



PRESTO GEOSYSTEMS

GEOBLOCK[®]5150
GEOBLOCK[®]2
GEOPAVE[™]

POROUS PAVEMENT SPECIFICATION
HELP DIRECTORY

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POROUS PAVEMENT TYPE

Presto Geosystems offers the Geoblock, Geopave and Geoweb porous pavement systems. Each system provides a permeable and stable surface for vehicular and pedestrian traffic. The systems are designed for various loading conditions, traffic frequencies, infiltration needs and infill requirements.

The **Geoblock® system** provides a vegetated surface with topsoil infill. Geoblock units are available in 2-inch (Geoblock 5150) and one-inch (Geoblock 2) cell depths to address all loading requirements. The Geoblock system supports heavy or concentrated loads by creating a structural bridge within the topsoil layer that maximizes load transfer/distribution while preventing topsoil compaction. The Geoblock5150 is generally recommended for heavier loading and when traffic frequency is higher.

The **Geopave™ system** provides an aggregate surface with aggregate infill, or a vegetated surface with a topsoil/aggregate structural infill and base. The Geopave unit has a 2-inch depth cell with a monolithic mesh bottom with ¼-inch square openings. The cell walls are vented to provide infill lock-up and lateral drainage between the cells. The mesh bottom secures aggregate in-place and prevents the system from coming out of the ground.

- The GeoPave system with **aggregate infill** and base can be designed to handle up to **H-20 loading**.
- The GeoPave system with **structural topsoil/aggregate** infill and base can be designed to handle up to **H-10 loading**.

Because of the GeoPave units' monolithic mesh bottom, other infill types may be used as long as the loading is appropriate for the application.

Porous Pavement Comparison Charts:

[Design Guide: Depth of Engineered Base Recommendation](#) (Imperial)

[Design Guide: Depth of Engineered Base Recommendation](#) (Metric)

PRODUCT MATERIAL PROPERTIES

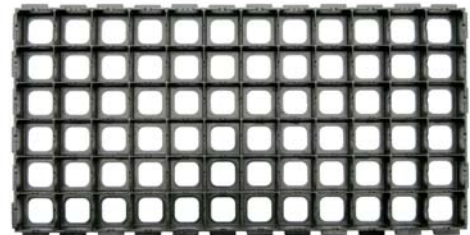
Geoblock®5150 Material Properties

The Geoblock®5150 units shall be molded from various densities of polyethylene with up to 97% recycled content. 1.5% - 2.0% carbon black shall be added for ultraviolet light stabilization.

Empty unit minimum crush strength @ 70°F (21°C) shall be 420 psi (2,900 kPa). Material flexural modulus at 73°F (23°C) shall be 35,000 psi (240,000 kPa).

The manufactured Geoblock® 5150 unit shall have a minimum deflection without breakage of 1.0 inches (25 mm) when units are supported at 20 inch (0.50 m) centers at 70°F (21°C).

Nominal dimensions (width x length) shall be 20 inches x 40 inches (0.50 m x 1.00 m). Unit depth shall be 2 inches (50 mm). Nominal coverage area shall be 5.38 ft² (0.50 m²).





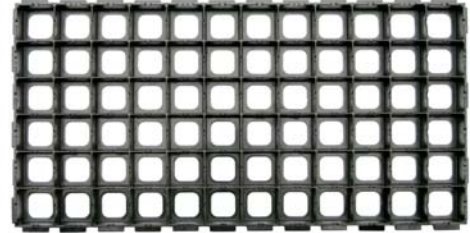
Geoblock®2 Material Properties

The Geoblock®2 units shall be molded from polyethylene with up to 97% recycled content. 1.5% - 2.0% carbon black shall be added for ultraviolet light stabilization.

Empty unit minimum crush strength @ 70°F (21°C) shall be 420 psi (2,900 kPa). Material flexural modulus at 73°F (23°C) shall be 35,000 psi (240,000 kPa).

The manufactured Geoblock®2 unit shall have a minimum deflection without breakage of 1.0 inches (25 mm) when units are supported at 20 inch (0.50 m) centers at 70°F (21°C).

