Protective Coatings:
Protection of Structures in Demanding Environments

FOSROC

constructive solutions

www.fosroc.com

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!

PROTECTION OF STRUCTURES IN DEMANDING ENVIRONMENTS

When it comes to the protection of concrete and steel on both new and existing structures in demanding environments, Fosroc has an extremely wide range of product solutions available, coupled with an enviable proven track history. Whatever the application and location, these systemised solutions are backed up by a wealth of in-house experience in providing the long-term technical support Fosroc are renowned for.

Whatever the environment and demand, Fosroc has it covered, whether it be a bund area in a chemical store, structural elements above and below ground, through to drinking water approved coating systems for lining a reservoir structure. These applications summarise where Fosroc protective coating systems have been frequently used and include:

- Sewerage & waste water treatment
- Infrastructure projects
- Chemical processing plants
- Exposed marine jetties and piers
- Manufacturing plant effluent handling and containment
- Drinking water structures
- Oil, Gas and energy related

Another significant benefit is that the protective coating systems are part of a wider package of products including complete reinstatement, repairs and surface smoothing compounds. This removes any question mark regarding system compatibility, which can have a serious impact on the project package.

PRE-TREATMENT OF NEW & EXISTING SUBSTRATES

When considering which coating solution is most appropriate for any given application, the substrate type, age and condition must be considered. Any structure will require pre-inspection and, very likely, some degree of corrective treatment.

It is essential that all surfaces to be coated are clean, sound and continuous in nature as any cracks, fissures or blow-holes could mean the coating film is interrupted and the performance will very likely be compromised.

The need for pre-treatment is likely to be required for both existing and new substrates.

The other critical aspect is the selection of the most appropriate primer. These can differ greatly depending on whether the substrate is concrete or steel. Other considerations include identifying if the substrate is mild or galvanised steel, previously coated steel and also establishing if any cementitious surfaces are dry, damp or saturated.

New substrates include:

- In-situ cast concrete
- Pre-cast concrete
- Steel
- New cementitious repairs
- New renders

Existing substrates include:

- Coated concrete
- Exisiting untreated renders
- Untreated concrete
- Repaired concrete
- Previously coated steel




It should be noted that even new concrete surfaces are likely to require corrective repairs prior to over coating with any protective resin coating system.

From an exposure viewpoint, generally, these repairs and any associated smoothing or filling operation should be undertaken using epoxy resin based systems.

For larger repairs, products such as Nitomortar GP, HB etc, are ideal as lightweight high-build repair product. Surface blemishes and defects can be made good using Nitomortar FC, epoxy fairing coat. Please refer to the relevant product data sheets or our brochure covering Concrete Repairs.

Surface preparation must be completed and ideally using light enclosed grit blasting or diamond grinding to remove all dust and laitance from the substrate face. A lightly textured surface is essential in order for any subsequentally applied coating system to gain optimum adhesion. Steel surfaces should be prepared by mechanical means to remove all traces of rust and mill scale and to provide a clean sound surface with a fine textured profile. Ideally this should be to a high standard such ISO8501/4 - SA2.5 or SA3; SSPC-SP10 or SP5; NACE2 or 1.

The correct primer shall then be selected and applied, based on the substrate porosity and the presence and degree of moisture levels.

All repairs and corrective works should be undertaken in accordance with applicable standards and specifications. e.g. EN1504.

TYPICAL REPAIR & COATING SEQUENCE

Survey Structure

Identify problem areas

Cut out and prepare

Prepare and repair

Face fill any open texture

Small scale face filling between coats

Apply the protective coating system

FOSROC SOLUTIONS IN

SEWERAGE & WASTE WATER TREATMENT

The primary issues faced here are with the sewage and treatment facilities handling and being exposed to dirty and contaminated effluent and sewage waste, which can be either acidic or alkaline in nature.

Often, these concrete structures have been exposed to this aggressive effluent for extended periods of time and as a result, the unprotected concrete surface has become attacked and damaged. This will result in the need for repairs to be completed, prior to applying a protective coating system. In these environments, repairs should be made with epoxy resin based repair mortars and fairing coats before applying a 2-component epoxy resin protective coating system such as Nitocote EP403, Nitocote EPU or EPS. Nitocote EP403 is normally supplied in light grey but other colours can be made available to suit the specific requirements of a project or to assist with ensuring full coverage of the previous coat is obtained.

Nitocote NT402 is a tar and VOC-free 2-component epoxy resin coating normally applied by brush, roller or spray at a dry film thickness of 0.4mm for a 2-coat application. There is normally no need for a separate primer application. A marine grade is available where there is a requirement to control biocidal and micro-biostatic effects. Available in a limited range of colours including dark grey, light grey, red and black.

