

VOLTEX®

BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

DESCRIPTION

VOLTEX® bentonite geotextile waterproofing system is a highly effective waterproofing composite of high strength geotextiles and 5.0 kg/sqm of sodium bentonite. The high swelling, low permeable sodium bentonite is encapsulated between a non-woven and woven geotextile. A proprietary needlepunch 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.

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 VOLTEX 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 cast-in-place concrete.

APPLICATIONS

VOLTEX is designed for below-ground vertical and horizontal structural foundation surfaces. Typical cast-in-place concrete applications include backfilled concrete walls, earth-covered roofs, structural slabs, tunnels, and property line construction. Property line construction applications include soldier pile and lagging, secant/contiguous piling, steel sheet piling, shotcrete and stabilized earth retention walls. Applications may include structures under continuous or intermittent hydrostatic pressure.

Where contaminated ground-water conditions exist, use VOLTEX CR with contaminant resistant sodium bentonite. VOLTEX CR resists higher levels of the following contaminants: nitrates, phosphates, chlorides, sulfates, lime and organic solvents. Verify suitability of product by submitting a site water sample to CETCO for Water Compatibility Testing prior to installation. Contact CETCO for further details.

INSTALLATION

General: Installation guidelines herein are for cast-in-place concrete applications. For shotcrete, precast concrete, and other applications not covered herein, refer to specific VOLTEX literature or contact CETCO for applicable installation guidelines. Install VOLTEX in strict accordance with the manufacturer's installation guidelines using accessory products as required. 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® waterproofing/sealant in all applicable horizontal and vertical concrete construction joints. Schedule waterproofing material installation to permit prompt placement of concrete or compacted backfill.

STORAGE: Keep VOLTEX and all accessory products dry prior to back fill or concrete placement.

Preparatory Work: Under Slab: Substrate should be smooth and compacted to a minimum of 85% Modified Proctor density. Concrete Walls: Concrete should be free of voids and projections. Surface irregularities should be removed before installation.

Apply BENTOSEAL® mastic compound waterproofing agent over filled tie-bolt holes and to honeycombed concrete and surface voids. Tie-bolt holes extending through the wall should be completely filled with non-shrink cementitious grout and a piece of WATERSTOP-RX centred in the wall. Property Line Shoring Walls: Install VOLTEX only after proper substrate preparation has been completed and is suitable to receive the waterproofing.

UNDER CONCRETE FLOOR SLABS

VOLTEX is recommended for use under structural reinforced concrete slabs 100 mm thick or greater on a compacted earth/gravel substrate. A minimum 150 mm thick reinforced slab, if installed over a concrete blinding. Where hydrostatic conditions exist, install VOLTEX under footings and ground beams.

Place VOLTEX over the properly prepared substrate with the dark grey (woven) geotextile side up. Overlap all adjoining edges a minimum 100 mm and stagger sheet ends a minimum 300 mm. Staple or nail edges together as required to prevent any displacement before and during concrete placement.

Cut VOLTEX to closely fit around penetrations and pile caps. Install WATERSTOPPAGE under cut VOLTEX edge at detailing and then apply a minimum 19 mm thick fillet of BENTOSEAL to top of cut VOLTEX edge at penetrations, pile caps, ground beams, and other detailing. Extend BENTOSEAL onto VOLTEX and detail a minimum of 50 mm. For hydrostatic conditions, VOLTEX should be installed under ground beams and footings. Extend VOLTEX onto footing a minimum 150 mm when required to tie into vertical wall waterproofing.

Where property line retaining walls, such as secant/contiguous piling, steel sheet piling, soldier pile and lagging etc., are used as the outside concrete form, install a VOLTEX transition course at the base of the wall per "Shoring Wall Transition" instructions within the "Property Line Construction" section herein. Continue the underslab VOLTEX installation up to the retaining wall overlapping the transition course a minimum 300 mm.

BACKFILLED CAST-IN-PLACE CONCRETE WALLS

Before installing the first course of VOLTEX, install BENTOSEAL fillet (min 38 x 38 mm) at the wall / footing transition corner. Trowel apply the BENTOSEAL® to form a continuous line.

