

GREENSTREAK®

The Recognized Leader for **WATERSTOPS FOR CONCRETE**



Concrete structures are only as watertight as the waterstops that join them. Greenstreak waterstops stop leaks before they start... in the joints of concrete structures.

Since 1950, Greenstreak has served the general and architectural concrete construction industry. Innovation, engineering and quality craftsmanship are combined to produce products of choice for the industry's owners, designers and contractors.

Greenstreak maintains its position of industry leadership by responding to the unique needs of our customers. Greenstreak's dedicated technical and customer service staffs are active participants in the concrete industry to take advantage of the latest technological advances, communicate with our market and analyze trends.

Centrally located, Greenstreak products are readily available through a dedicated network of Concrete Forming and Accessory Distributors both nationally and internationally.

Typical Structures Requiring Waterstops Include:

- ◆ Dams, locks, canals, water reservoirs and aqueducts
- ◆ Water and waste water treatment facilities
- ◆ Primary and secondary containment structures
- ◆ Culverts and tunnels
- ◆ Storage Tanks
- ◆ Retaining walls
- ◆ Bridge and deck abutments
- ◆ Foundations
- ◆ Slabs-on-grade
- ◆ Parking garages

Water Treatment Plant



Flood Wall

Lock and Dam



GREENSTREAK GROUP, INC.
A Family of Construction Companies

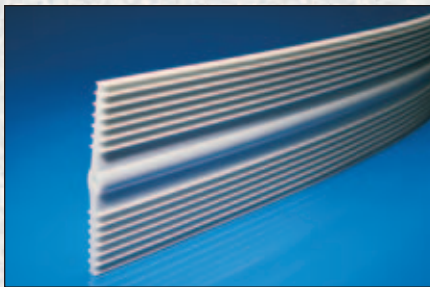
3400 Tree Court Industrial Boulevard, St. Louis, Missouri 63122
Phone: 800-325-9504 or 636-225-9400
Fax: 800-551-5145 or 636-225-2049
Greenstreak.com

WATERSTOP BASIC USE

Embedded in concrete, across and/or along the joint, waterstops form a watertight diaphragm that prevents the passage of fluid through the joint.

SUGGESTED WATERSTOP DESIGN CHECKLIST

- ◆ Determine structure type
- ◆ Verify chemical containment requirements (if any)
- ◆ Verify hydrostatic head pressure requirements
- ◆ Determine joint type and joint movement requirements
- ◆ Verify joinery details of dissimilar or non-symmetrical waterstop profiles (consider using one profile throughout to simplify intersections)
- ◆ Specify ribbed profile for best water sealing performance
- ◆ Specify type and size (by product number, if possible)
- ◆ Specify factory fabrications of intersections and heat welded field butt joints
- ◆ Specify method for securing waterstop in position (hog rings, grommets, etc.)



PVC WATERSTOP

- ◆ The industry standard
- ◆ Broadest design selection
- ◆ Formulated and compounded by Greenstreak
- ◆ Manufactured by Greenstreak from only prime resins and all virgin raw materials
- ◆ Great inherent elasticity
- ◆ Resistant to many waterborne chemicals
- ◆ Heat weldable
- ◆ Will not discolor concrete or produce electrolytic action
- ◆ Suitable for above or below grade applications

Physical properties

All Greenstreak PVC waterstops are specially formulated and manufactured to meet or exceed the industry's standard specifications.

Greenstreak PVC Waterstop Physical Properties		
PROPERTY	TEST *ASTM	NOMINAL VALUE
Water absorption	*D570	0.02
Tear resistance	*D624	225 lb./in.
Ultimate Elongation	*D638	360%
Tensile strength	*D638	2000 psi min.
Low temperature brittleness	*D746	Passed @ -35°F / -37°C
Stiffness in flexure	*D747	700 psi
Specific gravity	*D792	1.40
Hardness Shore A15	*D2240	79±3
Accelerated extraction	CRD-C 572	
• Tensile strength		1850 psi
• Elongation		350%
Effect of Alkali		
• weight change		+0.10%
• hardness change		+1 point

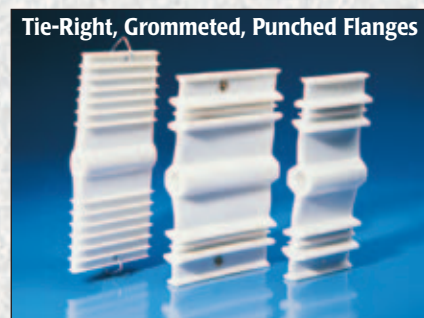
Note: Greenstreak conducts regular testing of materials. Refer to Suggested Master Specification for current values.

