

BUILDING ENVELOPE SOLUTIONS

TECHNICAL INFORMATION ON PRODUCTS AND SERVICES

APPLICATIONS

- ▶ Below-grade Waterproofing
- ▶ Plaza Deck Waterproofing
- ▶ Restoration Waterproofing
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- ▶ Remedial Waterproofing



DID YOU KNOW?



- ▶ CETCO solutions are supported and serviced by more than 40 offices globally. From Chicago to Copenhagen, from Shanghai to Sao Paulo, CETCO can support your project needs.
- ▶ CETCO provides product and services to customers in industries including: foundation drilling, concrete waterproofing, lining systems, tunnel boring, vapor intrusion systems, slurry wall construction, sediment remediation and non-oil and gas drilling.
- ▶ CETCO has an experienced team of field engineers and research scientists that introduce innovative products and services to customers worldwide. Much of this work is done from the 14,000 sq./ft., state-of-the-art research and development center in Hoffman Estates, IL.
- ▶ CETCO continues to make sustainability a fundamental characteristic of the entire organization; from land management practices to the design of its Silver LEED Certified corporate headquarters in Hoffman Estates, IL.



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INDEX OF TECH DATA SHEETS



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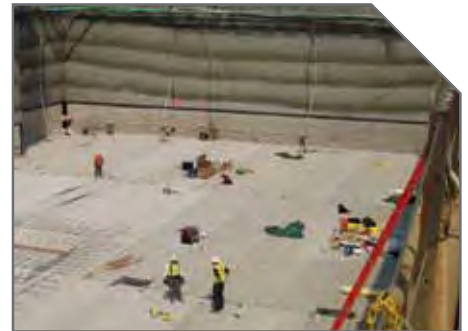
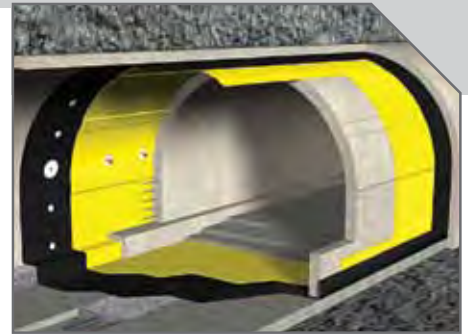
TECH DATA SHEETS AVAILABLE ONLINE:

- ▶ A-3000 WB Adhesive
- ▶ Adhesive SB100
- ▶ Akwaseal LV
- ▶ Akwastop
- ▶ Akwaswell
- ▶ Aquadrain 10X
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- ▶ Volclay Panels
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- ▶ Waterstop-RX
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TECH DATA SHEETS IN THIS MANUAL:

- ▶ CoreFlex 60
- ▶ Ultraseal
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- ▶ GreenScapes Sedum Tile
- ▶ GreenScapes Strataseal HR

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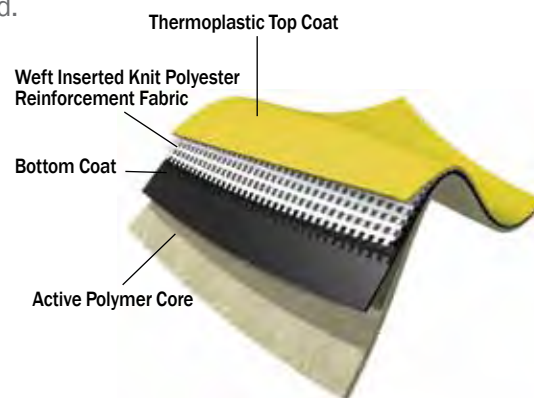
COREFLEX™ WELDED THERMOPLASTIC MEMBRANE WITH ACTIVE POLYMER CORE TECHNOLOGY LAYER

CoreFlex sets the industry standard for waterproofing membrane strength, durability and performance. The CoreFlex composite consists of a reinforced thermoplastic membrane integrally bonded to an Active Polymer Core (APC) Technology layer. The two barrier materials combined provide superior waterproofing protection unmatched by any other product.

With its integrated APC Technology, CoreFlex does not have to rely on an expensive grid system to maintain or control water ingress if the thermoplastic membrane is punctured or breached.

Simply the APC layer activates at the water leak and seals the breached area. Thus, the problem becomes part of the solution—automatically and reliably.

Coreflex provides built in waterproofing redundancy for those projects that just can't leak.



ADVANTAGES:

- ▶ Heat Welded Seams
- ▶ APC Technology for Active Sealing
- ▶ Excellent Chemical Resistance
- ▶ Superior Reinforcement
- ▶ Extremely Low Permeability
- ▶ Excellent Hydrostatic Resistance

APPLICATIONS:

- ▶ Property Line Construction
- ▶ Underslab
- ▶ Plaza Deck Restoration
- ▶ Greenroofs
- ▶ Tunnels
- ▶ Backfilled Foundation Walls



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TECHNICAL DATA

COREFLEX™ 60

THERMOPLASTIC WATERPROOFING MEMBRANE WITH ACTIVE POLYMER CORE

DESCRIPTION

CoreFlex 60 is a 60 mil (1.5 mm) nominal thermoplastic membrane reinforced with a 5.0 oz weft inserted knit polyester fabric integrally bonded to an Active Polymer Core (APC). CoreFlex 60 offers the ultimate in waterproofing barrier protection technology. The barrier performance starts with a thermoplastic membrane with welded seams providing a monolithic watertight barrier layer. The thermoplastic membrane is reinforced with a weft inserted knit polyester reinforcement fabric and is produced with DuPont's Elvaloy-KEE® (Keytone Ethylene Ester), a solid phase high molecular weight ethylene interpolymer.

Unlike traditional liquid PVC plasticizers, the Elvaloy-KEE does not experience phase separation and migrate out; thus the membrane properties are maintained for long term performance. Elvaloy-KEE also provides superior chemical resistance properties. The Active Polymer Core layer is integrally bonded to the Elvaloy-KEE thermoplastic membrane. The APC layer is designed to activate with water to swell and form a positive seal. Thereby, at any unforeseen puncture or installation defect, the APC layer reacts at the breach, self-sealing to stop the water ingress. CoreFlex is the only welded thermoplastic membrane composite with this reactive, self-sealing performance feature.

APPLICATIONS

The CoreFlex 60 waterproofing system provides waterproofing protection for structural concrete surfaces. Below-grade applications include backfilled cast-in-place concrete and masonry block foundation walls as well as property line shoring walls such as soldier pile and lagging. The membrane can be continued under the floor slab and up onto a horizontal deck to provide a continuous, uniform waterproofing system. CoreFlex 60 can be used to waterproof structures under continuous or intermittent hydrostatic pressure. CoreFlex 60 applications include: Plaza Decks, Split-Slab Deck Construction, Foundation Walls, Earth-Covered Structures, Property Line Construction, Under Slab, Tunnels and Greenroofs.

INSTALLATION

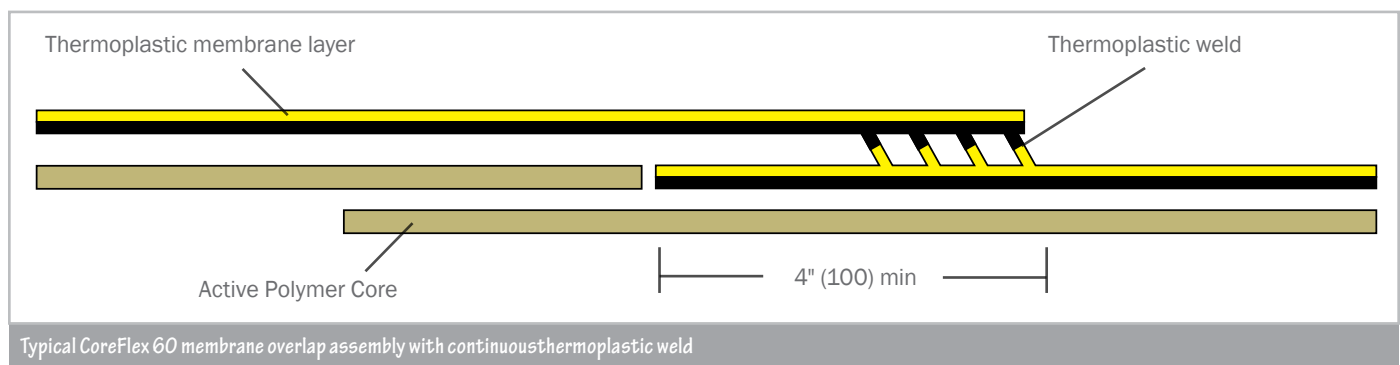
General: Install CoreFlex 60 Waterproofing System in strict accordance with the manufacturer's installation guidelines and details using accessory products, protection and drainage layers, and overburden as specified or required. Install CoreFlex 60 with the grey APC geotextile side directly in contact with the concrete to be waterproofed. Division 3 Concrete Work should include Waterstop-RX® installed in all applicable horizontal and vertical concrete construction joints and around penetrations.

PACKAGING

CoreFlex 60 is available in 54" x 50' (1.4 m x 15 m) rolls; 54" wide thermoplastic membrane with APC layer offset by 6" (150 mm) along the long roll edge.

QUALITY INSURANCE PROGRAM

Rely on quality waterproofing products and the HydroShield Quality Assurance Program from CETCO. This program is designed to protect your building and its contents from water leaks through pre-installation planning, experienced craftsmanship, and onsite inspection backed by the strongest warranty in the industry. If it's worth building, it's worth protecting.



COREFLEX 60

THERMOPLASTIC WATERPROOFING MEMBRANE WITH ACTIVE POLYMER CORE

TECHNICAL DATA		
PROPERTY	TEST METHOD	TYPICAL VALUE
Membrane Composite Thickness	ASTM D751	150 mil (3.8 mm)
Hydrostatic Pressure Resistance (min 1 hr @ 100 psi)	ASTM D5385	231 ft (70 m)
Puncture Resistance	ASTM D4833	224 lbs (996 N)
Tensile Strength ASTM D751	ASTM D751	549 lbs (2,442 N)
Bonded Seam Strength	ASTM D751	705 lbs (3,136 N)
Peel Adhesion to Concrete	ASTM D903 (mod)	10 lbs/in (1,751 N/m)
Methane Permeability	ASTM D1434	25 mL (STP)/m ² /day
Oil Resistance	ASTM D543	Passed
Microorganism Resistance	ASTM D4068-88	Passed
Environmental Stress Cracking	ASTM D1693	Passed
Hydrostatic Resistance (Procedure A)	ASTM D751	754 psi (5.2 mPa)
Water Vapor Retarder	ASTM E1745	Class A
Water Vapor Transmission	ASTM E96	0.1 perms (0.036 gr/m/hr)
Tensile Strength	ASTM E154	387 lbf/in (68 kN/m)
Puncture Resistance	ASTM D1709	12.0 lbs (5,500 grams)

SEPTEMBER 2010

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 visit www.CETCO.com. CETCO accepts no responsibility for the results obtained through application of this product. CETCO reserves the right to update information without notice. Elvaloy® is a registered trademark of DuPont™

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ULTRASEAL®

ADVANCED APC WATERPROOFING TECHNOLOGY WITH INTEGRATED GEOMEMBRANE LINER

Ultraseal waterproofing systems are engineered to provide the most effective below-grade waterproofing protection available. Utilizing an advanced Active Polymer Core (APC) technology, Ultraseal is ten times less permeable and more chemically resistant than traditional hydrophilic waterproofing membranes. Additionally, Ultraseal weighs less than half that of other membranes allowing quick and easy installations.

Ultraseal is quickly installed to provide greater flexibility to the construction schedule. The membranes are extremely durable and stand up to construction traffic and inclement weather. Ultraseal can actually be installed in freezing temperatures and applied to green concrete without having to wait for the concrete to cure.

ADVANTAGES:

- ▶ Excellent Hydrostatic Resistance
- ▶ Extremely Low Permeability
- ▶ Continuous Bond Strength to Concrete
- ▶ Self-Sealing Membrane Laps
- ▶ High Chemical Resistance
- ▶ Efficient Installation

APPLICATIONS:

ULTRASEAL BT:

- ▶ Backfilled Foundation Walls
- ▶ Tunnels
- ▶ Earth Covered Structures
- ▶ Property Line Walls

ULTRASEAL SP:

- ▶ Underslab Applications



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TECHNICAL DATA

ULTRASEAL®

ADVANCED APC WATERPROOFING TECHNOLOGY WITH INTEGRATED GEOMEMBRANE LINER

DESCRIPTION

Ultraseal is a unique waterproofing membrane that utilizes an advanced Active Polymer Core (APC) technology that is ten times less permeable and more chemically resistant than traditional active waterproofing membranes. Ultraseal combines the APC technology with a strong geomembrane liner for exceptional performance. Ultraseal contains zero VOC, can be installed in almost any weather condition to green concrete, and most importantly, has proven effective in both hydrostatic and nonhydrostatic conditions. Two Ultraseal membrane composites - BT and SP - provide waterproofing protection for a myriad of applications. Ultraseal SP is a three component membrane consisting of the APC core layer between a geotextile and a geomembrane. Ultraseal BT composite membrane consists of the APC core layer integrally bonded to a geomembrane.

Ultraseal works by forming a low permeable membrane upon contact with water. When hydrated, unconfined APC can swell many times its dry volume. When confined by backfill or concrete the swell is controlled, forming a dense, impervious waterproofing membrane. The swelling action of the APC technology resists high levels of groundwater contaminants and can self-seal small concrete cracks caused by ground settlement, concrete shrinkage, or seismic action. Ultraseal forms a strong mechanical bond to concrete when the concrete is poured against the membrane.

APPLICATIONS

Ultraseal SP is designed for primarily under slab applications. Ultraseal BT is designed for backfilled foundation walls, earth-covered roof structures and property line construction. Property line construction applications include soldier pile and lagging, metal sheet piling, auger cast caisson, shotcrete and stabilized earth retention walls. The membranes are compatible and are used in conjunction to complete the waterproofing. Applications may include

structures under continuous or intermittent hydrostatic pressure.

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 Ultraseal literature or contact CETCO for applicable installation guidelines. Install Ultraseal in strict accordance with the manufacturer's installation guidelines using accessory products as required. Install Ultraseal SP with the tan geotextile side toward the concrete to be waterproofed. Install Ultraseal BT with the APC side toward the concrete to be waterproofed. Install Waterstop-RX in all applicable horizontal and vertical concrete construction joints and around penetrations. Schedule waterproofing material installation to permit prompt placement of concrete or compacted backfill immediately following installation. **STORAGE:** Keep Ultraseal and all accessory products dry prior to use.

Preparatory Work: Under Slab: Substrate should be smooth and compacted to a minimum of 85% Modified Proctor density. Property Line Shoring Walls: Install Ultraseal BT only after proper substrate preparation has been completed and is suitable to receive the waterproofing. Remove all projections and fill all voids in the retaining wall larger than 1" (25 mm) with non-shrink grout or compacted soil. Aquadrain drainage composite can be installed over lagging gaps up to 2-1/2" (63 mm) to provide a uniform surface to mount the Ultraseal BT. Gaps larger than 2-1/2" (63 mm) should be completely filled with grout, wood, extruded polystyrene (40 psi min.) or compacted soil even if Aquadrain is installed prior to Ultraseal BT. Do not use plywood or other surface treatment that leaves the lagging gaps void.

UNDER CONCRETE FLOOR SLABS

Ultraseal SP is recommended for use under reinforced concrete slabs 4" (100 mm) thick or greater on a compacted earth/gravel substrate. A minimum 6" (150 mm) thick reinforced slab, if installed over a mud slab. Where hydrostatic conditions exist, install Ultraseal SP under footings and grade beams.

Place Ultraseal SP over the properly prepared substrate with the tan geotextile 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 Ultraseal SP to closely fit around penetrations and pile caps. Install Waterstoppage under cut Ultraseal SP edge at detailing and then apply a minimum 3/4" (18 mm) thick fillet of Bentoseal to top of cut Ultraseal SP edge at penetrations, pile caps, grade beams, and other detailing. Extend Bentoseal onto Ultraseal SP and detail a minimum of 2" (50 mm). For hydrostatic conditions, Ultraseal SP should be installed under grade beams and footings. Extend Ultraseal SP onto footing a minimum 6" (150 mm) when required to tie into vertical wall waterproofing.

Where property line walls, such as soldier pile and lagging, are used as the outside concrete form, install a Ultraseal BT transition course at the base of the wall per "Shoring Wall Transition" instructions within the "Property Line Construction" section herein. Continue the underslab Ultraseal SP installation to the retaining wall overlapping the Ultraseal BT transition course a minimum 12" (300 mm).

ULTRASEAL

ADVANCED APC WATERPROOFING TECHNOLOGY WITH INTEGRATED GEOMEMBRANE LINER

BACKFILLED CAST-IN-PLACE CONCRETE WALLS

Install Ultraseal BT with the APC core side against the concrete wall (white geomembrane side facing installer) on cast-in-place concrete foundation walls prior to backfilling. Ultraseal BT may be applied as soon as the forms are removed. It is not necessary to wait for the concrete to completely cure. Use Ultraseal BT with concrete cast with conventional forms that produce a smooth surface.

Surface Preparation: Footing should be swept clean of silt, rocks and debris to provide Ultraseal BT with direct contact to the concrete in the application area. The wall surface must be properly prepared before Ultraseal BT is installed. Areas of surface honeycombing or voids should be filled with cementitious grout or Bentoseal. Protrusions of over 1/4" (6 mm) should be knocked off smooth with the concrete surface. Concrete work should include completely filling taper-tie holes with non-shrink cementitious grout and a piece of Waterstop-RX centered in the wall. Apply Bentoseal over exterior grouted surface of all form-tie holes.

Membrane Installation: Before installing the first course of Ultraseal BT, place Hydrobar Tubes at the wall/footing inside corner. "Butt" the ends of Hydrobar Tubes together to form a continuous line. Beginning at the bottom of the wall, install Ultraseal BT horizontally oriented with the bottom edge over the Hydrobar Tubes and extending out a minimum 6" (150 mm) onto the footing. At corners cut the bottom edge of Ultraseal BT so that it can be extended onto the footing. Secure Ultraseal BT into position with washer-head fasteners a minimum 24" (600 mm) on center. Then cut and install a section over the uncovered footing corner area. Apply Bentoseal at the corner section to the overlaps. Install adjacent bottom course Ultraseal BT rolls horizontally oriented. Each roll should overlap the preceding roll a minimum 2"(50 mm) and should extend onto the footing a minimum 6" (150 mm). At vertical inside corners apply a continuous 3/4" (18 mm) fillet of Bentoseal directly in the corner prior to installing membrane. Stagger all vertical overlap joints minimum 12" (300 mm). When hydrostatic conditions exist, the vertical wall Ultraseal BT should cover the entire footing and overlap the underslab waterproofing a

minimum 6" (150 mm). Succeeding membrane courses can be installed either vertically or horizontally oriented. Tape all membrane overlap seams with CETCO Seamtape.

Penetrations: Cut Ultraseal BT to closely fit around penetrations. Then trowel a minimum 3/4" (18 mm) thick fillet of Bentoseal around the penetrations to completely fill any space between the penetration and the membrane edge. Extend Bentoseal onto the penetration and over the membrane edge 1-1/2" (38 mm). In areas where multiple penetrations are close together, it may be impractical to cut Ultraseal BT 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.

Grade Termination: Terminate Ultraseal BT membrane 12" (300mm) below finished grade elevation with washer-head fasteners maximum 12" (300 mm) on center. Install GF-40SA flashing to primed concrete substrate with bottom edge overlapping top edge of Ultraseal BT 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 GF-40SA; 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 shall be placed and compacted to minimum 85% Modified Proctor density promptly after waterproofing installation. Backfill should consist of compactable soil or angular aggregate (3/4" or less) free of debris, sharp objects, and stones larger than 3/4" (18mm).