Pre-applied installation

Apply VOLTEX® to timber formwork, either horizontally or vertically, by nailing

VOLTEX®

BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

or stapling, following general application guidelines for lapping all adjacent edges 100 mm, and staggering adjacent roll ends no less than 300 mm (avoiding four-way laps), and additionally ensuring that laps face downwards, as applicable. The non-woven (white) geotextile should be installed against the formwork, and the woven (grey) geotextile should face the concrete to be waterproofed.

Extend VOLTEX the full depth of the formwork, so that the VOLTEX laps 100 mm over the VOLTEX already cast into the slab edge and wall kicker, and allow no less than 150 mm at the top of the formwork, to provide waterproofing 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 the slab, additional VOLTEX will be required to link underslab/edge of slab VOLTEX with the pre-applied wall VOLTEX. Install BENTOSEAL fillet (min 38 x 38 mm) at the internal wall/slab corner, and place additional VOLTEX over the slab 'toe' lapping 100 mm 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 Installation

Beginning at the bottom corner of the wall, install VOLTEX horizontally oriented with 1.5 m on one wall and the remainder around the corner on the other wall surface. Cut the bottom edge of VOLTEX at the corner a minimum of 150 mm so that VOLTEX can be extended onto the footing. Fasten VOLTEX into position with washer headed fasteners a maximum 600 mm on centre. Then cut and install a VOLTEX section over the uncovered footing corner area. Apply BENTOSEAL at the VOLTEX section to VOLTEX overlap at the corner.

Install adjacent VOLTEX rolls of the bottom course horizontally oriented. Each roll should overlap the preceding roll a minimum 100 mm and should extend onto the footing a minimum 150 mm. At inside wall corners apply a continuous 19 mm fillet of BENTOSEAL directly in the corner prior to installing VOLTEX. Stagger all vertical overlap joints a minimum of 300 mm. For hydrostatic conditions, the vertical wall VOLTEX should cover the entire footing and overlap the underslab waterproofing a minimum 150 mm.

Cut VOLTEX to closely fit around penetrations. After installing VOLTEX, trowel a minimum 19 mm thick fillet of BENTOSEAL round the penetrations to completely fill any space between the penetration and the VOLTEX edge. Extend BENTOSEAL onto the penetration and over the VOLTEX edge 38 mm. In areas where multiple penetrations are close together, it may be impractical to cut VOLTEX to fit around each penetration. Therefore, apply a 19 mm thick fillet of BENTOSEAL around base of each penetration and cover the entire area between the penetrations. Extend BENTOSEAL 38 mm onto the penetrations.

Terminate VOLTEX membrane 300 mm below finished ground elevation with washer-head fasteners maximum 300 mm on centre. Install CETBIT 300 flashing to primed concrete substrate with bottom edge overlapping top edge of VOLTEX membrane minimum 100 mm. Overlap all roll ends a minimum 100 mm to form a continuous flashing. Height of flashing shall be as per project details and specifications. Install a rigid termination bar along top edge of CETBIT 300; fastened maximum 300 mm on centre. Complete ground termination detail with tooled bead of CETSEAL along the top edge, at all penetrations through the flashing, and all exposed overlap seams. Backfill should be placed and compacted to minimum 85% modified proctor density promptly after waterproofing installation. Backfill should consist of compactable soil or angular aggregate (19 mm or less) free of debris, sharp objects, and stone larger than 19 mm.

NOTE: VOLTEX is not recommended for masonry block walls. Contact CETCO regarding products and installation guidelines for masonry block foundation walls.

PROPERTY LINE CAST-IN-PLACE CONSTRUCTION

Use VOLTEX to waterproof various types of cast-in-place property line construction, including: secant/contiguous piling, steel sheet piling, soldier pile and lagging, and stabilized earth shoring walls. Following guidelines outline the installation of VOLTEX on secant/contiguous piled walls. For other property line shoring wall applications refer to the "VOLTEX Cast-In-Place Product Manual" or consult CETCO. For Shotcrete applications refer to the "VOLTEX Shotcrete Application Manual" for installation guidelines.