Independent laboratory tests are available for the following applicable standards:

- ◆ Corps of Engineers CRD-C572-74
- ◆ Bureau of Reclamation C902
- ◆ CH2M Hill
- ◆ Montgomery Watson, Inc.
- ◆ Various State Highway and/or Public Works Department Standards

Installation aids for PVC waterstops

Greenstreak offers various features to economically assist and promote proper installation of PVC waterstops. Waterstops must be securely positioned in the forms to prevent deflection or misalignment during concrete placement. This is achieved by tethering the outer flanges of the waterstop to the adjacent reinforcing steel.



The following features are offered to assist this method of installation:

- ◆ Tie-Right - most PVC shapes are available with factory applied hog rings
- ◆ Punched Flanges - most ribbed shapes are available with punched flanges
- ◆ Grommets - selected shapes are available with brass grommets



PVC Waterstop fabrications

PVC waterstop splices, directional changes and intersections are critical components of a quality installation. Specifications requiring factory made fabrications are strongly recommended. Greenstreak can provide homogeneous directional changes and intersections, leaving only the less difficult straight splices to be welded in the field.



SBR AND NEOPRENE RUBBER WATERSTOPS

Greenstreak offers SBR and Neoprene waterstops for applications requiring the physical properties of rubber. These waterstops are manufactured to meet the Corps of Engineers and The Bureau of Reclamation's specifications for rubber waterstops.

**Greenstreak Rubber Waterstop
Physical Properties**

Property	*ASTM Test Method	Styrene Butadiene (SBR)	High Tensile Neoprene**
Tensile Strength (PSI min)	*D412	2,500	2,500
Tensile Strength @ 300% Modulus (PSI min)	*D412	1,150	1,150
Ultimate Elongation, (% min)	*D412	450	450
Durometer, Shore A (+/- 5)	*D2240	65	65
Water Absorption, 7 Days at 70°C % Weight Change (% max)	CRD C575	5	15
Compression Set, 22 hr. @ 70°C % of Original Deflection (max)	*D395 (Method B)	30	30
Accelerated Aging, 96 hrs. @ 70°C % of Tensile Strength before aging (min) % of Elongation before aging (min)	*D572	80	80
		80	80
Ozone Resistance, 7 Days at 50PPHM @ 38°C, 20% Elong.	*D1149	No Cracks	No Cracks

**Provides maximum resistance to ozone, sewage, oil and solvents



Rubber Fittings

Splices, directional changes and intersections are achieved with premolded unions, fittings and a rubber adhesive kit.



See Hydrotite Catalog

HYDROTITE®

Hydrotite is a world renowned hydrophilic waterstop. Composed of modified chloroprene rubber, Hydrotite expands up to 8 times its original volume when exposed to water. This expansion creates an effective compression seal within joints of limited movement.

Hydrotite is used extensively in sealing concrete construction and control joints, pipe penetrations, precast concrete segments, tunnel lining segments and for repair of existing joints. Hydrotite features include:

- ◆ Volumetric expansion up to 8:1
- ◆ Durable chloroprene rubber composition
- ◆ Delay coating to protect fresh concrete
- ◆ Composite profiles; controls direction of expansion
- ◆ Eliminates special form work
- ◆ Installs quickly
- ◆ Easy to splice



See Hydrotite Catalog

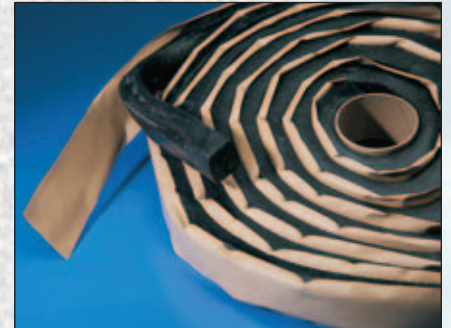
LEAKMASTER®

Leakmaster is a single component hydrophilic urethane sealant/adhesive. Expansion ratio of 2:1 makes Leakmaster a natural choice in sealing irregular joints and penetrations; as well as an aid in the installation of Hydrotite profiles.