Both products are normally applied directly onto a clean sound contaminant-free substrate, which has been lightly mechanically prepared at the rate of 5m^2/ lt / coat. For enhanced chemical resistance, opt for Nitocote EN901, an epoxy novolac coating system.

All of these systems will resist exposure to a wide range of chemicals including solutions of acids, alkalis and waste water including raw sewage.

FOSROC SOLUTIONS IN

CHEMICAL PROCESSING PLANT

In environments where chemicals are used and spilled, there are a number of inter-related issues, which need careful consideration. The selection of product is determined by the type of chemicals being handled; length of exposure; the concentration of the chemical solutions likely to be spilt and the related spillage temperature.

Most epoxy resin coating systems have generally good resistance to a wide range of chemicals and will accommodate exposure to a reasonably wide spread of concentration levels.

Where frequent or extended exposure to chemical spillage is required then epoxy-novolac based coatings will offer enhanced protection. Therefore, coating systems such as Nitocote EN901 become the first choice.

Nitocote EN901 is a solvent free 2-component epoxy-novolac coating system. It is normally applied by brush, roller or spray in a 2-coat application onto clean, sound and prepared concrete and steel substrates, typically at a thickness of 0.5mm for a two-coat application.

Where the substrate is uneven or where some dimensional stability is required, the Nitocote EN901 can be applied as a 'reinforced' system. This system comprises of a first coat being applied onto the clean sound substrate at a thickness of 0.3mm and whilst wet, a glass fibre mesh or mat (approx. 0.25g/m2 density) applied and rolled into the wet resin film. After overnight curing (at temperatures of 18 – 20°C), the surface is then lightly prepared and then a further two coats of Nitocote EN901 can be applied at 0.2mm per coat.

The inclusion of the glass fibre reinforcement not only improves the dimensional stability characteristics but increases the system thickness, helps to prevent reflective cracking and increases the overall impact resistance.

FOSROC SOLUTIONS IN

EXPOSED MARINE JETTIES & PIERS

In harsh marine environments coal-tar and pitch epoxy resin systems have often been used to provide protection to both semi and fully submerged structural concrete and steel elements.

As time has moved on, Fosroc has added a range of tar-free coatings in order to comply with increasingly demanding environmental and health & safety legislation.

Nitocote NT 402, NT550, ET402 and ET550 can all be used in these applications as can the Nitocote EP403 damp tolerant epoxy coating. The 'Epoxy-Tar' systems are usually black in colour whereas the 'Non-Tar' variants can be offered in a range of colours. Another important point of difference is the Nitocote ET550 & NT550 both contain solvent whereas the Nitocote ET402 and NT402 are both solvent free. The NT name denotes 'Non-Tar'.

All of these systems can be applied by brush roller or spray, typically at wet film thicknesses of 0.2mm and are normally applied as a 2-coat system .onto a clean, sound, dust or rust free, mechanically prepared concrete or steel substrate

FOSROC SOLUTIONS IN

MANUFACTURING PLANT EFFLUENT

The protection of holding tanks, channels, drains and sumps from exposure to effluent and waste water is not straightforward. There is a vast array of waste material types encountered, depending on the industry involved. Industries as diverse as food & beverage and paper processing through to mines and quarries.

The chemicals and sediments used vary considerably as does the degree of concentration and often elevated temperatures are involved too, making the selection of the correct protective system very complicated.

In areas of high chemical exposure, Nitocote EN901 is often used to provide maximum protection. In other more general areas, Nitocote EP403 onto either dry or damp surfaces will also provide a good option as can Nitocote NT402, where a fully solvent and tar free abrasion, bacteria and fungal resistant coating is required.

FOSROC SOLUTIONS IN

OIL, GAS & ENERGY RELATED

The energy and power sector has a set of demands not dissimilar to that of the chemical industry. In many cases, the infrastructure can be exposed to a number of different oil fractions including fuels and solvents across a range of temperatures. These chemicals are generally very aggressive and can attack many commonly used coating systems.

Generally, Nitocote EN901 is the ideal solution for protection against these types of products. Limitations will be with temperatures of up to 50 - 60ºC. The system normally comprises 2 - 3 coats and can include the use of a glass fibre reinforcement between the first and second coats. Other systems used in areas of lower exposure can include Nitocote EPS, Nitocote EPSW and Nitocote EPU. Please contact us to discuss the specific requirements of your project.

FOSROC SOLUTIONS IN

POTABLE WATER STRUCTURES

The requirements for the protection of structures in contact with water for consumption is driven by the use of systems approved for use with 'potable' or 'drinking' water. These products have to be tested to specific standards such as BS6920-1:2014. Additionally, approved products will normally be listed by a recognised body such as the Water Regulation Advisory scheme for the UK.

