD
85 Patiki Road
Auckland 1026
New Zealand

Contact
www.sika.co.nz
info@nz.sika.com
0800 745 269