Secant/Contiguous Piled Wall Preparation:

Substrates should be free of large voids or protrusions. Voids, pits, and cracks in excess of 20 mm, should be parged flush using cementitious grout or BENTOSEAL. Protrusions greater than 20 mm should be removed or smoothed flush. Generally, gradual undulating surfaces are acceptable, sudden changes in level, i.e. ridges and hollows, are not.

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 VOLTEX.

Where required, cast concrete backblinding or apply shotcrete to contiguous piled walls to provide a sound substrate, particularly where large voids occur between piles due to unstable soil loss.

Shoring Wall Transition:

At base of shoring wall, install VOLTEX sheet horizontally oriented (dark grey woven geotextile facing installer) with the bottom edge extending out onto the horizontal substrate a minimum 300 mm and the top edge of the sheet extending a minimum 300 mm above the finished slab elevation. Secure VOLTEX sheet to shoring wall with washer-head fasteners maximum 600 mm on centre. Overlap edges of VOLTEX sheets a minimum 100 mm. If the slab thickness is greater than 600 mm, install a second full sheet or cut strip of VOLTEX on the shoring wall to meet the 300 mm requirement above of the top slab elevation. Overlap top edge of previous sheet and edges of adjacent sheets a minimum 100 mm.

VOLTEX®

BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

Secant/Contiguous/Steel Sheet Piled Wall Installation: Follow the 'Shoring Wall Transition' instructions for installation of VOLTEX® transition course at the base of the secant/contiguous/steel sheet piled wall, with the 300 mm base flap cut and splayed as necessary, to allow the material to lay flat and provide continuity with the under slab installation.

Use washer-head fasteners to secure VOLTEX, following general application guidelines for lapping all adjacent edges 100 mm, and staggering adjacent roll ends no less than 300 mm (avoiding four-way laps), and additionally ensuring that laps face downwards, as applicable, ensure that VOLTEX closely contours the application surface. For secant and contiguous piling, locate fasteners close to cleavages. For steel sheet piling, locate fasteners close to sheet pile interlocks and along internal/external sheet pile corners.

Penetrations: Install a cut collar of VOLTEX tightly around the penetration; extending a minimum 300 mm radius. Apply BENTOSEAL® over VOLTEX collar around penetration; extending BENTOSEAL a minimum 75 mm radius at 6 mm thickness. Then install main course of VOLTEX membrane tightly around the penetration. Finally, detail around penetration with 19 mm thick fillet of BENTOSEAL. With sleeved pipes, fill the gap between the pipe and the sleeve with non-shrink cementitious grout and install WATERSTOP-RX® waterproofing/sealant to both sides of sleeve.

Ground Termination: Terminate VOLTEX membrane 300 mm below finished ground elevation with washer-head fasteners maximum 300 mm on centre. Install CETBIT 300 flashing to primed concrete substrate with bottom edge overlapping top edge of VOLTEX membrane minimum 100 mm. Overlap all roll ends a minimum 100 mm to form a continuous flashing. Height of flashing shall be per project details and specifications. Install a rigid termination bar along top edge of CETBIT 300; fastened maximum 300 mm on centre. Complete ground

termination detail with tooled bead of CETSEAL along the top edge, at all penetrations through the flashing, and all exposed overlap seams.

Secure all excavated VOLTEX overlap seams with washer-head fasteners maximum 600 mm on centre. Backfill shall be placed and compacted to minimum 85% Modified Proctor density promptly after waterproofing installation. Backfill should consist of compactable soil or angular aggregate (19 mm or less) free of debris, sharp objects, and stone larger than 19 mm.

LIMITATIONS

VOLTEX should only be installed after substrate preparation has been properly completed and is suitable to receive the waterproofing system. Concrete work should be cast-in-place with conventional forms that produce a smooth surface.

