

# VOLTEX®

## BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

### DESCRIPTION

VOLTEX® is a highly effective waterproofing composite of high strength geotextiles and 4.8 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® 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® 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 VOLCLAY GRANULES® 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®, place HYDROBAR TUBES® at the wall/footing transition corner. Butt the ends of HYDROBAR TUBES® together to form a continuous line.

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#### PRE-APPLIED INSTALLATION

Apply VOLTEX® 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 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 HYDROBAR TUBES® 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 soldier pile and lagging 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.

**Lagging Wall Preparation:** Remove all projections and fill all voids in the retaining wall larger than 25 mm with non-shrink grout or compacted soil. AQUADRAIN® drainage composite can be installed over lagging gaps up to 63 mm to provide a uniform surface to mount the VOLTEX®. Gaps larger than 63 mm should be completely filled with grout, wood, extruded polystyrene (2.75 bar min) or compacted soil even if AQUADRAIN® is installed prior to VOLTEX®. Do not use plywood or other surface treatment that leaves the lagging gaps void.

**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.

**Shoring Wall Installation:** Starting at the base corner, install course of VOLTEX® (horizontally oriented) to lagging wall over the previously installed corner transition sheet; with the bottom edge extending down to the wall/slab transition. Secure sheet edges to shoring wall with washer-head fasteners

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maximum 600 mm on centre. After the bottom horizontal course, VOLTEX® sheets can be installed either vertically or horizontally oriented. Continue VOLTEX® installation up wall to finished ground elevation overlapping adjacent VOLTEX® sheet edges a minimum 100 mm and staggering all sheet roll ends of adjacent courses a minimum 300 mm. Do not allow VOLTEX® overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 150 mm.

Prior to installing VOLTEX® at ground, install 12 mm thick cementitious wall board centred over metal soldier pile from finished ground elevation to specified depth of soldier pile and lagging removal. Remove cement wall board during excavation to terminate system at ground.

**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® installation, fill voids in retention wall substrate and tie-back head assembly with spray foam (min 1.38 bar) or non-shrink grout. For non-hydrostatic conditions, install and secure AQUADRAIN® drainage composite course per manufacturer's guidelines to soil retention wall prior to installing TB-BOOT®. For hydrostatic conditions, install TB-BOOT® prior to waterproofing membrane. With soldier piles, strip piles with waterproofing membrane prior to TB-BOOT® placement.

Secure TB-BOOT® to soil retention system using washer head fasteners along the outside edge of the flat base. Apply 6 mm thick by minimum 75 mm wide continuous ring of BENTOSEAL® onto the flat base just outside of the 12 mm raised collar. Install a 1.1 m by 1.1 m piece of VOLTEX® (with precut hole in centre to fit tight around the 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 fasten-

er spacing 150 mm. Do not install fasteners or puncture TB-BOOT® inside of the 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 100 mm.

**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 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 150 mm to both sides of the piling. Apply BENTOSEAL® 6 mm x 50 mm to VOLTEX® strip surface along both edges of each soldier pile.

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

**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 maxi-

mum 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.

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 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.

**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.

**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 150 mm base flap cut and splayed as necessary, to allow the material to lay flat and provide continuity with the under slab installation.

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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.

#### 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-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 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® 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).

#### 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®, VOLCLAY GRANULES®, TB-BOOT®, CETSEAL and CETbit 300 ground flashing.

