

**Filter Point**

**Filter Band™**

**Uniform Section**

**Enviromat™**

**Articulating Block**

**Hydrocast™ Armor Units**

# HYDROTEX™

**Fabric-formed Concrete Erosion Control and Armoring Systems**



**Product Guide**

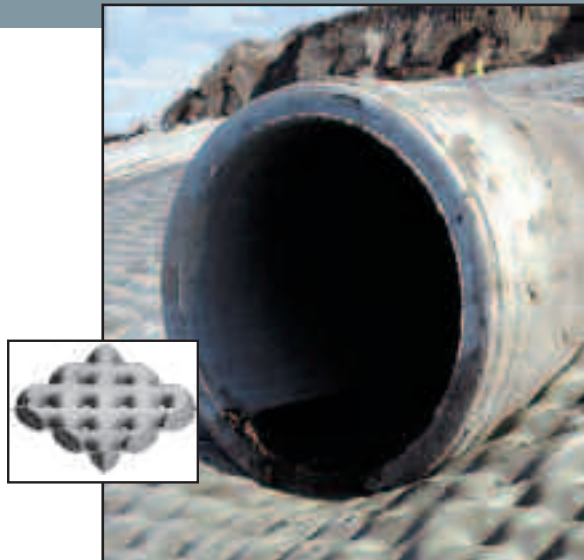


## Filter Point (FP) Linings

Filter Point Linings with filtering points (drains) provide erosion resistant, permeable concrete linings for ditches, channels, canals, streams, rivers, ponds, lakes, reservoirs, marinas, and port and harbor areas. Filter Point Linings have a cobbled surface and a relatively high coefficient of hydraulic friction in order to achieve lower flow velocities and to reduce wave run-up. The filter points provide for the relief of hydrostatic uplift pressures, increasing the system's stability.

Filter Point Linings were the first style of fabric form for concrete. In 1965, a Dutch patent was issued for "fabric-formed slope paving." The form suggested by this patent was later refined to create the first "filter point" lining.

As the use of this technology has spread worldwide, a variety of other forms have been developed to meet specific job requirements.

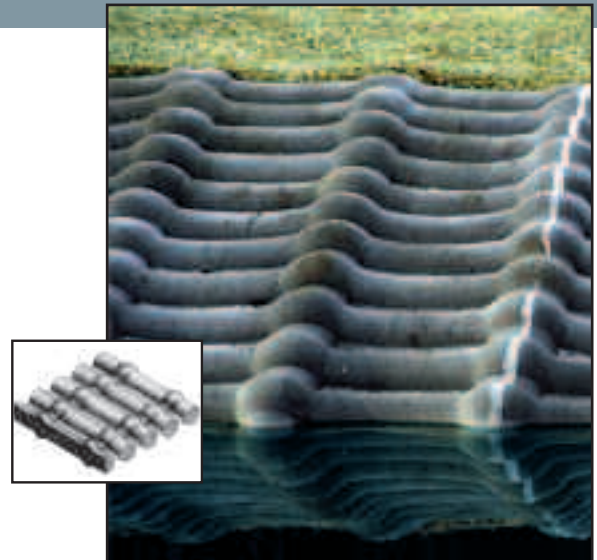


## Filter Band™ (FB) Linings

Filter Band Linings are similar to Filter Point Linings, providing an effective and highly permeable concrete lining that resists erosive forces.

Filter Band differs from Filter Point in that the form creates interconnected, tubular concrete elements that are separated by large, interwoven filter bands. The filter bands provide for greater reduction of uplift pressures than filter points. Also, the biaxial alignment of the tubular elements creates two directionally-determined coefficients of hydraulic friction. As a result, Filter Band achieves a greater reduction of flow velocity or wave energy than Filter Point.

Filter Band concrete linings are specified in situations similar to those for which Filter Point might be specified, but which also require greater relief of uplift pressures, higher reduction of flow velocities, or greater reduction of wave run-up.



## The Advantages of Hydrotex Linings, Mats, and Armor Units

### Stability:

Hydrotex Fabric Forms, manufactured by Synthetex LLC, have been used in millions of square feet of installations worldwide, some in the most severe conditions. In the process they have established a new benchmark in erosion protection by outperforming traditional concrete slope paving, gabions, precast concrete blocks, and rip rap.