NOTE: Ultraseal BT can also be used for waterproofing masonry block walls. Follow "Backfilled Concrete Wall" installation guidelines above.

PROPERTY LINE CAST-IN-PLACE CONSTRUCTION

Use Ultraseal BT to waterproof various types of cast-in-place property line construction, including: metal sheet piling, soldier pile and lagging, auger cast caisson, and stabilized-

earth shoring walls. Following guidelines outline the installation of Ultraseal BT on soldier pile and lagging walls. For other property line shoring wall applications refer to the "Ultraseal Cast-In-Place Product Manual" or consult CETCO. For Shotcrete applications refer to the "Ultraseal Shotcrete 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® drainage composite can be installed over lagging gaps up to 2-1/2" (63 mm) to provide a uniform surface to mount the Ultraseal BT. Gaps larger than 2-1/2" (63 mm) should be completely filled with grout, wood, extruded polystyrene (40 psi min.) or compacted soil even if Aquadrain is installed prior to Ultraseal BT. Aquadrain drainage composite system should be connected to operative water discharge system. Do not use plywood or other surface treatment that leaves the lagging gaps void.

Shoring Wall Transition: At base of shoring wall, install Ultraseal BT sheet horizontally oriented (APC side facing installer) with the bottom edge extending out onto the horizontal substrate a minimum 12" (300 mm) and the top edge of the sheet extending a min. 12" (300 mm) above the finished slab elevation. Secure Ultraseal BT sheet to shoring wall with washer-head fasteners maximum 24"(600 mm) on center. Overlap edges of Ultraseal BT sheets a minimum 4" (100 mm). If the slab thickness is greater than 24" (600 mm), install a second full sheet or cut strip of Ultraseal BT 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 Ultraseal BT (horizontally oriented with APC side facing installer) 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 maximum 24" (600 mm) on center. After the bottom horizontal course, Ultraseal BT sheets can be installed either vertically or horizontally oriented. Continue Ultraseal BT installation up wall to finished grade detail elevation overlapping adjacent Ultraseal BT sheet edges a minimum 4" (100 mm) and staggering all sheet roll ends of adjacent courses a minimum 12" (300 mm). Do not allow Ultraseal BT overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 6" (150 mm).

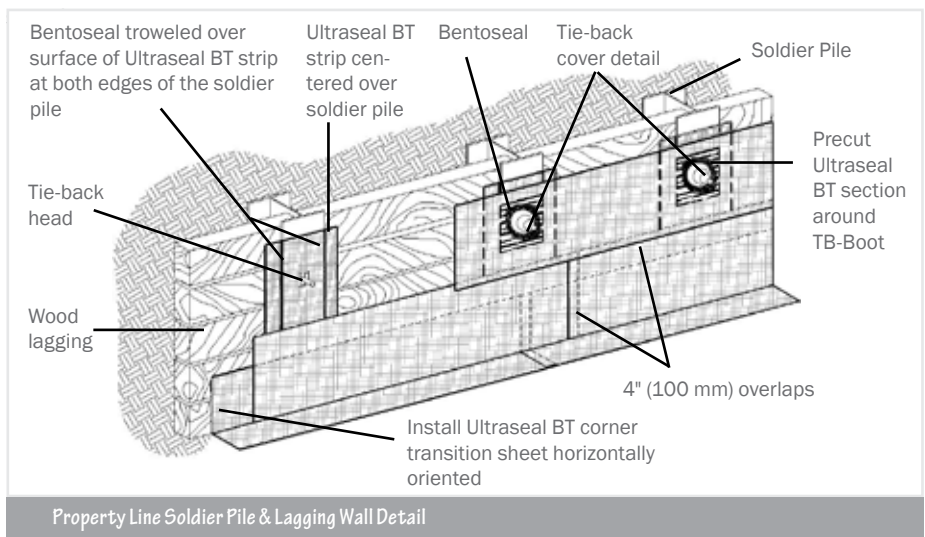
Prior to installing Ultraseal BT at grade, install 1/2" (12 mm) thick cementitious wall board (Durock) centered over metal soldier pile from finished grade detail elevation to specified depth of soldier pile and lagging removal. Remove cement wall board during excavation to terminate system at grade.

Tie-Back Covers: For all tie-back heads and soil nails, install Ultraseal system with applicable size TB-Boot cover for specific project condition(s). For irregular shoring wall conditions at tie-backs or oversize tie-back heads consult CETCO for alternate detail for specific project condition(s).

Penetrations: For all mechanical, structural and other penetrations, install waterproofing system per manufacturer's detail for specific project condition(s).

Soldier Pile Stripping: Install a strip of Ultraseal BT over all soldier piles with raised lagging hanger bolts, form tie rods, or other irregular surface. Ultraseal BT 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 Ultraseal BT strip surface along edges of each soldier pile.

Grade Termination: Terminate Ultraseal BT membrane 12" (300mm) below finished grade elevation with washer-head fasteners maximum 12" (300 mm) on center. Install GF-40SA flashing to primed concrete substrate with bottom edge overlapping top edge of Ultraseal BT 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



Install a rigid termination bar along top edge of GF-40SA; 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.

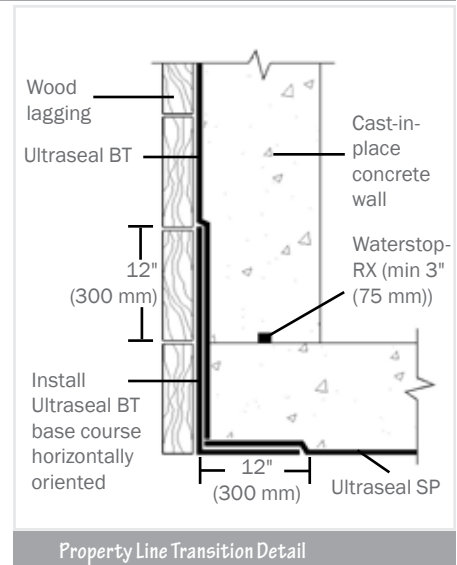
Where lagging timbers and the top end of steel soldier piles are removed, repair any waterproofing damaged by the excavation and removal of the retention wall system. Secure all excavated Ultraseal BT overlap seams with washer-head fasteners maximum 24" (600 mm) on center and then apply Seamtape centered 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 (3/4" or less) free of debris, sharp objects, and stones larger than 3/4" (18mm).

SIZE AND PACKAGING

Ultraseal SP and BT are both available in 4-ft x 25-ft (1.2 x 7.6 m) rolls. Both are packaged 25 rolls per pallet (2,500 sq. ft. (232 sq. m.)).

ASSOCIATED SYSTEM PRODUCTS

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



ACCESSORY PRODUCTS

Install Ultraseal 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, Seamtape, and GF-40SA grade flashing.

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ULTRASEAL

ADVANCED APC WATERPROOFING TECHNOLOGY WITH INTEGRATED GEOMEMBRANE LINER

LIMITATIONS

Ultraseal 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.

Ultraseal is designed for below-grade waterproofing applications where the product is properly confined. Products should not be installed in standing water or over ice. If ground water contains strong acids, alkalies, or is of a conductivity of 2,500 $\mu\text{mhos/cm}$ or greater, water samples should be submitted to the manufacturer for compatibility testing. Ultraseal SP is designed for use under reinforced concrete slabs 4" (100 mm) thick or greater on a compacted earth/gravel substrate.

Ultraseal SP requires a minimum 6" (150 mm) thick reinforced concrete slab if installed over a mud slab. Ultraseal SP is not designed for split-slab plaza deck construction. Ultraseal is capable of bridging typical shrinkage cracks in concrete up to 1/16" (1.5 mm).

Ultraseal is not designed to waterproof expansion joints. Expansion joints are the responsibility of others. Do not use Ultraseal SP on masonry block foundation walls. Consult CETCO for special installation guidelines that apply to shotcrete and precast concrete construction.

Ultraseal installation guidelines contained herein are for cast-in-place concrete applications and do not cover shotcrete or precast concrete applications. Refer to Ultraseal Product Manuals for additional property line shoring wall construction

technique applications. Consult CETCO for applicable products and installation guidelines for applications not covered herein.

IMPORTANT NOTICE: TO COMPLY WITH ISSUANCE OF HYDROSHIELD QUALITY ASSURANCE PROGRAM, CONTACT CETCO FOR VERIFICATION OF SPECIFICATION AND INSTALLATION REQUIREMENTS.

TECHNICAL DATA

PROPERTY	TEST METHOD	TYPICAL VALUE
ULTRASEAL BT		
Hydrostatic Pressure Resistance	ASTM D 5385 (mod.)	231 ft. (70 m)
Permeability	ASTM D 5084	$<1 \times 10^{-11}$ cm/sec.
Peel Adhesion to Concrete	ASTM D 903 (mod.)	10 lbs./in.
Grab Tensile Strength	ASTM D 4632	150 lbs.
Puncture Resistance	ASTM D 4833	70 lbs.
Elongation	ASTM D 4632	50%
Crack Bridging	ASTM C 836	Passed
Resistance to Decay	ASTM E 154	Passed
Permeance	ASTM E 96 B	0.03 Perms
ULTRASEAL SP		
Hydrostatic Pressure Resistance	ASTM D 5385 (mod.)	231 ft. (70 m)
Permeability	ASTM D 5084	$<1 \times 10^{-11}$ cm/sec.
Peel Adhesion to Concrete	ASTM D 903 (mod.)	10 lbs./in.
Grab Tensile Strength	ASTM D 4632	300 lbs.
Puncture Resistance	ASTM D 4833	130 lbs.
Elongation	ASTM D 4632	75%
Crack Bridging	ASTM C 836	Passed
Resistance to Decay	ASTM E 154	Passed
Permeance	ASTM E 96 B	0.03 Perms

SEPTEMBER 2010

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VOLTEX® AND VOLTEX® DS BENTONITE GEOTEXTILE WATERPROOFING SYSTEMS

Voltex is a highly effective waterproofing membrane ideal for below-grade vertical and horizontal foundation surfaces. Voltex uses the high swelling and self-sealing properties of sodium bentonite to form a monolithic, low permeable membrane to protect the structure from water. Installation is fast and easy and requires no primers or special tools.

Voltex is a unique composite comprised of two high strength geotextiles and a minimum of 1.1 lbs of sodium bentonite per square foot. The fibers of the geotextiles are interlocked by a needle-punching process which encapsulates the bentonite and keeps it uniformly distributed.

Voltex DS combines the proven waterproofing technology of a bentonite geotextile composite with a high-strength polyethylene liner. Voltex DS is designed for projects that require additional chemical resistance, and lower water vapor performance.

ADVANTAGES:

- ▶ Good Hydrostatic Resistance
- ▶ Continuous Bond Strength to Concrete
- ▶ Durable Construction
- ▶ Durable Construction Provides Tensile Strength and Puncture Resistance
- ▶ Self-Sealing Membrane Laps
- ▶ Can Be Applied to Green Concrete
- ▶ Easy to Install

APPLICATIONS:

- ▶ Backfilled Concrete Walls
- ▶ Under Slabs
- ▶ Tunnels
- ▶ Earth-Covered Roofs
- ▶ Property Line Construction



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www.CETCO.com/bmg**

TECHNICAL DATA

VOLTEx®

BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

DESCRIPTION

Voltex is a highly effective waterproofing composite of high strength geotextiles and 1.10 pounds of sodium bentonite per square foot. 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 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 saltwater 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 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 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 compacted earth/gravel substrate. A minimum 6" (150 mm) thick reinforced 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) geotextile 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 under grade beams and footings. 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.

VOLTEx

BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

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 underslab 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 GF-40SA 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 GF-40SA;

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% modified proctor density promptly after waterproofing installation. Backfill should consist of compactable soil or angular aggregate (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 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: metal sheet piling, soldier pile and lagging, auger cast caisson, 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 1" (25 mm) with non-shrink grout or compacted soil. Aquadrain® drainage composite can be installed over lagging gaps up to 2-1/2" (63 mm) to provide a uniform surface to mount the Voltex. Gaps larger than 2-1/2" (63 mm) should be completely filled with grout, wood, extruded polystyrene (40 psi 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 gray woven geotextile facing installer) 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 shoring wall with washer-head fasteners

maximum 24" (600 mm) on center. Overlap edges of Voltex sheets a minimum 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 (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 maximum 24" (600 mm) on center. After the bottom horizontal course, Voltex sheets can be installed either vertically or horizontally oriented. 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 minimum 12" (300 mm). Do not allow Voltex overlap joints to run at same elevation 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 soldier pile from finished grade elevation to specified depth of soldier pile and lagging removal. 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 installation, fill voids in retention wall substrate and tie-back head assembly with spray foam (min 20 psi) 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 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 1/2" (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 1/2" (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 GF-40SA 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 GF-40SA; 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 compactable 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.

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 designed to waterproof expansion joints. Expansion joints are the responsibility of others. 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 GF-40SA 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

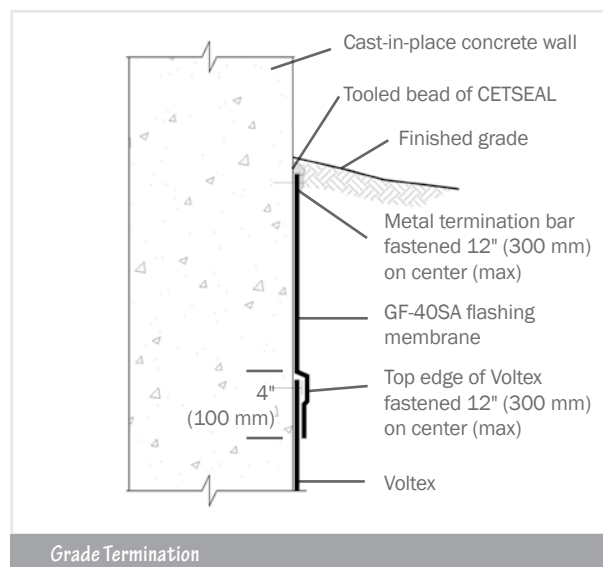
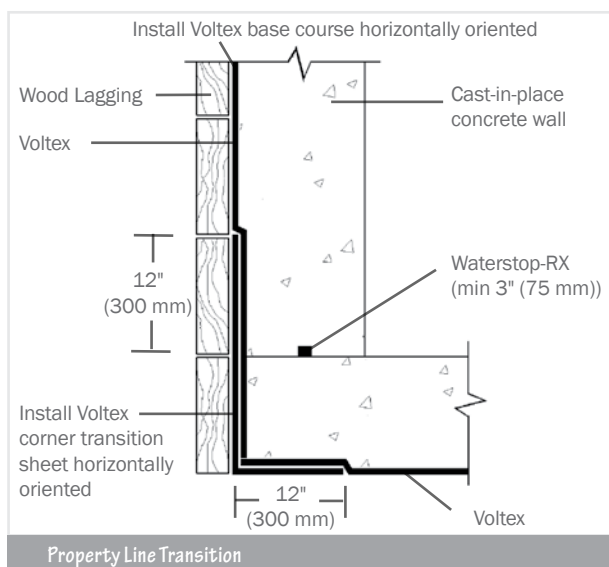
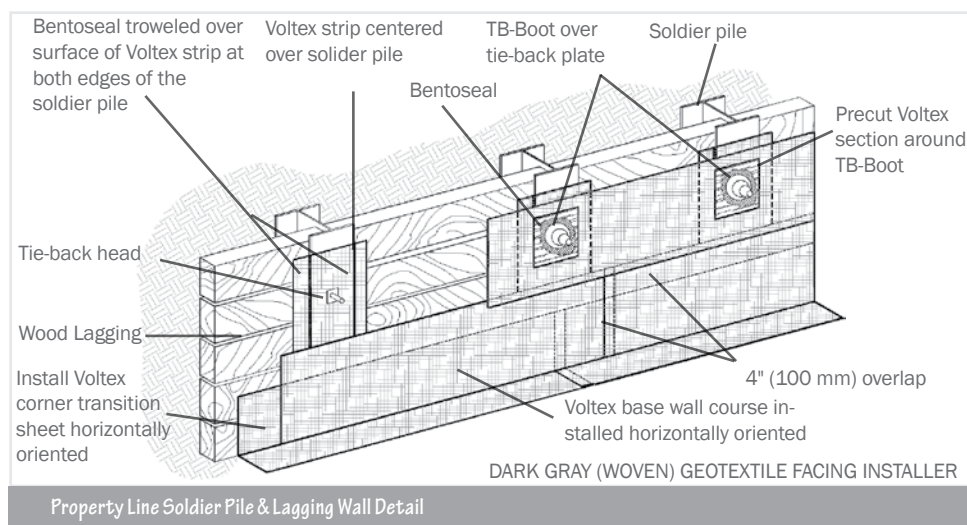


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VOLTEX

BENTONITE GEOTEXTILE WATERPROOFING SYSTEM

TECHNICAL DATA		
PROPERTY	TEST METHOD	TYPICAL VALUE
Bentonite Mass Per Unit Area	ASTM D 3776 (mod.)	1.10 lbs/sq ft
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	1×10^{-9} 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)



SEPTEMBER 2010

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TECHNICAL DATA

VOLTEX DS®

BENTONITE GEOTEXTILE WATERPROOFING WITH INTEGRATED POLYETHYLENE LINER

DESCRIPTION

Voltex DS is a highly effective waterproofing composite of high strength geotextiles, 1.10 pounds of sodium bentonite per square foot, 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 fibers are encapsulated into the surface of cast-in-place concrete.

APPLICATIONS

Voltex DS is designed for below-grade 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 DSCR with contaminant resistant sodium bentonite. Voltex DSCR 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 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 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 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 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 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 4" (100 mm) thick or greater on a compacted earth/gravel substrate. A minimum 6" (150 mm) thick reinforced slab, if installed over a mud slab. Where hydrostatic conditions exist, install Voltex DS under footings and grade beams.

Place Voltex DS over the properly prepared substrate with the dark gray (woven) geotextile 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 DS to closely fit around penetrations and pile caps. Install Waterstoppage under cut Voltex DS edge at detailing and then apply a minimum 3/4" (18 mm) thick fillet of Bentoseal to top of cut Voltex DS edge at penetrations, pile caps, grade beams, and other detailing. Extend Bentoseal onto Voltex DS and detail a minimum of 2" (50 mm). For hydrostatic conditions, Voltex DS should be installed under grade beams and footings. Extend Voltex DS 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 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 12" (300 mm).

BACKFILLED CAST-IN-PLACE CONSTRUCTION

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

VOLTEX DS

BENTONITE GEOTEXTILE WATERPROOFING WITH INTEGRATED POLYETHYLENE LINER

Beginning at the bottom corner of the wall, install Voltex DS 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 DS at the corner a minimum of 6" (150 mm) so that Voltex DS can be extended onto the footing. Fasten Voltex DS into position with washer headed fasteners a maximum of 24" (600 mm) on center. 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 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 DS. Stagger all vertical overlap joints a minimum of 12" (300 mm). For hydrostatic conditions, the vertical wall Voltex DS should cover the entire footing and overlap the underslab waterproofing a minimum 6" (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 3/4" (18 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 1-1/2" (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 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 DS membrane 12" (300 mm) below finished grade elevation with washer-head fasteners maximum 12" (300 mm) on center. Install GF-40SA flashing to primed concrete substrate with bottom edge overlapping top edge of Voltex DS 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 GF-40SA; 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 shall be placed and compacted to minimum 85% Modified Proctor density promptly after waterproofing installation. Backfill should consist of compactable soil or angular aggregate (3/4" or less) free of debris, sharp objects, and stones larger than 3/4" (18 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: metal sheet piling, soldier pile and lagging, auger cast caisson, and stabilized-earth shoring walls. Following guidelines outline the installation of Voltex DS on soldier pile and lagging 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.

