FILTER PAVE®

Featuring BASF Chemistry

FILTERPAVE PRODUCTS LLC

FILTERPAVE®

POROUS PAVEMENT SYSTEM

PRODUCT SPECIFICATION

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FPPS SPECIFICATION FEBRUARY 5, 2014

FILTERPAVE®
POROUS PAVEMENT SYSTEM
SPECIFICATION

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Figure 1: Typical Filterpave Cross Section 10

FILTERPAVE®
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SPECIFICATION

FOREWARD

This suggested Specification for **Filterpave® Porous Pavement System (FPPS)** is provided as a guideline only. Filterpave® refers to bound aggregate porous pavement. Each project is site specific and requires information related to local soil conditions, existing and proposed drainage parameters, and regional precipitation patterns. FPPS requires site specific design according to nationally recommended engineering standards and practices adhering to any state and local laws and regulations.

FPPS has continued to gain popularity as an ecologically-friendly method to effectively treat, control and retain or detain stormwater runoff. When properly utilized, FPPS can reduce or eliminate the need for detention ponds while providing significant water quality benefits through natural filtration. FPPS is predominantly used as a medium-duty pavement, such as those found in driveways, trails and parking area applications.

FPPS does not look or behave like asphalt or concrete pavements. While the finished surface is smoother and more aesthetically pleasing than other porous pavements, the surface is not as tight and uniform as traditional dense asphalt or concrete. In order to allow sufficient infiltration, the surface is open and varied with moderate amounts of surface shedding normal during the first few months of service. Such loose particles must be swept vigilantly to reduce additional scoring of the pavement. Specific maintenance requirements apply to FPPS and are available in the Filterpave Maintenance Guide document. These items are important to overall performance and lifespan of Filterpave. Owners, Engineers and Architects are encouraged to visit locations where FPPS has been installed before making the decision to specify and utilize the product.

Some traditional pavement testing methods are not applicable to this type of pavement material. FPPS is bound by an elastomeric binder and as such the pavement has characteristics of a flexible pavement. However, unlike asphalt, FPPS also has a fairly high compressive strength, excellent tensile strength, and positive flexural modulus. As continued testing of this product yields new test methods that are reproducible in the field and laboratory, the specifications will be modified.

FPPS Glass Series:

50% post-consumer recycled glass and 50% stone aggregate per FPPS specifications*, combined with a polyurethane binder, pigmented dispersion and aliphatic polyurea surface overcoat. A pigmented dispersion matching the color added to the binder may be added to the standard aliphatic polyurea surface overcoat which will be decided on a per job basis. FPLLC recommends samples are pre-approved by the customer. Not for use on roadways. Not for use in commercial parking lots. Not recommended for use under conditions of constant traffic from gross vehicle loads above 8,000 lbs. Intermittent use of gross vehicle loads from 8,000 lbs. up to 80,000 lbs. such as emergency equipment is allowable**.

FPPS Stone Series:

Stone aggregate that is adheres FPPS aggregate specifications*, combined with polyurethane binder. The FPPS Stone Series products may be mixed with up to 20% glass aggregate of standard Filterpave specified glass*. A clear aliphatic polyurea surface overcoat is required if glass content is above 10%. Any mix above 20% glass will fall under the Filterpave Glass Series requirements. Not for use on roadways. Not recommended for use on parking lot drive lanes. Suitable for parking stalls in parking lots. Not for use with gross vehicle loads above 80,000 lbs**.

Due to variations in color mix of crushed post-consumer recycled glass or natural stone minerals, which are mined directly from the earth and utilized in the creation of FPPS, a possibility of slight color variation and particulate concentrations may cause minor disparities. The variations add to the distinct and authentic look of FPPS. Actual installed product may vary from samples or from project to project. FPPS will color fade over time depending on many factors such as exposure to elements, the type of use and the color. Color may be rejuvenated to some degree with additional layers of surface overcoat applied as part of a maintenance program over a period of time.

*Refer to Filterpave aggregate specification guide.

**Refer to the Filterpave specification summary, table 2, for base guidelines of load description, depth of base and depth of Filterpave.

POROUS PAVEMENT SPECIFICATION

PART 1 GENERAL

1.1 SUMMARY

A. Work Included: This Section includes providing all material, labor, tools and equipment for installation of Filterpave® Porous Pavement System (FPPS) as shown in the Contract Documents and as specified in this Section.

B. The scope of this section includes subgrade preparation and installation of FPPS paths, driveways, parking lots and other areas requiring a firm and porous surface.

1.2 SUBMITTALS

A. Submit manufacturer's shop drawings including Manufacturer's product data, samples and section layout.

B. Submit qualifications certifying the installer is experienced in the installation of the FPPS.

1.3 QUALITY ASSURANCE AND CONTROL

A. The FPPS shall be provided from a single Manufacturer for the entire project.

B. Prior to the awarding of the contract, the contractor shall furnish owner or owners agent a statement of qualifications, experience, and a project listing of successfully installed FPPS projects, including site addresses and references.