Thousands of installations and extensive flume testing have proven that Hydrotex fabric-formed concrete erosion protection systems outperform all alternatives. Hydrotex Linings and Mats, with permissible shear stress in excess of 60 lbs/ft<sup>2</sup> (2.87 kN/m<sup>2</sup>), provide the high degree of stability needed to resist the stresses associated with high velocity flows. Hydrotex fabric-formed concrete has greater hydraulic efficiency than rip

rap, gabions, precast concrete blocks, and conventional concrete slope paving because of several factors. It can mitigate uplift forces due to outflow and excess pore water pressure, reduce hydraulic uplift by slowing channel velocities, and conform to soil contours to reduce the potential for scour.

### Reduced Uplift Pressures:

Many styles of Hydrotex Linings and Mats can accommodate severe uplift pressures. These uplift pressures often cause the failure of conventional concrete slope paving. Unlike traditional methods, fabric forms can be manufactured with built-in filter drains that reduce the mean phreatic level and pore pressures within the underlying soil.

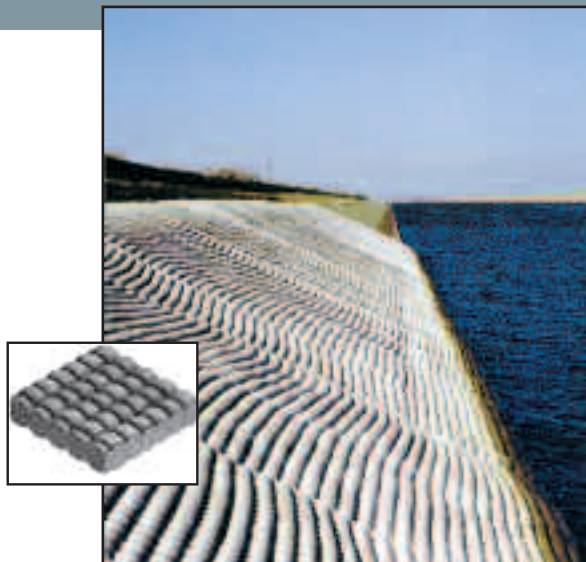
### Management of Hydraulic Flow:

Many Hydrotex Fabric Forms construct concrete linings and mats with deeply patterned surfaces. These patterns create a high coefficient of hydraulic friction. The result is reduced

## Uniform Section (US) Linings

Uniform Section Linings are similar to traditional concrete slope paving. They create a solid, high quality concrete lining with a relatively low coefficient of hydraulic friction and a uniform cross section. Uniform Section Linings are used to reduce the infiltration of aggressive waste and chemical fluids into or out of open channels and basins. They are also used to reduce exfiltration in arid regions where open channels and basins require watertight linings.

Uniform Section Linings are resistant to most leachates and chemicals. They protect geosynthetic liners from mechanical damage, exposure to UV light, and freeze-thaw cycles and also serve as a ballast layer. These self-supporting, high strength linings permit construction on steep side slopes and replace the use of clay or sand as liner protection. Concrete filling of the forms can be performed with a minimum of traffic on the liner, and the tensile strength and abrasion resistance of the fabric protect the liner from the pumped concrete.



flow velocity and reduced wave run-up. These surface characteristics impart stability to the system by reducing velocities and also mean that the designer can affect the flow characteristics of a channel, creating the opportunity for an “engineered” hydraulic system. By choosing the correct style of form, in-channel flow can be slowed, reducing downstream velocities and discharge turbulence. Or an hydraulically-efficient, smooth form (such as Uniform Section) can be chosen to maximize drainage from a given area.

