VOLTEX DS®

BENTONITE GEOTEXTILE WATERPROOFING WITH INTEGRATED POLYETHYLENE LINER

DESCRIPTION

VOLTEX DS® is a highly effective waterproofing composite of high strength geotextiles, 4.8 kg/sqm of sodium bentonite per square m, and a integrally bonded polyethylene liner. The high swelling, low permeable sodium bentonite is encapsulated between the two geotextiles. 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 DS® hydrates and forms a monolithic waterproofing membrane. VOLTEX DS® 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 DS® 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 DS® can self-seal small concrete racks caused by ground settlement, concrete shrinkage, or seismic action. VOLTEX DS® forms a strong mechanical bond to concrete when the geotextile fibres are encapsulated into the surface of cast-in-place concrete.

APPLICATIONS

VOLTEX DS® is designed for below-ground 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, steel sheet piling, secant/contiguous 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 DSCR® with contaminant resistant sodium bentonite. VOLTEX DSCR® 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.

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 DS® literature or contact CETCO for applicable installation guidelines. Install VOLTEX DS® in strict accordance with the manufacturer's installation guidelines using accessory products as required. Also, use VOLTEX DSCR® as required for contaminated conditions. Install VOLTEX DS® 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 concrete or compacted backfill. STORAGE: Keep VOLTEX DS® and all accessory products dry prior to backfill 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 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 DS® only after proper substrate preparation has been completed and is suitable to receive the waterproofing.

UNDER CONCRETE FLOOR SLABS

VOLTEX DS® 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 DS® under footings and ground beams.

Place VOLTEX DS® 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 DS® to closely fit around penetrations and pile caps. Install VOLCLAY GRANULES® under cut VOLTEX DS® edge at detailing and then apply a minimum 19 mm thick fillet of BENTOSEAL® to top of cut VOLTEX DS® edge at penetrations, pile caps, ground beams, and other detailing. Extend BENTOSEAL® onto VOLTEX DS® and detail a minimum of 50 mm. For hydrostatic conditions, VOLTEX DS® should be installed under ground beams and footings. Extend VOLTEX DS® 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, are used as the outside concrete form, install a VOLTEX DS® transition course at the base of the wall per "Shoring Wall Transition" instructions within the "Property Line Construction" section herein. Continue the underslab VOLTEX DS® installation to the retaining wall overlapping the transition course a minimum 300 mm.

BACKFILLED CAST-IN-PLACE CONSTRUCTION

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

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Pre-applied Installation

Apply VOLTEX DS® to timber formwork, either horizontally or vertically, by nailing 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 polyethylene liner should be installed against the formwork and the woven (grey) geotextile should face the concrete to be waterproofed.

Extend VOLTEX DS® the full depth of the formwork, so that the VOLTEX DS® laps 100 mm over the VOLTEX DS® 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 DS® as necessary. Normal concrete practice is sufficient in terms of striking times for formwork, but due care should be taken to ensure that VOLTEX DS® remains bonded to green concrete.

Where a slab toe exists, and underslab VOLTEX DS® has terminated at the top edge of the slab, additional VOLTEX DS® will be required to link underslab/edge of slab VOLTEX DS® with the pre-applied wall VOLTEX DS®. Install BENTOSEAL® fillet (min 38 x 38 mm) at the internal wall/slab corner, and place additional VOLTEX DS® over the slab 'toe' lapping 100 mm over the edge of slab VOLTEX DS®, and continue over the toe terminating under the unbonded wall VOLTEX DS® flap at the back of the kicker.

Post-applied Installation

Beginning at the bottom corner of the wall, install VOLTEX DS® 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 DS® at the corner a minimum of 150 mm so that VOLTEX DS® can be extended onto the footing. Fasten VOLTEX DS® into position with washer headed fasteners a maximum of 600 mm on centre. Then cut and install a VOLTEX DS® section over the uncovered footing corner area. Apply BENTOSEAL® at the VOLTEX DS® section to VOLTEX DS® overlap at the corner.