Nominal dimensions (width x length) shall be 20 inches x 40 inches (0.50 m x 1.00 m). Unit depth shall be 1.2 inches (30 mm). Nominal coverage area shall be 5.38 ft² (0.50 m²).



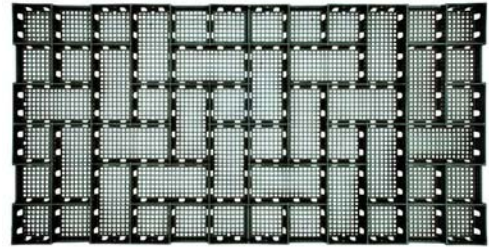
GeoPave™ Material Properties

The GeoPave™ units shall be molded from various densities of polyethylene with up to 97% recycled content. 1.5% - 2.0% carbon black shall be added for ultraviolet light stabilization.

Empty unit minimum crush strength @ 70°F (21°C) shall be 175 psi (1,202 kPa). Aggregate or Aggregate/Topsoil filled unit minimum crush strength shall be 1,000 psi (6,869 kPa). Material flexural modulus at 73°F (23°C) shall be 35,000 psi (240,000 kPa).

The manufactured GeoPave unit shall have a minimum deflection without breakage of 1.0 inches (25 mm) when units are supported at 20 inch (0.50 m) centers at 70°F (21°C).

Nominal dimensions (width x length) shall be 20 in x 40 in (0.50 m x 1.00 m). Unit depth shall be 2 inches (50 mm). Nominal coverage area shall be 5.38 ft² (0.50 m²).



CERTIFICATIONS AND SPECIFICATION REQUIREMENTS

These choices enable the user to develop quality specifications by including requirements for material certification, manufacturer's quality certification, material warranty, and installer and on-site manufacturer's field representative qualifications.

MATERIAL CERTIFICATION (if specified)

Product manufacturers shall provide certification of compliance with all applicable testing procedures and related specifications upon written request. Request for certification shall be submitted by the purchasing agency no later than the date of order placement.

Product manufacturers shall also have a minimum of 20 years experience producing products for porous pavement systems.

MANUFACTURER'S QUALITY CERTIFICATION (if specified)

The Manufacturer shall have earned an ISO 9001:2000 certification for its quality management system. A current ISO 9001:2000 certificate of continuous registration shall be on file and shall be submitted for approval. Any alternate materials submitted shall provide a certification that their porous pavement system manufacturing process is part of an ISO program and a certificate will be required specifically stating that their testing facility is certified and in accordance with ISO.

MATERIAL WARRANTY (if specified)

The Manufacturer shall warrant each Geoblock® or GeoPave™ porous paver units which it ships to be free from defects in materials and workmanship at the time of manufacture. The Manufacturer's exclusive limited liability under this warranty or otherwise will be to furnish without charge to the manufacturer's customer at



the original f.o.b. point a replacement for any unit which proves to be defective under normal use and service during the 10-year period which begins on the date of shipment by the manufacturer. The Manufacturer reserves the right to inspect any allegedly defective paver unit in order to verify the defect and ascertain its cause.

Materials submitted that do not offer a written 10-year warranty will be rejected.

This warranty shall not cover defects attributable to causes or occurrences beyond the manufacturer's control and unrelated to the manufacturing process, including, but not limited to, abuse, misuse, neglect, improper storage, improper installation or improper application.

The Manufacturer makes no other warranties, express or implied, written or oral, including, but not limited to, any warranties or merchantability or fitness for any particular purpose, in connection with the porous paver unit. In no event shall the manufacturer be liable for special, indirect, incidental or consequential damages for the breach of any express or implied warranty or for any other reason, including negligence, in connection with the Geoblock® or GeoPave™ porous paver unit.

INSTALLER QUALIFICATIONS (if specified)

The installer shall be experienced in the installation of the specified products and employ persons trained in the installation of the specified products.