C. If the FPPS placing Contractor has no previous experience with the product, Contractor shall retain a Manufacturer approved site engineer to supervise base preparation, material production, placement, finishing and curing. Expense for the approved site professional will be the Contractor's responsibility.

D. Test Panels: If so required by the contract, the FPPS Contractor may be required to prepare test panels. Cost of creating and, if necessary, removing test panels shall be paid as a separate line item in the contract proposal. Test panels will be of the same depth and shall be placed upon the same sub-base as the project slab.

E. USGBC LEED® Credit Contributions

1. The Filterpave system contributes to USGBC LEED® green building credits in the following categories:

   a. Reduced Site Disturbance through creation of permeable surfaces and reduction of stormwater detention facilities, resulting in less construction impact on an area basis and resulting in less potential particulate runoff and impact to the surrounding land and watercourses.

   b. Stormwater management through use of permeable surfaces that provide stormwater infiltration and reduce stormwater runoff.

   c. Reduced Heat Island Effect through creation of a cooler surface.

   d. Recycled Material Content through use of materials with recycled content to reduce impacts from extraction and processing of new virgin materials.

   e. Regional Materials by using material within 500-mile radius of source, if applicable.

F. Pre-Installation Meeting: Prior to installation of any materials, conduct a pre-installation meeting to discuss the scope of work and review installation requirements. The pre-installation meeting shall be attended by all parties involved in the installation of the FPPS.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver materials to site in Manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and Manufacturer.

B. The materials shall be stored in accordance with Manufacturer's instructions. The materials shall be protected from damage and out of direct sunlight and precipitation.

C. The materials shall be delivered, unloaded and installed in a manner to prevent damage.

PART 2 PRODUCTS

2.1 ACCEPTABLE MANUFACTURER

A. Filterpave Products LLC. 555 E. Green Meadows, Ste. 9, Columbia, MO 65201
Phone (573)228-9025. Fax (573)228-9029.
E-Mail info@Filterpave.com. Website www.Filterpave.com.

2.2 MATERIALS

A. Proven locally available materials having a track record of satisfactory performance shall be used. However, recycled glass and elastomeric binder must be only as approved by the manufacturer of the FPPS and at times may not be locally produced.

B. Base Aggregate

1. Base aggregate shall consist of crushed aggregate, crusher run limestone or equivalent material of good structural quality with a particle range from 3/8 to 1 inches.
2. A choker course of 1 ½ inches of 1/4-3/8 inch clean, crushed aggregate shall be placed above the base aggregate
3. All base aggregate materials shall have less than 5% fines.

C. Binder

1. The high strength elastomeric binder shall be specifically formulated for FPPS applications and provided by FPLLC's approved Manufacturer.
2. The elastomeric binder components shall be shipped in sealed and water-tight containers as specified by the Manufacturer.
3. Once unsealed, the elastomeric binder packaging shall use Manufacturer-approved desiccant caps to assure that moisture is not introduced to either of the two-part components of the binder.
4. MSDS information on the elastomeric binder material as well as ratio of binder to glass content shall be required.
5. The temperature of the binder shall be maintained within a range of 70 – 90 degrees Fahrenheit at all times until mixed and installed.

D. Aggregate

Glass Material Specification*

Glass approved for use with the Filterpave system must meet the material specification standards outlined below. Glass that does not meet the specification will be rejected and returned to the Glass provider at the Glass provider's expense.

Item	Specification
Amino-Silane Treated	Glass must be Amino-Silane treated 6% solution to glass weight.
Glass Particle Size	Shard-less and round-edged glass, 100% passing #4, retained on #12 screen, with 5% fines maximum.
Colors	Mixed, vary by region
Moisture (when bagged)	0-<10%. Bagged glass with 10% average moisture or more will be rejected.
SuperSak	5.1 or better load rated and 3" hand written SuperSak number with Born on date.
SuperSak Capacity	2500 Lb. Max

Stone Material Specification*

Stone approved for use with the Filterpave system must meet the material specification standards outlined below. Stone that does not meet the specification will be rejected and returned to the Stone provider at the Stone provider's expense.

Item	Specification
Stone Type	Igneous Rock, angular to sub-angular or rounded, 6.2 or higher on Moh's hardness scale, 0-<1% absorption
Stone Particle Size	100% passing 3/8" screen & retained on #8 screen, or passing ¼" & retained on #12 screen. 5% fines maximum.
Colors	Brown, Tan, Gold, Red, Black, Gray, Green. (Vary by region)
Moisture (when bagged)	0-<10%. Bagged aggregate with 10% average moisture or more will be rejected.
SuperSak	5.1 or better load rated and 3" hand written SuperSak number with Born on date.
SuperSak Capacity	3000 Max

*Refer to the Filterpave Aggregate Specification Quality Control document.

E. Pigment
   1. Pigmentation of resin shall be added per the Manufacturer's instruction.
   2. Colors shall **only** be chosen from the FPLLC standard palette made available to the certified contractor.