Install adjacent VOLTEX DS® 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 DS®. Stagger all vertical overlap joints a minimum of 300 mm. For hydrostatic conditions, the vertical wall VOLTEX DS® should cover the entire footing and overlap the underslab waterproofing a minimum 150 mm. Tape all VOLTEX DS® membrane overlap seams with CETCO Seamtape.

Cut VOLTEX DS® to closely fit around penetrations. After installing VOLTEX DS®, trowel a minimum 19 mm thick fillet of BENTOSEAL® around the penetrations to completely fill any space between the penetration and the VOLTEX DS® edge. Extend BENTOSEAL® onto the penetration and over the VOLTEX DS® edge 38 mm. In areas where multiple penetrations are close together, it may be impractical to cut VOLTEX DS® 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 DS® membrane 300 mm below finished ground elevation with washerhead fasteners maximum 300 mm on centre. Install CETBIT 300 flashing to primed concrete substrate with bottom edge overlapping top edge of VOLTEX DS® 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 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 stones larger than 19 mm.

NOTE: VOLTEX DS® 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 DS® 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 DS® on secant/contiguous piled walls. For other property line shoring wall applications refer to the "VOLTEX DS® Cast-In-Place Product Manual" or consult CETCO. For Shotcrete applications refer to the "VOLTEX DS® 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 DS®.

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 DS® 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 min. 300 mm above the finished slab elevation. Secure VOLTEX DS® sheet to shoring wall with washerhead fasteners maximum 600 mm on centre. Overlap edges of VOLTEX DS® sheets a minimum 100 mm.

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If the slab thickness is greater than 600 mm, install a second full sheet or cut strip of VOLTEX DS® 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 min. 100 mm.

Secant/Contiguous/Steel Sheet Piled Wall Installation: Follow the 'Shoring Wall Transition' instructions for installation of VOLTEX DS® 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 DS®, 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 DS® 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 DS® tightly around the penetration; extending a minimum 300 mm radius. Apply BENTOSEAL® over VOLTEX DS® collar around penetration; extending BENTOSEAL® a minimum 75 mm radius at 6 mm thickness. Then install main course of VOLTEX DS® membrane tightly around the penetration. Finally, detail around penetration with 19 mm thick a minimum 300 mm radius of BENTOSEAL®. With sleeved pipes, fill the gap between the pipe and the sleeve with non-shrink cementitious grout and install WATERSTOP-RX® to both sides of sleeve.

Ground Termination: Terminate VOLTEX DS® 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 DS® 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 DS® overlap seams with washer-head fasteners maximum 600 mm on centre and then install Seamtape centred along overlap seams. 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 stones larger than 19 mm.

LIMITATIONS

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

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

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

VOLTEX DS® installation guidelines contained herein are for cast-in-place concrete applications and do not cover shotcrete or precast concrete applications. Refer to VOLTEX DS® 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 DS® is available in 1.1 m x 5 m rolls. Typical roll weight is approximately 37 kg. VOLTEX DS® is packaged 35 rolls per pallet (176 sqm). VOLTEX DS® is also available in 2.5 m x 20 m and 5m x 40 m standard size rolls.

