

## **VOLTEX®** **BENTONITE GEOTEXTILE WATERPROOFING SYSTEM**

### **DESCRIPTION:**

VOLTEX is a highly effective waterproofing composite of high strength geotextiles and 1.0 pound of sodium bentonite per square foot. (4.8kg/sqm) The high swelling, low permeable sodium bentonite is encapsulated between a non-woven and woven geotextile. A proprietary 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.

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 fibers are encapsulated into the surface of cast-in-place concrete.

### **APPLICATIONS:**

VOLTEX is designed for below-grade 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, metal sheet piling, shotcrete and stabilized earth retention walls. Applications may include structures under continuous or intermittent hydrostatic pressure. Where contaminated ground-water

or salt-water conditions exist, use VOLTEX CR with contaminant resistant sodium bentonite. VOLTEX CR resists higher levels of the following contaminant's: nitrates, phosphates, chlorides, sulfates, lime and organic solvents.

### **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 gray (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 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 to form-tie pockets, construction joints and honeycombs. Tapered form-tie holes extending through the wall should be completely filled with non-shrink grout and a piece of Waterstop-RX centered 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 4" (100 mm) thick or greater on a

manufactured by



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compacted earth/gravel substrate. A minimum 6" (150 mm) thick re-inforced slab, if installed over a mud slab.

Where hydrostatic conditions exist, install VOLTEX under footings and grade beams.

Place VOLTEX over the properly prepared substrate with the dark gray (woven) geo-textile side up. Overlap all adjoining edges a minimum 4" (100 mm) and stagger sheet ends a minimum 12" (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 3/4" (18 mm) thick fillet of Bentoseal to top of cut VOLTEX edge at penetrations, pile caps, grade beams, and other detailing. Extend Bentoseal onto VOLTEX and detail a minimum of 2" (50 mm). For hydrostatic conditions, VOLTEX should be installed undergradebeam-sandfootings. Extend VOLTEX onto footing a minimum 6" (150 mm) when required to tie into vertical wall waterproofing.

Where property line retaining walls, such as soldier pile and lagging, 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 12" (300 mm).

### **BACKFILLED CAST-IN-PLACE CONCRETE WALLS**

Before installing the first course of VOLTEX, place Hydrobar Tubes® at the wall/footing transition corner. Butt the ends of Hydrobar Tubes together to form a continuous line.

Beginning at the bottom corner of the wall, install VOLTEX horizontally oriented with 5-ft. (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 6" (150 mm) so that VOLTEX can be extended onto the footing. Fasten VOLTEX into position with washer headed fasteners

a maximum 24" (600 mm) on center. 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 4" (100 mm) and should extend onto the footing a minimum 6" (150 mm). At inside wall corners apply a continuous 3/4" (18 mm) fillet of Bentoseal directly in the corner prior to installing VOLTEX. Stagger all vertical overlap joints a minimum of 12" (300 mm). For hydrostatic conditions, the vertical wall VOLTEX should cover the entire footing and overlap the under-slab waterproofing a minimum 6" (150 mm).

Cut VOLTEX to closely fit around penetrations. After installing VOLTEX, trowel a minimum 3/4" (18 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 1-1/2" (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 3/4" (18 mm) thick fillet of Bentoseal around base of each penetration and cover the entire area between the penetrations. Extend Bentoseal 1-1/2" (38 mm) onto the penetrations.

Terminate VOLTEX membrane 12" (300mm) below finished grade elevation with washer-head fasteners maximum 12" (300 mm) on center. Install Envirosheet flashing to primed concrete substrate with bottom edge overlapping top edge of VOLTEX membrane minimum 4" (100 mm). Overlap all roll ends a minimum 4" (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 Envirosheet; fastened maximum 12" (300 mm)

on center. Complete grade 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% mod-

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ified proctor density promptly af- ter waterproofing installa- tion. Backfill should consist of compactible soil or angular ag- gregate (3/4" or less) free of debris, sharp objects, and stone larger than 3/4" (18 mm).

