# VOLTEX®
# WATERPROOFING SYSTEM INSTALLATION GUIDE

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An AMCOL Company

# VOLTEX®

## BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

Voltex® is a highly effective waterproofing composite of high strength geotextile and 4.88kg of sodium bentonite per square metre. The high swelling, low permeable sodium bentonite is encapsulated between a non-woven and woven geotextile.

A patented needle-punch process interlocks the geotextiles together forming an extremely strong composite that maintains the equal coverage of bentonite, as well as, protects it from inclement weather and construction related damage. Once backfilled, Voltex® hydrates and forms a monolithic waterproofing membrane.

Voltex® contains zero VOC, can be installed in almost any weather condition to green concrete, and most importantly, has proven effective on both new and remedial waterproofing projects worldwide.

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# VOLTEX® BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

**Voltex works by forming a low permeability membrane upon contact with water. When wetted, unconfined bentonite can swell up to 15 times its dry volume.**

**When confined under pressure the swell is controlled, forming a dense, impervious waterproofing membrane. The swelling action of Volclay can self-seal small concrete cracks caused by ground settlement, concrete shrinkage, or seismic action; problems over which there is normally no control.**

**Voltex forms a strong mechanical bond to concrete when the geotextile fibres are encapsulated into the surface of poured-in-place concrete.**

## Application

Voltex is designed for below-ground vertical and horizontal structural foundation surfaces. Typical applications include backfilled concrete walls, earth covered roofs, structural slabs, tunnels and property line construction. Property line construction applications include secant and contiguous piling, skin wall, metal sheet piling, shotcrete and stabilized earth retention walls. Applications may include structures under continuous or intermittent hydrostatic pressure.

Where contaminated ground-water or saltwater conditions exist, use Voltex CR with contaminant resistant sodium bentonite. Voltex CR resists higher levels of the following contaminants: nitrates, phosphates, chlorides, sulphates, lime and organic solvents.

## Installation

### GENERAL

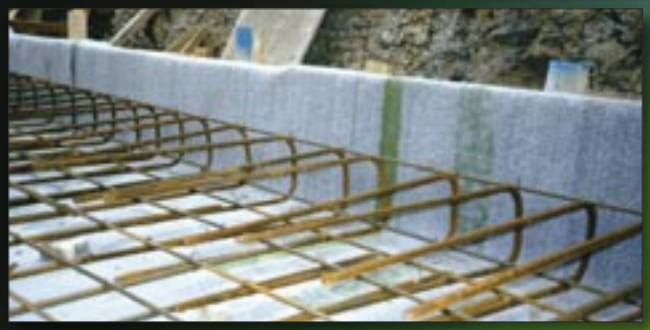
Install Voltex in strict accordance with the manufacturer's installation guidelines. Use accessory products as recommended. Also, use Voltex CR as required for contaminated conditions. Install Voltex with the dark grey (woven) geotextile toward the concrete to be waterproofed. Install Waterstop-RX in all applicable horizontal and vertical concrete construction joints. Schedule waterproofing material installation to permit prompt placement of backfill material or concrete. For applications not covered herein, refer to Voltex Product Manual or contact CETCO for specific installation guidelines.

### STORAGE

Keep Voltex and all accessory products dry, with adequate polyethylene or canvas cover for sides and top. Block up or pallet materials to prevent contact with ground surface water.

### PREPARATORY WORK

Substrate should be smooth and compacted to a minimum of 85% Modified proctor density. Concrete surfaces should be free of voids and sharp projections. Surface irregularities should be removed before installation. Honeycombing and other surface voids must be filled with mortar or Bentoseal, and tie-bolt holes must be filled with proprietary non-shrink mortar/grout.



## Under Concrete Floor Slabs

Voltex is recommended for use under structural reinforced concrete slabs 150mm thick or greater on compacted earth, substrate, or 50mm lean-mix concrete. Install Voltex around all foundations (ground beams, pads, pile caps etc.)