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® drainage composite can be installed over lagging gaps up to 2-1/2" (63 mm) to provide a uniform surface to mount the Voltex DS. Gaps larger than 2-1/2" (63 mm) should be completely filled with grout, wood, extruded polystyrene (40 psi min.) or compacted soil even if Aquadrain is installed prior to Voltex DS. Do not use plywood or other surface treatment that leaves the lagging gaps void.

Shoring Wall Transition: At base of shoring wall, install Voltex DS sheet horizontally oriented (dark gray woven geotextile facing installer) with the bottom edge extending out onto the horizontal substrate a minimum 12" (300 mm) and the top edge of the sheet extending a min. 12" (300 mm) above the finished slab elevation. Secure Voltex DS sheet to shoring wall with washerhead fasteners maximum 24" (600 mm) on center. Overlap edges of Voltex DS sheets a minimum 4" (100 mm). If the slab thickness is greater than 24"

(600 mm), install a second full sheet or cut strip of Voltex DS 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 min. 4" (100 mm).

Shoring Wall Installation: Starting at the base corner, install course of Voltex DS (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 maximum 24" (600 mm) on center. After the bottom horizontal course, Voltex DS sheets can be installed either vertically or horizontally oriented. Continue Voltex DS installation up wall to finished grade elevation overlapping adjacent Voltex DS sheet edges a minimum 4" (100 mm) and staggering all sheet roll ends of adjacent courses a minimum 12" (300 mm). Do not allow Voltex DS overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 6" (150 mm).

Prior to installing Voltex DS at grade, install 1/2" (12 mm) thick cementitious wall board (Durock) centered over metal soldier pile from finished grade elevation to specified depth of soldier pile and lagging removal. 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 installation, fill voids in retention wall substrate and tie-back head assembly with spray foam (min 20 psi) 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 Voltex DS membrane. With soldier piles, strip piles with waterproofing membrane prior to TB-Boot placement.

Fill pre-formed shape of TB-Boot with 2-part urethane spray foam (min 20 PSI) and place over tie-back head before foam sets up. 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 DS (with pre-cut hole in center to fit tight around the 1/2" (12 mm) raised collar) over the entire flat base with outside edges fastened to the retaining wall. Secure inside Voltex DS 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 1/2" (12 mm) raised collar. Apply counter flashing of Bentoseal along Voltex DS sheet edge around raised collar. Then install Voltex DS field sheet overlapping outer membrane edge minimum 4" (100 mm).

Penetrations: Install a cut collar of Voltex DS tightly around the penetration; extending a minimum 12" (300 mm) radius. Apply Bentoseal over Voltex DS collar around penetration; extending Bentoseal a minimum 3" (75 mm) radius at ¼" (6 mm) thickness. Then install main course of Voltex DS 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 DS over all soldier piles with raised lagging hanger bolts, form tie rods, or other irregular surface. Voltex DS 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 DS strip surface along both edges of each soldier pile.

Cementitious Board: Prior to installing Voltex DS 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 DS membrane 12" (300 Mm) below finished grade elevation with washer-head fasteners maximum 12" (300 mm) on center. Install GF-40SA flashing to primed concrete substrate with bottom edge overlapping top edge of Voltex DS 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 GF-40SA; 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 DS overlap seams with washer-head fasteners maximum 24" (600 mm) on center and then install Seamtape centered 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 (3/4" or less) free of debris, sharp objects, and stones larger than ¾" (18 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. Do not use stay-in-place concrete forming; use removable forming products only.

Voltex DS is designed for below-grade 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 2,500 µmhos/cm or greater, water samples should be submitted to the manufacturer for compatibility testing. Ultra-seal may be required if contaminated ground water or saltwater conditions exist.

Voltex DS is designed for use under reinforced concrete slabs 4" (100 mm) thick or greater on a compacted earth/gravel substrate. Voltex DS requires a minimum 6" (150

mm) thick reinforced concrete slab if installed over a mud slab. Voltex DS is not designed for split-slab plaza deck construction.

Voltex DS is not designed to waterproof expansion joints. Expansion joints are the responsibility of others. 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 4-ft x 14.5-ft (1.2 x 4.2 m) rolls. Typical roll weight is approximately 68 lbs. (30.8 kg). Voltex DS is packaged 35 rolls per pallet (2,030 sq. ft. (188 sq. m.)).

ACCESSORY PRODUCTS

Install Voltex DS 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, Seamtape and GF-40SA 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



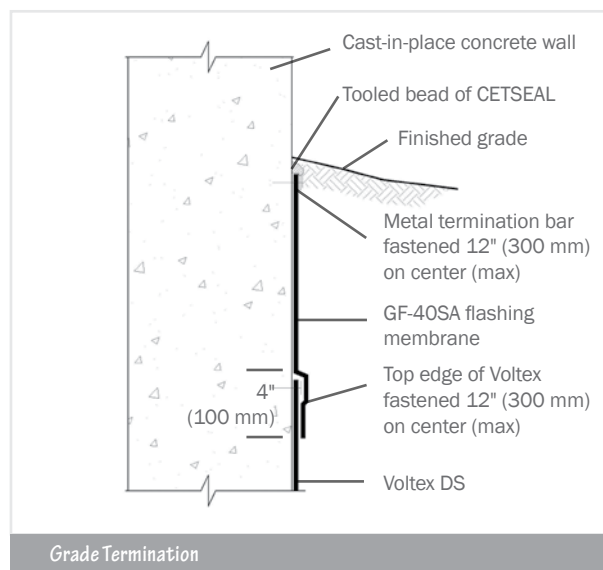
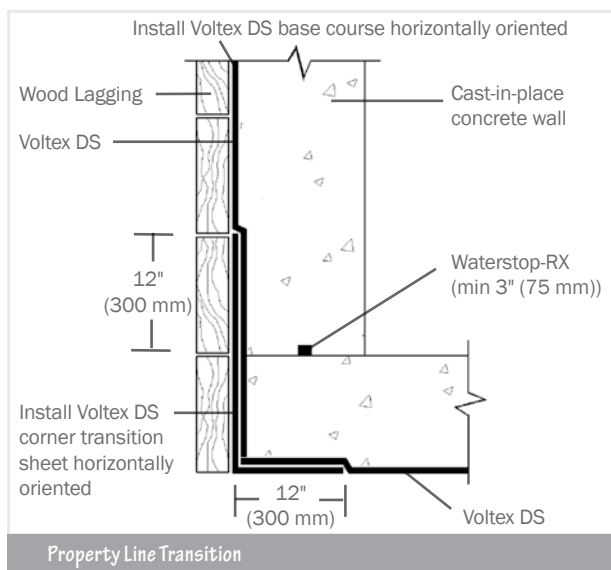
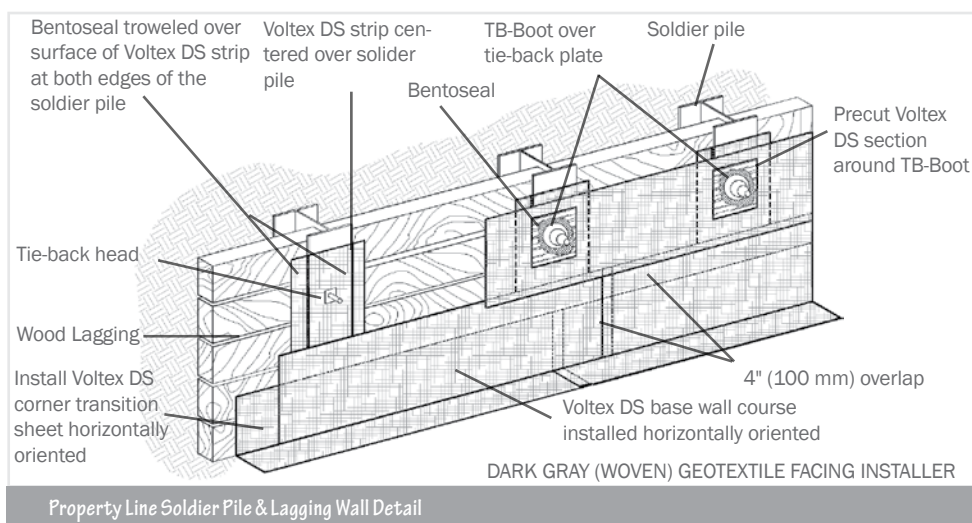
www.CETCO.com

VOLTEX DS

BENTONITE GEOTEXTILE WATERPROOFING WITH INTEGRATED POLYETHYLENE LINER

TECHNICAL DATA

PROPERTY	TEST METHOD	TYPICAL VALUE
Bentonite Mass Per Unit Area	ASTM D 3776 (mod.)	1.10 lbs/sq ft
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	1×10^{-10} cm/sec
Grab Tensile Strength	ASTM D 4632	120 lbs (530 N)
Puncture Resistance	ASTM D 4833	140 lbs (620 N)
Low Temperature Flexibility	ASTM D 1970	Unaffected @ -25° F (-32° C)
Water Vapor Transmission Rate	ASTM E 96	0.03 grains per hour/ft²



SEPTEMBER 2010

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 visit www.CETCO.com. CETCO accepts no responsibility for the results obtained through application of this product. CETCO reserves the right to update information without notice.

CETCO®

www.CETCO.com

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847.851.1800 | 800.527.9948



SWELLTITE® COMPOSITE BENTONITE WATERPROOFING SYSTEM

Swelltite is a highly effective Waterproofing composite of sodium bentonite compound integrally bonded to a geomembrane liner. This composition combines the active waterproofing benefits of sodium bentonite with the strength and puncture resistance of a thick geomembrane liner.

Unlike other membrane systems which require near-perfect installation, Swelltite's reactive bentonite compound can expand to seal installation imperfections or small punctures in the membrane. Swelltite works by forming a monolithic membrane upon hydration 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.

ADVANTAGES:

- ▶ Dual membrane construction provides excellent waterproofing protection
- ▶ Easy Installation
- ▶ Can be Applied to Green Concrete
- ▶ Rugged Construction Provides Tensile Strength and Puncture Resistance

APPLICATIONS:

- ▶ Backfilled Concrete Walls
- ▶ Masonry Block Walls
- ▶ Earth-Covered Roofs
- ▶ Tunnels
- ▶ Above Grade Split-Slab Construction
- ▶ Plaza Decks
- ▶ Parking Decks
- ▶ Balconies
- ▶ Interior Split-Slab Applications



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TECHNICAL DATA

SWELLTITE®

COMPOSITE BENTONITE WATERPROOFING SYSTEM

DESCRIPTION

Swelltite is a highly effective Waterproofing composite of sodium bentonite compound integrally bonded to a geomembrane liner. This composition combines the active waterproofing benefits of sodium bentonite with the strength and puncture resistance of a thick geomembrane liner.

Swelltite is a true advancement in waterproofing membrane technology. Unlike other membrane systems which require near-perfect installation, Swelltite's reactive bentonite compound can expand to seal installation imperfections or small punctures in the membrane. Swelltite is manufactured at a factory controlled thickness of 90 mils (0.090") assuring the specifier, contractor, and owner of consistent material application. This engineered composite consists of a white (heat reflective) 12-mil geomembrane liner and 78-mils of bentonite compound with a clear release film attached. Swelltite contains virtually zero VOC, can be installed in almost any weather condition to green concrete, and most importantly, has proven effective for more than 20 years.

Swelltite works by forming a monolithic membrane upon hydration 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 the bentonite compound can seal small concrete cracks caused by ground settlement, concrete shrinkage, or seismic action; problems over which there is normally no control.

APPLICATIONS

Swelltite is designed for below-grade vertical and horizontal structural foundation surfaces, as well as, above grade split-slab construction. Typical belowgrade

applications include backfilled concrete walls, masonry block walls, earth-covered roofs, and tunnels. Typical above grade split-slab construction applications include plaza decks, parking decks, and balconies. Additionally, Swelltite can be used for interior split-slab applications for mechanical rooms, kitchens, and laboratory facilities. Applications may include structures under continuous or intermittent hydrostatic pressure.

INSTALLATION

General: Install Swelltite in strict accordance with the manufacturer's installation guidelines. Use accessory products as recommended. Install Swelltite with the bentonite compound directly against the surface to be waterproofed. For ease of handling, the sticky bentonite compound is covered with a siliconized release film that must be removed during installation. Schedule waterproofing material installation to permit prompt placement of backfill material or concrete. For applications not covered herein, contact CETCO for specific installation guidelines.

Storage: Store Swelltite and accessory products in a dry location protected from construction operations and weather. Protect materials from moisture, excessive temperatures and prolonged exposure to direct sunlight during storage. When storing materials outside at a jobsite, provide weather-proof covering, top and all sides (allow for adequate ventilation). Do not double stack pallets in storage or during shipment.

Preparatory Work: Structural concrete surfaces should be smooth and free of dirt, rock, debris, oil, grease, laitance, or other foreign materials. Remove form fins and other protrusions to match substrate surface. Completely fill any Form-tie

holes, honeycombing, voids, and cracks with non-shrink cementitious grout, M-2000 or Bentoseal. Concrete surfaces to receive M-2000 Liquid Flashing should be water cured a minimum of 7 days prior to application. Where possible, design horizontal concrete surfaces with proper slope to drain.

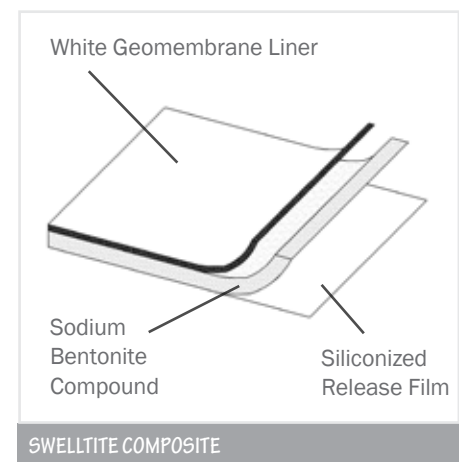
FOUNDATION WALL INSTALLATION

Before installing Swelltite membrane to foundation walls, prepare substrate, and detail all vertical inside corners, penetrations, and the footing/wall joint as follows:

Vertical Inside Corners: Install a 3/4" (18 mm) thick, continuous fillet of Bentoseal® at all vertical inside corners.

Penetrations: Apply a 3/4" (18 mm) thick fillet of Bentoseal around base of penetrations. Extend Bentoseal a minimum of 6" (150 mm) outward from penetration 90-mils thick. After Swelltite membrane is installed, apply a counter flashing of Bentoseal at membrane edge around penetration.

Footing/Wall Joint: Install at footing/wall joint a continuous 3/4" (18 mm) thick, 45° angle fillet of Bentoseal.



SWELLTITE

COMPOSITE BENTONITE WATERPROOFING SYSTEM

Membrane Installation: REMOVE CLEAR RELEASE FILM from back of membrane before installation. Starting at the base of the wall, install the membrane over the Bentoseal cant and onto the footing a minimum of 6" (150 mm) with bentonite compound directly against the wall (white liner side toward installer). Secure all membrane edges with washer-head mechanical fasteners maximum 24" (600 mm) on center or less as required to contour surface. Swelltite membrane may be installed either horizontally or vertically oriented. Overlap all membrane edges a minimum of 2" (50 mm). Stagger membrane roll ends a minimum of 12" (300 mm). Seal all membrane overlap seams with CETCO Seamtape. Continue membrane installation to finished grade detail or as specified.

Cut membrane to closely fit around penetrations. Trowel a minimum 3/4" (18 mm) thick layer of Bentoseal around penetrations. Extend Bentoseal onto penetration and completely fill area between membrane edge and penetration. Seal all overlap seams with CETCO Seamtape.

Terminate Swelltite membrane 12" (300 mm) below finished grade elevation with washer-head fasteners maximum 12" (300 mm) on center. Install GF-40SA flashing to primed concrete substrate with bottom edge overlapping top edge of Swelltite 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 GF-40SA; 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 material should be placed and compacted to 85% Modified Proctor density immediately following the application of the membrane. If backfill cannot be applied immediately, protect membrane edges from precipitation with CETCO Seamtape. If backfill contains sharp or irregular material, cover membrane with CETCO approved protection material course to avoid damage during backfilling and compaction.

Tie into underslab waterproofing as required by overlapping the underslab waterproofing a minimum of 6" (150 mm). When a drain tile is required, install it below the top of the footing.

Masonry Block Walls: CETCO recommends that the masonry block cells be filled with cementitious grout or concrete. All mortar joints should be completely filled and struck flush before membrane is installed to masonry walls.

HORIZONTAL DECK INSTALLATION

Before installing Swelltite membrane, prepare substrate and detail all drains, transition corners and penetrations. Consult manufacturer if deck is precast concrete planks or for other conditions not stated herein.

Drains: Trowel a minimum 90-mil (2.3 mm) thick layer of M-2000 on the drain ring and continuing into the drains inward throat slope. Extend M-2000 a minimum of 6" (150 mm) around the drain. Allow M-2000 to cure a minimum of 12 hours prior to installing membrane. After Swelltite membrane is installed around drain, apply a 60-mil thick counter flashing of M-2000 covering the membrane edge.

Penetrations: Trowel a minimum 3/4" (18 mm) cant of M-2000 around the penetration. Extend M-2000 outward from penetration a minimum of 6" (150 mm) at 90 mils thick. After membrane has been installed overlapping M-2000 2" (50 mm), apply a 60-mil thick counter flashing of M-2000 at the membrane edge.

Transition Corners: Apply a 3/4" (18 mm) thick M-2000 fillet to inside transition corners. Then extend M-2000 at 90-mil minimum thickness for 6" (150 mm) in both directions from the corner. Allow M-2000 to cure a minimum of 12 hours prior to installing membrane. After membrane has been installed to the corner, apply a 60-mil thick counter flashing of M-2000 covering the membrane edge.

Membrane Installation: REMOVE CLEAR RELEASE FILM from back of membrane before installation. Install membrane with bentonite compound directly against the deck (white liner side up) from the low point to the high point across the fall line to create a shingle-style installation. Overlap all membrane edges a minimum of 2" (50 mm). Stagger membrane roll ends a minimum 12" (300 mm). Seal all membrane overlap seams with CETCO Seamtape.

Cut membrane to closely fit around penetrations overlapping previously installed M-2000. Trowel 90-mil thick counter flashing of M-2000 over membrane edge.

OPTIONAL ADHESIVE METHOD

Apply A-3000WB Adhesive by roller or sprayer at a rate of 250-275 sq ft per gallon (25 sq m per 3.8 liters) and allow to cure (dry black) before applying membrane. After adhesive has cured, follow membrane installation instructions for applicable application, foundation wall or deck, excluding the mechanical fasteners. Primed surfaces not covered with membrane during the same working day must be re-primed.

SIZE AND PACKAGING

Swelltite roll size is 40" wide by 37' 9" long (1.02 m x 11.5 m); 125 square feet (11.5 sq m) per roll. Each roll weighs approximately 81 lbs. (36.8 kg).

LIMITATIONS

Do not install Swelltite in standing water or during precipitation. If ground water contains strong acids, alkalies, or is of a conductivity of 2,500 μ mhos or greater, submit water samples to the manufacturer for compatibility testing.

Swelltite is not designed for unconfined above-grade waterproofing applications or subsurface applications that do not provide full confinement coverage. Do not install Swelltite on horizontal plaza deck applications that utilize pavers placed on pedestals.

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

For foundation walls, backfill should consist of compactible soils or crushed stone (3/4" or less). Compact soils to minimum 85% Modified Proctor density. Stone backfill larger than 3/4" (18 mm) will require the use of a protection course; consult CETCO for specific guidelines. Avoid backfill with aggregate 1-1/2" (38 mm) or larger.