ON-SITE MANUFACTURER'S FIELD REPRESENTATIVE (if specified)

A qualified Manufacturer's field representative shall be on-site at the start of construction to observe the installation of the porous pavement system is in accordance with the Contract Documents and Manufacturer's recommendations. The representative shall have at least 2 years experience installing the Manufacturer's porous pavement systems and have installed a minimum of 10,000 square feet (1,000 square meters). The time for on-site observation shall be indicated in the Contract Documents and included in the base bid price.

BASE MATERIALS

The strength of the overall porous pavement system is determined by the strength of the existing subgrade, strength of the base materials (if required), strength of the porous paver unit, and strength of the infill material.

For a given applied load over an existing sub-base soil, both the base material and porous paver unit provide support.

The **depth of base requirement** is determined by the sub-base strength ([CBR value](#)), strength of the porous paver unit, loading requirements and stormwater storage requirements. To determine recommended base depth requirement for the chosen product type, view the Porous Pavement Table linked below.

[Design Guide: Depth of Engineered Base Recommendation](#) (Imperial)

[Design Guide: Depth of Engineered Base Recommendation](#) (Metric)

CBR RANGE OF THE IN-SITU SOILS

It is important to know the CBR range of the sub-base soils in order to determine the depth of engineered base (if any) that is recommended for the loading requirement. For CBR values < 2, contact the manufacturer for design guidance.

CBR is the abbreviation for California Bearing Ratio. Methods for determining CBR vary from more sophisticated laboratory methods to simple field identification methods that use hand manipulation of the soil. One method is not recommended over another, however, the user must have a high degree of confidence in the results produced by the chosen method. If other than CBR soil strength values exist, use available correlation charts to relate the value to CBR.



BASE SPECIFICATIONS

Base for Vegetated Systems: GeoBlock or GeoPave Units

Specification Output: The aggregate/topsoil engineered infill shall consist of a homogenous mixture consisting of 1) a clear-stone/crushed rock having an AASHTO #5 or similar designation blended with 2) pulverized topsoil and 3) a void component generally containing air and/or water. This homogeneous mixture will promote vegetative growth and provide required structural support. The aggregate portion shall have a particle range from 0.375 in to 0.5 in (10 mm to 13 mm). The percentage void-space of the aggregate portion shall be at least 30%. The pulverized topsoil shall equal 25% of the total volume and be added and blended to produce a homogenous mixture prior to placement.

Base for Aggregate Systems: GeoPave Units Only

Specification Output: A minimum of 2 inches (50 mm) of aggregate base should be placed below the GeoPave units as a drainage layer and an infiltration storage area. Greater depth may be required depending upon design rainfall needs and sub-base permeability.

The aggregate base shall be a poorly-graded 0.5-inch minus, crushed aggregate with a fine content less than 5%. The aggregate shall be compacted to 95% Standard Proctor Density. After compaction, the surface shall be uniform with no protrusions from larger aggregate particles.

SECURING PAVER UNITS

FIXING UNITS IN PLACE

Geoblock paver units may be fixed in place to prevent shifting of units during construction caused by trafficking/turning of heavier construction vehicles during installation.

Geoblock paver units may be prevented from shifting during installation with placement of-one or both of the following:

1. Temporary wood stakes or permanent metal (0.5 in (13 mm) #4 rebar stakes placed through holes in the Geoblock units.
2. Thread-forming tapping screws through perimeter interlocking tabs. Install 2 to 4 screws on the long side and 1 to 2 screws on the short side.

GeoPave paver units are "locked" in place with the U-CLIP connection device, forming one continuous interconnected pavement system.

PERMANENT ANCHORING OF PAVER UNITS

Permanent anchoring may also be required when placing the Geoblock or GeoPave units on a slope (5-10% maximum).

The Geoblock units may be anchored in-place with 0.5 in (13 mm) #4 rebar stakes placed through holes in the units.

The GeoPave units may be anchored in-place with 0.5 in (13 mm) #4 rebar stakes placed through the units' internal vent holes.

Anchor Length and Spacing

Anchor stake length is generally 12 inches (305 mm) or longer depending on the slope, subgrade CBR and loading requirement.