VOLTEX is designed for below-ground waterproofing applications where the product is properly confined. VOLTEX should not be installed in standing water or over ice. If ground water contains strong acids, alkalies, or is of a conductivity of 2500 $\mu\text{mhos/cm}$ or greater, water samples should be submitted to the manufacturer for compatibility testing. ULTRASEAL® XP waterproofing membrane may be required if contaminated ground water or saltwater conditions exist.

VOLTEX is designed for use under reinforced concrete slabs 100 mm thick or greater on a compacted earth/gravel substrate. VOLTEX requires a minimum 150 mm thick reinforced concrete slab if installed over a concrete blinding. VOLTEX is not designed for split-slab plaza deck construction.

VOLTEX is not intended to seal expansion joints; contact CETCO for expansion joint applications. Do not use VOLTEX on masonry block foundation walls. Consult CETCO for special installation guidelines that apply to shotcrete and precast concrete construction.

VOLTEX installation guidelines contain herein are for cast-in-place concrete applications and do not cover shotcrete or precast concrete applications. Refer to VOLTEX Product Manuals for additional property line shoring wall construction technique applications. Consult CETCO for applicable products and installation guidelines for applications not covered herein.

SIZE AND PACKAGING

VOLTEX is available in 1.1 x 5 m rolls. Typical roll weight is approximately 33 kg. VOLTEX is packaged 35 rolls per pallet (192.5 sqm). VOLTEX is also available in 2.5 m x 20 m and 5 m x 40 m standard size rolls.

ACCESSORY PRODUCTS

Install VOLTEX using accessory products in strict accordance with the manufacturer's installation guidelines and details. Primary accessory products include BENTOSEAL, WATERSTOPPAGE, CETSEAL and CETBIT 300 ground-level flashing.

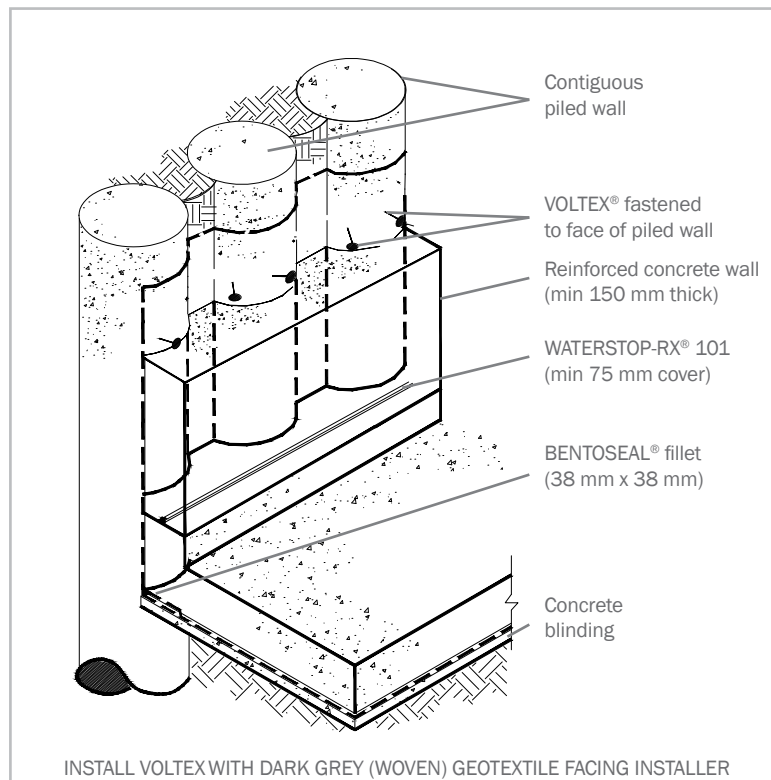
ASSOCIATED SYSTEM PRODUCTS

AQUADRAIN® subsurface drainage composite and WATERSTOP-RX® expanding concrete joint waterstop.