On horizontal decks, Swelltite requires proper containment from a topping ballast material. Swelltite requires a minimum 3" (75mm) thick structural concrete slab or a minimum paver assembly weight of 20-lbs. (9 kg) per square foot (includes sand or grout leveling course). When compactible soil topping is used, it must be at least 18" thick and compacted to a minimum 85% Modified Proctor density.

ACCESSORY PRODUCTS

M-2000 Liquid Flashing®: M-2000 Liquid Flashing is a trowel-grade waterproofing mastic used as a detailing product around penetrations, drains and at corner transi-

tions for horizontal deck and vertical wall installations. M-2000 is a single-component moisture curing elastomer that meets the requirements of ASTM C836-84.

BENTOSEAL®: trowel grade sodium bentonite compound used as a detailing mastic around penetrations and corner transitions for vertical wall Swelltite installations.

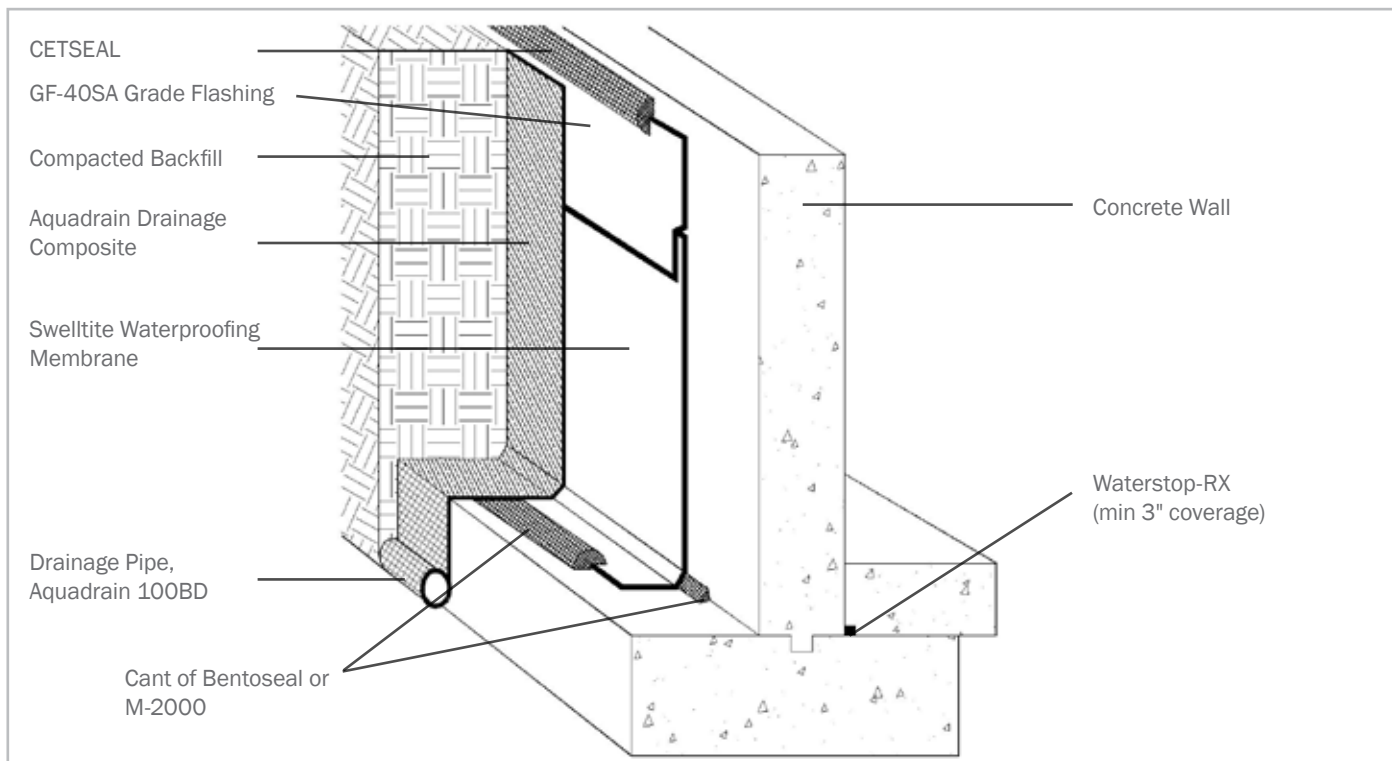
A-3000WB ADHESIVE®: water-based latex adhesive applied to substrates to promote adhesion of Swelltite Membrane. Typical application rate 250-275 sq ft/gallon.

SEAMTAPE®: tape used to seal membrane overlap seams.

AQUADRAIN®: prefabricated drainage composite consisting of a heavy filter fabric adhered to a high-strength plastic drainage core. Aquadrain is available in 4' x 52' rolls.

WATERSTOP-RX®: expanding bentonite-based concrete joint strip waterstop designed to replace PVC dumbbell waterstops. Adhered into place with CETSEAL.

GF-40SA: UV resistant flashing membrane for grade terminations and thru wall flashing.



Backfilled concrete foundation wall detail

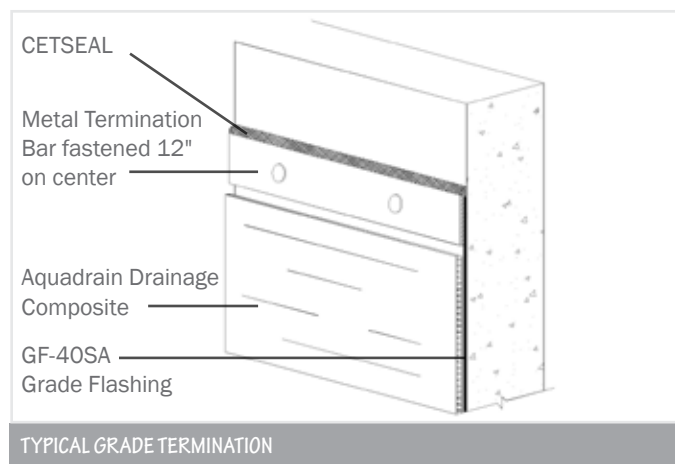
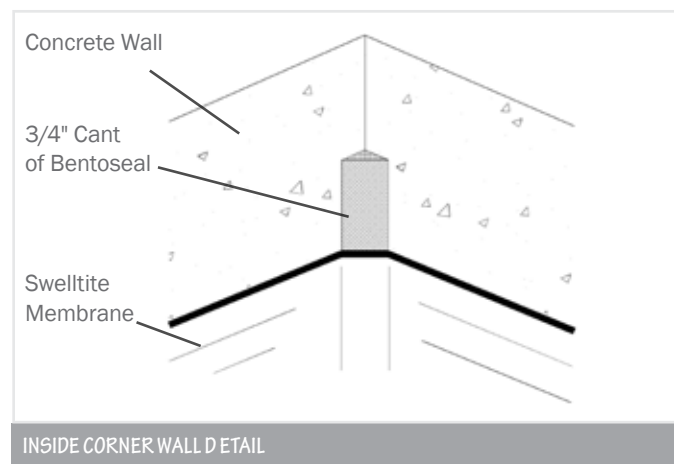
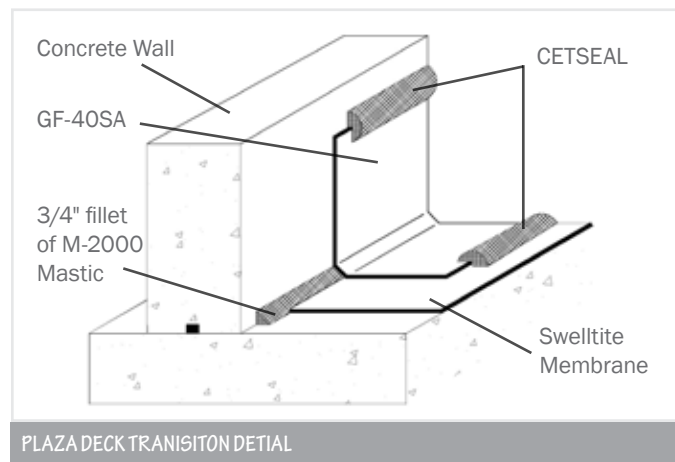
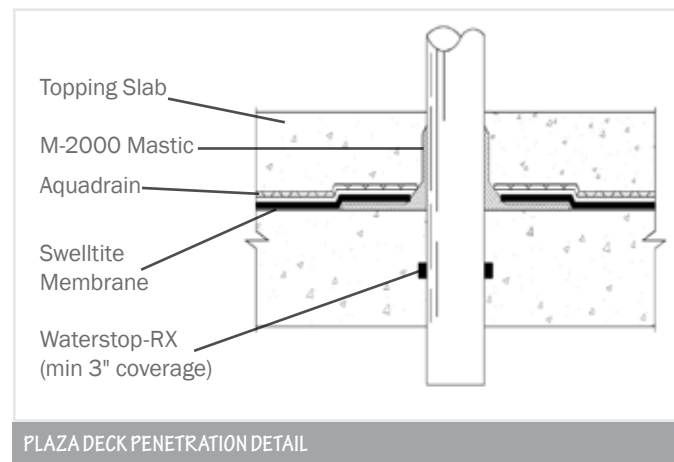
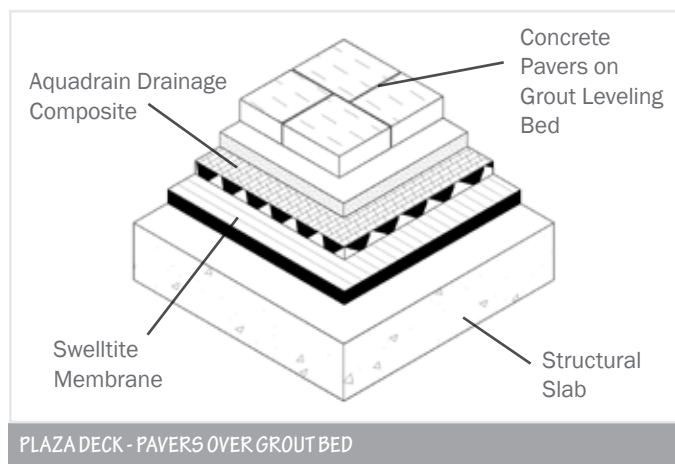
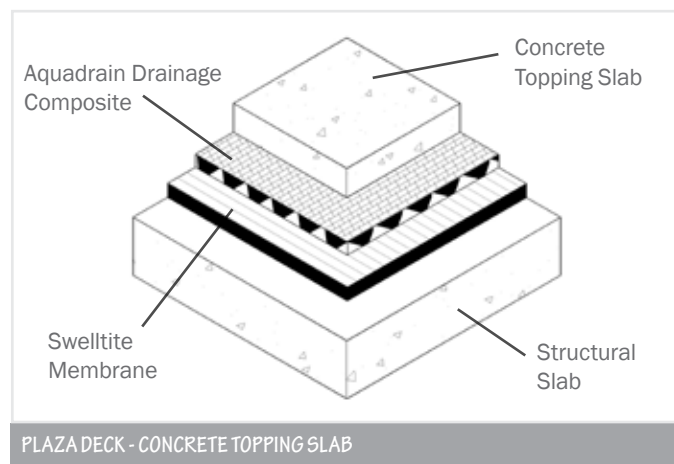
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SWELLTITE

COMPOSITE BENTONITE WATERPROOFING SYSTEM

GENERAL APPLICATION DETAILS



NOVEMBER 2010

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WATERSTOP-RX®

EXPANDING CONCRETE JOINT WATERSTOP

Waterstop-RX is an expanding strip waterstop designed to stop water infiltration through cast-in-place concrete construction joints. It expands upon contact with water to form a positive seal against the concrete. The key to Waterstop-RX's effectiveness is high sodium bentonite content which provides superior expansion to seal and fill voids and cracks in the concrete. Waterstop-RX is designed to replace passive PVC/Rubber dumbbell waterstops, thereby eliminating the requirement of special pieces, split-forming and seam welding.

Waterstop-RX is manufactured in light-weight, flexible coils that are easily installed by a single worker. The product is adhered to concrete, steel, and PVC (pipes) with CETSEAL at or exceeding the required minimum distance from the exterior concrete surface. Coil ends are butted together - not overlapped—to form a continuous waterstop.

ADVANTAGES:

- ▶ Active, Swelling Waterstop
- ▶ Fast, Easy Installation
- ▶ Seals Around Penetrations
- ▶ Ideal When Pouring New Concrete Against Existing Concrete
- ▶ Expands to Seal Off Leaks
- ▶ High Hydrostatic Resistance

APPLICATIONS:

- ▶ Vertical and Horizontal Non-Moving Concrete Construction Joints
- ▶ New To Existing Concrete Construction
- ▶ Irregular Surfaces
- ▶ Around Through-Wall Penetrations
- ▶ Seal Around Concrete Pilings and Steel I-Beams
- ▶ Continuous and Intermittent Hydrostatic Conditions



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TECHNICAL DATA

WATERSTOP-RX®

EXPANDING CONCRETE JOINT WATERSTOP

DESCRIPTION

Waterstop-RX 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-RX's effectiveness is its high sodium bentonite content which provides superior expansion to seal and fill voids and cracks in the concrete. Waterstop-RX is an active bentonite/butyl-rubber based waterstop that is designed to replace passive PVC/Rubber dumbbell waterstops, thereby eliminating the requirement of special pieces, split-forming and seam welding. Waterstop-RX has been successfully tested by independent testing firms to over 200 feet (60 meters) of hydrostatic water pressure, under both continuous immersion and wet/dry cycling.

Waterstop-RX is available in three sizes and shapes (see Product Table). Waterstop-RX 101 is produced in a rectangular shape measuring 1" x 3/4" (25 x 19 mm). Waterstop-RX 101T is produced in a trapezoidal shape measuring 1-1/4" x 1/2" (31 x 12 mm) with a reinforcing plastic scrim embedded in the top surface for high tensile strength. The patented trapezoidal shape distributes the expansive force over a greater area and allows the concrete to flow more readily over the product during placement. Waterstop-RX 102 is produced in a half-circle (Crescent) shape measuring 3/4" x 3/8" (19 x 9 mm).

Though Waterstop-RX possesses good resistance to many chemicals, the waterstop is not intended to be used as the primary joint sealant for chemical containment vessels. Consult manufacturer for guidance regarding chemical compatibility for secondary chemical containment applications. Additionally, Waterstop-RX is not an expansion joint sealant. Expansion joints require an expansion joint product provided by others.

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. Additionally Waterstop-RX can seal around concrete pilings and steel H-piles passing through the slab. Waterstop-RX works in both continuous hydrostatic and intermittent hydrostatic conditions.

Waterstop-RX products are designed for reinforced structural concrete with a minimum of 3,000 psi compressive strength. RX-101 and RX-101T are designed for concrete 8" (200 mm) thick or greater with two rows of reinforcing steel. RX-102 is designed for vertical concrete 6" (150 mm) thick or greater; and horizontal concrete no less than 4" (100 mm) thick. RX-102 should be used in concrete with one row of steel reinforcement, concrete curbs, planter walls, fountains, and lightweight structural concrete.

Waterstop-RX is a reliable, cost-effective means to stop water infiltration through concrete cold joints. It can also be used around pipe and structural penetrations

INSTALLATION

Surface preparation: Surfaces should be clean and dry. Remove all dirt, rocks, rust or other construction debris. Do not install Waterstop-RX in standing water or on an iced substrate.

Adhesive: Apply a continuous bead of CETSEAL along the substrate where Waterstop-RX will be installed. Assure proper 3" (75 mm) concrete coverage will be maintained. Keep the nozzle tip pressed against the concrete at a 45° angle during application.

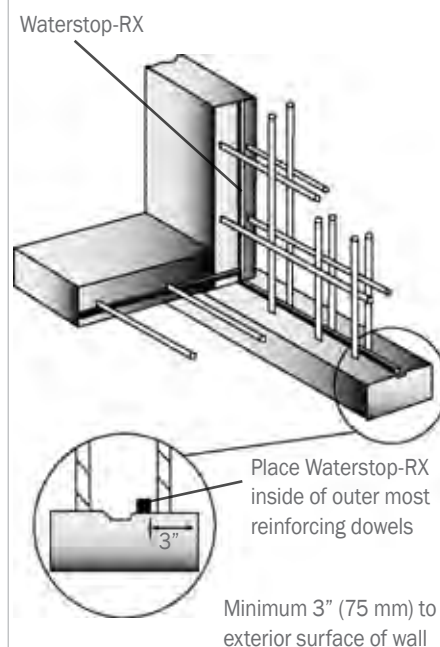
Installation: After applying a continuous bead of CETSEAL, remove release paper, then firmly press the entire length of Waterstop-RX onto the adhesive. For vertical and overhead applications, firmly press a minimum of 15 seconds to assure adhesion. For best results apply Waterstop-RX within 30 minutes of adhesive installation. Waterstop must be placed into adhesive prior to CETSEAL skinning over and curing. CETSEAL may be applied to damp surfaces, but not in standing water.

Tightly butt coil ends together to form a continuous waterstop - do not overlap coil ends. Place in maximum practical lengths to minimize coil end joints. Where required, cut coils with a sharp knife or utility blade to fit coil ends together. Make horizontal to vertical transitions by abutting product coil sections together, no special accessory pieces are required.

At structural and pipe penetrations, cut into strips to fit around the penetration. Apply to adhesive and abut coil ends together.

On irregular surfaces such as stone or rough concrete, make sure waterstop remains in direct contact with the substrate along the entire installation. There should not be any air gap between the waterstop and the substrate.

Footing/Wall Joint



General Application Detail

WATERSTOP-RX

EXPANDING CONCRETE JOINT WATERSTOP

INSTALLATION

Surface preparation: Surfaces should be clean and dry. Remove all dirt, rocks, rust or other construction debris. Do not install Waterstop-RX in standing water or on an iced substrate.

Adhesive: Apply a continuous bead of CETSEAL along the substrate where Waterstop-RX will be installed. Assure proper 3" (75 mm) concrete coverage will be maintained. Keep the nozzle tip pressed against the concrete at a 45° angle during application.

Installation: After applying a continuous bead of CETSEAL, remove release paper, then firmly press the entire length of Waterstop-RX onto the adhesive. For vertical and overhead applications, firmly press a minimum of 15 seconds to assure adhesion. For best results apply Waterstop-RX within 30 minutes of adhesive installation. Waterstop must be placed into adhesive prior to CETSEAL skinning over and curing. CETSEAL may be applied to damp surfaces, but not in standing water.

Tightly butt coil ends together to form a continuous waterstop - do not overlap coil ends. Place in maximum practical lengths to minimize coil end joints. Where required, cut coils with a sharp knife or utility blade to fit coil ends together. Make horizontal to vertical transitions by abutting product coil sections together, no special accessory pieces are required.

At structural and pipe penetrations, cut into strips to fit around the penetration. Apply to adhesive and abut coil ends together.

On irregular surfaces such as stone or rough concrete, make sure waterstop remains in direct contact with the substrate along the entire installation. There should not be any air gap between the waterstop and the substrate.

LIMITATIONS

Waterstop-RX is not a self-adhering product. CETSEAL is required to secure Waterstop-RX to concrete, metal, or PVC (Pipe) surfaces. Mechanical fasteners should not be used to secure waterstop alone, but may be used in conjunction with CETSEAL. Do not use any other adhesive or construction sealant, except CETSEAL, to secure Waterstop-RX.

Waterstop-RX is not designed, nor intended to function as an expansion joint sealant. For precast concrete applications, contact manufacturer for product suitability and for any special installation requirements.

Waterstop-RX products are designed for structural concrete with a minimum of 3,000 psi compressive strength. Waterstop-RX 101 and RX-101T require a minimum of 3" (75 mm) of concrete coverage. Waterstop-RX 102 requires a minimum concrete coverage of 2" (50 mm). Waterstop-RX should only be used in applications where the product is completely encapsulated within the concrete.