SWELLSTOP™ WATERSTOP

A flexible butyl rubber and swellable clay waterproofing compound that swells upon contact with water to form a long lasting compression seal in non-moving concrete joints.

Swellstop requires a 2" minimum clear coverage from the face of the concrete.



Applications include:

- ◆ Foundation walls and slabs
- ◆ Slabs-on-grade
- ◆ Precast wall panels
- ◆ Manholes
- ◆ Pipe connections
- ◆ Box culverts
- ◆ Utility and burial vaults
- ◆ Wet wells
- ◆ Portable water tanks

LOCKSTOP™ WATERSTOP

Similar in appearance to Swellstop, but different in nature. Lockstop is a single-component self-sealing mastic waterstop which prevents moisture from penetrating non-moving concrete joints.

Typical construction joint applications include:

- ◆ Foundation walls and slabs
- ◆ Slabs-on-grade
- ◆ Manholes
- ◆ Pipe connections
- ◆ Retaining walls
- ◆ Tunnels
- ◆ Culvert
- ◆ Storage tanks

Note: Swellstop and Lockstop are for **non-working** joints only.

TYPES OF CONCRETE JOINTS

Contraction (Control) Joint

Contraction joints are designed planes of weakness to control the location of cracks due to shrinkage of concrete.

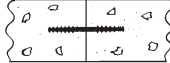
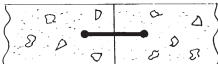

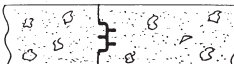
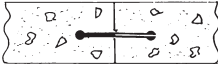
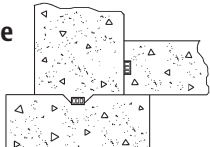
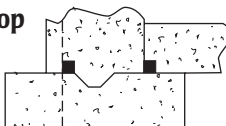
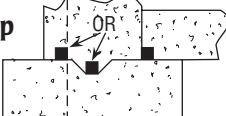
Expansion (Isolation) Joint

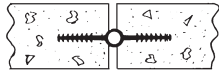
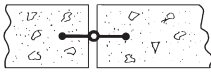
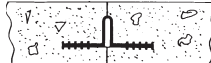
Expansion joints separate or isolate abutting concrete structures (walls, slabs, footings columns) protecting them from compressive

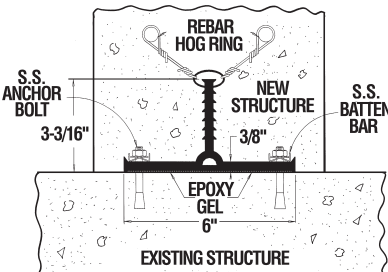
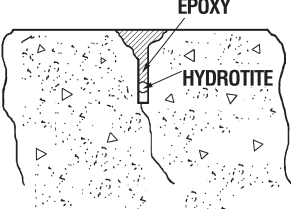
stresses that may develop due to thermal expansion, settlement, creep, live load deflections, drying shrinkage or crush. Differential movement at these joints can be both lateral and transverse.

Construction Joint

Construction joints are determined by interruptions in the placement of concrete.