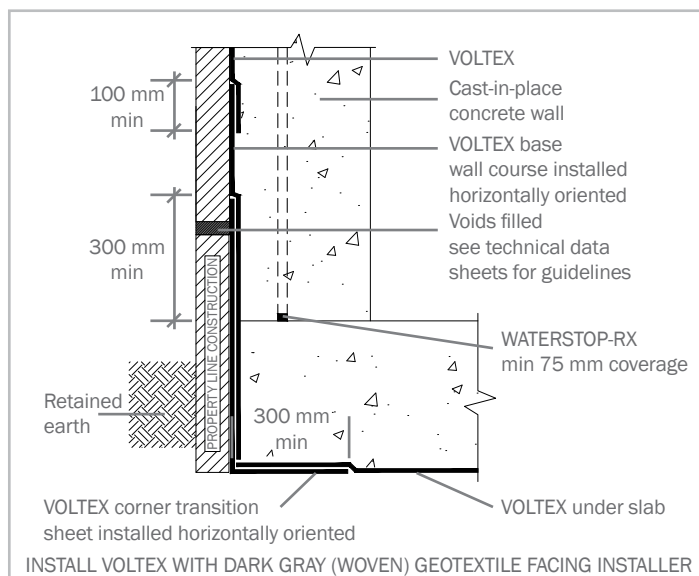
IMPORTANT NOTICE: CONTACT CETCO FOR VERIFICATION OF SPECIFICATION AND INSTALLATION REQUIREMENTS TO COMPLY WITH ISSUANCE FOR ELIGIBILITY OF HYDROSHIELD WARRANTY.

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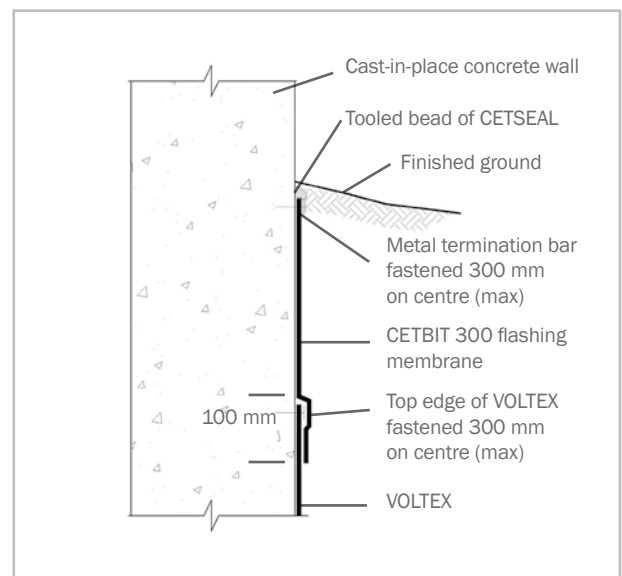
BENTONITE GEOTEXTILE WATERPROOFING SYSTEM



Property Line Contiguous Piled Wall Detail



Property Line Transition



Ground Termination

VOLTEX®

BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

TECHNICAL DATA		
MATERIAL PROPERTIES	TEST METHOD	NOMINAL VALUE
BENTONITE		
Bentonite Free Swell	ASTM D 5890	≥ 24 ml / 2 g
Bentonite Fluid Loss	ASTM D 5891	18 ml max.
Bentonite mass / unit area	EN 14196	5.0 kg/m²*
MEMBRANE COMPOSITE		
Hydrostatic Pressure Resistance	ASTM D 5385 (mod)	70 m
Peel Adhesion to Concrete	ASTM D 903 (mod)	2.6 kN / m min
Hydraulic Conductivity	ASTM D 5084	1.0 x 10 ⁻⁹ cm/s
Tensile Strength (MD / CD)	EN ISO 10319	10.0 kN/m / 10.0 kN/m**
Thickness @ 2 kPa	EN ISO 9863-1	7.0 mm (typical)
Puncture Resistance	EN ISO 12236	1.8 kN***
Low Temperature Flexibility	ASTM D 1970	unaffected @ -32°C

* average value at 12% MC, tolerance ±0.2 kg/m²

** average value, tolerance ±2.0 kN/m

*** average value, tolerance ±0.3 kN



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cetco@mineralstech.com | cetco.com

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