



Fosroc Solutions for Waterstops

www.fosroc.com



constructive solutions

ABOUT FOSROC INTERNATIONAL

Since the company's beginnings over 50 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, India, North and South 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!

FOSROC BUILDINGS EXPERTISE

FOSROC's vast experience in providing constructive solutions to many famous building structures around the world has been built on a broad portfolio of products. These include waterproof membranes, waterstops, joint sealants, concrete repair mortars, resin flooring, protective coatings, structural strengthening, grouts and concrete admixtures manufactured to the highest quality standards backed by independent test certificates.

At Fosroc we recommend the best technology for each project rather than being driven by one particular response. We liaise and evaluate with our customers the most appropriate solution for what they are trying to achieve. We just want to

deliver what is best to the customer providing peer to peer based solutions for engineering problems to ultimately find a number of ways to create value.

The scale of the projects being entrusted with Fosroc are epitomised by a huge nuclear power plant being built in Barakah in the UAE, which requires extensive waterproofing covering the complete buildings and inlet channels.

Supercast PVC waterstops were chosen for all concrete joints, along with Proofex Engage, a pre-applied water/gasproofing membrane and Proofex Alkorplan PVC membrane.



JOINT TYPES

CONSTRUCTION JOINTS

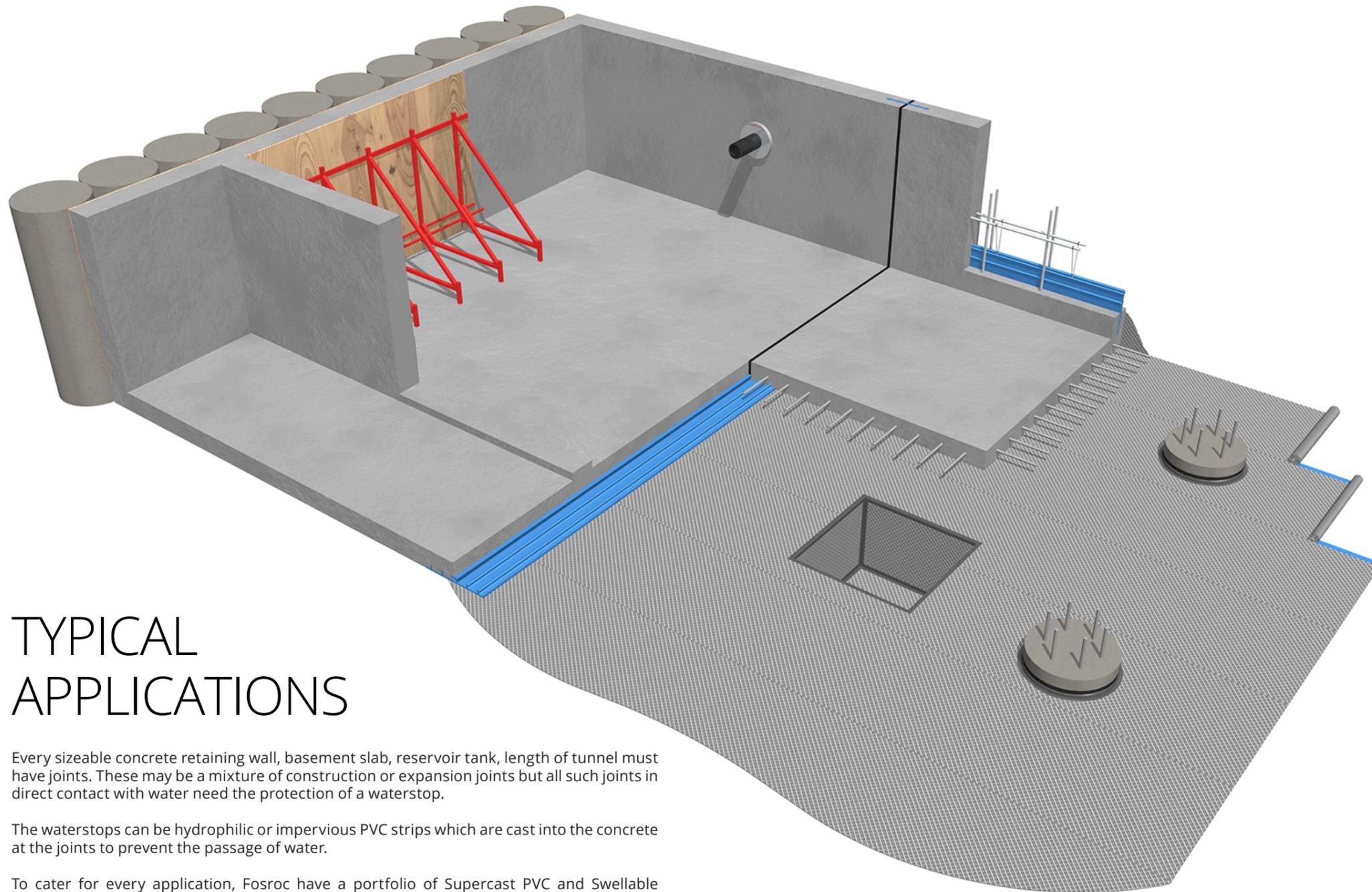
As their name implies, these joints are used to simplify construction; they are not intended to accommodate movement. Nevertheless, cracks tend to develop at breaks in construction whether wanted or not, so construction joints have to be designed with cracking in mind; for example a PVC waterstop placed over the blinding and cast into a basement floor.

EXPANSION JOINTS

These create a gap in the structure to allow for both expansion and contraction caused by thermal and moisture movements. These joints are usually formed by installing a compressible filler board between sections. 'Settlement' joints are included under this heading - or any joint designed to take up such movement. Locating expansion joints demands careful thought, considering not only the spacing needed to avoid cracking but also a pleasing appearance and access for subsequent maintenance.

CONTRACTION JOINTS

These are for relieving shrinkage stresses induced in concrete as it sets; stresses that would otherwise cause random cracking. A contraction joint may be designed as a complete break in the structure, each cast butting against the previous one. If more structural stability is needed between sections the reinforcement may be continued across the joint to restrict its opening. Forming grooves in the concrete surface - top, bottom or both - makes another kind of contraction joint to induce cracks to form along predetermined planes of weakness. A waterstop may be incorporated into such joints.