Place Voltex over the properly prepared substrate with the dark grey (woven) geotextile side facing the concrete to be waterproofed (i.e. the white (spun) side should face the groundwater). Overlap all adjoining edges a minimum of 100mm and stagger ends to a minimum of 300mm. Staple or nail edges together as required to prevent any displacement before and during concrete placement.

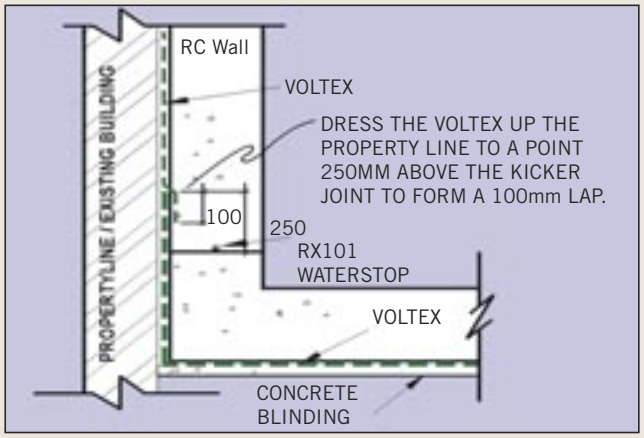
Voltex should not extend into foundation bearing planes (i.e. pile caps, ground beams, pads etc.) but should completely envelop them. Where this is not possible/desirable, VolSeal 20 (cementitious waterproofing by crystallization) or similar can be used as a continuity 'membrane' through the bearing plane, to which Voltex can be sealed using a 100mm lap, incorporating a 5mm x 50mm fillet of Bentoseal.

Cut Voltex to provide a snug fit around all applicable penetrations (pipes, piles etc).

Detail all penetrations with a 40mm fillet of Bentoseal or Volclay Paste (granules & water) around the penetration on top of the Voltex. Where concrete underblinding is not used, detail an additional 50mm chase filled with Volclay Granules around the penetration under the Voltex.

Where property line construction, such as secant/ contiguous piling, metal sheet piling, skin wall, etc., is used as the outside concrete form, continue the underslab Voltex installation up the property line a minimum of 250mm above the top edge of the floor slab, foundation, or kicker level.

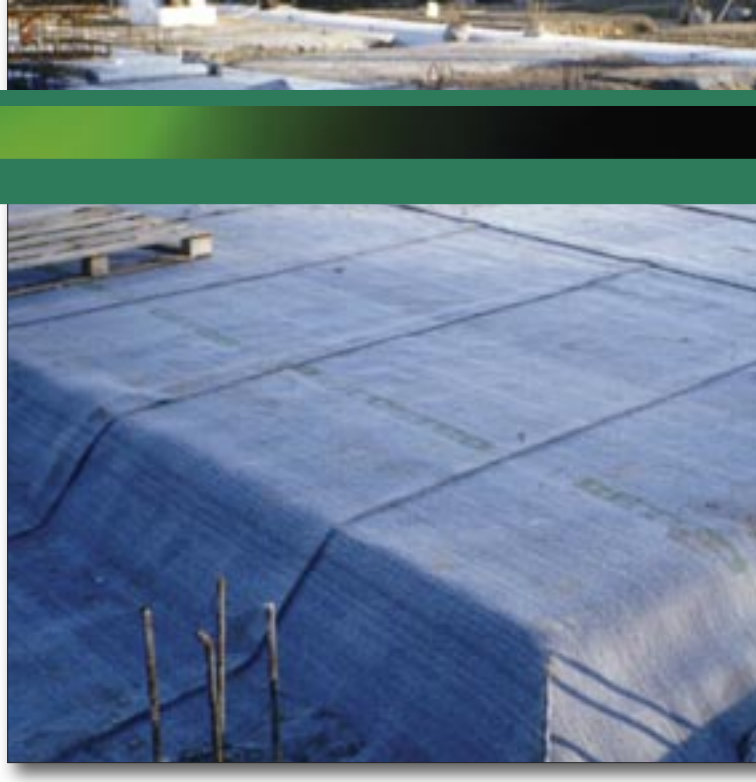
The extra 250mm is very important since there is no access to the outer edge after the concrete pour, and the top 100mm is to be kept free of concrete splashes to enable a clean lap later.