NOTE: VOLTEX is not recommended for masonry block walls. Contact CETCO re- garding products and installation guide- lines 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: metal sheet piling, soldier pile and lagging, au- ger cast caisson, and stabi- lized-earth shoring walls. Following guidelines outline the installa- tion of VOLTEX on soldier pile and lagging walls. For other property line shoring wall applica- tions refer to the "VOLTEX Cast-In-Place Prod- uct Manual" or consult CETCO. For Shotcrete applications refer to the "VOLTEX Shotcrete Application Manual" for installation guidelines.

Lagging Wall Preparation: Remove all projections and fill all voids in the retaining wall larger than 1" (25 mm) with non-shrink grout or compacted soil. Aquadrain® drain- age composite can be installed over lagging gaps up to 2-1/2" (63 mm) to provide a uni- form surface to mount the VOLTEX. Gaps larger than 2-1/2" (63 mm) should be com- pletely filled with grout, wood, extruded poly- styrene (40 psi min.) or compacted soil even if Aquadrain is installed prior to VOLTEX. Do not use plywood or other surface treat- ment that leaves the lagging gaps void.

Shoring Wall Transition: At base of shor- ing wall, install VOLTEX sheet horizontally oriented (dark gray woven geotex- tile facing in- staller) with the bottom edge extending out onto the horizontal substrate a minimum 12" (300 mm) and the top edge of the sheet extending a minimum 12" (300 mm) above the finished slab elevation. Secure VOLTEX sheet to shor- ing wall with washer-head fasteners maximum 24" (600 mm) on center. Overlap edges of VOLTEX sheets a mini- mum 4" (100 mm). If the

slab thickness is greater than 24" (600 mm), install a second

full sheet or cut strip of VOLTEX on the shoring wall to meet the 12" (300 mm) requirement above of the top slab elevation. Overlap top edge of previous sheet and edges of adjacent sheets a minimum 4" (100 mm).

Shoring Wall Installation: Starting at the base corner, install course of VOLTEX (hori- zontally oriented) to lagging wall over the pre- viously installed corner transition sheet; with the bottom edge extending down to the wall/ slab transi- tion. Secure sheet edges to shor- ing wall with washer-head fasteners maximum 24" (600 mm) on center. After the bottom horizontal course, VOLTEX sheets can be in- stalled either vertically or horizontally orient- ed. Continue VOLTEX installation up wall to finished grade elevation overlapping adjacent VOLTEX sheet edges a minimum 4" (100 mm) and staggering all sheet roll ends of adjacent courses a mini- mum 12" (300 mm). Do not al- low VOLTEX overlap joints to run at same el- evation as the concrete pour lift joints; extend membrane past a minimum 6" (150 mm).

Prior to installing VOLTEX at grade, install 1/2" (12 mm) thick cementitious wall board (Durock) centered over metal sol- dier pile from finished grade elevation to speci- fied depth of soldier pile and lagging re- moval. Remove cement wall board during excavation to terminate system at grade.

Tie-Back Heads: Select appropriate size TB-Boot to fit over tie-back plate and allow proper cast-in-place concrete coverage per project requirements. TB-Boot should fit over entire tie-back head without the tie-back plate or cables in direct contact with the TB- Boot. Prior to TB-Boot instal- lation, fill voids in retention wall substrate and tie-back head assembly with spray foam (min 20 psi) or non-shrink grout. For non-hydrostatic condi- tions, install and secure Aquadrain drainage composite course per manufacturer's guide- lines to soil retention wall prior to installing TB-Boot. For hydrostatic conditions, install TB-Boot prior to water- proofing membrane.

With soldier piles, strip piles with waterproof- ing membrane prior to TB-Boot placement.

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Secure TB-Boot to soil retention system using washer head fasteners along the outside edge of the flat base. Apply ¼" (6 mm) thick by minimum 3" (75 mm) wide continuous ring of Bentoseal onto the flat base just outside of the ½" (12 mm) raised collar. Install 4-ft by 4-ft piece of VOLTEX (with precut hole in center to fit tight around the ½" (12 mm) raised collar) over the entire flat base with outside edges fastened to the retaining wall. Secure inside VOLTEX edge around raised collar with washer-head fasteners that pass through the Bentoseal ring; typical fastener spacing 6" (150 mm). Do not install fasteners or puncture TB-Boot inside of the ½" (12 mm) raised collar. Apply counter flashing of Bentoseal along VOLTEX sheet edge around raised collar. Then install VOLTEX field sheet overlapping outer membrane edge minimum 4" (100 mm).