TYPICAL APPLICATIONS

Every sizeable concrete retaining wall, basement slab, reservoir tank, length of tunnel must have joints. These may be a mixture of construction or expansion joints but all such joints in direct contact with water need the protection of a waterstop.

The waterstops can be hydrophilic or impervious PVC strips which are cast into the concrete at the joints to prevent the passage of water.

To cater for every application, Fosroc have a portfolio of Supercast PVC and Swellable waterstops which have been successfully installed all over the world for many decades.



SUPERCAST PVC WATERSTOPS

Fosroc **Supercast PVC** waterstop profiles have been designed with high performance at their core. These profiles capture the best principles of PVC waterstop engineering utilising tortuous path ribs, correct bulb shapes giving excellent sealing effect acting as valves, eyelets for secure placement and sloping web thickness to avoid cracking.

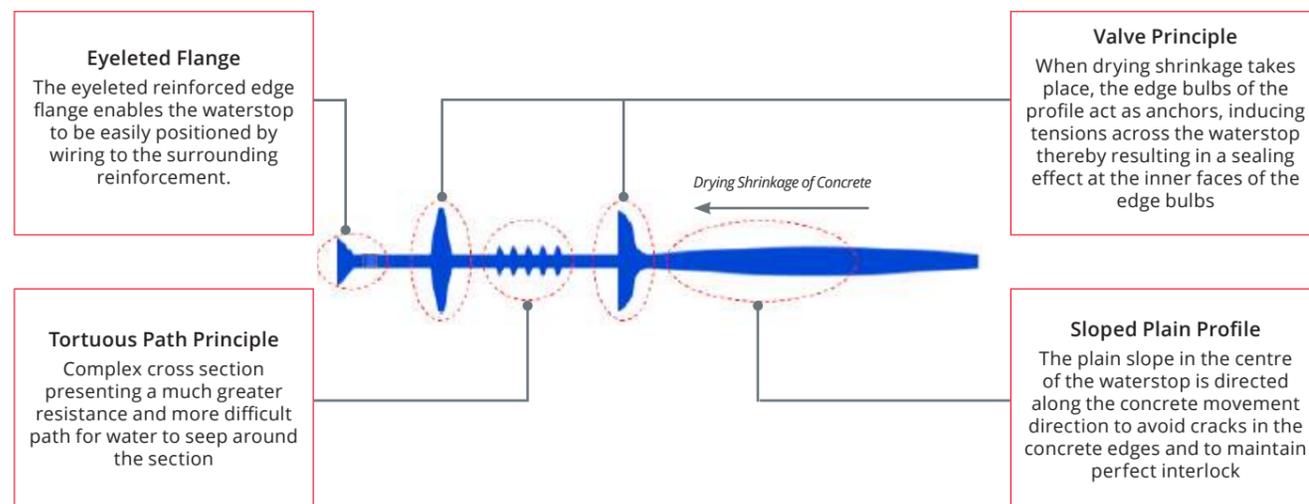
For over four decades Fosroc **Supercast PVC** waterstops have been installed in many projects throughout the world achieving assured long term performance even in extreme conditions, resulting in prevention of unwanted water penetration.



ENGINEERED SOLUTIONS

Fosroc **Supercast PVC** waterstops allow freshly poured structural concrete to flow around them. However, designs that include large congested ribs can create confined spaces and lead to a restriction in the concrete flow which could limit compaction and the interlocking process between the waterstop and the concrete.

Beware of ultra-flexible and relatively loose PVC waterstops which can be easily displaced upon pouring of fresh concrete. Fosroc Supercast PVC profiles are flexible, elongation >300%, but suitably firm (Shore Hardness between 80 - 90).

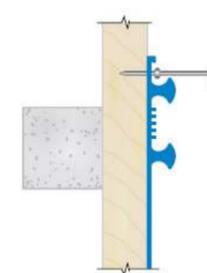
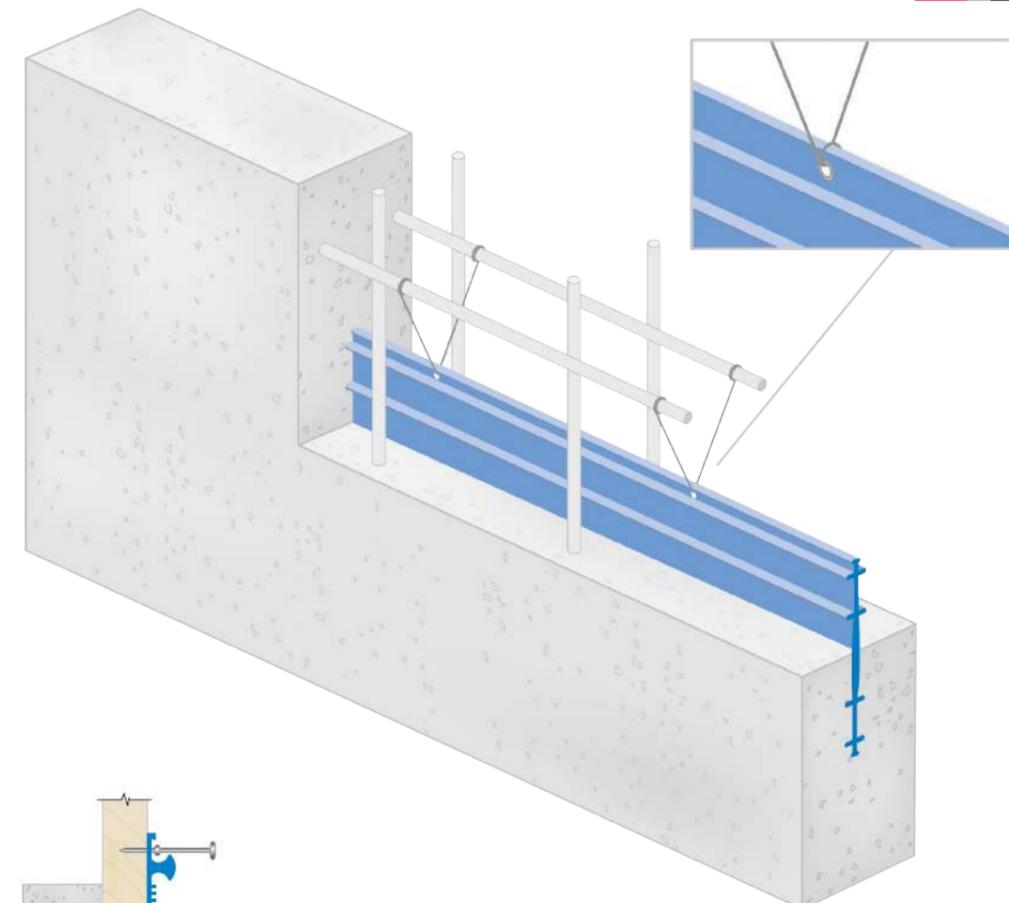