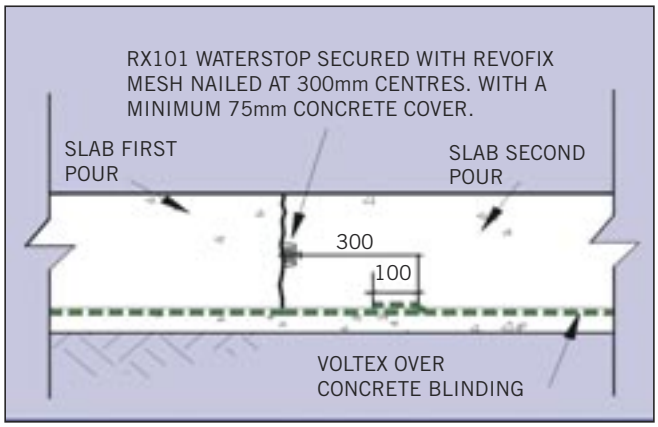



## Backfilled Concrete Walls

Voltex can be applied to backfilled walls in two ways: mechanically fastening to cast concrete just prior to backfilling (post-applied), or preferably, by utilizing the peel-adhesion properties of the Voltex (pre-applied). The needle-punched geotextile fibres, which have been forced from the white (spun) side through the bentonite and dark grey (woven) side, will be trapped within the wet concrete, and allow the Voltex to remain firmly attached to the concrete after the formwork has been removed.

All through concrete tie holes, etc., must be filled, from the outside, using a proprietary non-shrink grout or similar, covered in a 'mushroom' of Volclay Paste or Bentoseal, either prior to Voltex (post-fix) application, or prior to backfilling (pre-fix/peel-adhered application), where additional Voltex patching will be required.






Detail all pipe penetrations with Waterstop RX101 as a 'puddle flange' within the concrete, ensuring no less than 75mm concrete cover to all sides, and where penetrations pass through Voltex, ensure that Voltex is cut to provide a snug fit, and detail with a 40mm x 40mm fillet of Volclay Paste (granules & water) or Bentoseal, prior to backfilling.

Backfill material shall be compactable soils and free of construction debris. Backfill shall be clean, well grounded, and compacted every 300 mm to 85% modified proctor (as defined by ASTM 1557), and meet these general specifications:

- No rocks, stones or boulders larger than 50mm
- 90% minimum soil particles smaller than 5mm
- 10% maximum soil particles finer than 74 micron

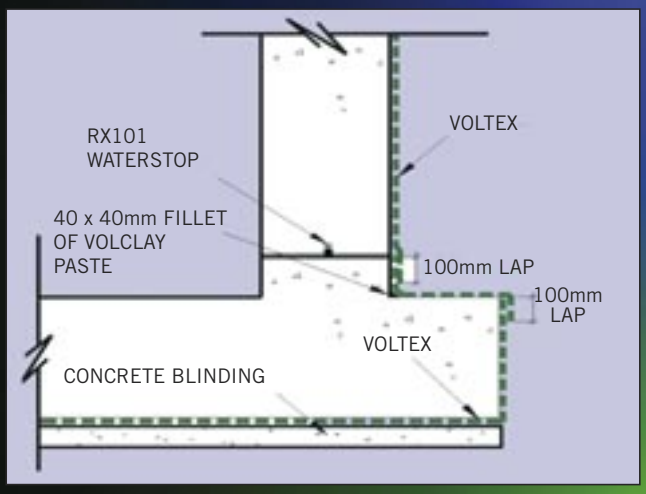
Terminate Voltex at ground level, etc., integrating the Voltex with a damp proof course/cavity tray (as per architects arrangement), by extending the DPC to overlap Voltex a minimum of 150mm. The Voltex/ DPC lap should be enhanced by the inclusion of a 5mm x 50mm fillet of Bentoseal, centrally located.