**Penetrations:** Install a cut collar of VOLTEX tightly around the penetration; extending a minimum 12" (300 mm) radius. Apply Bentoseal over VOLTEX collar around penetration; extending Bentoseal a minimum 3" (75 mm) radius at ¼" (6 mm) thickness. Then install main course of VOLTEX membrane tightly around the penetration. Finally, detail around penetration with ¾" (18 mm) thick cant of Bentoseal. With sleeved pipes, Division 3 work should include filling the gap between the pipe and the sleeve with non-shrink cementitious grout and install Waterstop-RX to both sides of sleeve.

**Soldier Pile Stripping:** Install a strip of VOLTEX over all soldier piles with raised lagging hanger bolts, form tie rods, or other irregular surface. VOLTEX strip should extend a minimum 6" (150 mm) to both sides of the piling. Apply Bentoseal 1/4" x 2" (6 mm x 50 mm) to VOLTEX strip surface along both edges of each soldier pile.

**Cementitious Board:** Prior to installing VOLTEX to finished grade detail, install ½" (12 mm) thick cementitious wall board centered over steel soldier pile from finished grade elevation to specified depth that the top of steel soldier pile and lagging will be removed.

**Grade Termination:** Terminate VOLTEX membrane 12" (300

mm) below finished grade elevation with washer-head fasteners

maximum 12" (300 mm) on center. Install Envirosheet flashing to primed concrete substrate with bottom edge overlapping top edge of VOLTEX membrane minimum 4" (100 mm). Overlap all roll ends a minimum 4" (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 Envirosheet; fastened maximum 12" (300 mm) on center. Complete grade termination detail with tooled bead of CETSEAL along the top edge, at all penetrations through the flashing, and all exposed overlap seams.

Where lagging timbers and the top of steel soldier piles are removed, repair any waterproofing damaged by the excavation and removal of the retention wall system. Secure all excavated VOLTEX overlap seams with washer-head fasteners maximum 24" (600 mm) on center. Backfill shall be placed and compacted to minimum 85% Modified Proctor density promptly after waterproofing installation. Backfill should consist of compactible soil or angular aggregate (¾" or less) free of debris, sharp objects, and stone larger than ¾" (18 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. Do not use stay-in-place concrete forming; use removable forming products only.

VOLTEX is designed for below-grade 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, alkalis, or is of a conductivity of 2,500 µmhos/cm or greater, water samples should be submitted to the manufacturer for compatibility testing. Ultraseal may be required if contaminated ground water or saltwater conditions exist.

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VOLTEX is designed for use under reinforced concrete slabs 4" (100 mm) thick or greater on a compacted earth/gravel substrate. VOLTEX requires a minimum 6" (150 mm) thick reinforced concrete slab if installed over a mud slab. 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 4-ft x 15-ft (1.2 x 4.5 m) rolls. Typical roll weight is approximately 70 lbs. (31.7 kg). VOLTEX is packaged 35 rolls per pallet (2,100 sq. ft. (195 sq. m.)).

### **ACCESSORY PRODUCTS:**

Install VOLTEX using accessory products in strict accordance with the manufacturer's installation guidelines and details. Primary accessory products include Bentoseal®, Hydrobar Tubes®, Waterstoppage® TB-Boot®, CETSEAL and Enviro-sheet grade flashing.