To ensure a firm fix, Fosroc Supercast Watafoil and Hydrofoil PVC waterstops incorporate a row of eyelets along both edges for wiring to nearby steel reinforcement.

Make sure that there is adequate clearance between the waterstop and surrounding steel reinforcement for wiring and to ensure good compaction of concrete.



When sealing joints in water tank roofs it is not always practical to install a centrally placed waterstop. An externally placed bandage strip such as Fosroc Expoband H45 is ideal for this application. **Hydrocell XL** joint filler board and **Nitoseal MS600** joint sealants complete the system.

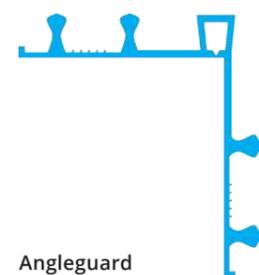
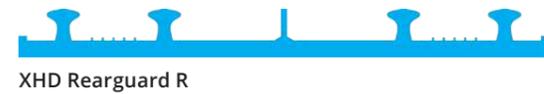


Fosroc **Supercast Rearguard R** and **S** PVC waterstops have an "outboard" flange along each edge for nailing to the formwork or blinding concrete

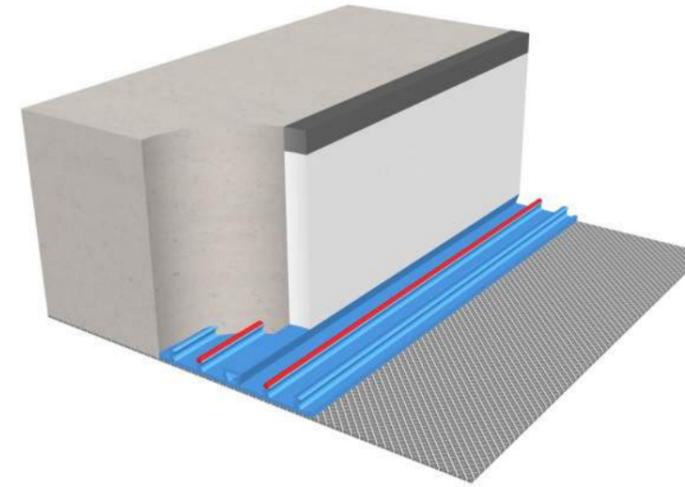


Fosroc **Supercast PVC** waterstops are manufactured to the highest quality standards in factories that are ISO 9001 and ISO 14001 quality assured. These waterstops when combined with Fosroc **Proofex membranes** and **Nitoseal** joint sealants continue to give clients around the world piece of mind, with compatible systems providing structural integrity ensuring long term performance.

SUPERCAST PVC PROFILES



SUPERCAST TWINSTOP



Where high water tables exist in deep basement construction and the highest possible watertight design is required, then use Fosroc Supercast Twinstop.

Fosroc **Supercast Twinstop** is a combined PVC and hydrophilic waterstop for extra protection. The PVC profile performs as normal but when water reaches the hydrophilic inserts, they expand to form a sealed barrier.

The hydrophilic inserts are based on Fosroc's basic polymer swellable compound which is post-inserted into the PVC waterstop meaning there is no chance of pre-swell prior to concrete casting. The hydrophilic insert has a large surface area allowing excellent swelling performance.

Fosroc **Supercast Twinstop** is available in 250mm width for both centrally and externally placed expansion joints.

Fosroc **Supercast PVC** waterstops are manufactured in a range of sizes, the appropriate size in each case being the one that has a width closest to that of the wall or slab to be jointed.

Cross sectional profiles are formed in two fundamentally different shapes: one for casting centrally into a wall or slab, the other for casting into the outer face of a wall or slab.