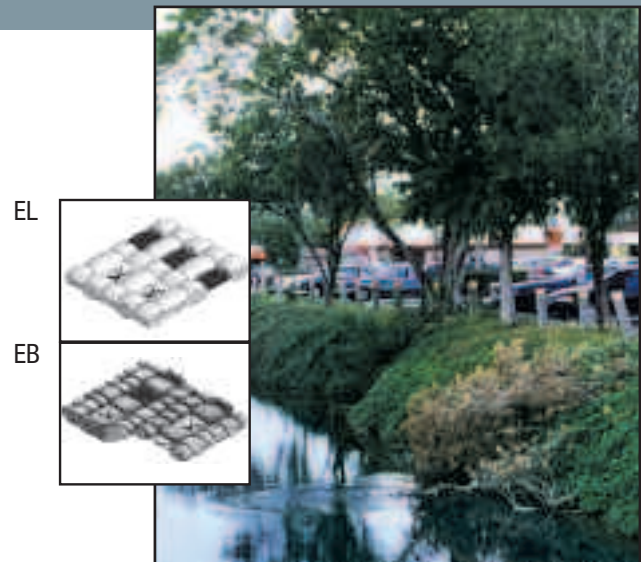
### Adaptation to Soil Contours:

Filled-in-place fabric forms accommodate uneven contours, curves, and subgrades at the time that they are filled. Consequently, the soil and the concrete protection are in intimate contact, reducing the chance of underscour. Some forms create discrete concrete units, attached to each other with fabric perimeters and/or embedded cables. As a result, the concrete mats can articulate to adapt to uneven settlement.

## Enviromat™ (EL and EB) Linings

Enviromat Linings are installed to provide protection against periodic high flows. After installation, vegetation can be planted within the open structure of the lining. Enviromat Linings are used in drainage ditches and on the upper slopes of channels, canals, lakes, reservoirs, rivers, and other water courses as well as for embankments subject to heavy run-off.

Enviromat Linings are comprised of concrete-filled elements and unfilled areas that allow for the establishment of vegetation. Once the concrete sets, the unfilled areas are opened by cutting the fabric and are then planted or filled with topsoil and seeded. Within a growing season a vegetated cover will normally extend over the lining, resulting in an erosion control system with the hydraulic, ecological, and aesthetic features desired. EL Linings have a greater open area than EB, so a vegetated cover will be established more rapidly. However, EB Linings are designed to articulate and are more tolerant of uneven settlement after installation.



### Ease of Installation:

Hydrotex Fabric Forms are delivered to the job site ready-to-fill and require no additional forming materials. Installation consists of preparing the area, laying out the fabric forms, and filling them with concrete through a small-line concrete pump. Wood or steel forming is not required. The fabric forms themselves assure that the concrete assumes the proper configuration, contours, dimensions, and thickness. Hydrotex Linings and Mats do not require steel reinforcement or concrete finishing. A small crew can handle the installation, and fabric forms can be installed without dewatering the site.

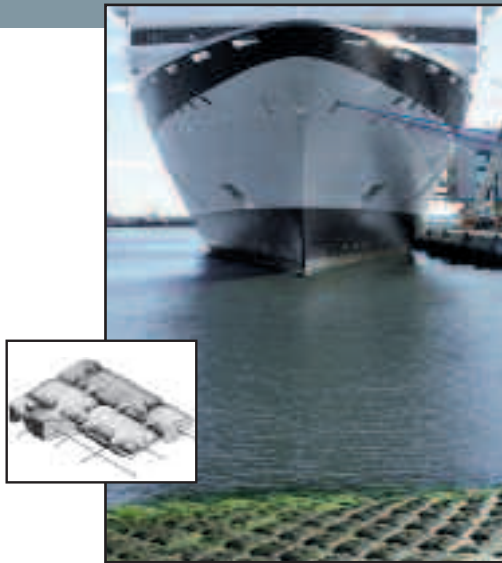
### Simple Job Mobilization:

Fabric forms are extremely lightweight, so they can be rapidly shipped anywhere in the world. The “weight” component of a fabric-formed system, the fine aggregate concrete, is readily available from concrete suppliers

## Articulating Block (AB) Mats

Articulating Block Mats form cable-reinforced concrete block mattresses that resist erosive forces. They are often installed where a revetment is exposed to attack by wave action and are used to protect shorelines, canals, rivers, lakes, reservoirs, underwater pipelines, bridge piers, and other civil and marine structures from propeller wash, ship wakes, waves, currents, and high velocity flows. They are also used in environmental construction for landfill caps, downchutes, and collector channels.