WATERSTOPS FOR NON-WORKING JOINTS	
<p>Ribbed Flat</p> 	<p>Construction or contraction joints where little or no movement is expected. Ribbed shapes provide a better seal than dumbbell shapes.</p>
<p>Dumbbell</p> 	<p>Construction or contraction joints where little or no movement is expected.</p>
<p>Base Seal</p> 	<p>Ideal for slab-on-grade joints or walls which will be back-filled. Easy to form.</p>
<p>*Labyrinth</p> 	<p>Primarily used in vertical joints where little or no differential movement is expected. Does not require split forming and adds a key to the joint. Difficult to use in horizontal joints.</p>
<p>*Split Waterstop</p> 	<p>Available in ribbed with centerbulb and dumbbell shapes. Eliminates the need for split form bulkhead.</p>
<p>Hydrotite</p> 	<p>Used in joints of limited movement, Hydrotite expands with water contact to create a compression seal. Installs quickly.</p>
<p>Swellstop</p> 	<p>Used in precast and cast-in-place below grade applications. Swellstop is intended for non-moving joints only.</p>
<p>Lockstop</p> 	<p>Provides a watertight, mastic bond to concrete surfaces in non-moving joints.</p>

WATERSTOPS FOR WORKING JOINTS	
<p>Ribbed with Centerbulb</p> 	<p>The most versatile type of waterstop available. The centerbulb accommodates lateral, transverse and shear movement. Larger centerbulbs accommodate larger movements.</p>
<p>Dumbbell with Centerbulb</p> 	<p>Accommodates lateral, transverse and shear movements. Ribbed shapes provide better sealing characteristics.</p>
<p>*Tear Web</p> 	<p>Accommodates large movements. Upon joint movement the tear web ruptures allowing the U-bulb to deform without putting the material in tension.</p>

RETROFIT APPLICATIONS	
<p>Retrofit System</p> 	<p>Seals joints where new construction meets existing structure. Eliminates the need to saw cut and grout in a conventional waterstop.</p>
<p>Hydrotite/Leakmaster</p> 	<p>Used in repair of existing joints, Hydrotite reduces stress on sealants. Also use where joining new concrete to existing and little movement is expected.</p>

*Some directional changes or intersections may not be practical or possible with this style of waterstop. Consult Greenstreak's Technical Service Department for the suitability of this style waterstop for your specific application.

WATERSTOP PROFILES

Once you have determined the joint type, the magnitude of the differential movements and the type of waterstop to meet project requirements, you must select a specific profile from the multitude of shapes. The following are a few of the most commonly specified profiles.

GREENSTREAK® waterstop is manufactured in widths from 4" to 12" and in thicknesses from 1/8" to 1/2". Over 110 different sizes and

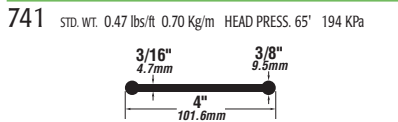
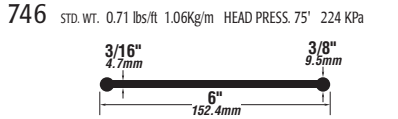
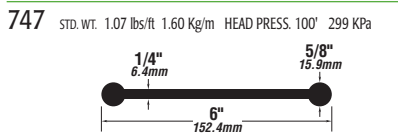
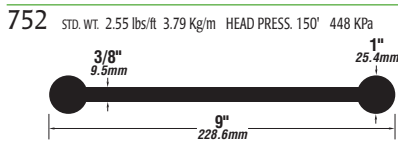
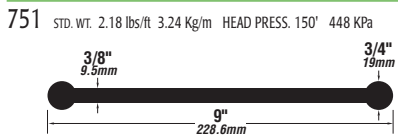
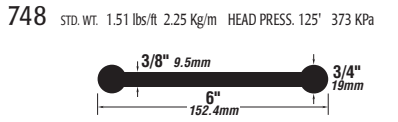
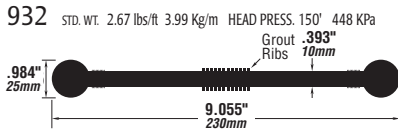
profiles are available to meet the most demanding requirements. Should your project require a special shape, GREENSTREAK offers the world's broadest line of waterstop sizes and profiles. Custom orders will be considered. A Waterstop Profile supplement illustrating all of the profiles is available upon request. For a copy, call GREENSTREAK at (800)325-9504.