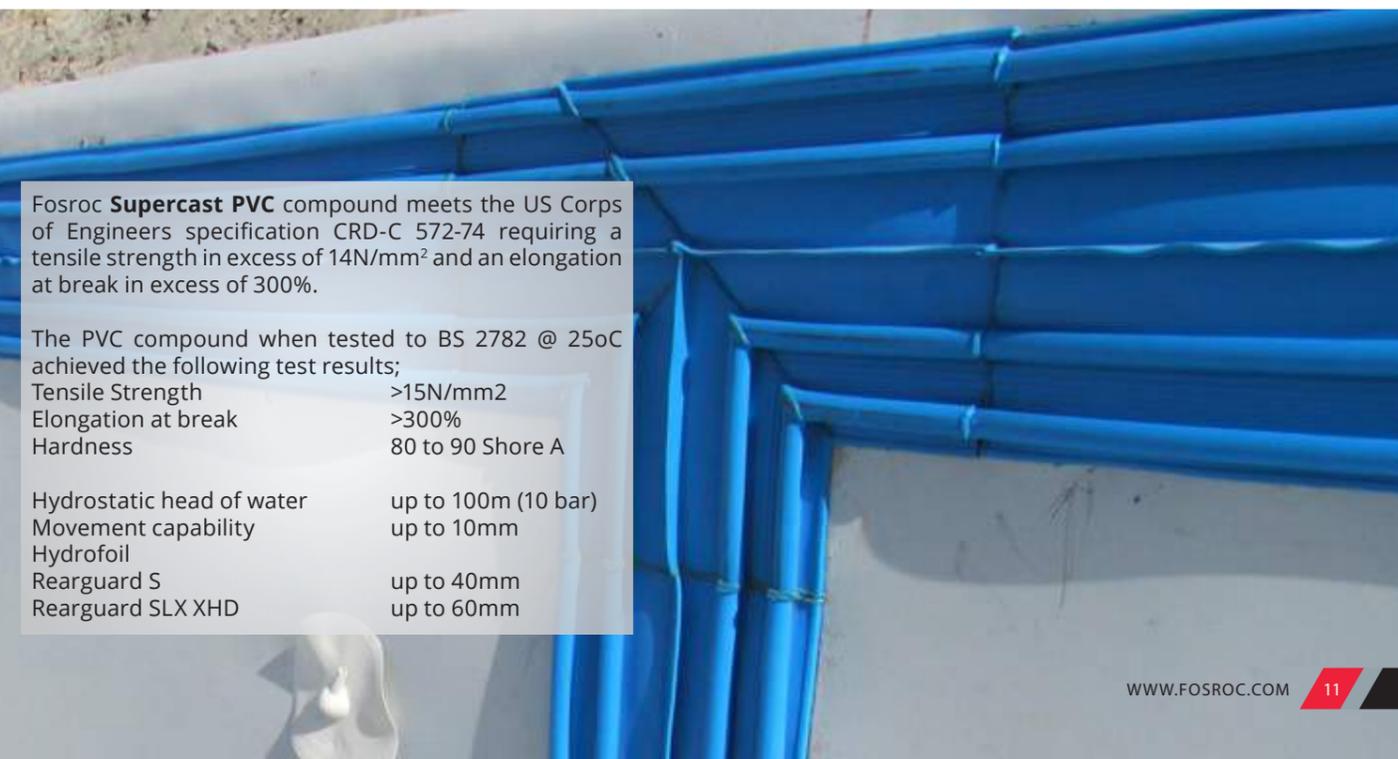
Centrally placed waterstops provide an efficient barrier to penetration of water from either face of the wall or slab, they demand careful fixing in the formwork before concreting.

Externally placed waterstops are easier to fix by nailing through the "outboard" flange and prevent the passage of water from the outside of the structure, typically used in piled wall basement construction.



PROFILE SELECTOR

Supercast Product	150	200	250	330	Description
Watafoil	*	*	*	*	Centrally placed construction joint
Hydrofoil	*	*	*	*	Centrally placed expansion joint
XHD Watafoil			*		Heavy duty centrally placed construction joint
XHD Hydrofoil			*		Heavy duty centrally placed expansion joint
Rearguard R	*	*	*	*	Externally placed construction joint
Rearguard S	*	*	*	*	Externally placed expansion joint
XHD Rearguard R			*		Heavy duty externally placed construction joint
XHD Rearguard S			*		Heavy duty externally placed expansion joint
XHD Rearguard SLX			*		Heavy duty Externally placed settlements and high movements
Twinstop Hydrofoil			*		Centrally placed composite hydrophilic / pvc
Twinstop Rearguard S			*		Externally placed composite hydrophilic / pvc
Angleguard			*		Externally placed 90° angled waterstop
Rearguard C			*		Compartment waterstop for PVC membranes



Fosroc **Supercast PVC** compound meets the US Corps of Engineers specification CRD-C 572-74 requiring a tensile strength in excess of 14N/mm² and an elongation at break in excess of 300%.

The PVC compound when tested to BS 2782 @ 25oC achieved the following test results;

Tensile Strength	>15N/mm ²
Elongation at break	>300%
Hardness	80 to 90 Shore A

Hydrostatic head of water	up to 100m (10 bar)
Movement capability	up to 10mm
Hydrofoil	
Rearguard S	up to 40mm
Rearguard SLX XHD	up to 60mm

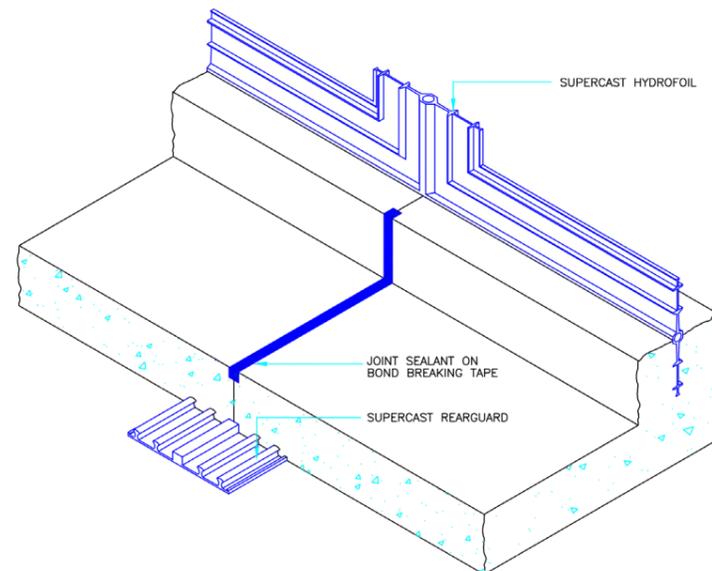
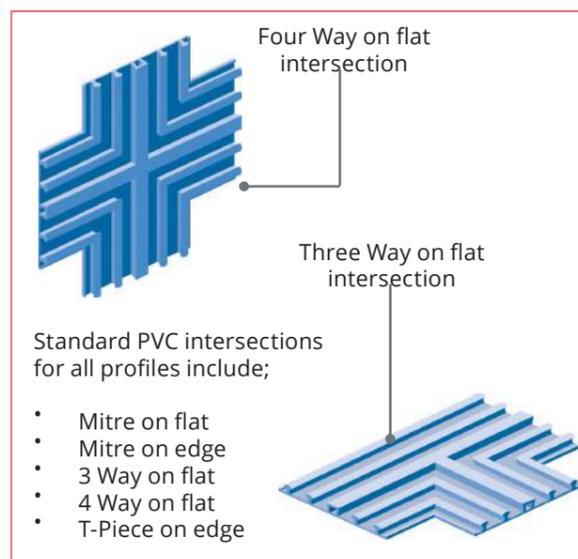
SUPERCAST PVC WELDED JOINTS & INTERSECTIONS



PVC waterstops should always be joined by welding using the process above, never by lapping. Fosroc supply jigs and heating blades suitable for making simple butt joints on site.