# VOLTEX® BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

## PRE-APPLIED

Apply Voltex to timber formwork, either horizontally or vertically, by nailing or stapling, following general application guidelines for lapping all adjacent edges 100mm, and staggering adjacent roll ends no less than 300mm (avoiding four-way laps), and additionally ensuring that laps face downwards, as applicable. The white (spun) side should be against the formwork, and the dark grey (woven) side should face the concrete to be waterproofed.

Extend Voltex the full depth of the formwork, so that the Voltex laps 100mm over the Voltex already cast into the slab edge and wall kicker, and allow no less than 150mm at the top of the formwork, to provide ground slab continuity later, if required.




Position formwork as required, and tie/space forms, penetrating Voltex as necessary. Normal concrete practice is sufficient in terms of striking times for formwork, but due care should be taken to ensure that Voltex remains bonded to green concrete.

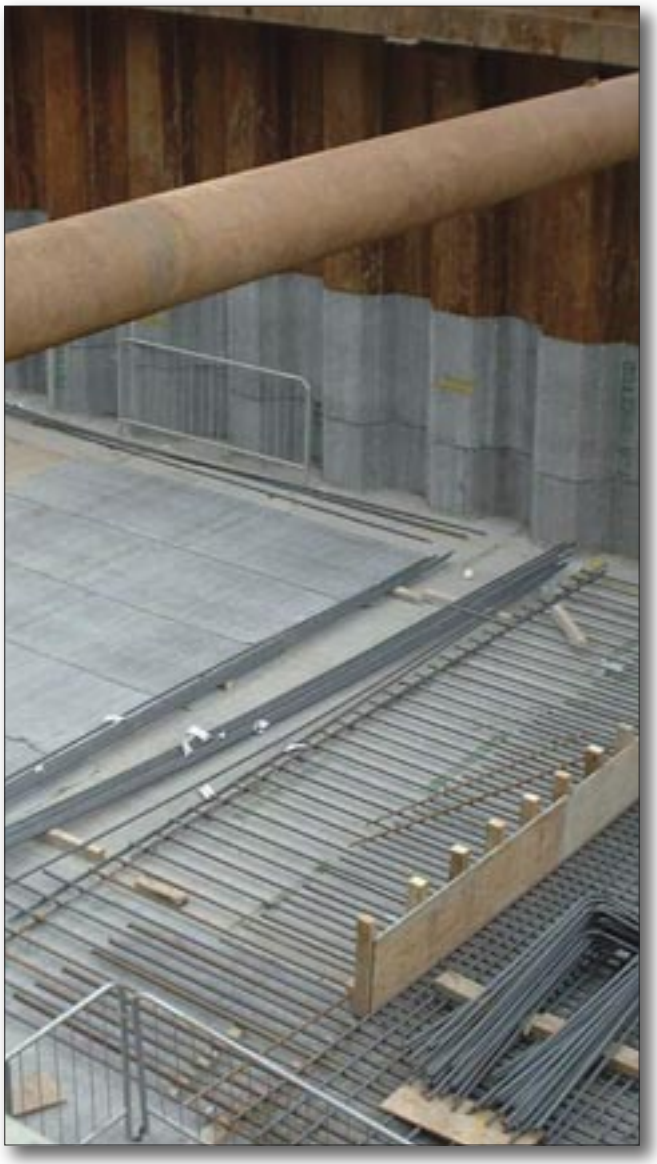
Where a slab 'toe' exists, and underslab Voltex has terminated at the top edge of slab, additional Voltex will be required to link underslab/edge of slab Voltex with wall Voltex. Apply a 40mm x 40mm fillet of Volclay Paste (granules & water) at the internal wall/slab corner, and place additional Voltex over the slab 'toe' lapping 100mm over the edge of slab Voltex, and continue over the 'toe' terminating under the unbonded wall Voltex 'flap' at the back of the kicker.