PVC SHAPES

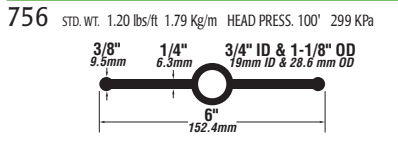
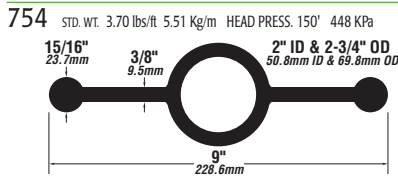
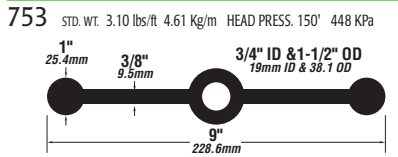
<p>Ribbed</p> <p>646 STD. WT. 2.37 lbs/ft 3.53 Kg/m HEAD PRESS. 175' 523 KPa <i>Montgomery-Watson</i></p>	<p>Ribbed With Centerbulb</p> <p>735 STD. WT. 2.45 lbs/ft 3.65 Kg/m HEAD PRESS. 175' 523 KPa <i>CH2M-Hill Montgomery-Watson</i></p>	<p>Ribbed With Centerbulb</p> <p>706 STD. WT. 1.90 lbs/ft 2.83 Kg/m HEAD PRESS. 150' 448 KPa</p>
<p>957 STD. WT. 1.75 lbs/ft 2.60 Kg/m HEAD PRESS. 150' 448 KPa</p>	<p>696 STD. WT. 2.65 lbs/ft 3.94 Kg/m HEAD PRESS. 175' 523 KPa <i>Bureau of Reclamation COE</i></p>	<p>702 STD. WT. 0.74 lbs/ft 1.10 Kg/m HEAD PRESS. 65' 194 KPa <i>CH2M-Hill</i></p>
<p>679 STD. WT. 1.50 lbs/ft 2.23 Kg/m HEAD PRESS. 125' 373 KPa <i>Montgomery-Watson</i></p>	<p>718 STD. WT. 2.10 lbs/ft 3.13 Kg/m HEAD PRESS. 175' 523 KPa</p>	<p>701 STD. WT. 0.40 lbs/ft 0.60 Kg/m HEAD PRESS. 50' 149 KPa</p>
<p>956 STD. WT. 1.32 lbs/ft 1.96 Kg/m HEAD PRESS. 125' 373 KPa</p>	<p>709 STD. WT. 1.63 lbs/ft 2.43 Kg/m HEAD PRESS. 175' 523 KPa</p>	<p>838 STD. WT. 1.10 lbs/ft 1.64 Kg/m HEAD PRESS. 150' 448 KPa</p>
<p>786 STD. WT. 2.07 lbs/ft 3.08 Kg/m HEAD PRESS. 175' 523 KPa</p>	<p>953 STD. WT. 1.77 lbs/ft 2.64 Kg/m HEAD PRESS. 150' 448 KPa</p>	<p>712 STD. WT. 4.38 lbs/ft 6.52 Kg/m HEAD PRESS. 225' 672 KPa</p>
<p>783 STD. WT. 1.39 lbs/ft 2.07 Kg/m HEAD PRESS. 125' 373 KPa</p>	<p>732 STD. WT. 1.60 lbs/ft 2.38 Kg/m HEAD PRESS. 125' 373 KPa <i>CH2M-Hill Montgomery-Watson</i></p>	<p>713 STD. WT. 3.60 lbs/ft 5.36 Kg/m HEAD PRESS. 225' 672 KPa</p>
<p>786 STD. WT. 2.07 lbs/ft 3.08 Kg/m HEAD PRESS. 175' 523 KPa</p>	<p>705 STD. WT. 1.19 lbs/ft 1.77 Kg/m HEAD PRESS. 125' 373 KPa <i>Bureau of Reclamation</i></p>	<p>738 STD. WT. 2.73 lbs/ft 4.06 Kg/m HEAD PRESS. 150' 448 KPa</p>
<p>783 STD. WT. 1.39 lbs/ft 2.07 Kg/m HEAD PRESS. 125' 373 KPa</p>	<p>703 STD. WT. 0.73 lbs/ft 1.09 Kg/m HEAD PRESS. 100' 299 KPa</p>	<p>731 STD. WT. 1.73 lbs/ft 2.58 Kg/m HEAD PRESS. 175' 523 KPa</p>