Stake anchors are typically installed with 2 to 4 on the long side and 1 to 2 on the short side.

GEOSYNTHETIC LAYER DETAILS (if specified)

Under some conditions, a geosynthetic layer may be a required component between the in-situ soil and the required engineered base for the porous pavement system. Generally, the geosynthetic layer will provide tensile reinforcement, separation and/or drainage.



SUB-DRAINAGE COMPONENT DETAILS (if specified)

If the porous pavement system is built over non-porous soils and an excavation is required such that water could be trapped, sub drainage becomes a required component of the system. Sub-drainage will remove harmful water accumulation that will cause degradation of the in-situ soils resulting in loss of support capacity.

UNIT ORIENTATION & LAYING PATTERN

The orientation and laying pattern of Geoblock and GeoPave units vary depending on application. The following orientation and laying patterns are recommended according to traffic pattern:

1. Bricklayer pattern for access lane applications
2. Herringbone pattern for large areas with random traffic flow

CELL INFILL

CELL INFILL TYPE

Infill: Topsoil/Vegetation

For vegetated surfaces, topsoil infill is suitable for either the Geoblock5150 or Geoblock2 systems. An engineered topsoil/aggregate mixture is required in the GeoPave system for structural strength. The GeoPave system also should only be specified for loads up to H10.

[Design Guide: Depth of Engineered Base Recommendation](#) (Imperial)

[Design Guide: Depth of Engineered Base Recommendation](#) (Metric)

Infill: Aggregate

Aggregate infill is recommended only within the GeoPave units as the monolithic mesh bottom is designed specifically to contain aggregate infill under loading stresses. Aggregate infill is not recommended for use in the Geoblock units due to the open bottom design and potential for aggregate loss/movement beneath the porous paving system.

Infill: Other

Other infill material may be used in the GeoPave units and include bark/wood chips, rubber chips, crushed shells, soils not intended to be vegetated. Loading and trafficking requirements should be considered when specifying other infill type to ensure appropriate infill is specified for the application.

Infill: None

The Geoblock units may be left empty in some applications (such as ATV trails or temporary access lanes/pavements). In this case, expansion joints may be required every few feet to prevent uplift or buckling of the Geoblock units caused by thermal expansion.

CELL INFILL SPECIFICATION

Vegetated Surfaces

The topsoil infill placed within the cells of the Geoblock or GeoPave paver units must provide a nourishing medium for development of a healthy root system for the vegetative cover. The topsoil should be a good quality, drainable soil and not be compacted within the paver unit.

The topsoil or topsoil/aggregate infill determines the permeability and controls the rate of water infiltration within the porous paver layer. If climatic conditions are such where prolonged periods of dryness exist, moisture retention additives may be appropriate. Final infill placement should be at or slightly below the level of the porous paver cell wall.

Infill: Topsoil Specification for Geoblock Units

Specification Output: *The infill shall be topsoil that is free from all elements harmful to vegetation growth and shall contain sufficient organic component to promote healthy vegetation growth. The topsoil shall be pulverized before infilling the Geoblock units with 100 percent passing a one-inch sieve and 90 percent shall pass a No. 10 sieve.*



Infill: Engineered Topsoil/Aggregate Specification for GeoPave Units

Specification Output: *The aggregate/topsoil engineered infill shall consist of a homogenous mixture consisting of 1) a clear-stone/crushed rock having an AASHTO #5 or similar designation blended with 2) pulverized topsoil and 3) a void component generally containing air and/or water. This homogeneous mixture will promote vegetative growth and provide required structural support. The aggregate portion shall have a particle range from 0.375 in to 0.5 in (10 mm to 13 mm). The percentage void-space of the aggregate portion shall be at least 30%. The pulverized topsoil shall equal 25% of the total volume and be added and blended to produce a homogenous mixture prior to placement.*

Infill: Aggregate Specification for GeoPave Units

Aggregate infill is only appropriate within the GeoPave paver unit. Ensure that the aggregate particle size and gradation is suitable for the intended use of the porous pavement system. Acceptable materials shall include various colored and angular aggregate types. The aggregate infill determines the permeability and controls the rate of water infiltration within the porous pavement layer.