Although it is possible to weld mitres and corners on site it is advisable to purchase factory-made intersections from Fosroc, then to butt-weld these to the standard rolls of waterstop on site. This method speeds up installation and means that only simple straight welds are required. Intersections available include those of dissimilar profiles e.g. Supercast Watafoil to Hydrofoil or Supercast Rearguard S to Hydrofoil.

For complex geometries or repeated shapes, special bespoke fabrications can be supplied. These fabrications are made-to-order in our premises and delivered to site in pre-agreed sections. To take advantage of this service please contact your local Fosroc specification / sales manager who will assist you in this process.



SUPERCAST PVC CASE STUDIES

Baraka Nuclear Power Plant - UAE

47,000 m2 water proofing system for substructure was required as per the specification, Fosroc specified Proofex PGP loose laid PVC waterproofing membrane system, which is loose laid with heat welded water tight joints Proofex PGP was approved and applied successfully. All joints were sealed using Supercast PVC waterstops.



Water Treatment Plant
Saudi Arabia



Seagate Shugart
Singapore



Emirates Arena
Glasgow

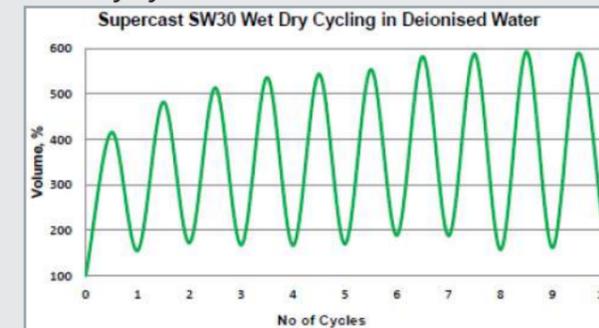


Al Habtoor Palace
Dubai

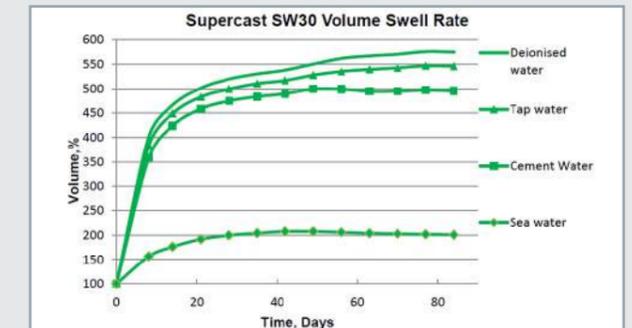


SUPERCAST PERFORMANCE

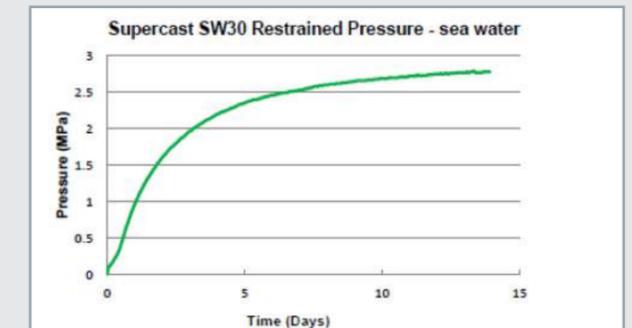
Wet/Dry Cycle Performance



Volume Swell Performance



Fosroc **Supercast SW** waterstops are designed for consistent long term performance throughout the lifetime of a structure. Their superior polymer basis allows them to expand and contract consistently over multiple wet/dry cycles ensuring that water passage is arrested.



SUPERCAST SWELLABLE

Fosroc **Supercast SW** waterstop strips use basic-polymer hydrophilic technology which allows them to swell on contact with water creating a positive pressure against the faces of the joint thus preventing the passage of water.

The main advantage they have over conventional PVC waterstops for non-movement joints is that they provide a problem solving solution for applications where, traditionally, complex formwork would have been required. They provide an excellent solution for pipe entry sealing and also do not require hot welding on site.

Fosroc **Supercast SW** waterstops may be used for the integral sealing of construction joints. However due to the fact they must be fully restrained to function properly, they should not be used in movement joints. In this instance a traditional Fosroc **Supercast PVC** waterstop with expansion profile designed to accommodate movement should be used.



SUPERCAST
SW10

5mm x 20mm strip for use where steel reinforcement is continuous through the joint



SUPERCAST
SW20

10mm x 20mm strip for all construction joints, water pressure resistant up to 100m



SUPERCAST
SW30

10mm x 20mm strip for all construction joints, water pressure resistant up to 100m, special salt water grade extra swell

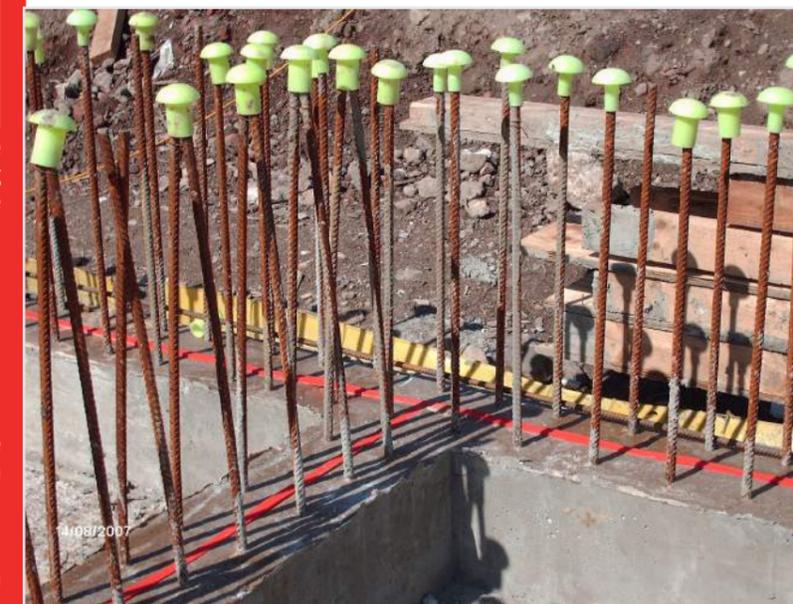


There is a myth that the greater the swelling % the better the swellable waterstop. This of course is wrong because the main measures of success for a swellable waterstop are based upon;

- 1) Wet/dry cycling long term performance
- 2) Ability to resist water pressure shortly after concreting
- 3) Ability to resist water pressure for the life of the structure

Fosroc **Supercast SW** strips gain swelling pressure quickly after concreting and typically achieve an equivalent water pressure resistance of 6 bar after 1 day.