PVC SHAPES

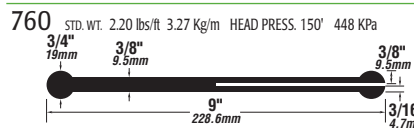
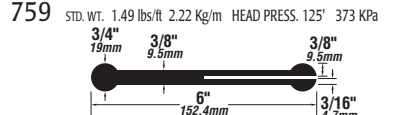
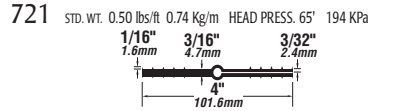
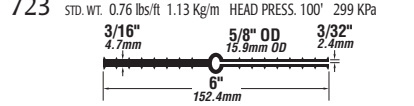
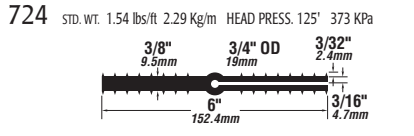
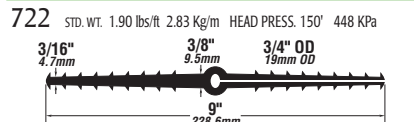
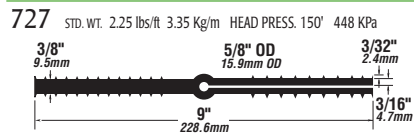
Dumbbell



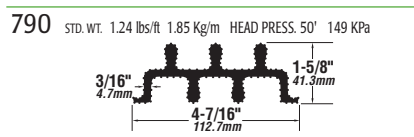
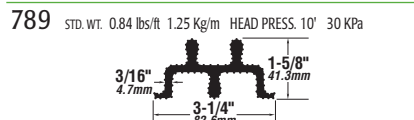
Dumbbell With Centerbulb



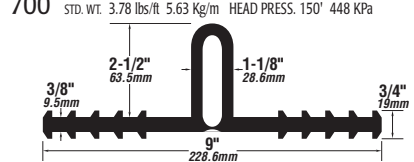
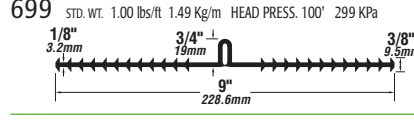
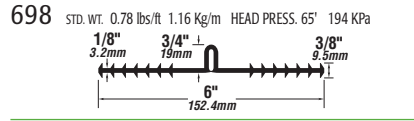
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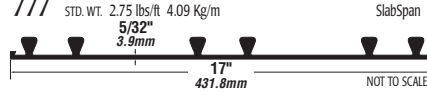
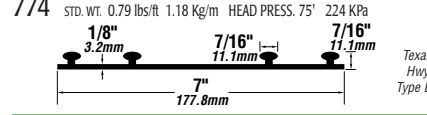
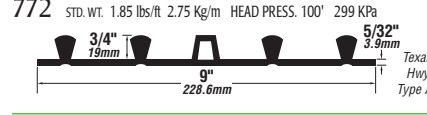
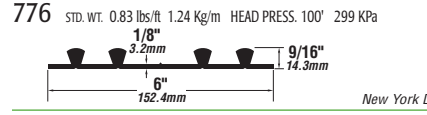
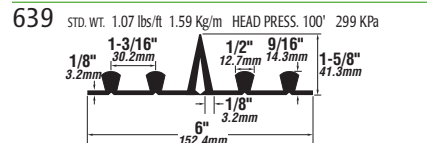
Labyrinth