Waterstop-RX should not be prehydrated by being subjected to submersion or remain in extended contact with water prior to encapsulation in concrete. If the product exhibits considerable swell prior to encapsulation in the concrete, it must be replaced with new material.

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

PACKAGING

Waterstop-RX is available in corrugated cartons, palletized 36 cartons per pallet. Cartons are color coded for easy product identification. CETSEAL is packaged separately.

ACCESSORY PRODUCTS

CETSEAL is a multi-purpose, single component polyether moisture cure adhesive used to secure Waterstop-RX into position. Apply a continuous bead of CETSEAL to substrate then install Waterstop-RX before CETSEAL skins over and cures. Adhesive yield will vary with use, substrate and application.

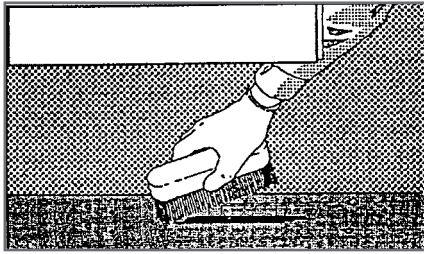
WATERSTOP-RX PRODUCT TABLE

PRODUCT	SIZE	ROLL LENGTH	CROSS-SECTION SHAPE	UNIT QTY/CARTON	MIN CONCRETE COVERAGE
RX-101	1" X 3/4"	16' 8" (5 m)	Rectangle	100 LF (30.4 m)	3" (75 mm)
RX-101T	1-1/4" X 1/2"	20' (6 m)	Trapezoid with Poly Scrim Reinforcement	120 LF (36.5 m)	3" (75 mm)
RX-102	3/4" x 3/8"	33' 4" (10 m)	Half-Circle	200 LF (60.9 m)	2" (50 mm)

5 FAST & EASY INSTALLATION STEPS

STEP 1

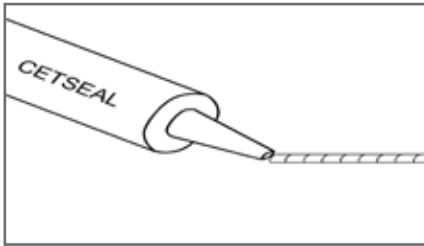
CLEAN SURFACE



REMOVE ALL DIRT AND DEBRIS

STEP 2

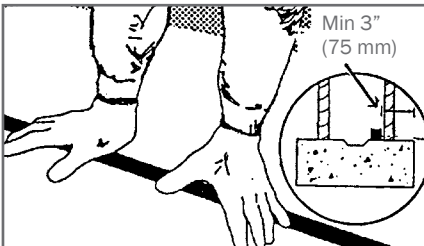
APPLY ADHESIVE



APPLY CETSEAL

STEP 3

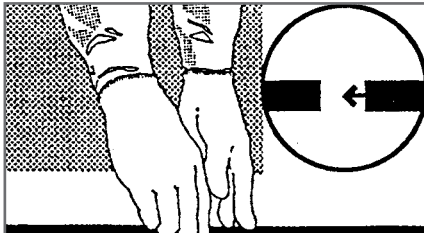
PLACE WATERSTOP



REMOVE RELEASE PAPER THEN PRESS FIRMLY AGAINST CETSEAL. MAINTAIN MIN. CONCRETE COVERAGE DEPTH

STEP 4

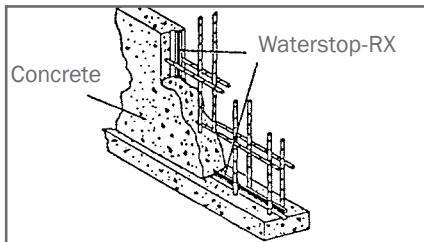
BUTT COIL ENDS



TIGHTLY BUTT COIL ENDS TO FORM A CONTINUOUS WATERSTOP. DO NOT OVERLAP COIL ENDS

STEP 5

POUR CONCRETE



POUR AND VIBRATE CONCRETE

LIMITED WARRANTY

Specifications and other information contained herein supersedes all previously printed matter and are subject to change without notice.

All goods sold by seller are warranted to be free from defects in material and workmanship. The foregoing warranty is in lieu of and excludes all other warranties not expressly set forth herein, whether expressed or implied by operation of law or otherwise, including but not limited to any implied warranties of merchantability or fitness.

Seller shall not be liable for incidental or consequential losses, damages or expenses, directly or indirectly arising for the sale, handling or use of goods, or from any other case relating thereto, and seller's liability hereunder in any case is expressly limited to the replacement (in the form originally shipped) of goods not complying with the agreement or at seller's election, to the repayment of, or crediting buyer with, an amount equal to the purchase price of such goods, whether such claims are for breach of warranty or negligence.

Any claim by buyer with reference to the goods sold hereunder for any cause shall be deemed waived by buyer unless submitted to seller in writing within thirty (30) days from the date buyer discovered or should of discovered, any claimed breach.

Materials should be inspected and tested by purchaser prior to their use if product quality is subject to verification after shipment. Performance guarantees are normally supplied by the applicator.

Waterstop-RX is not an expansion joint material nor should it be used as such. Watertightness of expansion joints is the responsibility of others.

TYPICAL PROPERTIES

PROPERTY	TEST METHOD	VALUE
Hydrostatic Head Resistance	Independent Test	231 Ft. (70 m)
Wet / Dry Cycling (25 Cycles @ 231 ft)	Independent Test	No Effect
Adhesion to Concrete Using CETSEAL	Independent Test	Excellent

WATERSTOP-RX

EXPANDING CONCRETE JOINT WATERSTOP

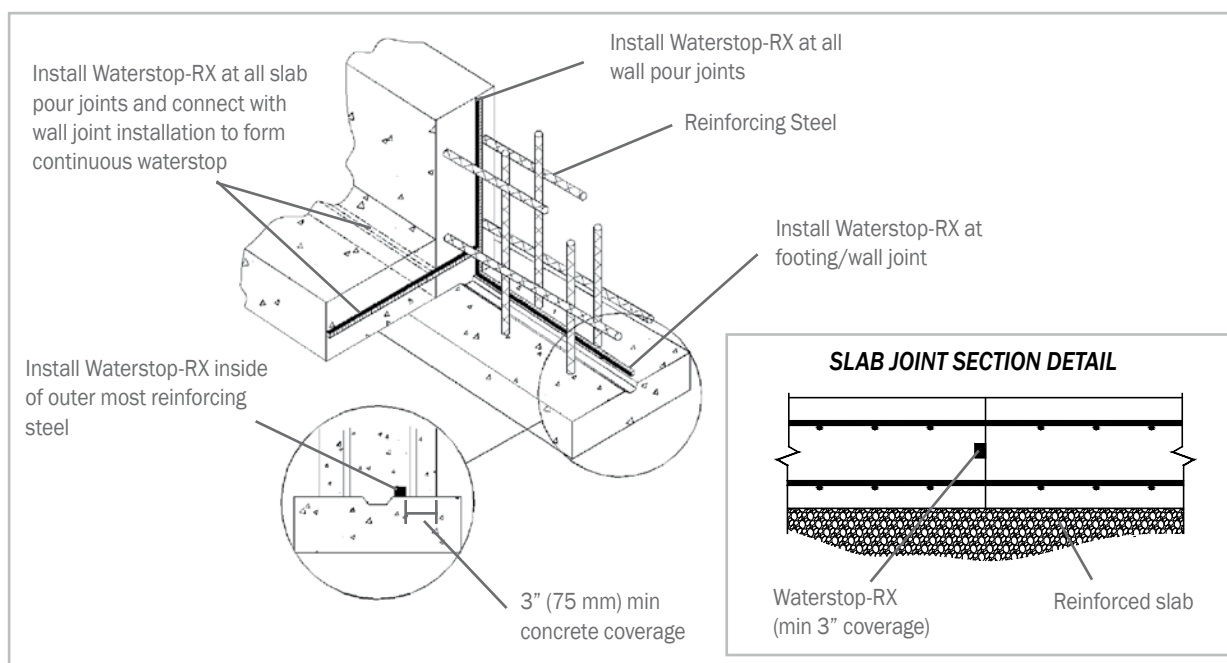
TYPICAL PRODUCT APPLICATIONS

WATERSTOP-RX101 and RX101T

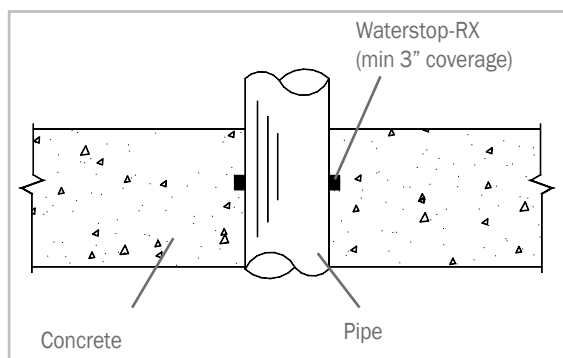
- ▶ Vertical and horizontal concrete 8" (200 mm) thick or greater
- ▶ Concrete with two rows of steel reinforcement
- ▶ Shotcrete Foundation Walls
- ▶ High hydrostatic pressures
- ▶ Tie-back plates and penetrations

WATERSTOP-RX 102

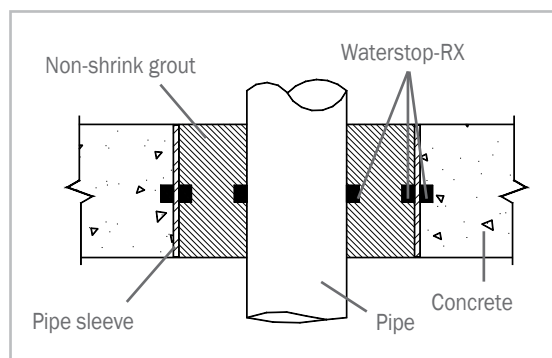
- ▶ Vertical concrete 6" (150 mm) thick or greater.
- ▶ Horizontal concrete 4" (100 mm) thick or greater
- ▶ Concrete with one row of steel reinforcement
- ▶ Slabs containing only wire mesh
- ▶ Fountains / Planter Boxes / Curbs



Typical Waterstop-RX Foundation Detailing



Cast-in-Place Penetration



Sleeved Penetration Detail

NOVEMBER 2010

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847.851.1800 | 800.527.9948



BENTOGROUT® REMEDIAL WATERPROOFING INJECTION GROUT

BentogROUT is a high-solids grout consisting of a proprietary blend of bentonite and polymers formulated for sealing water leaks in existing below-grade structures.

Installation is fast and easy. Simply mix BentogROUT with water and pump it adjacent to the exterior of the building. There it solidifies and expands slightly to form a waterproofing barrier. It can be pumped from above-grade outside the structure without excavating or from the interior of the structure through drilled holes in the walls or slabs. Limited jobsite space is required for injection.



The CETCO BentogROUT Pump and Mixer equipment is designed specifically for BentogROUT. CETCO BentogROUT equipment is comprised of a progressive cavity pump with a vertical paddle and horizontal ribbon blender type mixer.

Solve those difficult water ingress problems with BentogROUT.

ADVANTAGES:

- ▶ No Excavation Required
- ▶ Ability to Self-Seal as the Structure Settles
- ▶ Maintains a Flexible, Putty-Like Consistency
- ▶ Retains a Swell Potential to Seal Itself
- ▶ Easy Installation
- ▶ Fills Void Areas and Bridges Concrete Cracks
- ▶ Environmentally Safe
- ▶ Not Affected by Freeze/Thaw Cycling

APPLICATIONS:

- ▶ Foundation Walls
- ▶ Underslab
- ▶ Tunnels
- ▶ Sheet Piling Interlock
- ▶ Concrete and Masonry Foundation Walls
- ▶ Manholes
- ▶ Utility Vaults



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TECHNICAL DATA

BENTOGROUT®

REMEDIAL WATERPROOFING INJECTION GROUT

DESCRIPTION

BentogROUT is a high-solids grout consisting of a proprietary blend of bentonite and polymers formulated for sealing water leaks in existing below-grade structures. BentogROUT is pumped in a fluid state adjacent to the exterior of the structure where it sets into a gelatinous state forming a waterproofing barrier. BentogROUT can be used to seal leaks in concrete, masonry block, brick, and stone foundations.

Installation is fast and easy. Simply mix BentogROUT with water and pump it adjacent to the exterior of the building. There it solidifies and expands slightly to form a waterproofing barrier. It can be pumped from above-grade outside the structure without excavating or from the interior of the structure through drilled holes in the walls or slabs. Limited jobsite space is required for injection.

Unlike many remedial waterproofing products that are applied as a surface treatment to the interior of the foundation, BentogROUT is applied to the exterior of the building where it stops the water before it can penetrate the structure and further corrode the reinforcing steel. The thick BentogROUT barrier covers the exterior surface of the structure filling voids in the adjacent soil and bridging over small cracks in the concrete. Also, BentogROUT has the ability to self-seal if the structure settles and therefore its performance is not limited by future hairline cracking in the concrete. BentogROUT does not shrink or dry out in sub-surface soil formations and is not affected by freeze/thaw cycling. It remains flexible, maintains a putty-like consistency over time and retains a swell potential to seal itself off. And since BentogROUT primarily consists of natural minerals it is friendly to the environment and will last the life of the structure.

APPLICATIONS

- ▶ Foundation walls
- ▶ Foundation slabs
- ▶ Tunnels
- ▶ Sheet piling interlock
- ▶ Concrete and masonry foundation walls
- ▶ Manholes
- ▶ Utility vaults

PACKAGING

BentogROUT is packaged in 50 lb. (22.6 kg), multi-wall bags; 48 bags per pallet. Store in a dry, moderate temperature location

PREPARATION

Locate and mark all below-grade electrical, sewer and mechanical service lines prior to injection operations. A successful operation requires the installation to occur without mechanical failure of the BentogROUT mixing/pumping equipment. Ensure that all required materials are available and in working condition prior to beginning the application. If pumping from the interior of the building, drilling operations should be completed prior to mixing BentogROUT.

Exterior Injection Head: The applicator will need to fabricate an "Injection Head" to connect the pump hose to the injection pipe. An example of this "Injection Head" assembly is pictured below. Figure 1 illustrates an Injection Head assembly with a quick disconnect fitting, shut off valve, three way tee and end cap. On the bottom of the three way tee is the injection pipe (length to be determined by project depth requirements; typically 8-10' (2.4 m - 3.0 m)). The Injection Head will also serve as a leverage device to hold onto when the applicator is inserting the injection pipe into the soil substrate.

Mix Water: Use only clean water; approximately 14 gallons. BentogROUT mixes best in cool water with a pH between 8 and 10. High temperature water can accelerate the set up time of the grout.

Equipment: CETCO recommends the use of the CETCO BentogROUT Pump and Mixer as the equipment is designed specifically for BentogROUT. Use mixing equipment capable of producing continuous shear and agitation movement. CETCO BentogROUT Equipment is comprised of progressive cavity pumps with vertical paddle and horizontal ribbon blender type mixers. It is not recommended to use a piston style pump due to the high spikes in back-pressure generated.

Caution: Pumping any material under pressure can cause lifting or movement of adjacent structures.



BENTGROUT

REMEDIAL WATERPROOFING INJECTION GROUT

The CETCO BentogROUT Pump and Mixer are separate wheel mounted units that weight 170lbs and 210lbs respectively; each are ran by 1 HP electric motors (Figure 2). The CETCO BentogROUT Pump consists of a rotor-stator ribbon pump that is capable of pumping a consistent 3 gallons per minute and has a 18 gallon hopper. The CETCO BentogROUT Mixer is able to mix a 50lb bag of BentogROUT in approx. 8 minutes with its three mixing paddles and has a mixing capacity of 22 gallons. Both units are completely electric and only require a 120V, 15 AMP current (standard GFI outlet). For information or to purchase the CETCO BentogROUT Pump, Mixer and accessories, contact your local CETCO sales representative.

Pumping Pressures: BentogROUT is typically pumped at pressures of 10-80 psi. Since there are many jobsite variables, actual pumping pressure will vary. Variables may include, amount of water added to BentogROUT, pump hose diameter and length, resistance at hose-head, substrate material and compaction, etc. For example, in large void areas the pumping pressure may only be 10 psi, but as soon as back pressures form the pressure may spike to 100-200 psi. Watch the pumping pressure closely while installing the BentogROUT. Backoff as the pressure increases. Additionally, a crew member may be stationed inside the structure to monitor the injection. This is especially important with masonry block foundations.

Pump Hose: A 1" (25 mm) diameter pump hose with a minimum 200 psi pressure rating is recommended. The pump hose should be as short as possible without adversely limiting operations. The longer the hose and the more turns it makes, the greater the pumping pressure decrease at the place of injection.

INSTALLATION

Mixing Instructions: Add 14 gallons (53 l) of fresh water to a motorized mixer and then add a single 50 lb. (22.6 kg) bag of dry BentogROUT to the water. Thoroughly mix for approximately 5-8 minutes until even "oatmeal" consistency. BentogROUT remains pumpable and placeable for 45 minutes after being mixed. After mixing, if pumping is

stopped or suspended, use a CETCO ByPass Assembly to redirect the material back into the pump hopper to recycle BentogROUT during a suspended period. Do not allow mixed BentogROUT to stand in hose. It will set up and clog the hose; flush water through equipment if there is a stop in use for 20 minutes or longer.

Coverage Rate: Typical installation thickness of BentogROUT is 1/2" (12 mm) or greater. Coverage rates will be affected by injection depth, void areas, soil compaction, material spread, etc. A 50 lb. bag of BentogROUT yields 2.2 cubic feet of grout. Estimating a 1/2" (12 mm) thick coverage rate without any void spaces, a 50 lb. bag should cover approximately 50 sq ft (4.6 sq m). Actual results will vary with each project.

Surface Injection From Exterior of Building:

Use 3/8" - 3/4" (10-19 mm) diameter heavy wall steel pipe as injection pipe for BentogROUT placement. Cut the pipe tip at a 45° angle to aid in sinking of the injection pipe. A single pipe can be repeatedly inserted and removed, or numerous pipes can be inserted and than all injected through in sequence.

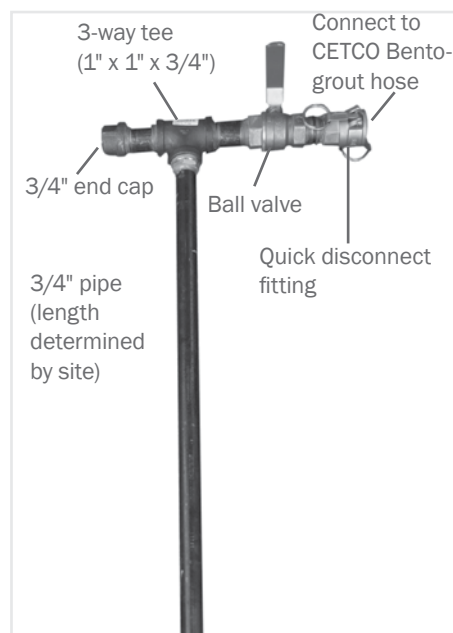


Figure 1: Single Connection Injection Head Assembly

Insert injection pipe as close as possible to the foundation wall at 24" (0.6 m -1.2 m) on center to the top of the footing or the desired depth. Use a "Tile Rod" or long drill bit to start the first few feet of the injection hole.



Figure 2: CETCO pump and mixer with electric 1HP motor.

With a Single Connection Injection Head, use the grout as a drilling medium to assist with sinking the pipe (see Figure 1). For deep depths, it may be necessary to use scaffolding to operate from when first inserting a long pipe.