Articulating Block Fabric Forms consist of a series of compartments linked by interwoven perimeters. Grout ducts interconnect the compartments. High strength revetment cables are installed between and through the compartments and grout ducts. Once filled, AB Mat becomes a mattress of pillow-shaped, rectangular concrete blocks. The interwoven perimeters between the blocks serve as hinges to permit articulation. The cables remain embedded in the concrete blocks to link the blocks together and facilitate articulation.



worldwide. Once the site is prepared, simple hand tools and a concrete pump are all that is needed to fill the forms. And in areas with difficult or restricted access, the concrete can be pumped to the forms from as far away as 800 feet (250 meters). Because of the low mobilization costs, it is practical to install fabric forms on jobs as small as a hundred square feet (10 square meters). Regardless of the job size, the ease of mobilization and transportation and the reduced equipment and labor requirements mean that the job goes in faster and at less cost per square unit of protected area.

### Environmental Compatibility:

Fabric forms are designed to provide the least possible environmental impact. The fabric used in the forms allows excess mixing water to escape while retaining the cement solids, fine aggregate, and sand. EL and EB Linings have been designed to provide defined areas that can be cut out after installation so that native vegetation can be planted or

## Hydrocast™ Armor Units

Hydrocast Armor Units are monolithic concrete structures which replace heavy rip rap and large precast concrete armor units, such as tetrapods. When the rectangular fabric forms are filled, they assume a flattened cylindrical cross section and range in size from roughly 180 pounds to in excess of 70 tons (80-64,000 kg) per unit. Available in custom sizes and shapes, the dimensions of the form control the concrete armor unit's length, width, height, and weight.

Armor Units have the mass and stability for the construction of gravity seawalls and revetments, groins, levees, dikes, dams, check dams, and other civil and marine structures subject to attack by waves or rapidly flowing water. Since they are filled in place, they adapt to variations in the subgrade and are ideal for preventing or repairing scour at bridge piers and abutments, culvert outfalls, or underwater pipelines. Hydrocast installations do not require dewatering, a crucial advantage in emergency repair situations.



seeded to create a more natural appearance. And Hydrotex Linings and Mats are free of hazardous projections that could endanger pedestrians, animals, vehicles, or boats.

**Hydrotex fabric-formed concrete erosion control systems outperform all traditional solutions and reduce total system cost. The expertise and knowledge that Synthetex has gained from thousands of installations worldwide are incorporated into every form we manufacture. Time and again, in many different types of projects, our erosion control systems have performed “as specified” and delivered predictable erosion control.**

# Hydrotex™

## Fabric-formed Concrete Erosion Control and Armoring Systems

**Hydrotex systems outperform rip rap, gabions, precast concrete blocks, and concrete slope paving, yet are less expensive and far easier to install.**



### **Applications:**

Drainage Ditches  
Channels and Canals  
Streams, Rivers, and Bayous  
Lakes and Reservoirs  
Coastal and Intracoastal Shorelines  
Jetties and Groins  
Dikes and Levees  
Dune Protection  
Beach Renourishment  
Seawall and Bulkhead Scour Protection  
Boat Launching Ramps  
Wildlife Crossings  
Low-water Stream Crossings  
Embankments  
Underwater Pipeline Covers  
Bridge Abutments and Piers  
Check Dams  
Dams and Spillways  
Ponds and Holding Basins  
Landfill Caps  
Down Chutes  
Water Control Structures

Hydrotex Fabric Forms are filled in place with fine aggregate concrete, delivering the durability and performance of concrete without the costly and difficult installation process of a conventionally-formed concrete slope paving.

Hydrotex systems are not only less expensive than rip rap, gabions, precast concrete blocks, or conventionally-formed concrete slope paving, they also deliver significant stability and performance advantages once installed.

Hydrotex systems can:

- adapt to variable subgrades,
- relieve uplift pressures,
- reduce wave run up, and
- manage channel velocities.

The result is a more cost-effective erosion control system with greater hydraulic efficiency, higher permissible velocities, and improved stability, durability, and performance.

### **A Wide Range of Solutions**

Constructed of high strength, specially woven fabric, Hydrotex™ Fabric Forms come in a variety of form styles. Each style has been engineered to match a certain set of project parameters, allowing you to specify different forms to accommodate differing site conditions. Hydrotex Linings and Mats are used to create erosion and scour prevention systems ranging from ditch linings to coastal revetments. Hydrocast™ Armor Units are monolithic concrete structures that are used for the construction of seawalls and other civil and marine applications.