GeoPave Specification Output: *The aggregate infill shall be a well-graded 0.375 in to 0.5 in (10 mm to 13 mm) crushed angular stone with a fine content less than 5%.*

VEGETATION CHOICE

Vegetation type should be selected by a qualified agronomist and be resilient enough to withstand anticipated load frequencies. Choice of vegetation shall be determined based upon local climate and proposed use.

SOD SPECIFICATION

Specify sod for areas where immediate use is desired. Young sod that is free from netting materials is recommended. Mature sod with a more developed root system and sod with netting may be difficult to press/cut into the porous paver cells. The sod should consist of dense, well-rooted growth of permanent and desirable grasses, indigenous to the locality where it will be installed.

SEED SPECIFICATION

Seed infill is appropriate for grass pavements when immediate access is not required. When seed is used, good seeding, fertilizing, and water procedures for turf establishment shall conform with the requirements of the governing authority for seeding and restrictions on noxious weed seed.

DELINEATION

With vegetated systems, once healthy turf has been established, the cell wall structure will have minimal visibility when proper turf-maintenance practices are followed. Delineation may be desirable to create greater visibility for those using the pavements or access lanes. A variety of delineation methods may include in-ground and above-ground curbing, shrubbery, vegetation, perimeter lighting and delineation markers/signs.





Table 1: Imperial Design Guideline: Depth of Engineered Base Requirement

	DESIGN GUIDELINE Depth of Engineered Base Recommendation: (Imperial)							
	GEOBLOCK®5150		GEOBLOCK®2		GEOPAVE™		GEOPAVE™	
LOAD DESCRIPTION	VEGETATED SURFACES Topsoil Infill & Topsoil/Aggregate Base		VEGETATED SURFACES Topsoil Infill & Topsoil/Aggregate Base		AGGREGATE SURFACES Aggregate Infill & Base		VEGETATED SURFACES Topsoil/Aggregate Infill & Topsoil/Aggregate Base	
TYPICAL MAXIMUM TIRE PRESSURE								
GROSS VEHICLE LOADS	CBR ^{1,2} 2 – 4	CBR ¹ > 4	CBR ^{1,2} 2 – 4	CBR ¹ > 4	CBR ^{1,2} 2 – 4	CBR ¹ > 4	CBR ^{1,2} 2 – 4	CBR ¹ > 4
HEAVY FIRE TRUCK & H-20 LOADING Typical 110 psi 80,000 lb	6 in	4 in	14 in	10 in	6 in	6 in	Not Recommended	Not Recommended
	Infrequent Passes		Infrequent Passes		Normal Traffic			
Single axle loadings of 145 kN, tandem axle loadings of 220 kN.								
LIGHT FIRE TRUCK & H-15 LOADING Typical 85 psi 60,000 lb	4 in	2 in	10 in	6-10 in	6 in	4 in	Not Recommended	Not Recommended
	Infrequent Passes		Infrequent Passes		Normal Traffic			
Single axle loadings of 110 kN.								
UTILITY & DELIVERY TRUCK & H-10 LOADING Typical 60 psi 40,000 lb	2 in	2 in	6-10 in	4-8 in	4 in	2 in	4 in	2 in
	Infrequent Passes		Infrequent Passes		Normal Traffic		Infrequent Passes	
Single axle loadings of 75 kN.								
CARS & PICK-UP TRUCK ACCESS Typical 45 psi 8,000 lb	None	None	4-8 in	2-4 in	2 in	None ³	2 in	None ³
	Occasional Passes		Occasional Passes		Normal Traffic		Occasional Passes	
Single axle loadings of 18 kN.								
TRAIL USE: SURFACE STABILIZATION <1,000 lb	None	None	2-4 in	0-2 in	None	None	None	None
Loading for ATVs, golf carts, campers, boats, equestrian, motorcycle, bicycle, pedestrian, wheelchairs.								
¹ CBR is the abbreviation for California Bearing Ratio. Methods for determining CBR vary from more sophisticated laboratory methods to simple field identification methods that use hand manipulation of the soil. If other-than-CBR soil strength values exist, use available correlation charts to relate the value to CBR. ² For CBR <2, contact Presto Products Company for recommendations. ³ A minimum of 2 inches of aggregate base should be placed below the GeoPave units as a drainage layer and an infiltration storage area. Greater depth may be required depending upon design rainfall requirements and subbase permeability. ALL DESIGNS SHOULD BE CHECKED BY A CERTIFIED ENGINEER. 20 June 2009 Presto Products Company www.prestogeo.com Copyright 2009								