After sinking the injection pipe to the desired depth, pump BentogROUT until it extrudes out at grade or substantial back pressure is achieved. (Caution: Be careful not to inject BentogROUT into sub-surface drainage tile.) Continue to pump BentogROUT while slowly removing injection pipe. Then move to adjacent injection point and continue process; Injection points are typically 2'-4' (0.6 m to 1.2 m) on center. Cohesive soil conditions will require closer placed injection points while non-cohesive soils may only need injection points placed 4' (1.2 m) apart. After the outside of the wall is injected with BentogROUT, a second round of injections can take place between previously injected holes to ensure outside is completely coated.

Interior Injection Through Slab or Wall:

Use a 1-1/2" (38 mm) diameter bit to drill a 6" (150 mm) deep starter hole in the concrete (to set CETCO Injection Packer). From 6" depth continue drilling through the remaining thickness of the concrete with a 3/4" - 1" (19-25 mm) diameter drill bit. Once hole is drilled, insert CETCO Injection Packer with the red rubber gasket completely placed into the 1-1/2" hole section, then tighten and firmly set Injection Packer with the handle. Install Injection Packer with ball valve in the closed position. Then hook up the CETCO Pressure Gauge and the CETCO Injection Hose to the Injection Packer. Drill the bottom row of wall injection holes as close to the wall/slab joint as possible 4' (1.2 m) on center. Drill the second row 4' (1.2 m) up and offset 2' (0.6 m) from the bottom row. Drill subsequent rows (as required) in the same pattern to the previous row: 4' (1.2 m) up and offset 2' (0.6 m) (creating a diamond pattern).

For interior wall injections, begin grout injection at the lowest injection point on the wall and then work upwards. A minimum of two holes should be drilled - one for grout injection and the other for pressure release. Prior to pumping BentogROUT, open the ball valve of the Injection Packer and adjacent Injection Packer(s). Then pump BentogROUT through Injection Packer until BentogROUT begins to flow out of adjacent Injection Packers (with ball valve in open position) or substantial backpressure is achieved. When BentogROUT is observed to be flowing out of adjacent CETCO Injection Packers, successful BentogROUT flow between Packers has been achieved (void is being filled). Close ball valve of adjacent Injection Packer that BentogROUT is flowing out and continue to pump in same Injection Packer until pressure spikes or BentogROUT flow stops. Then move to adjacent injection packers and continue same process. Inject BentogROUT through each Injection Packer; including adjacent packers with previous BentogROUT return flow. **Caution:** pumping material under pressure can cause lifting or movement of the structure.

After BentogROUT injection, leave the CETCO Injection Packers set in the drilled holes for a minimum 24 hours to allow BentogROUT to setup. If required, BentogROUT can be typically be injected through the same injection points again the next day. Remove the Injection Packer and plug hole with a non-shrink hydraulic cement patch product. Finish interior wall surface per project requirements.

An alternative interior injection method is to use a Single Connection Injection Head (Photo 1) with a short 8" (200 mm) heavy wall steel injection pipe for BentogROUT placement. Injection pipe tip may require a rubber gasket to provide a tight seal for pump operations.

Clean Up: Clean application tools and mixing equipment with water immediately after use. Remove any access BentogROUT from grade surface. Caution mixed BentogROUT is slippery.

Precautions: It is mandatory that the user take the following precautionary measures to protect workers and the public. Avoid inhalation of powder dust. Ensure adequate ventilation. Avoid contact with eyes. Wear protective eye wear at all times. Flush eyes with water if contact occurs. Additional precautions, safety information and first aid treatments are contained on the Material Safety Data Sheet.

Limitations: BentogROUT is not designed to bridge cracks or gaps larger than 1/8" (3 mm). Interior surface cracks greater than 1/8" (3 mm) should be surface sealed with cement based patching material to prevent grout extrusion into the structure. BentogROUT is not designed as a structural patch. BentogROUT is not recommended for above grade or applications that do not provide proper confinement. BentogROUT is not suitable for sealing expansion joints.



Mixing BentogROUT in CETCO mixer.

CETCO®

www.CETCO.com

BENTGROUT

REMEDIAL WATERPROOFING INJECTION GROUT



INTERIOR SURFACE GROUT INJECTION: BentogROUT is applied to the inside of the building without excavating the site.



INTERIOR THROUGH WALL APPLICATION: BentogROUT injected to the exterior of a manhole through pre-drilled holes using a short injection wand.



EXTERIOR MASONRY WALL APPLICATION: Inject BentogROUT along the exterior of a foundation wall at 24" (600 mm) on center intervals.



STRUCTURAL SLAB APPLICATION: Inject BentogROUT under an existing slab to provide waterproofing and fill void areas.

TECHNICAL DATA DRY MATERIAL PROPERTIES

PROPERTY	TYPICAL VALUE
Bulk Density	55 lbs/ft ³
Specific Gravity	2.5 gm/cm ³
Bonded Moisture Content	12%

TECHNICAL DATA FINAL SET MATERIAL PROPERTIES

PROPERTY	TYPICAL VALUE
Permeability (ASTM D5084)	5.2×10^{-8} cm/sec
Mud Weight	10.2 lbs/gal
Cone Penetrometer (24 hours)	44 mm
Yield per Bag	2.2 cubic ft (0.06 m ³)

SEPTEMBER 2010

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GREENSCAPES™ SINGLE SOURCE GREENROOF SOLUTIONS

GreenScapes Greenroof solutions combines the performance of proven waterproofing systems with modern greenroof technology and design. Unlike conventional earth-covered structures, CETCO's GreenScapes assemblies contribute much more to the urban landscape and can be installed on nearly any new or existing structure.

GreenScapes Greenroofs are customized to meet your building requirements. CETCO will work with you to develop a greenroof solution that is specific to you, taking into account, aesthetic, functional and structural requirements. GreenScapes offers our customers unique greenroof solutions—from the waterproofing to the plants—all from one source. Backed by the industry leading HydroShield Quality Assurance Program, GreenScapes provides you with more than a beautiful, sustainable project. You also get peace of mind knowing that your building is protected by proven technology.

ADVANTAGES:

- ▶ Waterproofing Membrane Protection
- ▶ Stormwater Retention and Management
- ▶ Reduced Energy Consumption
- ▶ Reduced Urban Heat Island Effect
- ▶ Improved Air Quality
- ▶ Improved Sound Insulation
- ▶ Aesthetics and Additional Recreational Space
- ▶ Habitat for Animals and Plants



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TECHNICAL DATA

GREENSCAPES™ GS-110

ROOT BARRIER

DESCRIPTION

GS-110 is a 10-mil (0.25 mm) thick, single ply polyethylene sheet used as a root barrier with an extensive GreenScapes Assembly. GS-110 can also be used in deeper assemblies where no woody species are to be planted. GS-110 is manufactured with polyethylene resins that provide high tensile strength, high puncture resistance, low moisture vapor permeability as well as excellent resistance to root penetration and decay.

APPLICATIONS

GS-110 is typically installed above the waterproofing protection course and below other components including insulation and drainage layers. GS-110 is primarily used in the Strataseal HR Protected Membrane Roof Assembly, Plaza Deck Assembly, Greenroof Assembly, or Landscaped Assembly as the root barrier protection layer. For applications that require a welded root barrier overlap

seam use GS-120 Root Barrier.

INSTALLATION

Install GS-110 Root Barrier over the waterproofing membrane assembly. Unroll and install GS-110 over the waterproofing protection course with minimal wrinkles and air pockets. Overlap adjacent sheet edges a minimum 12" (600 mm) and tape with CETCO Seamtape. Extend GS-110 installation up all roofing termination points and flashing to provide total root protection to all roof/ flashing surfaces that will be subsequently covered with growing media.

Cut as required to fit around all penetration and drainage details. As applicable, seal all cut edges and seal around detail with Seamtape. As GS-110 Root Barrier is installed loose-laid, temporary ballasting may be required prior to the installation of subsequent topping materials. Temporary ballast should be a material that will not

puncture the root barrier such as sand bags and milled lumber. Upon completion of the root barrier layer installation, install subsequent toppings as soon as possible within 30 days to avoid prolonged UV exposure.

PRECAUTIONS

GS-110 is not designed for extended UV exposure. GS-110 must be covered within 30 days to prevent deterioration to the sheet.

PACKAGING

GS-110 roll size is 15 feet (4.5 m) x 100' (30.5 m) - 1500 sq ft (139 sq m) per roll. Typical roll weight: 74 lbs (33.5 kg).

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
Tensile Strength	ASTM E154	10.5 N/mm
Permeance	ASTM E96B	0.036 Perms
Puncture Resistance	ASTM D1709B	2600 g

FEBRUARY 2011

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TECHNICAL DATA

GREENSCAPES™ GS-120

ROOT BARRIER

DESCRIPTION

GS-120 Root Barrier is a 20-mil (0.50 mm) thick, thermoplastic weldable root barrier liner used within waterproofing and greenroof assemblies. GS-120 is manufactured with polyester woven fabric coated with a thermoplastic coating to provide high tensile strength, high puncture resistance, low moisture vapor permeability, as well as excellent resistance to roots and decay. The overlap seams of GS-120 are typically hot air fused together to form a seamless connection to impede root penetration.

APPLICATIONS

GS-120 is typically installed above the reinforced asphalt protection (RAP) sheet course and below other components including insulation and drainage layers. GS-120 is primarily used in the Strataseal HR Protected Membrane Roof Assembly, Plaza Deck Assembly, Greenroof Assembly,

or Landscaped Assembly as the root barrier protection layer. For applications that require a welded root barrier overlap seam use GS-120 Root Barrier.

INSTALLATION

Install GS-120 Root Barrier over the waterproofing membrane assembly. Unroll and install GS-120 over the waterproofing protection course with minimal wrinkles and air pockets. Overlap adjacent sheet edges a minimum 6" (150 mm) and construct all seams with a continuous thermoplastic weld. Extend GS-120 installation up all roofing termination points and flashing to provide total root protection to all roof/ flashing surfaces that will be subsequently covered with growing media.

Cut as required to fit around all penetration and drainage details. As applicable, seal all cut edges and seal around detail with a continuous thermoplastic weld. As GS-

120 Root Barrier is installed loose-laid, temporary ballasting may be required prior to the installation of subsequent topping materials. Temporary ballast should be a material that will not puncture the root barrier such as sand bags and milled lumber. Upon completion of root barrier layer installation, install subsequent toppings as soon as possible within 30 days to prevent damage.

PACKAGING

GS-120 roll size is 61" (1.6 m) x 100' (30.5 m) - 508 sq ft (47 sq m) per roll. Typical roll weight: 65 lbs (79 kg).

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
Grab Tensile	ASTM D751 Procedure B	375/350 lb (1669/1557 N)
Strip Tensile	ASTM D751 Dielectric Weld	10 lb _f /in (9 daN/5 cm)
Hydrostatic Resistance	ASTM D751 Procedure A	500 psi (3.45 MPa)
Puncture	ASTM D4833	258 lbs (1.147 kN)

JANUARY 2011

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TECHNICAL DATA

GREENSCAPES™ GS-232

MOISTURE RETENTION MAT

DESCRIPTION

GS-232 Protection and Retention Mat is a heavy weight, non-woven geotextile composed of recycled fibers designed to retain moisture thereby helping to sustain greenroof plant life. It also serves as a protection layer against garden tools penetrating the root barrier and waterproofing layers.

APPLICATIONS

GS-232 is a storm water retention layer as well as a protection layer for the root barrier. When insulation is installed in the greenroof, an air layer (Aquadrain G20) must be added to maintain the thermal properties of the insulation.

INSTALLATION

Install GS-232 Protection and Retention Mat over the root barrier or air layer, overlapping all seams and laps a minimum of 4" (100mm). Allow GS-232 to lay flat at perimeters.

PACKAGING

GS-232 is available in rolls 12' (3.6 m) by 60' (18.3 m) 720 sq ft per roll; individually packaged in bags.

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
Weight	ASTM D5261	32 oz/yd ² (758 g/m ²)
Weight per sq. ft. dry		0.22 lbs. (99.8 g)
Water Retention Capacity		0.18 gal/ft ² (7.33 l/m ²)
Weight (Saturated) per sq. ft.		1.72 lbs (780.2 g)

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TECHNICAL DATA

GREENSCAPES™ GS-300

DRAINAGE COMPOSITE

DESCRIPTION

Greenscapes GS-300 Drainage Composite consists of a polypropylene drainage core of fused, entangled filaments and a non-woven polypropylene filter fabric bonded to the top side. The entangled filaments are molded into a square waffle pattern that maintains this flexible design. GS-300 is installed with the filter fabric side up to accept the placement of growing media. The material content of the product includes 40% post-industrial recycled polymer by weight.

APPLICATIONS

For use in:

- ▶ Greenroofs
- ▶ Exterior planters

FEATURES AND BENEFITS

- ▶ Excellent durability
- ▶ Conforms to irregular surfaces and corners
- ▶ Lays flat when unrolled – has very little to no roll memory
- ▶ Maintains continuous flow under high loads
- ▶ Long rolls reduce installation costs – fewer seams
- ▶ Recycled content contributes to LEED points
- ▶ 3-inch fabric overlap

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
Core Material		Recycled polypropylene
Thickness		0.45 in (11.43 mm)
Weight		20.5 oz./yd ² (695.2 g/m ²)
Compressive Load Test	ASTM 1621 mod. and ASTM D4716	30,000 psf (1,436 kN/m ²)

FLOW RATES

PRESSURE	1.0 GRADIENT	0.5 GRADIENT	0.2 GRADIENT
100 psf	22.5 gal/min/ft. width	15.5 gal/min/ft. width	9.2 gal/min/ft. width
250 psf	22.5 gal/min/ft width	15.5 gal/min/ft. width	9.2 gal/min/ft. width
500 psf	22.0 gal/min/ft width	15.2 gal/min/ft. width	8.7 gal/min/ft. width
1000 psf	19.0 gal/min/ft width	14.3 gal/min/ft. width	8.4 gal/min/ft. width

*Typical flow vs. pressure ASTM D 4716. Sample configuration: plate/GS-300/plate. Values are average of machine direction and cross machine direction test results

GREENSCAPES GS-300

DRAINAGE COMPOSITE

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
Polymer		Polypropylene
Fabric Color		Black
Weight	ASTM D 5261	4.5 oz/yd ² (152.6 g/m ²)
Grab Strength MD/CD	ASTM 4632	120.0 lbs (0.52 kN)
Grab Elongation	ASTM D 4632	50%
Trapezoid Tear	ASTM D 4533	50.0 lbs (0.22 kN)
Puncture Strength	ASTM D 4833	70.0 lbs (0.31 kN)
AOS (maximum average)	ASTM D4751	70 US Sieve (0.212 mm)
Flow Rate	ASTM D 4491	120 gal/min/ft ² (4,887 l/sec/m ²)
Permittivity	ASTM D 4491	1.8 sec ⁻¹
*Values are MARV Minimum Average Roll Value		

POLYMER PROPERTIES

Polypropylene has excellent resistance to organic solvents, degreasing agents, acids and alkalines. It has tensile strength superior to high density polyethylene. It has a low moisture absorption rate, is resistant to staining, and is very lightweight.

PACKAGING

PROPERTY	TYPICAL VALUE
Roll Width	39.0 in (99.1 cm)
Roll Length	100.0 ft (30.5 m)
Area	324.0 Ft ² (30.1 m ²)
Roll Diameter	27.0 in (68.5 cm)
Gross Roll Weight	55.0 lbs (24.5 kg)

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TECHNICAL DATA

GREENSCAPES™ GS-310

STORMWATER MANAGEMENT

DESCRIPTION

Aquadrain GS-310 is a stormwater retention and drainage composite product used within GreenScapes greenroof systems. GS-310 consists of a 3-dimensional polystyrene formed dimple core providing compressive strength to support subsequent layers. The formed dimple core retains stormwater but allows excessive stormwater to drain through drainage holes in the top of the drain board. Aquadrain GS-310 is preassembled with a spunbonded, filter fabric made from 100% post-consumer recycled polyester geotextile adhered to the top of the core and a black nonwoven polypropylene filter fabric adhered to the bottom of the core. The spunbonded filter fabric may vary in color from tan to black depending on the color of the recycled fibers from which it is made.

APPLICATIONS

Aquadrain GS-310 provides storm water retention and drainage for CETCO GreenScapes Greenroof Systems. Aquadrain GS-310 allows for storage of up to 0.11 gallons of stormwater per square foot promoting irrigation through the plant roots and evapotranspiration into the GS-500 Series Growing Media.

INSTALLATION

Install Aquadrain GS-310 loose laid with the woven, spunbonded filter fabric facing up to maximize storm water retention. Do not mechanically fasten. Install adjacent rows butted together with filter fabric flap overlapping adjacent drainage panel ensuring the Growing Media does not pass

through gaps between adjacent drainage panels. Cut the GS-310 composite as required to fit around all penetration and drainage details.

Minimize direct traffic on the drainage material until placement of the Growing Media to avoid shifting of the installed drainage composite. Do not drive vehicles directly on drainage composite prior to installation of the Growing Media. Repair damaged or disrupted drainage composite prior to installing of the Growing Media. Do not leave exposed for prolonged time period.

PACKAGING

Aquadrain GS-310 is available in rolls 4' (1.2 M) by 50' (15.2 M) 200 sq-ft (18.5 sq m); per roll.

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
DRAINAGE CORE PROPERTIES		
Panel Height	ASTM D1777	1" (25 mm)
Compressive Strength	ASTM D1621	9,500 psf (454 kPa)
Flow	ASTM D4716	30 gal/min/foot width (376 l/min/m)
TOP SPUNBONDED FILTER FABRIC PROPERTIES		
Weight	ASTM D3776	2.95 oz/yd ² (100 g/m ²)
Grab Tensile Strength	ASTM D4632	75 lbs. (33 kN)
Grab Elongation	ASTM D4632	40%
Trapezoidal Tear	ASTM D4533	20 lbs. (0.09kN)
BOTTOM NON-WOVEN FILTER FABRIC PROPERTIES		
Weight		4 oz/yd ² (94.8 g/m ²)
Grab Tensile Strength	ASTM D4632	100 lbs. (0.4 kN)
Puncture	ASTM D4833	65 lbs. (0.28 kN)
TOTAL COMPOSITE PROPERTIES		
Weight (Dry)		2.0 lbs/sq ft
Weight (Saturated - filled cups)		2.9 lbs/sq ft
Water Retention		0.11 gals/sq ft

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TECHNICAL DATA

GREENSCAPES™ GS-315

DRAINAGE/RETENTION PANEL

DESCRIPTION

Greenscapes GS-315 is a 1.5 inch deep 3-dimensional drainage/retention panel that retains water for plant root uptake while allowing free flow of excess water over both the top surface and underneath the panel. The GS-315 is made of high density polyethylene that is very light in weight yet strong enough to support a high overburden load. The large, open, configuration of the GS-315 makes it an ideal choice for intensive greenroof applications with high overburden loads or in extensive greenroof applications where maximum water retention is desired as part of a storm water management program.