### **Proven in the Lab and in the Field**

Hydrotex products have been extensively evaluated in an advanced hydraulics laboratory at a leading research facility. Flume testing of Hydrotex Linings and Mats has derived precise design values to assist you in selecting the appropriate fabric form style and mass per unit area to resist the expected hydraulic loading. Hydrotex products have proven their value, quality, and integrity in literally thousands of projects worldwide.

### **Backed with Technical Expertise**

Synhetex's team of technical, manufacturing, and field personnel work closely with engineers, owners, and contractors to derive the best design solutions. Our design philosophy demands solutions that meet strict performance, aesthetic, cost, and construction criteria. You are assured of quality materials, superior technical support, competitive prices, and a commitment to excellence. Our team is able to provide technical and design assistance, system specifications, cost estimates, and construction drawings.

## Linings and Mats: Typical Installed Dimensions, Weights and Volumes

Products and Sizes	Average Thickness, in (mm)	Mass per Unit Area, lb/ft <sup>2</sup> (kg/m <sup>2</sup> )	Concrete Coverage, ft <sup>2</sup> /yd <sup>3</sup> (m <sup>2</sup> /m <sup>3</sup> )	Varies With Product	
<b>Filter Point Linings</b>				Filter Point Spacing, inches (mm)	
FP220	2.2 (55)	25 (120)	136 (16.6)	5 (125)	
FP300	3 (75)	34 (165)	100 (12.1)	6.5 (165)	
FP400	4 (100)	45 (220)	75 (9.1)	8 (200)	
FP600	6 (150)	68 (330)	50 (6.1)	10 (255)	
FP800	8 (200)	90 (440)	38 (4.6)	12 (305)	
FP1000	10 (250)	113 (550)	30 (3.6)	14 (355)	
FP1200	12 (300)	135 (660)	25 (3.0)	16 (405)	
<b>Filter Band™ Linings</b>				Filter Band Spacing, inches (mm)	
FB400	4 (100)	45 (220)	75 (9.1)	8 (200)	
<b>Uniform Section Linings</b>					
US300	3 (75)	34 (165)	100 (12.1)		
US400	4 (100)	45 (220)	75 (9.1)		
US600	6 (150)	68 (330)	50 (6.1)		
US800	8 (200)	90 (440)	38 (4.6)		
US1000	10 (250)	113 (550)	30 (3.6)		
US1200	12 (300)	135 (660)	25 (3)		
US1600	16 (400)	180 (880)	19 (2.3)		
<b>Environ™ Linings</b>				Open Vegetated Area, %	
EM250	2.5 (65)	28 (138)	120 (14.6)	20	
EM400	4 (100)	45 (220)	75 (9.1)	20	
<b>Articulating Block Mats</b>				Mass Per Block, lb (kg)	Nom. Block Dimensions, inches (mm)
AB300	3 (75)	34 (165)	100 (12.1)	52 (23.5)	22 x 10 (560 x 255)
AB400	4 (100)	45 (220)	75 (9.1)	95 (43)	22 x 14 (560 x 355)
AB600	6 (150)	68 (330)	50 (6.1)	205 (93)	22 x 20 (560 x 510)
AB800	8 (200)	90 (440)	38 (4.6)	350 (158)	22 X 26 (560 x 660)
AB1000	10 (250)	113 (550)	30 (3.6)	550 (250)	35 x 20 (890 x 510)
AB1200	12 (300)	135 (660)	25 (3.0)	880 (400)	35 x 27 (890 x 685)



Hydrotex Linings, Mats, and Armor Units are filled in place by pumping fine aggregate concrete into fabric forms. The results are reduced material and equipment costs, faster installation, and dependable erosion and scour prevention.

Whether you're lining a channel; protecting landfill containment systems, underwater pipelines or dams; repairing bridge scour; or armoring a shoreline against storm damage, Synthetex LLC has the form that meets your needs.

**For complete specifications and our Construction and Quality Control Manual, please visit our web site at: [www.synthetex.com](http://www.synthetex.com)**

Note: Values shown are typical and will vary with weight of concrete and field conditions. Custom products of different thicknesses and dimensions can be manufactured.



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