## POST-APPLIED

Apply Voltex vertically or horizontally against concrete, starting with a 100mm lap with the underslab/edge of slab Voltex (peel-adhered to concrete), using CETCO's proprietary shot-fired 'soft-washer' fasteners, and following general application guidelines for lapping all adjacent edges 100mm, and staggering adjacent roll ends no less than 300mm, (avoiding four-way laps), and additionally ensuring that laps face downwards, as applicable. The dark grey side should be against the concrete, and the white (spun) side facing the installer.

Detail all horizontal and vertical internal corners with a 40mm x 40mm fillet of Volclay paste (granules & water) or Bentoseal, prior to Voltex application.

**NOTE**: Voltex is not recommended for masonry block walls.



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## Property Line Construction

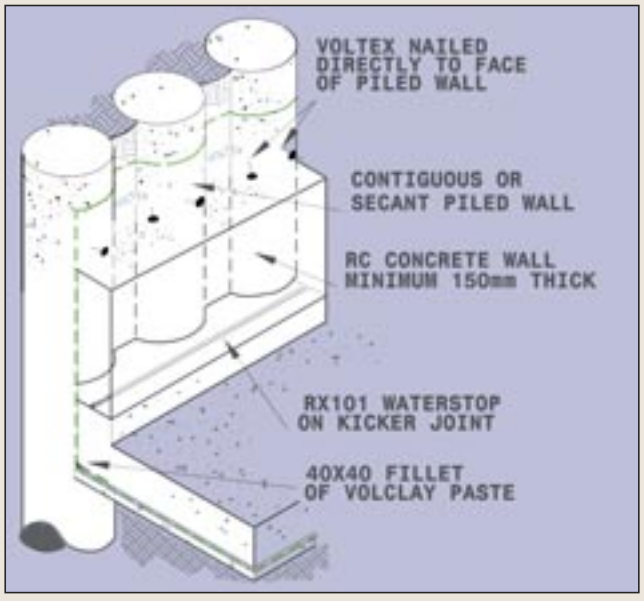
Voltex is used to waterproof various types of property line construction, including metal sheet piling, secant and contiguous piling, skin wall, shotcrete and stabilized-earth retention walls. Shotcrete can be applied directly against Voltex.

Concrete surfaces shall be free of large voids or projections. Voids, pits, and cracks in excess of 20mm, shall be parged to flush condition using cement grout, Volclay Bentoseal or Volclay paste (granules & water). Projections greater than 20mm shall be removed or smoothed flush. Generally, gradual undulating surfaces are acceptable, sudden changes in level, i.e. ridges and hollows, are not.

When working against property line, always start with the vertical installation, prior to installing Voltex under slab. Apply the bottom run of Voltex length ways/ horizontally against the property line, approximately 1,100mm from the substrate/ blinding level, allowing 150mm of Voltex to extend under slab.

On profiled property line (metal sheet piling, secant and contiguous piling, etc) the 150mm base 'flap' will need to be cut and splayed as necessary, to allow the material to lay flat.

Using CETCO's proprietary shot-fired 'soft-washer' fasteners, and following general application guidelines for lapping all adjacent edges 100mm, and staggering adjacent roll ends no less than 300mm (avoiding four-way laps), and additionally ensuring that laps face downwards, as applicable, ensure that Voltex closely contours the application surface.




For secant piling, locate fixings close to cleavages. On contiguous piling, ensure that soil columns between piles are cut back to no less than one third of the pile diameter, to create a fixing cleavage, and reduce the likelihood of soil dislodging behind the membrane.