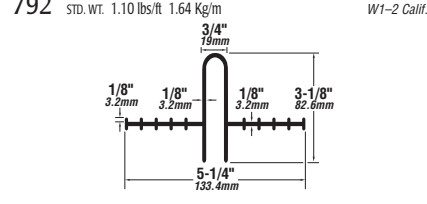
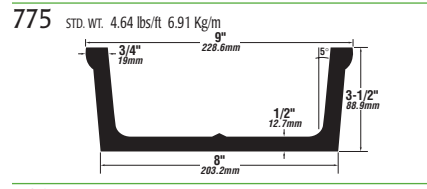
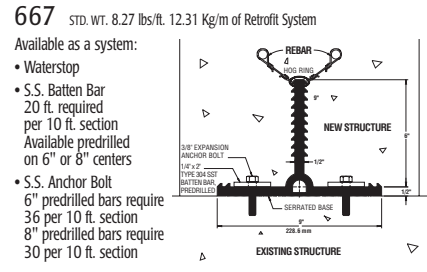
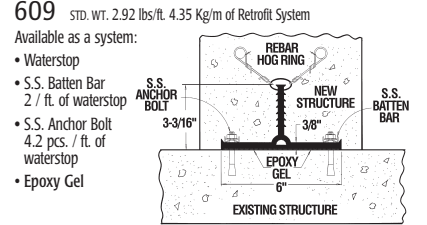
Tear Web



Base Seal



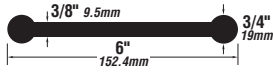
Special Shapes



RUBBER SHAPES

Neoprene Rubber

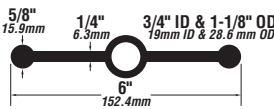
918 STD. WT. 1.51 lbs/ft 2.25 Kg/m HEAD PRESS. 125' 373 KPa



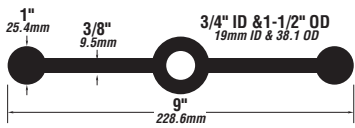
919 STD. WT. 2.20 lbs/ft 3.27 Kg/m HEAD PRESS. 150' 448 KPa



920 STD. WT. 1.22 lbs/ft 1.82 Kg/m HEAD PRESS. 100' 299 KPa

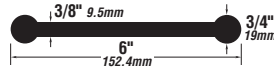


921 STD. WT. 2.90 lbs/ft 4.32 Kg/m HEAD PRESS. 150' 448 KPa



Styrene Butadiene Rubber (SBR)

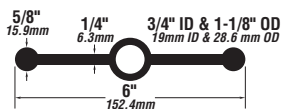
902 STD. WT. 1.30 lbs/ft 1.93 Kg/m HEAD PRESS. 125' 373 KPa



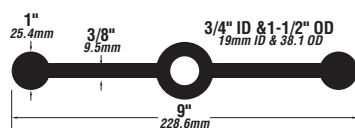
903 STD. WT. 1.90 lbs/ft 2.83 Kg/m HEAD PRESS. 150' 448 KPa