Fosroc has a number of systems approved for use in these applications. Within the coatings range offer, this includes Nitocote EP405, 2-component solvent free epoxy resin coating and Nitocote CM210 cementitious waterproof coating.

Both systems are applied by brush roller or spray though Nitocote CM210 can also be applied by trowel, most frequently to provide a waterproof protective layer to internal and external elements of the structure. Application thickness can vary depending on the substrate condition and level of protection required. Nitocote EP405 is typically used at 0.4mm thickness for 2 coats whereas Nitocote CM210 is typically applied at a nominal thickness of 2mm, in order to ensure crack-bridging capability is achieved.

Where a detailed specification is required, your local Fosroc team will be on hand to assist you with the product selection process.

CASE STUDY:
YACHT HAVEN MARINA

THE PROJECT
Situated on the north coast of Thailand's idyllic island of Phuket, Yacht Haven Marina is commercial berth serving up to 300 yachts for mooring and servicing. The jetty is subject to attack from chlorides as well as the weathering, impacts and erosion caused by a tidal area. Planned maintenance occurs every 10 years and materials are selected by the marina's professional engineering team.

THE SOLUTION
Fosroc provided a complete system of repair insert and protection solutions. Nitoprime Zincrich is a key of system selection as the active zinc constituents provide excellent protection against chloride attack to steel reinforcement. High-strength grouts and mortars combined with isolating epoxy primers were used for repairing concrete above and below the waterline.
The structure was finally coated with Nitocote ET550, a protective epoxy tar high performance coating to provide flexible and robust protection from chloride ingress, UV and barnacle growth.

THE BENEFIT
The client was very satisfied with the repair and protection solution proposed by Fosroc and the contractor. The integrated system ensured that all materials selected are compatible and easy to apply in this challenging environment.

Importantly for the client and the contractor, the project was commissioned with no lost berthing time during implementation. This meant users of the marina experienced no disruption and the operators found no incidental cost to performing the works.

Fosroc systems are designed to be durable and robust. This will help ensure that there will be no requirement to revisit the repairs until the next maintenance cycle in 10 years' time.

FOSROC PRODUCTS USED

- CONBEXTRA HF
- RENDEROC S
- NITOPRIME ZINCRICH
- NITOBOND EP
- NITOCOTE ET550

CASE STUDY

KING FAHAD PORT, SAUDI ARABIA

THE PROJECT

Like many industrial ports, the King Fahad industrial Port in Jubail was suffering from the effects of chloride induced corrosion on the steel reinforcement to the jetties and their steel piles. Mechanical damage caused by shipping and cranes had also taken its toll. The port authority needed a fully integrated repair and protection package that could not only replace broken and deteriorated concrete, but provide a long term and durable solution to the corrosion problem.

THE SOLUTION

Protecting the steel piles below water was undertaken using 1,682 Fosroc Marine Jackets. This Cathodic Protection solution provides a protective fibreglass jacket to protect a zinc anode within. This is connected to the reinforcement and grouted to create the correct resistivity. Areas of reinforced concrete subject to chloride attack were protected using Galvashield CC and XP anodes.

As part of the protective package was completed by the use of the heavy duty Dekguard and Nitocote protective coatings to ensure the structure remains integrally sound and gains long term protection from the harsh environment including further chloride attack.

THE BENEFIT

Fosroc's Marine Jacket provides cathodic protection for up to 35 years service life without maintenance. This means that the use of the jetties will rarely be interrupted by maintenance issues. The grout and the jacket provide robust support from mechanical damage. The jackets are purpose made for each project and therefore the desired fit is easy to obtain and the level of anode used can be matched to the client's requirements.
Protection rather than repair is normally the most economic long term solution, and in adopting a holistic approach to remediation Fosroc have assisted the designer and contractor in providing the client with the best solution to this technically challenging problem.

Dekguard PU

Steels coated with Fosroc Dekguard PU

Sewage Treatment Plant, UAE

The continued growth in the local population led to a need for a new water treatment plant capable of treating in excess of 300,000m3 of waste on a daily basis.

The structures required a robust protective coating solution, capable of dealing with this level of exposure.

The coatings selected for the protection of the various surfaces included Nitocote EP403, Nitocote EN901, Nitocote EPS and Dekguard PU. The total area for protection totaled some 200,000m2. Full support was provided by the local Fosroc team.

Desalination Plant, Jeddah

This water retaining structure required the use of a high quality protective coating system to hold sea water for use in the reverse osmosis process to produce 'sweet water'.

After extensive testing and validation by both the client and the consultants, Nitocote EPU was selected for this application. The system comprised pre-smoothing repairs and two coats of the protective coating at a minimum system thickness of 0.4mm.