Detail all through wall pipe/sleeve penetrations with Waterstop RX101® as a 'puddle flange' within the concrete, ensuring no less than 75mm concrete cover to all sides.

## Limitations

Horizontal installation surfaces shall be free of excessive* standing water, particularly where concrete underblinding is not utilized.

*(*Voltex can be installed in almost all inclement weather conditions, providing the quality/accuracy of the installation is not affected e.g. Voltex floating, Waterstop RX submersed, etc).*

If ground water contains strong acids, alkalis, or is of a conductivity of 2,500 umhos or greater, submit water samples to the manufacturer for compatibility testing. If contaminated ground-water or saltwater conditions exist, please contact manufacturer.

# VOLTEX® BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

Voltex is not designed for unconfined above-ground waterproofing applications or below-ground masonry block foundation walls. Voltex is engineered for use under reinforced structural concrete slabs of 150mm thick or greater. Do not install Voltex in horizontal split-slab, plaza deck and roof applications that will receive a poured concrete wear surface or other solid topping.

Voltex is not designed to waterproof expansion joints. Expansion joints require a properly engineered expansion joint sealant product manufactured by other companies.

## Size and Packaging

Standard Voltex roll sizes are 1.1m x 5.0m (5.5m$^2$) packaged 35 No. rolls per pallet (192.5m$^2$). Average product weight varies with moisture content, and is between 6 and 7kg/m$^2$. Voltex dimensions can be tailored to suit project requirements, keeping one dimension at 5.0m, and the other from 1.1m up to 40.0m. Larger rolls may be subject to special handling requirements.

## Accessory Products

Volclay Voltex accessories include:

**BENTOSEAL®**
Patented trowel grade sodium bentonite compound used as a detailing mastic around penetrations and corner transitions. Bentoseal is packaged in 14.25 litre tubs.

**VOLTEX® GRANULES®**
Pure granular Volclay Bentonite used to detail critical areas that may require extra Volclay protection. Volclay Granules are packaged in 20kg bags.

**WATERSTOP RX101®**
Expanding bentonite-based concrete joint strip waterstop for use in non-moving concrete construction joints. Waterstop-RX101 is manufactured in flexible strips.

**TECHNICAL DATA**

| PROPERTY | TEST METHOD | TYPICAL VALUE |
|---|---|---|
| Bentonite mass per unit area | ASTM D 3776 (mod) | 4.88 kg/m$^2$ |
| Peel adhesion to concrete | ASTM D 903 (mod) | 2.5 KN (per m width) |
| Hydrostatic pressure resistance | ASTM D 5385 (mod) | 70 m |
| Permeability | ASTM D 5084 | 1 X 10$^{-9}$ cm/sec |
| Grab tensile strength | ASTM D 4632 | 422 N |
| Puncture resistance | ASTM D 4833 | 445 N |
| Low temperature flexibility | ASTM D 1970 | Unaffected @-32°C |