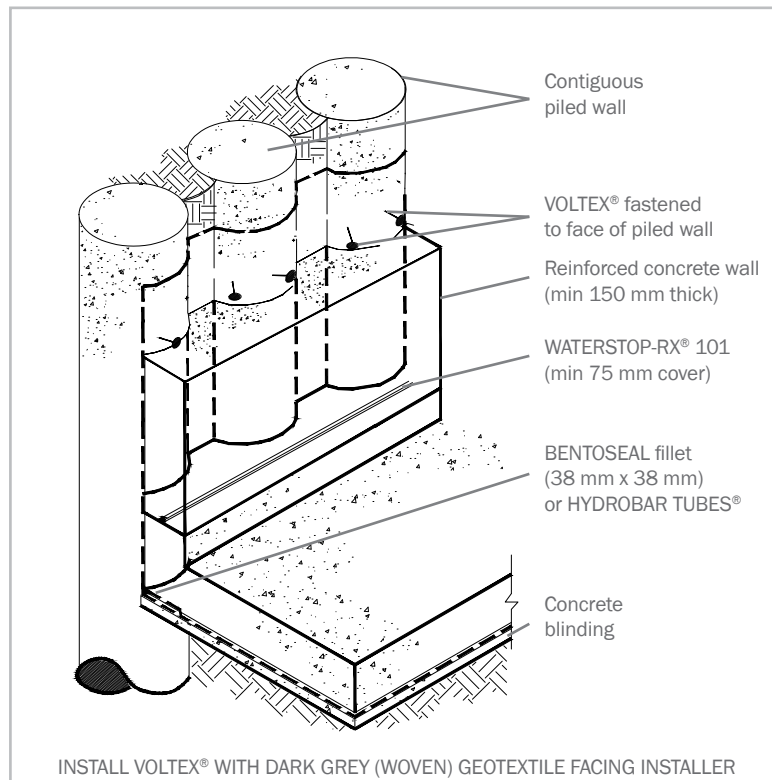
#### ASSOCIATED SYSTEM PRODUCTS

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

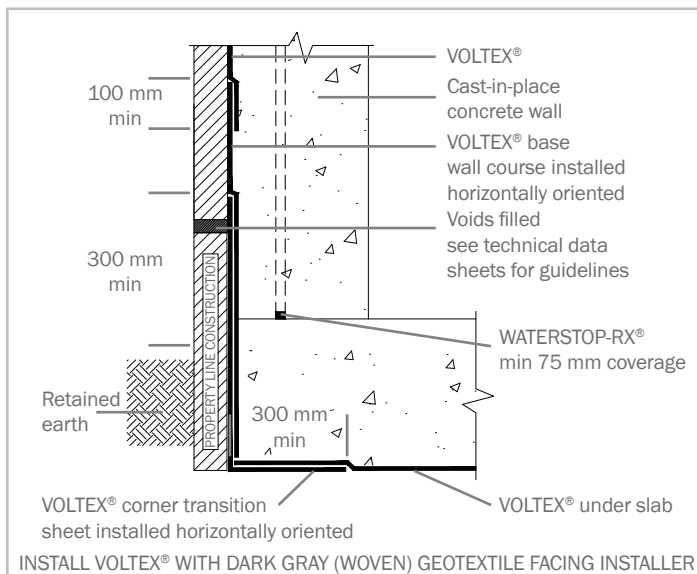
**IMPORTANT NOTICE:** CONTACT CETCO FOR VERIFICATION OF SPECIFICATION AND INSTALLATION REQUIREMENTS TO COMPLY WITH ISSUANCE FOR ELIGIBILITY OF HYDROSHIELD WARRANTY

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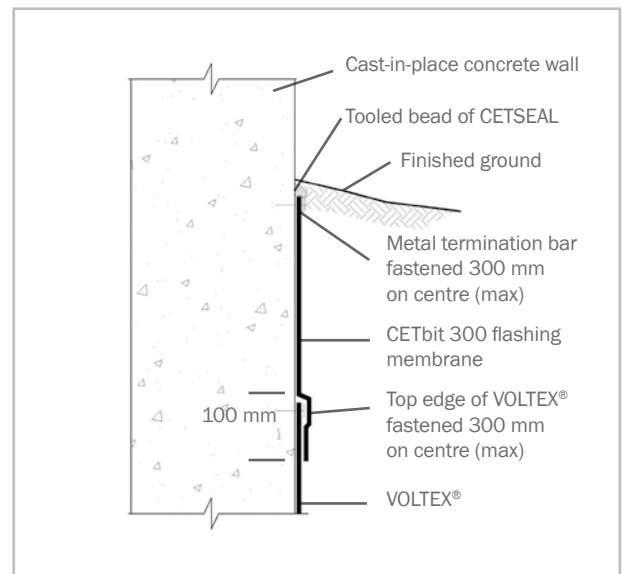
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Property Line Soldier Pile & Lagging Wall Detail



Property Line Transition



Ground Termination

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TECHNICAL DATA		
MATERIAL PROPERTIES	TEST METHOD	NOMINAL VALUE
<b>GEOTEXTILES (PP)</b>		
Woven mass / unit area	EN ISO 9864	100 g/m <sup>2</sup>
Non-woven mass / unit area	EN ISO 9864	200 g/m <sup>2</sup>
<b>BENTONITE</b>		
Bentonite Free Swell	ASTM D 5890	>24 ml / 2 g
Water Absorption	ASTM E 946	600%
Bentonite Fluid Loss	ASTM D 5891	Max 18 ml
<b>GEOSYNTHETIC CLAY BARRIER</b>		
Bentonite mass / unit area	EN 14196	4.8 kg/m <sup>2</sup> *
Total mass / unit area	EN 14196	5.1 kg/m <sup>2</sup> *
Hydraulic Conductivity	ASTM D 5084	1.0 x 10 <sup>-11</sup> m/s
Tensile Strength (MD / CD)	EN ISO 10319	8.0 kN/m / 8.0 kN/m
Elongation at Break	EN ISO 10319	20% (typical)
Peel Strength	ASTM D 6496	400 N/m
Thickness @ 2kPa	EN ISO 9863-1	7.0 mm (typical)
Puncture Resistance	EN ISO 12236	1.5 kN
Peel Adhesion to Concrete	ASTM 903 (mod)	2.6 kN / m min
Hydrostatic Pressure Resistance	ASTM D 5385 (mod)	70 m

\* Bentonite mass / unit area reported at 12% moisture content



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A Minerals Technologies Company

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IMPORTANT: The information contained herein supersedes all previous printed versions, and is believed to be accurate and reliable. For the most up-to-date information, please contact CETCO sales team. CETCO accepts no responsibility for the results obtained through application of this product. CETCO reserves the right to update information without notice.

FORM: TDS\_VOLTEX\_EMEA\_EN\_201407\_V7