

# 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 25 mm (1") with non-shrink grout or compacted soil. Aquadrain drainage composite can be installed over lagging gaps up to 63 mm (2-1/2") to provide a uniform surface to mount the ULTRASEAL BT. Gaps larger than 63 mm (2-1/2") 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 100 mm (4") thick or greater on a compacted earth/gravel substrate. A minimum 150 mm (6") 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 100 mm (4") and stagger sheet ends a minimum 300 mm (12"). 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 18 mm (3/4") 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 50 mm (2"). For hydrostatic conditions, ULTRASEAL SP should be installed under grade beams and footings. Extend ULTRASEAL SP onto footing a minimum 150 mm (6") 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 300 mm (12").

### 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 honeycomb-

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ing or voids should be filled with cementitious grout or Bentoseal. Protrusions of over 6 mm (1/4") 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 150 mm (6") 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 600 mm (24") 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 50 mm (2") and should extend onto the footing a minimum 150 mm (6"). At vertical inside corners apply a continuous 18 mm (3/4") fillet of Bentoseal directly in the corner prior to installing membrane. Stagger all vertical overlap joints minimum 300 mm (12"). When hydrostatic conditions exist, the vertical wall ULTRASEAL BT should cover the entire footing and overlap the underslab waterproofing a minimum 150 mm (6"). 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 18 mm (3/4") 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 38 mm (1-1/2"). In areas where multiple penetrations

are close together, it may be impractical to cut ULTRASEAL BT to fit around each penetration. Therefore, apply a 18 mm (3/4") thick fillet of Bentoseal around base of each penetration and cover the entire area between the penetrations. Extend Bentoseal 38 mm (1-1/2") onto the penetrations.

**Grade Termination:** Terminate ULTRASEAL BT membrane 300 mm (12") below finished grade elevation with washer-head fasteners maximum 300 mm (12") on center. Install GF-40SA flashing to primed concrete substrate with bottom edge overlapping top edge of ULTRASEAL BT membrane minimum 100 mm (4"). Overlap all roll ends a minimum 100 mm (4") 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 300 mm (12") 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 (18 mm (3/4") or less) free of debris, sharp objects, and stones larger than 18 mm (3/4").

**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 25 mm (1") with non-shrink grout or compacted soil. AQUADRAIN® drainage composite can be installed over lagging gaps up to 63 mm (2-1/2") to provide a uniform surface to mount the ULTRASEAL BT. Gaps larger than 63 mm (2-1/2") 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 300 mm (12") and the top edge of the sheet extending a minimum 300 mm (12") above the finished slab elevation. Secure ULTRASEAL BT sheet to shoring wall with washer-head fasteners maximum 600 mm (24") on center. Overlap edges of ULTRASEAL BT sheets a minimum 100 mm (4"). If the slab thickness is greater than 600 mm (24"), install a second full sheet or cut strip of ULTRASEAL BT on the shoring wall to meet the 300 mm (12") requirement above of the top slab elevation. Overlap top edge of previous sheet and edges of adjacent sheets a minimum 100 mm (4").

**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 600 mm (24") 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 100

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mm (4") and staggering all sheet roll ends of adjacent courses a minimum 300 mm (12"). Do not allow ULTRASEAL BT overlap joints to run at same elevation as the concrete pour lift joints; extend membrane past a minimum 150 mm (6").

Prior to installing ULTRASEAL BT at grade, install 12 mm (1/2") 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.