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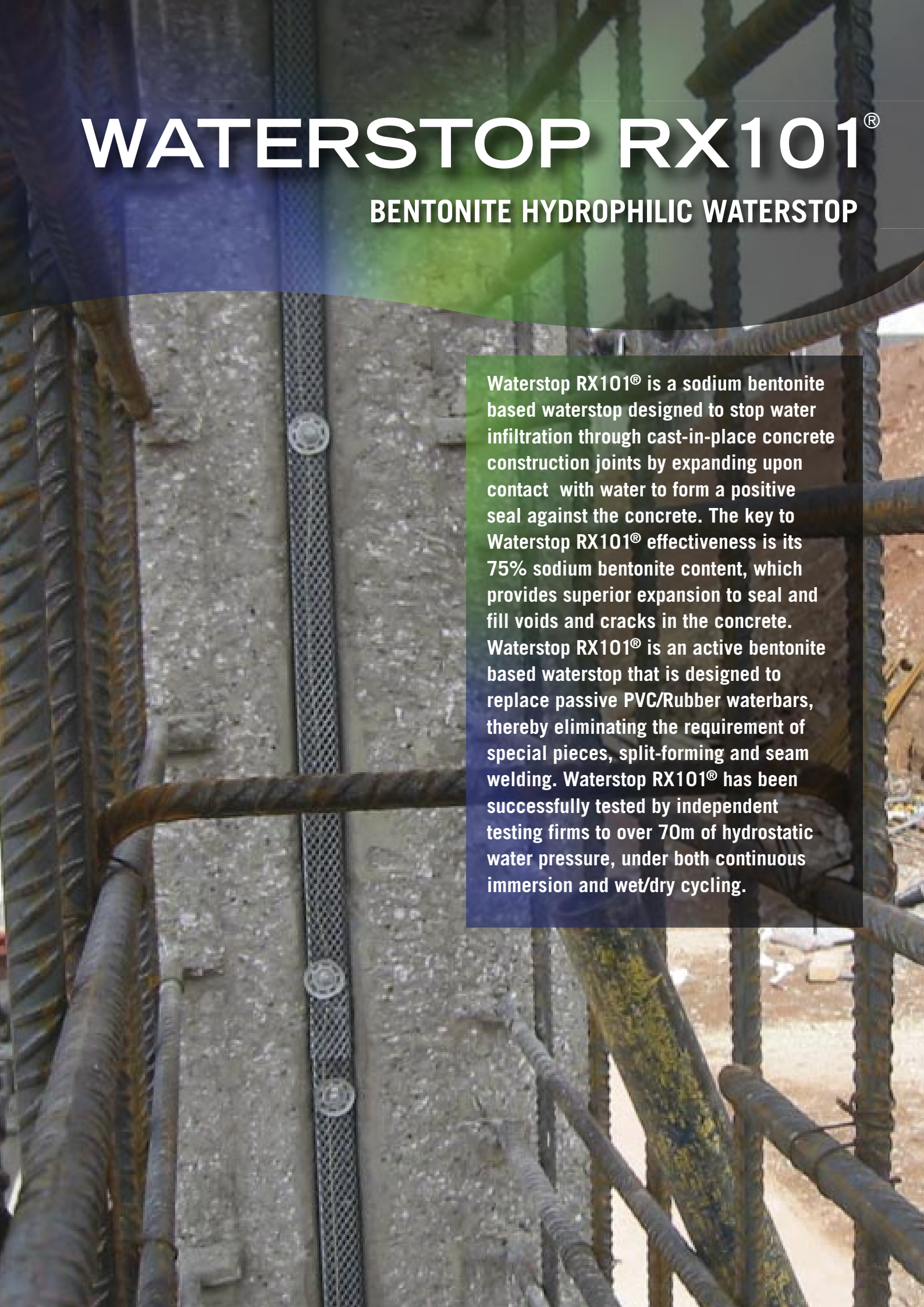
# WATERSTOP RX101®

## BENTONITE HYDROPHILIC WATERSTOP



Waterstop RX101® is a sodium bentonite based waterstop designed to stop water infiltration through cast-in-place concrete construction joints by expanding upon contact with water to form a positive seal against the concrete. The key to Waterstop RX101® effectiveness is its 75% sodium bentonite content, which provides superior expansion to seal and fill voids and cracks in the concrete. Waterstop RX101® is an active bentonite based waterstop that is designed to replace passive PVC/Rubber waterbars, thereby eliminating the requirement of special pieces, split-forming and seam welding. Waterstop RX101® has been successfully tested by independent testing firms to over 70m of hydrostatic water pressure, under both continuous immersion and wet/dry cycling.