APPLICATIONS

For use in:

- ▶ Greenroofs
- ▶ Exterior planters

FEATURES AND BENEFITS

- ▶ Excellent durability
- ▶ Large retention cups maximize storm water retention
- ▶ Flat 40 inch x 48 inch panels ship easily on a pallet and are easy to move and handle during installation.
- ▶ Maintains continuous flow under high loads
- ▶ Easy to cut to fit around penetrations, perimeters and drains
- ▶ Can be filled with lightweight aggregate (LWA) for added compressive strength when used with deeper growing media profiles

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
Material		High Density Polyethylene
Size		40 in. x 48 in (1.02 m x 1.2 m)
Packaging		4,000 sq. ft. per pallet (371.6 sq. meters/pallet)
Height		1.5 in (3.8 cm)
Weight		
Empty/dry		0.26 lbs/sq. ft (1.27 kg/sq. m)
Empty/water filled		0.91lbs/sq. ft. (4.44 kg/sq. m)
Filled with LWA/dry		Approx.0.54 lbs/sq. ft (2.63 kg/sq. m)
Filled with LWA/saturated		Approx. 2.32 lbs/sq. ft (11.33 kg/sq. m)
Water Retention		
Empty		0.078 gal/sq. ft (3.18 L/sq. m)
Filled with LWA		0.20 gal/sq. ft (8.15 L/sq. m)
Flow Rate	ASTM D-4716*	23.5 gal/min/foot width (291.6 L/m width)
Lightweight Aggregate to fill		0.047 cubic ft./sq. ft (123.6 cubic cm/sq. m)
Compressive Strength	ASTM D-1621**	864 lbs/sq. ft (4,218.4 kg/sq. m)
*Test conditions of 1000 psf pressure and 0.1 gradient		
**Filling cups with lightweight aggregate greatly increases compressive strength		

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TECHNICAL DATA

GREENSCAPES™ GS-404

FILTER FABRIC

DESCRIPTION

GS-404 Filter Fabric is a non-woven geotextile allowing drainage of stormwater from the growing media to the water management layer. In addition to retaining the fines of the growing media, it provides excellent laminar flow. GS-404 maintains separation and provides a cushioning layer between the growing media from the water management layer. The geotextile is produced from a synthetic fabric that is chemically resistant to typical acid and alkali soil conditions and will not degrade over time from nutrients that may wash through the growing media.

INSTALLATION

Place GS-404 Filter Fabric over the GS-315 Stormwater Management layer. Overlap all edges 6" with a minimum of 6' between overlaps. Keep overlaps a minimum of 6' from all perimeters. Secure filter fabric under any perimeter metal counter flashings. Cut filter fabric around any drainage openings so to not restrict the water flow to the drain. Cut filter fabric around any penetrations in such a manner as to prevent any stone ballast from entering between penetration and insulation

GS-404 is also used with metal edging to prevent growing media fines from passing through the perforations of the edging.

PACKAGING

GS-404 Filter Fabric is available in rolls of 12'-6" (3.8 m) by 360 feet (109.8 m) packaged in bags.

PHYSICAL PROPERTIES

PROPERTY	TEST STANDARD	TYPICAL VALUE
Weight	ASTM D5261	4 oz/yd ² (94.8 g/m ²)
Trapezoid Tear Strength	ASTM D4533	50 lbs (0.22 kN)
Grab Tensile Elongation	ASTM D4632	50%
Grab Tensile Strength	ASTM D4632	115 lbs (0.51 kN)
Burst Strength	ASTM D3786	210 psi (1448 Kpa)
Apparent Opening Size	ASTM D4751	70 US Sieve (0.212 mm)
Flow Rate	ASTM D4491	140 GPM/ft ² (5704 l/min/m)

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TECHNICAL DATA

GREENSCAPES™ GS-500 SERIES

GROWING MEDIA

DESCRIPTION

GS-500, GS-505 and GS-510 are light-weight engineered growing media blends for greenroofs. The GS-500 series consists of a uniform distribution of aggregate grain sizes and organic materials producing consistent color, structure and texture that allows the media to maintain specified aeration, water permeability, erosion resistance and root penetration. The GS-500 series promotes sustainability of the greenroof through it's compatibility with plant life; having the correct physical, chemical and biological properties to promote vegetative growth. GS-500 Series Growing Media provides plant roots with a stable base to anchor the plant while providing a matrix from which the

plant can obtain air, water and nutrients to support life. GS-500 Series Growing Media is available in three general media types to meet the needs of a variety of greenroof designs; GS-500 for extensive plantings, GS-510 for intensive plant types and GS-505 that is custom designed to meet a range of project-specific parameters included very low load capacities or the demands of specialized plant palettes.

INSTALLATION

Place GS-500, 505 or 510 Growing Media on top of the greenroof drainage composite filter fabric layer avoiding damage to the drainage and other materials including walls, paving, drainage and roof. Apply growing media at a

rate such that it does not exceed the project specific final grade when compacted using a 200-300 lb landscape roller or hand-held mechanical compactor achieving a 50-60% compaction as determined by ASTM D1557. For deeper intensive applications, GS-510 Growing Media should be placed in lifts not to exceed 8 inches between compaction efforts.

PACKAGING

The GS-500 Growing Media Series is shipped by the cubic yard either bulk, in 1/2 to 1 cubic foot poly bags or in 1-2 cubic yard super sacks. Contact CETCO for packaging options available in your area.

PHYSICAL PROPERTIES

SPECIFICATION	GS-500 EXTENSIVE	GS-505 CUSTOM BLEND	GS-510 INTENSIVE
Density (cubic ft. dry weight)	36-60 lbs (16.3-27.2 kg)	36-72 lbs (16.3-32.6 kg)	42-72 lbs (19.1-32.6 kg)
Density (cubic ft. max water capacity)	56-90 lbs (25.4-40.8 kg)	56-98 (25.4-44.4 kg)	62-98 lbs (28.1-44.4 kg)
Minimum Air Capacity at Saturation	≥10%	≥8%	≥8%
Maximum Water Capacity	≥30%	30->40%	≥40%
Water Permeability	5.4-16.8 in/hr	2.9-16.8 in/hr	2.9-11.3 in/hr
Total Organic Matter, By Combustion (dry weight)	3-6 mass %	3-15 mass %	5-12 mass %

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TECHNICAL DATA

GREENSCAPES™ GS-T

MODULAR GREENROOF TRAY SYSTEM

DESCRIPTION

A modular greenroof is made up of a series of trays, which hold engineered growing media and plants. The greenroof can go directly on existing roofs, assuming necessary support exists, without retrofit and the associated costs. It provides the important elements associated with greenroofs, including stormwater retention, insulation and membrane protection.

FEATURES

- ▶ Available for extensive and intensive applications
- ▶ Ideal for retrofit
- ▶ Manufactured in recycled high density polyethylene (HDPE), with 60% post-industrial recycled material
- ▶ Raised corners allow for normal water flow across the roof
- ▶ Raised drain holes (on corners) allow for 3/4" of storm water retention and water reintroduction to water cycle
- ▶ Trays manufactured in black material with UV stabilizers
- ▶ Typical saturated weight of 4" (extensive) system: 24 lbs per square foot
- ▶ Typical saturated weight of 8" (intensive) system: 50 lbs per square foot

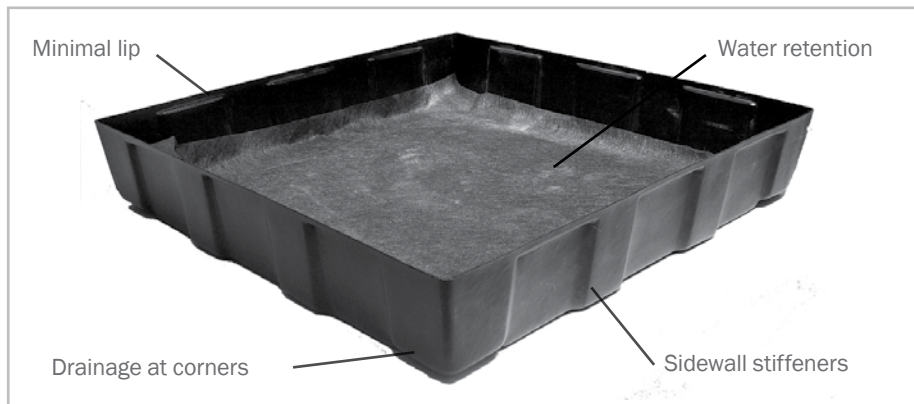
BENEFITS

- ▶ Easy roof repair & maintenance
- ▶ Quick & easy installation
- ▶ Easy green roof maintenance
- ▶ May be retrofitted to an existing roof
- ▶ Pre-engineered components mean less custom design
- ▶ Lightweight
- ▶ May be pre-planted and pre-grown - a mature roof planted without waiting

SIZES

24" x 24" x 4"

24" x 24" x 8"



A pre-planted, pre-grown tray

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TECHNICAL DATA

GREENSCAPES™ PLANT PLUG TRAYS

FOR EXTENSIVE GREENROOFS

DESCRIPTION

Greenscapes Plant Plug Trays offer a wide variety of plants suitable for growing on extensive greenroofs. Over 50 sedum varieties and more than 25 other small herbaceous perennials are available in two sizes, standard 72-cell trays and custom grown in 24-cell size. Depending on site conditions, specific selections can be made to suit light to moderate shade, high wind, particularly hot and dry environments and very cold to more moderate growing zones. Design criteria such as maximum color, season long bloom and winter interest can be achieved with the proper selection of available varieties

APPLICATIONS

- ▶ Extensive greenroofs
- ▶ Exterior planters
- ▶ Ground Cover for Intensive greenroofs

BENEFITS

- ▶ Large variety of plants to choose from
- ▶ Affordable pricing allows designers to specify generous planting densities
- ▶ Year round availability of 72-cell size for early or late season installation
 - ▶ Custom grown availability of 24-cell size (minimum 16 week lead time)
- ▶ Provides fast vegetation coverage with proper installation and care
- ▶ Robust on delivery, the well established root system will quickly root in
- ▶ Can be successfully grown in as little as 2.5 inches (63 mm) of growing media

PRE-INSTALLATION STORAGE

Plug trays should be immediately removed from shipping cartons, placed in a cool shaded outdoor area and watered daily until installed.

INSTALLATION

Tap/shake trays to loosen plugs. Dump out the plugs or gently push out from the bottom of the trays to remove. Plugs should be planted in triangular staggered rows (like a "5" on dice) at the depth of the top of the root ball in a minimum of 2.5 inches of growing media and watered thoroughly to settle. See CETCO Greenscapes Vegetation Plug Tray Care Guidelines for more detailed information.

PHYSICAL PROPERTIES

SUGGESTED PLUG SIZES	ON CENTER SPACING	SQ FT MULTIPLIER	100 SF	1,000 SF	10,000 SF	25,000 SF
72-cell	6" (152 mm)	4.619	462	4,619	46,190	115,475
72-cell	7" (177 mm)	3.394	340	3,394	33,940	84,850
72-cell	8" (203 mm)	2.598	260	2,598	25,980	64,950
72 or 24 cell	9" (228 mm)	2.053	205	2,053	20,530	51,325
24-cell	10" (279 mm)	1.663	166	1,663	16,630	41,575
24-cell	12" (304 mm)	1.155	116	1,155	11,550	28,875



72-Cell Plug

72-Cell Plugs

- ▶ 1 ½" wide x 2" deep
- ▶ Most widely used size for greenroofs
- ▶ Good year round availability
- ▶ Best combination of rooftop viability and affordable price



24-Cell Plug

24-Cell Plugs

- ▶ 2 5/8" wide x 2 1/2" deep
- ▶ Affords fast rooftop coverage
- ▶ Large plug is ideal for planting in harsh conditions
- ▶ Custom grown only (16 weeks lead time)

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TECHNICAL DATA

GREENSCAPES™ BULK SEDUM CUTTINGS FOR EXTENSIVE GREENROOFS

DESCRIPTION

Greenscapes Bulk Sedum Cuttings are ½ - 2 ½ inch long spontaneously rooting stems available in a wide variety of sedums suitable for growing on extensive greenroofs. Sedum Cuttings are a great choice for low-cost planting of extensive greenroofs, overplanting of plug installations, repair of damaged areas and filling in of sparse areas on extensive greenroofs.

APPLICATIONS

- ▶ Extensive greenroofs
- ▶ Exterior planters

BENEFITS

- ▶ Over 40 varieties to choose from
- ▶ Affordable pricing allows designers to specify generous planting densities
- ▶ Fast installation greatly reduces planting cost versus other methods
- ▶ Can be planted in mixes or by individual variety to allow design flexibility
- ▶ 3 season availability allows planting for most of the year
- ▶ Provides fast vegetation coverage with proper installation and care
- ▶ Can be successfully grown in as little as 2 1/2" (6 cm) of growing media

PRE-INSTALLATION STORAGE

Shipping boxes should be opened immediately upon arrival, stored out of the sun and planted within 24 hours. If planting

is not possible within 24 hours opened boxes can be stored in a cooler at a temperature between 40°- 45° F for up to 1 week.

INSTALLATION

Hand cast cuttings directly onto a minimum of 2 1/2" (6 cm) of freshly wetted Greenscapes GS-500 extensive growing media. Cuttings should be covered with either hydromulch, a 50/50 mixture of sand and topsoil or compost, or Greenscapes GS-612 Erosion Control Blanket for best results. See CETCO Greenscapes Vegetation Sedum Cuttings Care Guidelines for more detailed information.

AVAILABLE VARIETIES

Sedum acre 'Aurea'	Sedum kamtschaticum 'Variegatum'	Sedum spurium 'Dragon's Blood'
Sedum acre 'Gold Moss'	Sedum mexicanum	Sedum spurium 'Elizabeth'
Sedum album 'Chloroticum'	Sedum middendorffianum diffusum	Sedum spurium 'Green Mantle'
Sedum album 'Coral Carpet'	Sedum oreganum	Sedum spurium 'Fuldaglut'
Sedum album 'Green Ice'	Sedum pachyclados	Sedum spurium 'John Creech'
Sedum album 'Murale'	Sedum reflexum 'Blue Spruce'	Sedum spurium 'Red Carpet'
Sedum album 'Orange Ice'	Sedum reflexum 'Green Spruce'	Sedum spurium 'Roseum'
Sedum divergens	Sedum rupestre	Sedum spurium 'Summer Glory'
Sedum ellacombianum	Sedum rupestre 'Angelina'	Sedum spurium 'Tricolor'
Sedum floriferum	Sedum sexangulare	Sedum spurium 'Voodoo'
Sedum hispanicum 'Purple Form'	Sedum spurium sp.	Sedum stefco
Sedum hybridum 'Immergrunchen'	Sedum spurium 'Album Superbum'	Sedum takesimensis 'Golden Carpet'
Sedum hybridum 'Czar's Gold'	Sedum spurium 'Bronze Carpet'	Sedum tetractinum 'Coral Reef'
Sedum kamtschaticum	Sedum spurium 'Coccineum'	Sedum 'Weihenstephaner Gold'

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TECHNICAL DATA

GREENSCAPES™ SEDUM MAT

PREVEGETATED SEDUM CARPET

DESCRIPTION

Greenscapes Sedum Mat consists of 8-11 mixed varieties of sedums planted over a coconut coir fiber base covered with approximately one inch of growing media. The sedum mat is planted and field grown to a minimum of 85% coverage prior to being shipped. It is harvested just prior to shipping, rolled into approximately 48-inch wide by 75 inch long rolls and placed on pallets for shipping.

BENEFITS

- ▶ Provides finished vegetation coverage on day of planting
- ▶ Reduces weed competition by reducing weed seed germination
- ▶ Provides protection from wind scour of growing media
- ▶ Large rolls reduce installation costs – faster coverage
- ▶ Established root system will quickly root in and produce healthy, robust plants



25 sq ft Roll

APPLICATIONS

- ▶ Extensive greenroofs
- ▶ Well-drained landscapes
- ▶ Exterior planters

PHYSICAL PROPERTIES

PROPERTY	TYPICAL VALUE
Planted coverage When Shipped	85% Minimum
Dry Weight	3-4 lbs. per square foot
Wet Weight	5-6 lbs. per square foot
Thickness	1 – 1 ½ inches
Square Feet per Roll	25 square feet
Roll Width	48 inches (120 cm)
Roll Length	75 inches (196 cm)

SEDUM VARIETIES USED IN GREENSCAPES SEDUM MAT

VARIETIES USED IN EVERY MAT	VARIETIES USED AS ACCENTS
Sedum album 'Coral Carpet' or 'Murale'	Sedum spurium 'Tricolor'
Sedum acre 'Gold Moss'	Sedum hispanicum 'Purple Form'
Sedum sexangulare	Sedum divergens
Sedum spurium 'John Creech'	
Sedum spurium 'Red Carpet'	
Sedum spurium 'Fuldaglut'	
Sedum rupestre 'Blue Spruce'	
Sedum floriferum 'Weinestephaner Gold'	
Sedum kamtschaticum	

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TECHNICAL DATA

GREENSCAPES™ SEDUM TILE

PRE-VEGETATED SEDUM SOD

DESCRIPTION

Greenscapes Sedum Tile consists of a mixture of sedum varieties planted over a thin coconut coir fiber base covered with approximately one inch of growing media. The Sedum Tile is planted and greenhouse grown in controlled conditions resulting in a vibrant and beautiful sedum “sod” with a minimum of 95% coverage prior to being shipped. Sedum Tiles are shipped flat in either boxes or in special cardboard trays that are palletized to keep shipping costs low. Sedum Tiles are available as 4 standard types; 1) Color Max (maximum flower and

foliage color varieties), 2) All Seasons (all non-deciduous varieties), 3) Shade Mix (low light tolerant varieties), and, 4) Tuff Stuff (the most hearty varieties). Plant information for the 4 Standard Sedum Tile blends is listed on the next page. Custom Sedum variety blends also available.