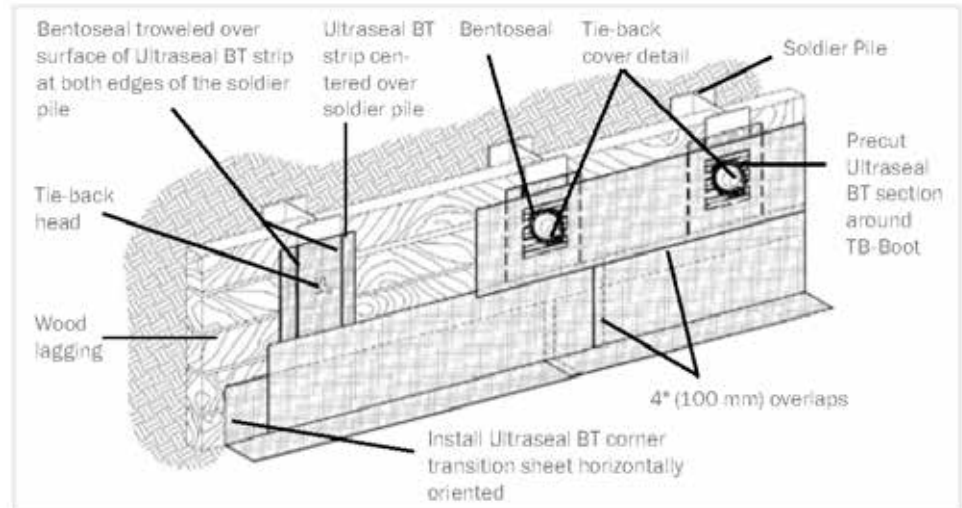
**Tie-Back Covers:** For all tie-back heads and soil nails, install ULTRASEAL system with applicable size TB-Boot cover for specific project condition(s). For irregular shoring wall conditions at tie-backs or oversize tie-back heads consult CETCO for alternate detail for specific project condition(s).

**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 150 mm (6") to both sides of the piling. Apply Bentoseal 6 mm x 50 mm (1/4" x 2") 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 300 mm (12") on center. Install GF-40SA flashing to primed concrete substrate with bottom edge overlapping top edge of ULTRASEAL BT membrane minimum 100 mm (4"). Overlap all roll ends a minimum 100 mm (4") 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 300 mm (12") on center. Complete grade termination detail with tooled bead of CETSEAL along the top



Property Line Soldier Pile & Lagging Wall Detail

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 19mm (3/4").

### SIZE AND PACKAGING

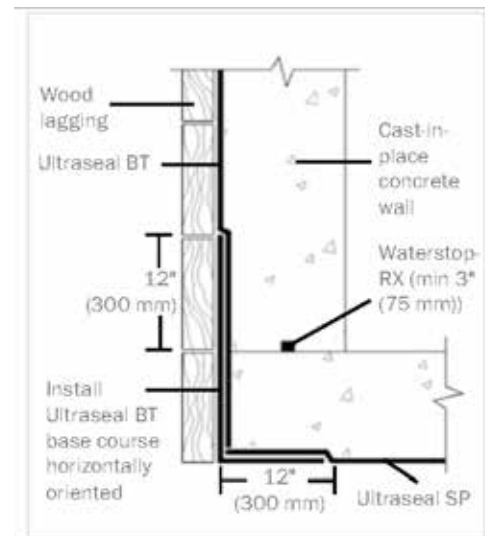
ULTRASEAL SP and BT are both available in 1.2 x 7.6 m (4-ft x 25-ft) rolls. Both are packaged 25 rolls per pallet (232 sq. m. (2,500 sq. ft.)).

### 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



Property Line Transition Detail

installation guidelines and details. Primary accessory products include BENTOSEAL, HYDROBAR TUBES, WATERSTOPPAGE, TB-BOOT, CETSEAL, SEAMTAPE, and GF-40SA grade flashing.

### 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

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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, alkalis, 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 100 mm (4") thick or greater on a compacted earth/gravel substrate.

ULTRASEAL SP requires a minimum 150 mm (6") 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 1.5 mm (1/16").

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
<b>ULTRASEAL BT</b>		
Hydrostatic Pressure Resistance	ASTM D 5385 (mod.)	231 ft. (70 m)
Permeability	ASTM D 5084	<1 x 10 <sup>-11</sup> 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
<b>ULTRASEAL SP</b>		
Hydrostatic Pressure Resistance	ASTM D 5385 (mod.)	231 ft. (70 m)
Permeability	ASTM D 5084	<1 x 10 <sup>-11</sup> 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

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UPDATED: JUNE 2015

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