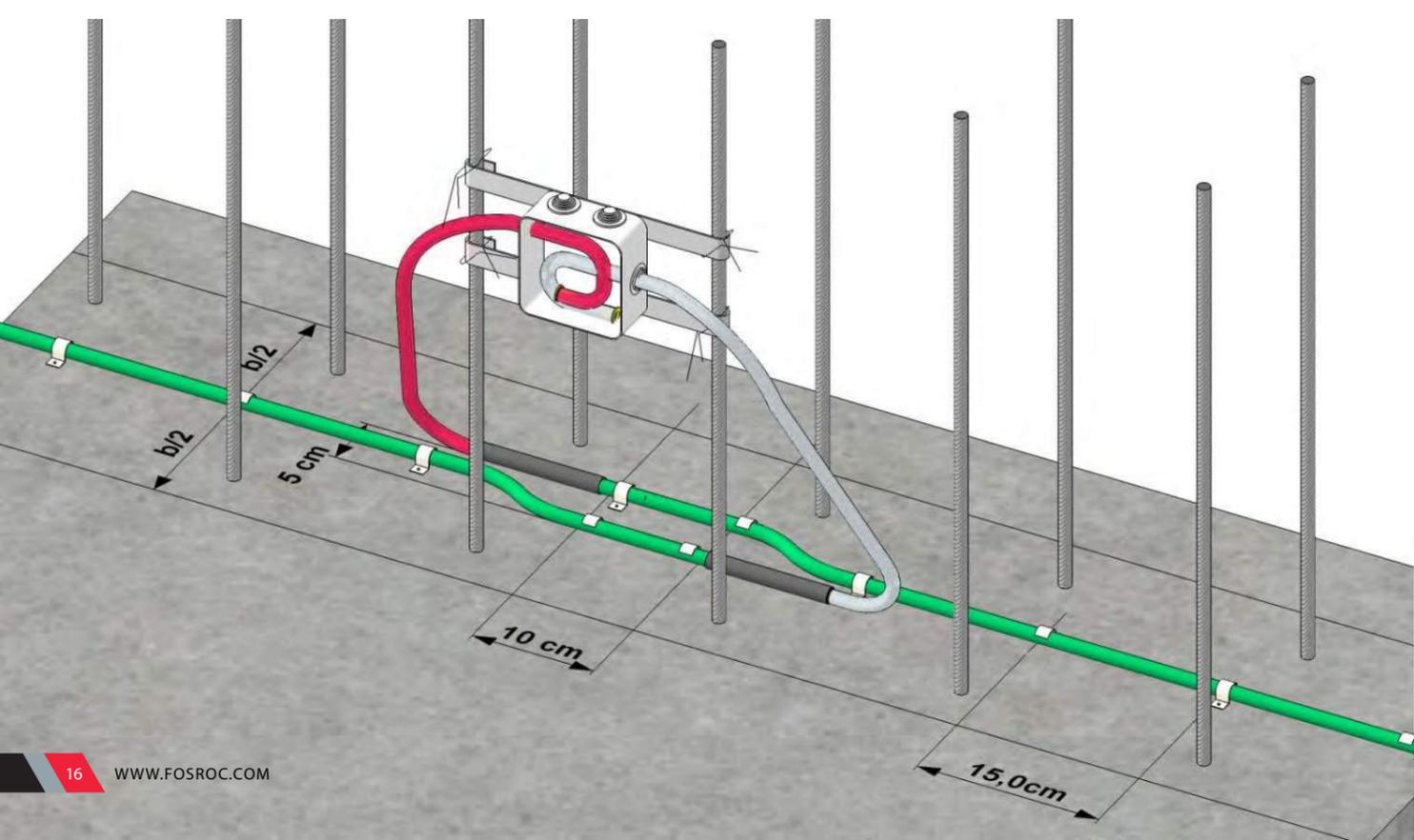
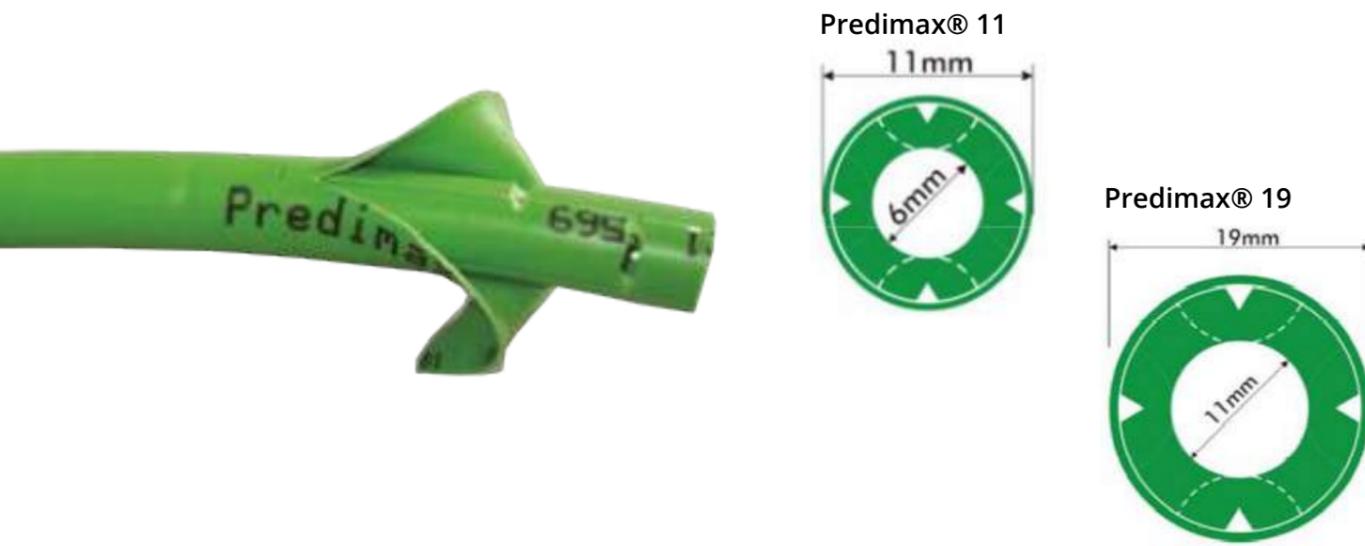
Full watertightness testing has been carried out on a specially designed test rig designed to simulate a real-life construction joint sealed with Supercast SW20/30. Positive water pressure is applied to the simulated joint, and is increased up to a maximum pressure of 10 bar (equivalent to 100m hydrostatic head). The joint can be opened to simulate a crack in the construction joint, and the Supercast SW20/30 tested for watertightness at increasing gaps. Both Supercast SW20 and SW30 are independently tested achieving 10 bar results even up to 3mm gap.