904 STD. WT. 1.05 lbs/ft 1.55 Kg/m HEAD PRESS. 100' 299 KPa



906 STD. WT. 2.50 lbs/ft 3.70 Kg/m HEAD PRESS. 150' 448 KPa

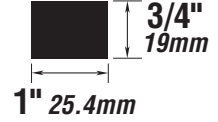


STRIP APPLIED

See Hydrotite Catalog

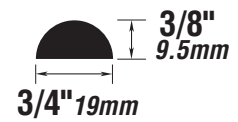
Swellstop

594 STD. WT. 0.55 lbs/ft 0.81 Kg/m



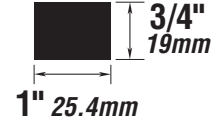
Swellstop II

596 STD. WT. 0.22 lbs/ft 0.33 Kg/m



Lockstop

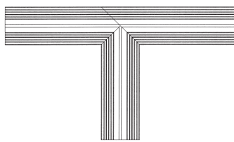
595 STD. WT. 0.48 lbs/ft 0.71 Kg/m



PVC FABRICATIONS

PVC Intersections

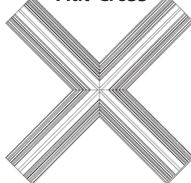
Flat Tee



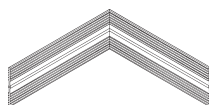
Flat EII



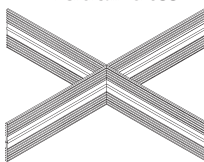
Flat Cross



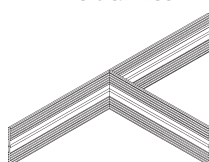
Vertical EII



Vertical Cross

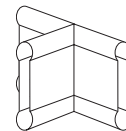


Vertical Tee

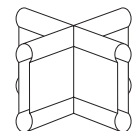


RUBBER FITTINGS

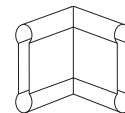
Rubber Fittings (Vertical and Flat)



Vertical "T"



Vertical Cross



Vertical EII



Union

Note: Adhesive available for bonding rubber intersections (unions).

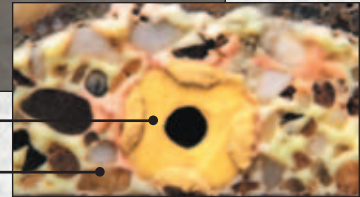
*Consult Greenstreak for special fabrications your project may require



THE WORLD'S NUMBER ONE INJECTION HOSE SYSTEM

FUKO is a specially designed and patented solid core PVC Injection Hose System which is installed in concrete joints to waterproof and seal any cracks or voids in the joint area. The FUKO System seals joints watertight and offers a complete maintenance program if leakage appears in the future. When Portland Cement, Microfine Cement, or Duroseal Injection Resins are selected, the FUKO System can be used for multiple reinjections – a significant advantage over any other hose system available.

A suitable injection material must be selected according to the requirements of the joint. Two recommended injection materials are summarized here. Please contact Greenstreak for additional recommendations regarding injection materials.



FUKO Hose

Injection Material

Cross section of completed injection

DUROSEAL INJECT is a solvent-free acrylate resin which swells up to a factor of 1.5 on contact with water. **DUROSEAL INJECT** is a low viscosity resin which penetrates microfine cracks and capillaries to seal them permanently. It is resistant to acids, lyes and many solvents and fuels. Equipment and tools used with **DUROSEAL INJECT** can be easily cleaned with water.



TRICODUR SI is a single component, suspension based microfine cement which is ready for use. **TRICODUR SI** can be mixed at high-speed with water to form a cement suspension with low viscosity and high penetrating ability. The micro-fineness of **TRICODUR SI** lets it penetrate into microfine cracks (down to 0.05 mm) and seals them reliably. The flow properties of **TRICODUR SI** cement suspension last up to 60 minutes.



LIMITED WARRANTY: GREENSTREAK warrants to the Buyer that this product will be free of defects and will perform as represented in writing subject to the (2) following conditions:

First, the application of the product and the concrete construction practices used in the application are in accordance with GREENSTREAK'S Recommendations. Second, the Buyer has selected the proper product for the specific application required. GREENSTREAK disclaims any responsibility for the selection of a particular waterstop product. Product selection is the sole responsibility and decision of the buyer. The suitability of any material for a specific application requiring fluid resistance is best determined by specific testing for the application. GREENSTREAK urges the Buyer to conduct its own testing.

Any information supplied by GREENSTREAK with respect to its products is believed to be correct. GREENSTREAK makes no representations or warranties, express or implied, as to the accuracy or completeness of such information or the use of such information for a particular purpose. GREENSTREAK has not

performed any tests. Any test data has been prepared by independent commercial laboratories.

Because GREENSTEAK has no control over either the application or the selection of its products, GREENSTREAK's Limited Warranty is as follows:

The exclusive remedies of the Buyer and the limit of the liability of GREENSTREAK from any and all losses or damages resulting from the use of this product (including claims based on contract, negligence, strict liability, or otherwise) shall be either the full refund of the purchase price to Buyer of this product or the replacement of the quantity of product purchased by the Buyer - at the election of GREENSTREAK. In no event shall GREENSTREAK be liable for any incidental or consequential damages. The Buyer and all users of this product are deemed to have accepted the terms of this Limited Warranty which may not be varied in any way by any verbal or written agreement.



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