APPLICATIONS

- ▶ Extensive greenroofs
- ▶ Exterior planters
- ▶ As groundcover plants on Intensive greenroofs

BENEFITS

- ▶ Provides finished vegetation coverage on day of planting
- ▶ Reduces weed competition by reducing weed seed germination
- ▶ Provides protection from wind scour of growing media
- ▶ Ships flat to arrive in optimal condition
- ▶ Easy to handle 15 in. x 20 in. size makes installation very efficient
- ▶ Established root system will quickly root in and produce healthy, robust plants
- ▶ Can be successfully grown over as little as 2 inches (5 cm) of growing media

PHYSICAL PROPERTIES

PROPERTY	TYPICAL VALUE
Planted Coverage When Shipped	95% Minimum
Dry Weight	2-3 lbs. per square foot
Saturated Weight	4-5 lbs. per square foot
Thickness – fiber/soil base	1 inch (2.5 cm)
Thickness – total with vegetation	2-3 inches (5.0 - 7.5 cm)
Size	15 in. x 20 in. (3.8 – 7.6 cm)
Coverage Area per Tile	2.08 sq. ft.(0.23 sq. meters)
Minimum growing media substrate required	2.0 inches (5.0 m)

COLOR MAX TILES (EACH TILE INCLUDES 6-8 OF LISTED VARIETIES)

PLANT NAME	FLOWERING TIME	FLOWER COLOR	WINTER INTEREST	GROWING ZONES
Sedum acre ‘Aurea’	Late Spring	Yellow	Yes	4 - 7
Sedum album ‘Coral Carpet’	Mid Summer	White	Yes	4 - 8
Sedum album ‘Orange Ice’	Mid Summer	White	Yes	4 - 8
Sedum floriferum ‘Weihenstephaner Gold’	Late Spring	Gold	Yes	3 - 7
Sedum kamtschaticum ‘Variegatum’	Mid Summer	Yellow	No	4 - 7
Sedum reflexum ‘Blue Spruce’	Late Spring	Yellow	Yes	5 - 7
Sedum rupestre ‘Angelina’	Mid Summer	Yellow	Yes	4 - 7
Sedum spurium ‘Green Mantle’	Early Summer	Yellow	Yes	3 - 7
Sedum spurium ‘John Creech’	Mid Summer	Pink	Yes	3 - 8
Sedum spurium ‘Red Carpet’	Mid Summer	Red	Yes	3 - 7
Sedum spurium ‘Summer Glory’	Mid Summer	Pink	Yes	4 - 7
Sedum spurium ‘Tricolor’	Early Summer	Pink	Yes	4 - 7

ALL SEASONS BLEND (EACH TILE INCLUDES 6-8 OF LISTED VARIETIES)

PLANT NAME	FLOWERING TIME	FLOWER COLOR	WINTER INTEREST	GROWING ZONES
Sedum album 'Coral Carpet'	Mid Summer	White	Yes	4 - 8
Sedum hybridum 'Immergrunchen'	Summer - Fall	Yellow	Yes	4 - 7
Sedum floriferum 'Weihenstephaner Gold'	Late Spring	Gold	Yes	3 - 7
Sedum middendorffianum diffusum	Mid Summer	Yellow	Yes	5 - 8
Sedum reflexum 'Green Spruce'	Early Summer	Yellow	Yes	4 - 7
Sedum spurium 'Coccineum'	Mid Summer	Red	Yes	3 - 7
Sedum spurium 'Fuldaglut'	Early Summer	Red	Yes	5 - 8
Sedum spurium 'John Creech'	Mid Summer	Pink	Yes	3 - 8
Sedum spurium 'Red Carpet'	Mid Summer	Red	Yes	3 - 7
Sedum spurium 'Roseum'	Early Summer	Rose Pink	Yes	4 - 7
Sedum stefco	Mid Summer	White	Yes	5 - 8
Sedum takesimensis 'Golden Carpet'	Mid Summer	Yellow	Yes	4 - 8
Sedum tetractinum 'Coral Reef'	Late Spring	Yellow	Yes	6 - 9

SHADE MIX (EACH TILE INCLUDES 6-8 OF LISTED VARIETIES)

PLANT NAME	FLOWERING TIME	FLOWER COLOR	WINTER INTEREST	GROWING ZONES
Sedum acre 'Aurea'	Late Spring	Yellow	Yes	4 - 7
Sedum hybridum 'Immergrunchen'	Summer - Fall	Yellow	Yes	4 - 7
Sedum pachyclados	Mid Summer	White	Yes	4 - 7
Sedum sexangulare	Mid Summer	Yellow	Yes	4 - 7
Sedum spurium 'Album Superbum'	Mid Summer	White	Yes	5 - 8
Sedum spurium 'Eco Mt. Emei'	Early Summer	Yellow	Yes	4 - 7
Sedum spurium 'Fuldaglut'	Early Summer	Red	Yes	5 - 8
Sedum spurium 'Green Mantle'	Early Summer	Yellow	Yes	3 - 7
Sedum spurium 'John Creech'	Mid Summer	Pink	Yes	3 - 8
Sedum ternatum	Early Summer	White	Yes	4 - 7

TUFF STUFF (EACH TILE INCLUDES 6-8 OF LISTED VARIETIES)

PLANT NAME	FLOWERING TIME	FLOWER COLOR	WINTER INTEREST	GROWING ZONES
Sedum album 'Coral Carpet'	Mid Summer	White	Yes	4 - 8
Sedum caucicolum	Mid Summer	Pink	No	3 - 7
Sedum ellacombianum	Early Summer	Yellow	No	3 - 7
Sedum hybridum 'Czar's Gold'	Mid Summer	Gold	Yes	4 - 7
Sedum kamtschaticum	Early Summer	Yellow	Yes	4 - 7
Sedum middendorffianum diffusum	Mid Summer	Yellow	Yes	5 - 8
Sedum rupestre	Mid Summer	Yellow	Yes	4 - 7
Sedum sexangulare	Mid Summer	Yellow	Yes	4 - 7
Sedum spurium sp.	Mid Summer	Pink	Yes	4 - 7
Sedum spurium 'Roseum'	Early Summer	Pink	Yes	4 - 7
Sedum spurium 'Voodoo'	Summer - Fall	Rose	Yes	4 - 8
Sedum stefco	Late Summer	White	Yes	5 - 8

FEBRUARY 2011

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STRATASEAL® HR

HOT-APPLIED RUBBERIZED ASPHALT WATERPROOFING

Strataseal HR is a hot-applied rubberized asphalt membrane ideal for roofing and plaza deck waterproofing applications. It combines decades of membrane polymer experience and advanced mineral enhancement technology into a 100% solids membrane product that is durable and reliable.

Strataseal HR is a tough, seamless membrane that eliminates the inconvenience and inaccuracy of mixing or curing associated with two-component products. With advanced adhesion properties, it confines water migration to the damaged area; adheres to and fills most surface irregularities; can be installed in temperatures as low as 0°F. Once applied, is also backed by the industry-leading HydroShield Quality Assurance Program.

APPLICATIONS:

Strataseal HR can be installed as a component of:

- ▶ Protected Membrane Roof
- ▶ Plaza Deck
- ▶ Asphalt Parking Decks
- ▶ Split-Slab Construction
- ▶ Tunnel Roofs
- ▶ Greenroofs
- ▶ Planters
- ▶ Earth Covered Structures



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TECHNICAL DATA

STRATASEAL® HR

HOT-APPLIED RUBBERIZED ASPHALT WATERPROOFING

DESCRIPTION

StrataSeal HR is a single component, 100% solid, hot-applied rubberized asphalt membrane used for waterproofing and protected roof applications. StrataSeal HR reinforced assembly is a tough, flexible waterproofing membrane that incorporates a reinforcing fabric for enhanced durability and physical properties. The reinforcing fabric is applied over the 90-mil (2.3 mm) thick base layer of rubberized asphalt while the membrane is still warm and tacky. Then a second 125 mil (3.2 mm) thick layer of rubberized asphalt fully encapsulates the reinforcing fabric for a total system thickness of 215 mils (5.5 mm). Depending on the application and project design perimeters, subsequent protection, drainage, insulation and wear course materials are installed over the waterproofing membrane. StrataSeal HR is applied as a thick, joint-free membrane that adheres tenaciously to virtually any sound surface which allows for a wide variety of job site conditions. The fast set up time speeds the completion of the waterproofing and allows the project to proceed on schedule. StrataSeal HR is installed in a hot fluid state with excellent flow characteristics to contour the substrate and completely fill around mechanical and drainage penetrations. It sets to form a thick, monolithic barrier fully adhered to the concrete thus protecting the structure from water ingress.

APPLICATIONS

StrataSeal HR is ideal for new construction and remedial waterproofing and roofing applications. The membrane can be applied to horizontal and vertical concrete surfaces and is designed for use on splitslab plaza decks, paved plaza decks, parking garages, bridge decks, foundation walls, tunnels, planters, earth covered structures and roof decks using a protected membrane system or green roof system. StrataSeal HR can be applied at below freezing temperatures to substrates without ice or frost.

StrataSeal HR is not recommended for use as an exposed membrane or wearing course surface. Nor is it recommended for use with lightweight insulating or cellular concrete.

INSTALLATION

Substrate Preparation: Structural weight concrete shall be water cured and in place preferably for 28 days, minimum 14 days. Lightweight structural concrete shall be water cured and in place preferably for 60 days, minimum 28 days. Venting metal deck form pan is recommended to facilitate drying.

Concrete to receive membrane shall be sound, dry, clean and free of dirt, laitance, oil, grease, wax, tar, asphalt, paint, curing agents, and other contaminants which may interfere with the adhesion of the membrane. Concrete surface shall be light broom or board float textured finish. A steel float finish surface will provide too smooth a surface for proper adhesion, and therefore must be sandblasted to roughen surface.

Remove fins, ridges, or other projections to provide a level surface. Fill holes, honeycombs, rock pockets, spalls or other voids and depressions with approved cementitious patching compound.

Precast concrete decks must be mechanically secured to minimize movement and all joints must be grouted. Contact CETCO for guidelines on substrates and conditions not covered herein.

Details and Flashings: Prepare concrete cold joints, concrete cracks, deck transitions, penetrations and expansion joints in accordance with manufacturer's current details and recommendations. Prime all substrate surfaces prior to performing detailing work as stated below:

NON-MOVING CRACKS AND JOINTS: Cracks up to 1/16" (1.6 mm) require no special treatment. Reinforce all cracks and joints

1/16" (1.6 mm) to 3/16" (4.8 mm) in a minimum 6" (150 mm) wide strip of Stratabond 100 fabric reinforcement embedded in 90 mil (2.3 mm) thick by 9" (225 mm) wide tack coat of StrataSeal HR. Reinforce all cracks and joints 3/16" (4.8 mm) to 1/2" (12 mm) in width with minimum 6" (150 mm) wide strip of N-Flash embedded in 90 mil (2.3 mm) thick by 9" (225 mm) wide tack coat of StrataSeal HR. Embed the reinforcing while the tack coat is still warm and tacky. Overlap reinforcing strip ends a minimum of 2" (50 mm), ensuring lap receives rubberized asphalt.

PRECAST DECK JOINTS: Reinforce all non-moving, grouted precast joints with a minimum 6" (150 mm) wide strip of N-Flash embedded in 90 mil (2.3 mm) thick by 9" (225 mm) wide tack coat of StrataSeal HR. Embed the reinforcing while the tack coat is still warm and tacky. Overlap reinforcing strip ends a minimum of 2" (50 mm), ensuring lap receives rubberized asphalt.

EXPANSION JOINTS: Expansion joints shall be sealed with proper expansion joint material, as approved by the project engineer, compatible with hot rubberized asphalt waterproofing membrane. Contact membrane manufacturer for expansion joint detailing illustrations to address specific project conditions.



215-mil Thick reinforced membrane

STRATASEAL HR

HOT-APPLIED RUBBERIZED ASPHALT WATERPROOFING

DECK TO WALL TRANSITIONS: Apply StrataSeal HR membrane up face of wall per project requirements and extend onto horizontal deck; with Stratabond 100 reinforcing fabric terminating a minimum of 1" (25 mm) prior to membrane termination at deck corner. For deck transition incorporating N-Flash, refer to manufacturer's current N-Flash details.

DECK DRAINS: Apply 125 mil (2.3 mm) thick, 12" (300 mm) minimum ring of membrane around all deck drains. Place flashing sheet over coated drain flange extending a minimum of 6" (150 mm) around the flange. Apply a second coat of membrane over flashing sheet. Apply clamping ring.

Primer: Apply Strataprime SB evenly with handheld sprayer at a rate of 300-500 ft² per gallon (28-46 m² per 3.8 l) to all surfaces to receive StrataSeal HR. Primed concrete surface will look discolored, but not black. Allow primer to dry prior to installing the membrane. Install membrane same day as primer.

Membrane Heating: Heating of StrataSeal HR is accomplished utilizing a double jacketed, oil bath tank or air jacketed kettle with mechanical agitation designed for hot-rubberized asphalt membrane. Heat membrane until membrane can be drawn free flowing and lump free at a temperature range of 325°F to 340°F (163°C to 171°C). Place the membrane block, including the polyethylene wrap, in the kettle. Caution: Do not exceed maximum safe operating temperature of 375°F (190°C).

Membrane Installation: Apply the first layer of StrataSeal HR at a minimum of 90 mils (2.3 mm) thickness to the entire area to be waterproofed, including all previously applied detailing. (The most popular method of membrane application is with a squeegee.) While the first layer is still warm and tacky, firmly press a layer of the reinforcement fabric into the surface of the membrane, overlapping fabric edges slightly - minimum 1/2" (12 mm) to 1" (25 mm). Then apply a second layer of StrataSeal HR over the reinforcing fabric at a minimum thickness of 125 mils (3.2 mm) for a total minimum membrane thickness of 215 mils (5.5 mm). Ensure reinforcing fabric is completely covered by the

top membrane layer and that a layer of membrane is placed between the fabric overlaps by utilizing the "push-pull" squeegee method against the fabric overlaps.

For prolonged or daily membrane stops, lightly wipe all previously applied material edges a minimum of 6" (150 mm) wide with mineral spirits or a citrus acid based solvent to remove any accumulated dirt and dust. The new work shall overlap previous work a minimum of 6" (150 mm).

Protection Layer: While the top coat of StrataSeal HR is still warm and tacky, embed the specified protection/separation sheet into the membrane ensuring a good bond. Overlap the seams of the protection layer and seal with StrataSeal HR hot applied rubberized asphalt in the seams and laps. Refer to specific protection layer Tech Data Sheet for detailed instructions.

Flood Test: Verify that the structure can withstand the deadload weight of the water prior to commencement of the flood test. If not, then confer with CETCO for alternate testing procedures. Allow StrataSeal HR to cool minimum 24 hours prior to performing flood test. Plug all drains and provide barriers necessary to contain water. Allow for any overflow to protect the building in the event of rain. Pond water to a depth of 2" (50 mm) for a period of 48 hours. Inspect for leaks and repair membrane if leaks are found. Repeat water test process after making repairs. For HydroShield warranty coverage, flood test shall be witnessed and documented by independent inspector.

180 Mil Thick Reinforced Membrane: For less demanding applications, StrataSeal HR can be applied at 180 mils (4.6 mm) thick or per project specifications.

FINISHED ASSEMBLY

Various cover assemblies installed over StrataSeal HR are completed according to project design and specifications. Typical project assembly designs are concrete and paver plaza decks, asphalt paving deck, bridge deck, and roofing surfaces for protected roof and greenroof systems.

PACKAGING

StrataSeal HR is packaged in 30-lbs. (13.6 kg) per box with the rubberized asphalt wrapped in a polyethylene film liner.

COVERAGE

Following is a guide to estimate the amount of StrataSeal HR required for various membrane thicknesses. Actual results will vary with substrate conditions and installation techniques.

- ▶ 215 mils thick = 1.35 lbs/ft²
(5.6 mm thick = 5.5 kg/sq m)
- ▶ 180 mils thick = 1.13 lbs/ft²
(5.6 mm thick = 5.5 kg/sq m)
- ▶ 90 mils thick = 0.56 lbs/ft²
(5.6 mm thick = 5.5 kg/sq m)

ACCESSORY PRODUCTS

Aquadrain: prefabricated drainage composites.

BB-200: 8-ft wide rolls of heavy spun bonded polyester filter fabric for filter and ballast layer over insulation course.

N-Flash: 60-mils thick uncured, nonstaining neoprene flashing. Also available: Bonding Adhesive, lap splicing cement and lap sealant N-Flash is available in widths of 6", 12" and 36"; all 100 feet in length.

RAP 200: 90-mils reinforced rubberized asphalt protection sheet with both sides sanded.

Stratabond 100 - 1.5 oz/sq yd spun bonded polyester high-strength reinforcing fabric in 48" width.

Strataprime SB: solvent-based asphalt emulsion primer to condition substrate for membrane and flashings.

Strataprime WB: water-based asphalt emulsion primer to condition substrate for membrane and flashings. XPS40 - 40psi rigid, extruded insulation board. Board size 2' (0.6 m) x 8' (2.4 m). Thicknesses: 1", 1.5", 2" and 3".

XPS60: 60 psi rigid, extruded insulation board. Board size 2' (0.6 m) x 8' (2.4 m). Thicknesses: 2" and 3".

XPS100: 100 psi rigid, extruded insulation board. Board size 2' (0.6 m) x 8' (2.4 m). Thickness: 2".

LIMITATIONS

StrataSeal HR is designed for subsurface waterproofing and roofing applications and should only be used in applications where it is protected from permanent UV exposure and traffic. Protection layer must be installed immediately after membrane. Do not allow construction traffic on unprotected membrane. Repair any membrane damage immediately.

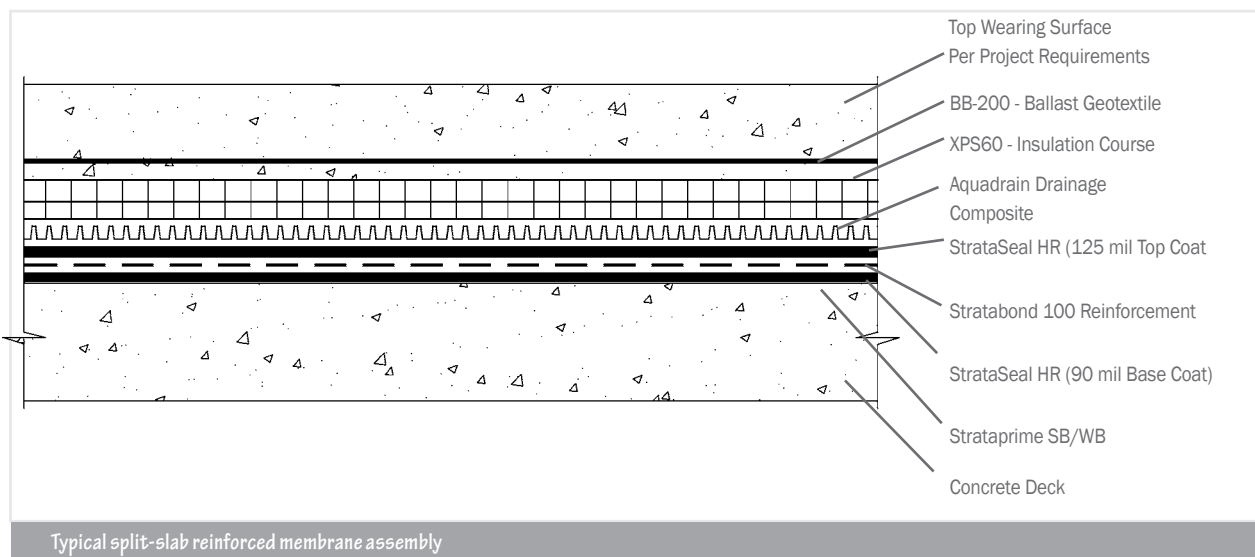
Horizontal surfaces should be sloped to provide positive drainage to deck edge or interior drains. All surfaces and detailing must be prepared in accordance with manufacturer's recommendations and adjacent areas protected. StrataSeal HR should not be applied to surfaces with frost or ice, or at ambient air temperatures that are below 0°F (-18°C).

Protection course, drainage systems, insulation or other courses should not penetrate the membrane. Mechanical fastening of subsequent layers with termination bars installed to adjacent approved surfaces may be utilized per manufacturer's standard detail drawings. The use of solvent based products over StrataSeal HR is not recommended. Protective clothing should be worn during application, including a mist respirator and full coverage eyewear. Install StrataSeal HR only in well ventilated areas. If working in tented installations, a protective air respirator is required. Avoid prolonged exposure to product and product vapor. CETCO recommends that StrataSeal HR should not be installed above applicator's chest height. Refer to MSDS for first aid and emergency information.

StrataSeal HR is not intended as a filler for asphalt concrete repair. Refer to manufacturer's standard detail drawings for joint treatment and crack treatment using appropriate standard detail drawings. StrataSeal HR is not recommended for use on lightweight insulating or cellular concrete. Contact CETCO for usage of StrataSeal HR on retrofit applications.

Refer to standard detail drawings for specific application installations. Any deviation from standard detail drawings must be approved by CETCO prior to installation. Failure to do so may void warranty.

Warranty: Prior to material specification and application, contact CETCO for terms and conditions required for issuance of material or HydroShield warranty.



STRATASEAL HR

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TECHNICAL DATA		
PROPERTY	TEST METHOD	TYPICAL VALUE
Solid Content	n/a	100%
Flow	CGSB 37.50 - M89	Max 3 mm @ 140°F
Penetration (1/10th mm)	CGSB 37.50-M89	Max 77°F = 110 Max 122°F = 200
Flash Point	CGSB 37.50-M89	Min 77°F above maximum application temperature
Water Vapor Permeance	CGSB 37.50-M89	Max 1.7 ng/Pa.s.m ²
Toughness	CGSB 37.50-M89	Min 5.5 Joules
Ration of Toughness: Peak Load	CGSB 37.50-M89	Min 0.040
Adhesion	CGSB 37.50-M89	Min 1.0
Viscosity	CGSB 37.50-M89	Max 15
Water Absorption	CGSB 37.50-M89	Min 0.18
Low Temperature Flexibility	CGSB 37.50-M89	No cracking, delamination or adhesion loss
Heat Stability in viscosity, penetration, flow or low temp flexibility after aging	CGSB 37.50-M89	No change

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