SUPERCAST PREDIMAX INJECTION HOSE WATERSTOPS

Fosroc **Supercast Predimax** injection hose waterstops are designed to provide a means for future sealing of cracks in concrete. They are fixed into the construction joint in a central position with a minimum of 80mm concrete cover. The fixing clips are positioned at 150mm spacing. Hoses are overlapped at junction locations and terminated at the surface in junction boxes.

Fosroc **Supercast Predimax** is available in 2 sizes, 11mm and 19mm external diameter. For multiple injection you should first inject with cement, then micro cement then finally PU resin. The injection process should not commence prior to 6 weeks after the concrete has been cast, to allow for shrinkage and settlements.



INJECTION METHOD

Once secure connections have been made, begin the injection process. Fill hose with suitable injection material until it emerges from the opposite end. Clamp the end shut.

Start injection at a pressure of between 75 and 150PSI. Once the injection material has filled the joint area and is no longer flowing, gradually increase the pressure to a necessary delivery volume of between 500 and 600PSI.

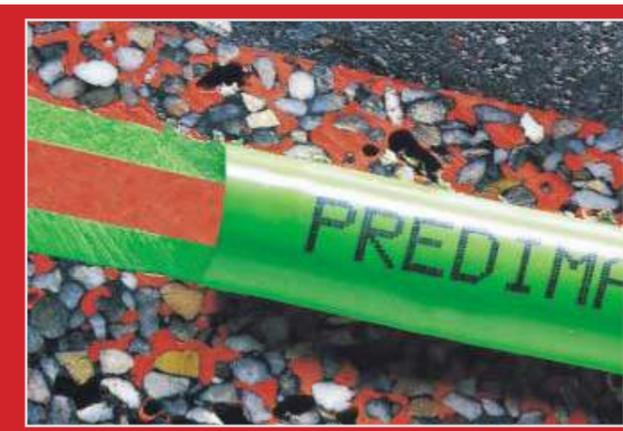
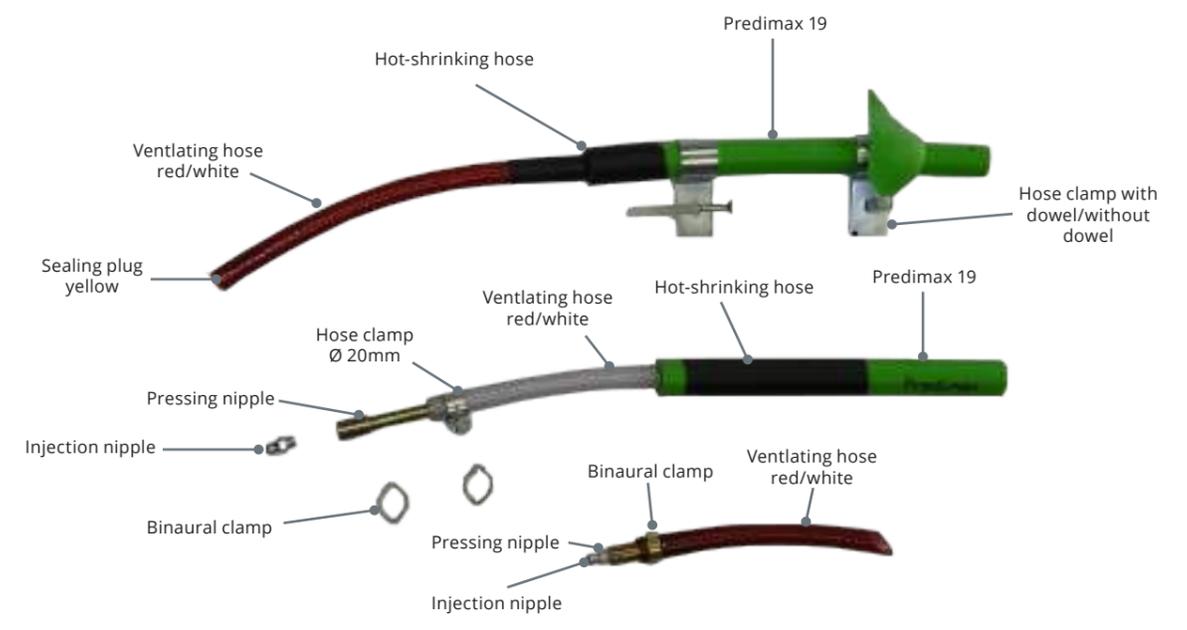
Maintain this pressure for approximately 3 to 5 minutes, allowing for injection material to thoroughly penetrate the joint area.

Once maximum pressure of 500 - 600PSI is held for the designated period of 3 - 5 minutes, disconnect the pump from the injection vent and begin the connection process for injection at the opposite vent end; clamp the first injection end first. Reinject the hose from the opposite end within the gel time of the injection material.