ACCESSORY PRODUCTS

Install VOLTEX DS® using accessory products in strict accordance with the manufacturer's installation guidelines and details. Primary accessory products include BENTOSEAL®, VOLCLAY GRANULES®, CETSEAL, Seamtape and CETBIT 300 ground 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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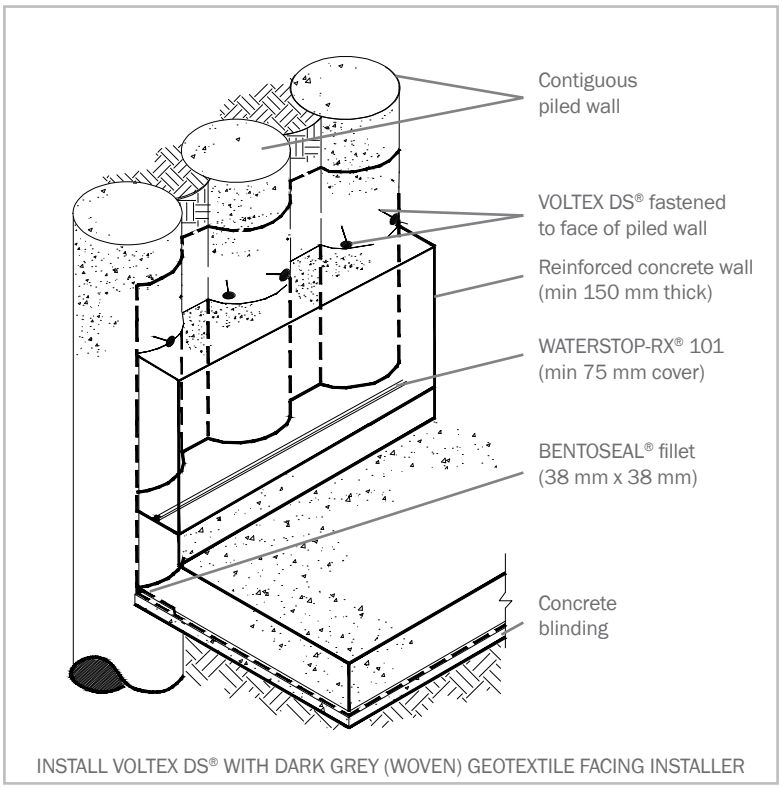
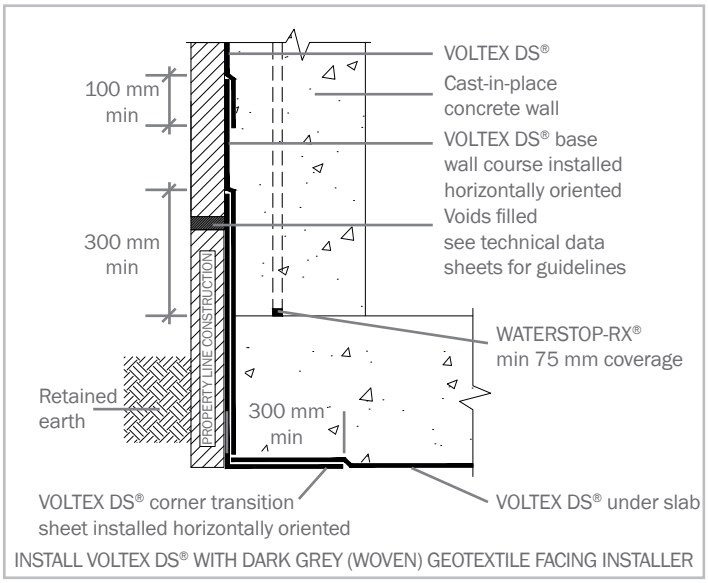
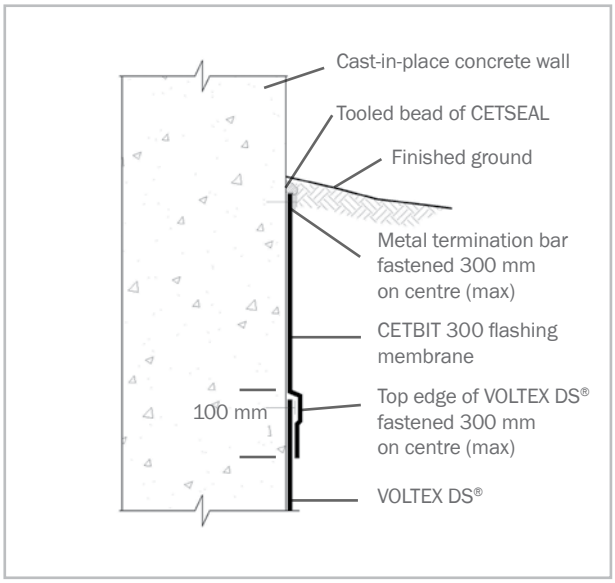


Property Line Contiguous Piled Wall Detail



Property Line Transition



Ground Termination

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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	4.8 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	1.0×10^{-10} 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

BBA APPROVAL INSPECTION TESTING CERTIFICATION
CERTIFICATE 86/1650

CE
1488-CPR-0030/Z
1035-CPD-018658
EN 13491:2004 + EN 13491:2004/A1:2006

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