Table 2: Metric Design Guideline: Depth of Engineered Base Requirement

	DESIGN GUIDELINE Depth of Engineered Base Recommendation (Metric)							
	GEOBLOCK@5150		GEOBLOCK@2		GEOPAVE™		GEOPAVE™	
LOAD DESCRIPTION	VEGETATED SURFACES Topsoil Infill & Topsoil/Aggregate Base		VEGETATED SURFACES Topsoil Infill & Topsoil/Aggregate Base		AGGREGATE SURFACES Aggregate Infill & Base		VEGETATED SURFACES Topsoil/Aggregate Infill & Topsoil/Aggregate Base	
TYPICAL MAXIMUM TIRE PRESSURE								
GROSS VEHICLE LOADS	CBR ^{1,2} 2 – 4	CBR ¹ > 4	CBR ^{1,2} 2 – 4	CBR ¹ > 4	CBR ^{1,2} 2 – 4	CBR ¹ > 4	CBR ^{1,2} 2 – 4	CBR ¹ > 4
HEAVY FIRE TRUCK & H-20 LOADING Typical 758 kPa 36.3 tonne	150 mm	100 mm	350 mm	250 mm	150 mm	150 mm	Not Recommended	Not Recommended
	Infrequent Passes		Infrequent Passes		Normal Traffic			
Single axle loadings of 145 kN, tandem axle loadings of 220 kN.								
LIGHT FIRE TRUCK & H-15 LOADING Typical 586 kPa 27.2 tonne	100 mm	50 mm	250 mm	150-250 mm	150 mm	100 mm	Not Recommended	Not Recommended
	Infrequent Passes		Infrequent Passes		Normal Traffic			
Single axle loadings of 110 kN.								
UTILITY & DELIVERY TRUCK & H-10 LOADING Typical 414 kPa 18.1 tonne	50 mm	50 mm	150-250 mm	100-200 mm	100 mm	50 mm	100 mm	50 mm
	Infrequent Passes		Infrequent Passes		Normal Traffic		Infrequent Passes	
Single axle loadings of 75 kN.								
CARS & PICK-UP TRUCK ACCESS Typical 310 kPa 3.6 tonne	None	None	100-200 mm	50-100 mm	50 mm	None ³	50 mm	None ³
	Occasional Passes		Occasional Passes		Normal Traffic		Occasional Passes	
Single axle loadings of 18 kN.								
TRAIL USE: SURFACE STABILIZATION <0.45 tonne	None	None	50-100 mm	0-50 mm	None	None	None	None
Loading for ATVs, golf carts, campers, boats, equestrian, motorcycle, bicycle, pedestrian, wheelchairs.								
¹ CBR is the abbreviation for California Bearing Ratio. Methods for determining CBR vary from more sophisticated laboratory methods to simple field identification methods that use hand manipulation of the soil. If other-than-CBR soil strength values exist, use available correlation charts to relate the value to CBR. ² For CBR <2, contact Presto Products Company for recommendations. ³ A minimum of 50 mm of aggregate base should be placed below the GeoPave units as a drainage layer and an infiltration storage area. Greater depth may be required depending upon design rainfall requirements and subbase permeability. ALL DESIGNS SHOULD BE CHECKED BY A CERTIFIED ENGINEER. 20 June 2009 Presto Products Company www.prestogeoco.com Copyright 2009								