Hydepark Reservoir, Ireland

A major reservoir supplying parts of Belfast, Northern Ireland required waterproof protection.

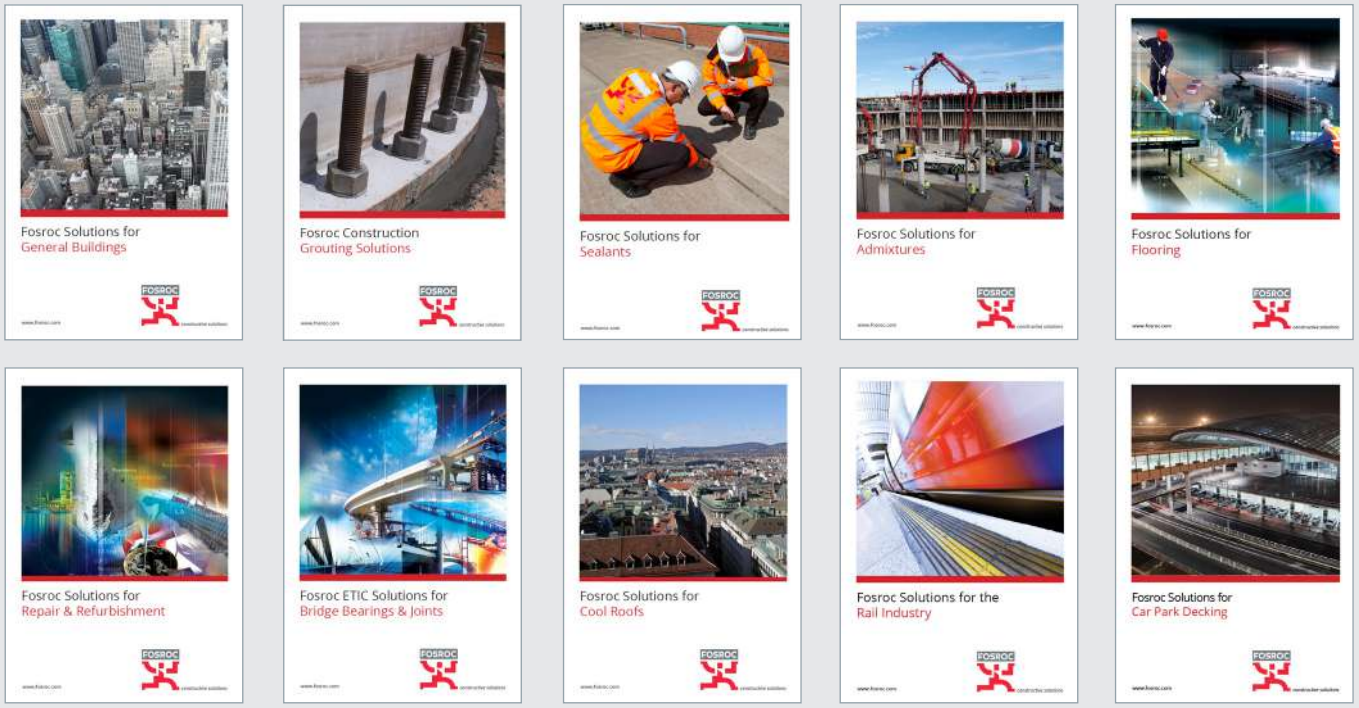
20,000m2 of Proofex Sheetdrain and Nitocote CM210 were selected to provide the necessary waterproof protection.

The team from Fosroc UK provided full technical support and detailed specifications for the project. The Nitocote CM210 was applied using specialist spary application.

INTEGRATED REPAIR & PROTECTION RANGE

Product	Material Characteristics
Conbextra BB92	Cementitious Thickness 10-150mm Ultimate Strength > 90MPa
Conbextra BB92-0	Cementitious Thickness 10-150mm Ultimate Strength > 90MPa Fatigue tested
Conbextra SG	Cementitious Thickness 10-400mm Ultimate Strength > 100MPa
Conbextra HF	Cementitious Thickness 10-100mm Ultimate Strength > 70MPa
Conbextra BB72	Cementitious Thickness 10-100mm Ultimate Strength > 70MPa
Nitobond PC20	Epoxy Resin Ultimate Strength > 100MPa
Auramix 740	High Early Strengths Excellent Surface Finish
Concure WB	High efficiency water based curing agent for concrete and cementitious grouts
Reebol 2010	For treatment of casting formwork
Renderoc Range	Various thickness and strength repair systems for damaged concrete bases
Nitocote CM660	Withstand positive and negative water pressure
Renderoc FC / Nitocote CM650	Protective system for application to concrete Providing impervious finish
Dekguard PU	Tough durable Polyurethane protective coating system, ideal for use in corrosive environments.

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
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