# WATERSTOP RX101® BENTONITE HYDROPHILIC WATERSTOP

**Waterstop RX101® is manufactured in light-weight, flexible coils that are easily installed by a single worker. The product is applied to concrete, steel and PVC (Pipes) with Revofix Mesh (preferred), and/or RX WB Adhesive. Coil ends are butted together - not overlapped - to form a continuous waterstop.**

## Applications

Applications include both vertical and horizontal non-moving concrete construction joints, new to existing concrete construction, irregular surfaces, and around through-wall penetrations; such as plumbing and utility pipes. Waterstop RX101 works in both continuous hydrostatic and intermittent hydrostatic conditions.

Waterstop RX101 is designed for use in reinforced structural concrete, utilizing two rows of reinforcing steel, with a minimum thickness of 175mm, providing the RX with no less than 75mm concrete cover to all sides.

## Installation

### SURFACE PREPARATION

Construction joint surfaces should be clean and free of standing water. Loose/flaking concrete or laitance should be removed (scabbling, brushing, jet-washing etc.) Forming of rebates/chases is not required.

### INSTALLING WATERSTOP RX101 WITH REVOFIX MESH

After preparing concrete surface, uncoil Waterstop RX101 and leaving the release paper intact, apply exposed/black face against concrete, pushing firmly against release paper to force RX101 into concrete undulations.

As work proceeds, remove release paper, and locate Revofix Mesh sections over RX101, lapping the ends just. Nail through laps with fixings supplied, and provide one additional fixing in between i.e. fixings at 300mm c/c.

End-to-end or end-to-side junctions are created by simple butt joints. Ensure continuity is achieved through Revofix Mesh, by pressing ends firmly together. Start at junctions; do not stretch Waterstop RX101 to fit. Do not overlap the Waterstop RX101.

### INSTALLING RX101 WITH RX WB ADHESIVE

After preparing concrete surface, brush apply a thin, uniform strip, 25mm wide, of WB Adhesive onto concrete, working well into undulations, and allow to cure to black (5-20 minutes depending on ambient temperatures). Recoat areas not receiving RX within 6 hours. Uncoil RX, and leaving the release paper intact, apply exposed/black face against concrete, pushing firmly against release paper to force RX into concrete undulations.

Release paper can remain, as it provides some protection from rainfall, but MUST be removed prior to placing concrete.

Waterstop RX101 junctions are as for 'Installing RX101 with Revofix Mesh'.

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Waterstop RX101 may be installed as 'puddle flanges' around cast-in, through wall/slab penetrations, using the RX WB Adhesive and/or tie-wire to secure.

On irregular surfaces make sure Waterstop RX101 remains in direct contact with the substrate along the entire installation on irregular surfaces e.g. Old to new slab junctions. Bentoseal can be used to provide a 'bed' for Waterstop RX101, followed by application of Revofix Mesh (which may require additional nailing to allow it to conform to the surface profile).

## Limitations

**Waterstop RX101 is not a self-adhesive product. Revofix Mesh or WB Adhesive is required to secure Waterstop RX101 to concrete, metal or PVC (Pipes) surfaces.**

**Waterstop RX101 is not designed, nor intended to function as an expansion joint sealant.**
**Contact Manufacturer for precast concrete applications, technical information and approval.**

Waterstop RX101 is designed for structural concrete. Waterstop RX101 requires a minimum of 75mm of concrete cover to all sides.

Waterstop RX101 should only be used in applications where the product is completely encapsulated within the concrete.

Waterstop RX101 should not be prehydrated by being subjected to submersion or remain in contact with water prior to concrete pour. If the product exhibits considerable swell prior to confinement in the joint, it must be replaced with new material.

In conditions where severe ground water chemical contamination exists or is expected, consult manufacturer for compatibility information and approval.

## Size and Packaging

Waterstop RX101 is supplied in single 5m coils, 30m per box. Revofix Mesh is supplied in 30 No 1m lengths, 30m per box. RX WB Adhesive is supplied in 3.8 litre tubs (sufficient for 100 +m of RX application).


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