Disconnect the cap from the vent ends. Connect a vacuum pump to either one of the vent ends and place the other end into a bucket filled with water.

Commence the vacuum process. The outer tube of the hose will close the injection ports and the remaining residual injection material will be removed from the interior of the hose. Then flush with water.

As soon as the water flow is clean on the vacuum side, disconnect the water supply by removing the vent end from the bucket of water. Disconnect the vacuum pump and close the injection vent ends and secure tightly with screws.



BELOW-GROUND WATERPROOFING

Fosroc offers one of the most comprehensive ranges in below-ground waterproofing, providing leak-free buildings around the world. These systems are manufactured to the highest quality standards backed by independent test certificates.

For below-ground structures where the exterior face of the structural concrete is inaccessible, the waterproofing must be applied prior to pouring the concrete. Conventional systems are either loose-laid or self-adhering to the substrate not the structural concrete, this means there is no seal between the waterproofing and the structural concrete which can lead to water travelling between the waterproofing and the structure from any leakages that may occur. BS8102:2009 highlights this problem and recommends that a fully-bonded pre-applied waterproofing system be used to mitigate this risk. A similar problem occurs where ground settlement takes place.

Fosroc have developed an innovative system, **Proofex Engage**, which incorporates a unique cell mesh which mechanically bonds to freshly placed concrete giving a tenacious waterproof seal, preventing water migration even if ground settlement occurs. It is installed rapidly with no need for blinding concrete, priming or protection and can be trafficked immediately after application. It is also gas resistant and highly durable and is unaffected by contaminants within the ground. Quality is assured through BBA and EN13967:2004 and the system is suitable for use in accordance with BS8102:2009 Grades 1, 2 and 3.

- Rapid installation - no blinding concrete or protection required.
- Assured watertight integrity even in the event of ground settlement.
- No water-tracking.
- Easy jointing and compatible full range of ancillaries.
- Integrity assured at pile caps.
- Excellent solution for precast concrete.
- Protects structure against ground contaminants.
- Long term watertight durability.



Where a structurally integral waterproof system is chosen, (i.e. BS8102:2009 Type B) the **Conplast WP** range of hydrophobic pore-blocking admixtures can be added to the insitu concrete. These admixtures reduce porosity and permeability, and increase water and corrosion resistance. Optimum dosages can be recommended based on project specific details.

System type	Example of application use	Fosroc Product name
Pre-applied membrane	Piled wall basements	Proofex Engage
PVC membrane	Basements	Proofex PGP / Alkorplan
Self-adhesive membranes	Ground slabs and shallow basements	Proofex 3000 / GP / 12 / 3000MR
Liquid-applied membranes	Foundations / dampproofing	Nitoproof range
Cementitious coatings	Existing basements	Brushbond / Nitocote CM210
Torch-applied membranes	Basements	Proofex Torchseal
PVC waterstops	Concrete joints	Supercast Watafoil / Hydrofoil / Rearguard
Swellable waterstops	Concrete joints	Supercast SW10 / 20 / 30 / X
Injection hose waterstops	Concrete joints	Supercast Predimax
Drainage membranes	Basements	Proofex Sheetdrain / Cavitydrain
Waterproof admixtures	Basements and ground slabs	Conplast WP range



Proofex PGP / Alkorplan, a loose-laid PVC membrane system, is available in large rolls. Joining is realised through welding with hot air. Compartments can be laid out using **Supercast PVC** waterstops which are welded to the membrane.



The **Nitoproof** liquid-applied coatings range provides protection for foundations or for dampproofing, they are easy to apply and are available in a wide range of grades.



Supercast Predimax injection hose waterstops for future provision of sealing leaking joints.



Nitocote CM210 provides an excellent solution for waterproofing the outside or inside faces of basement walls and floors due to its ability to withstand both positive and negative water pressure. This makes it an ideal choice for waterproofing existing basements. The system is easily applied by brush, roller, trowel or spray and the completed solution gives both water, fire and CO₂ protection.



For BS8102:2009 Type C internal drained cavity waterproofing, the structural concrete is designed to minimise water penetration and a suitable HDPE studded drainage membrane is installed to collect groundwater seepage. The groundwater is then directed to suitable discharge points. **Proofex Cavitydrain 80** and **200** drainage membranes can provide up to 10L/s/m water flow capacity.



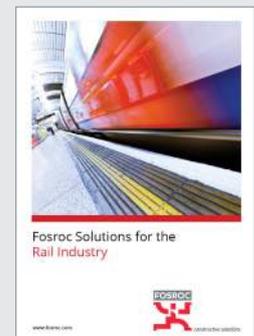
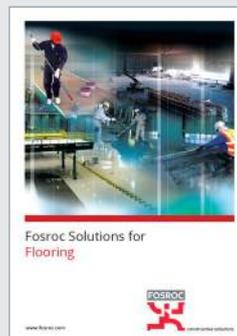
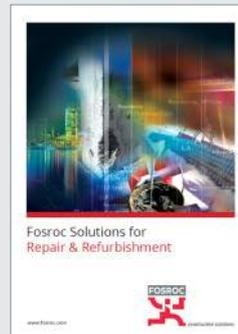
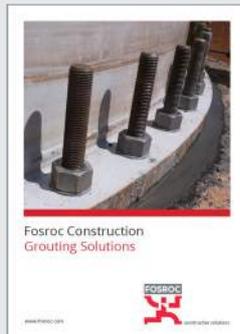
Post-applied bitumen based waterproofing for floors and walls can be easily installed using **Proofex GP / 3000** self-adhesive membranes in conjunction with **Proofex Protection Boards**. **Proofex 3000MR** is ideal where gas is present in the ground or the soil is contaminated. The aluminium foil layer in the membrane provides resistance and long term durability.



Supercast PVC and **Supercast SW** swellable waterstops to stop the passage of water through joints in concrete structures.

Supercast SW20 swellable strip achieves 1 bar water pressure resistance after 1 day and long term wet/dry cycling assuring excellent performance throughout the life of the structure.

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

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.



constructive solutions