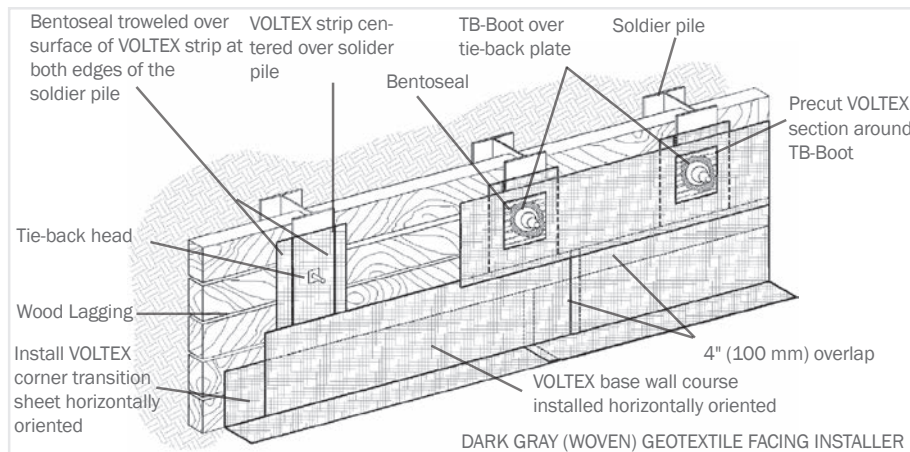
### **ASSOCIATED SYSTEM PRODUCTS**

Aquadrain® subsurface drainage composite and Waterstop-RX® expanding concrete joint waterstop.

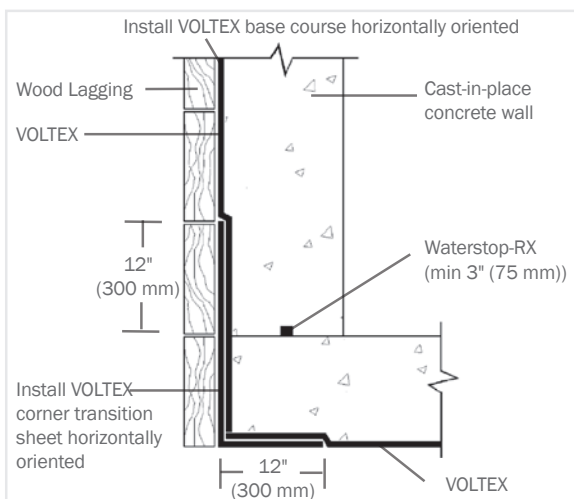
IMPORTANT NOTICE: CONTACT CETCO FOR VERIFICATION OF SPECIFICATION AND INSTALLATION REQUIREMENTS TO COMPLY WITH ISSUANCE FOR ELIGIBILITY OF HYDROSHIELD WARRANTY

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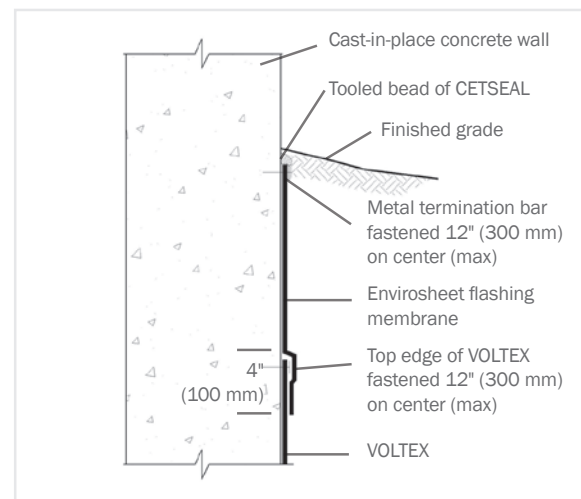
MATERIAL PROPERTY	TEST METHODE	TEST RESULTATEN
Bentonite Mass Per Unit Area	ASTM D 3776 (mod.)	1.0lb/sqft (4.8kg/sqm)
Peel Adhesion to Concrete	ASTM D 903 (mod.)	15 lbs/in (2.6kN/m min)
Hydrostatic Pressure Resistance	ASTM D 5385 (mod.)	231 ft (70 m)
Permeability	ASTM D 5084	1 x 10 <sup>-9</sup> cm/sec
Grab Tensile Strength	ASTM D 4632	95 lbs (422 N)
Puncture Resistance	ASTM D 4833	100 lbs (445 N)
Low Temperature Flexibility	ASTM D 1970	Unaffected @ -25° F (-32° C)



Property Line Soldier Pile & Lagging Wall Detail



Property Line Transition



Grade Termination

manufactured by