F. Proportions
   1. Contractor shall be required to meet Manufacturer's specification for proposed binder ratio (typically expressed as a percentage by weight of glass) and shall maintain this ratio within a plus or minus 5 percent tolerance.
   2. The recycled glass content will be derived from 100% post-consumer food and beverage containers. Stone shall be igneous rock or equivalent. 1% deleterious material including, paper, ceramics, plastic and metal to be present. All aggregate shall meet FPLLC specifications per the Filterpave aggregate specification guide.
   3. Admixture ratios to be dictated by site-specific weather conditions and approved by binder supplier. Contractor to take specific precautions to accurately and thoroughly combine admixtures to avoid early cure FPPS mix.

G. Surface Overcoat
   1. The overcoat material shall be supplied the Manufacturer.
   2. Surface over-coating shall be applied with dual component sprayer.

H. Geotextiles
   1. The geotextile shall be non-woven, 8 ounce per yard density minimum average value with a minimum infiltration rate of 90 gal/min, per sq ft, or as specified in the Contract Documents.
   2. Other geotextiles may be allowed as approved by the Engineer.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify site conditions are as indicated on the drawings. Notify the Engineer if site conditions are not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

B. Verify layout of FPPS is as indicated on the drawings. Notify the Engineer if layout is not acceptable. Do not begin preparation or installation until unacceptable conditions have been corrected.

3.2 INSTALLATION

A. Sub Grade Preparation
   1. Subgrade Permeability

a. Prior to FPPS placement, the sub-grade permeability shall be tested by double ring infiltrometer, or other suitable test for sub-grade permeability.

b. Sub-grade permeability shall meet a minimum infiltration rate of 1 inch per hour unless otherwise approved by Engineer.

2. Sub Grade Support

a. Sub-grade shall have adequate support to carry the weight of low ground pressure equipment

b. If borrow material is required, it shall be clean and free of deleterious materials. It shall be placed in 8 in lifts and compacted to a 90 percent Standard Proctor in accordance with ASTM D1557 or AASHTO T180.

3. Groundwater

a. Depth to groundwater is recommended to be a minimum of three feet from bottom of base at time of high groundwater interval to be confirmed at time of excavation.

4. Base Material

a. Base depth shall be site specific and as described in the Contract Documents.

b. Place 3/8 to 1 inch clear stone with a maximum of 5 percent fines passing the #200 mesh using LGP equipment.

c. An alternate base foundation layer of 3/8 to ½ inch cleaned, crushed, screened rough glass may be used.

d. A 1 ½ inch choker course of 1/4 -3/8 inch clean, crushed aggregate shall be placed above any base aggregate.

e. Choker course shall be leveled to within 1/4 inch of specified elevation as shown in the Contract Documents.

f. All material shall be compacted to a 90 percent Standard Proctor in accordance with ASTM D1557 or AASHTO T180

5. Formwork

a. When forms are required, forms shall me made of aluminum, wood, steel, or plastic.

b. Forms shall be the full depth of the pavement.

c. Forms shall be sufficient strength and stability to support mechanical screeding equipment without deformation following spreading and strike-off operations.

d. A non-petroleum based, 100% biodegradable vegetable oil or specially design PUR mold release agent (such as Frekote Emralon 329) shall be applied to forms, tools and any equipment that will come into contact with the elastomeric binder. Under no circumstances should a petroleum based form release agent be used.

e. Forms shall not have stakes or spikes protruding above the top of the forms to assure even screeding of the poured material

B. Mixing

1. Mixing shall be with volumetric mixers specifically designed for producing FPPS.

2. All mixing shall be on-site to reduce waste and impact to adjacent roadways.

3. The volumetric mixer shall operate at 300 RPM minimum and shall be instantaneously produced and discharged into the conveyance equipment and/or directly to the forms to maintain maximum working time.

4. The volumetric mixer and mixer components shall be kept dry until the binder can be introduced.
5. Calibration of the binding agent content shall be completed upon the mixer and the percentage will be in conformance with the manufacturer's design formulation.

C. Placement

1. Discharge shall be a continuous operation and shall be completed as quickly and efficiently as possible.
2. Material shall be discharged into conveyance equipment as close to its final position as practical to ensure that fresh mix enters the mass of previously placed material.
3. In the event of material shortage or mechanical delays in mixing, a construction joint equivalent to project forms will be utilized.

D. Finishing

1. Strike off shall be performed using vibratory power-screed or vibrastrike type device with a metal screed as dictated by project parameters. Extreme care should be taken to strike off the material as flat and uniformly as possible. No wooden screeds are allowed to be used.
2. Filling and cutting imperfections can be completed with fresno or other hand trowels immediately after strike off. Any apparent low spots must be filled only immediately (<5 minutes) after strike off and floated in using hand or mechanical trowels.
3. Finishing shall be accomplished with Fresno and hand trowels within 10 minutes of screeding.
4. Edging shall commence immediately after final finish with conventional concrete edging tools. Immediately (<5 minutes) fill low spots along the edge created by strike off operations.
5. If required, spacing of and determination between tooled edge construction joints or mechanically cut in compression joints to be determined by project specifications.

E. Surface Overcoat

1. Two coats, 3 mils thick, of Manufacturer approved surface binder material shall be applied to the Filterpave installation no sooner than 4 hours after installation is completed.
2. If traffic is allowed to access the Filterpave installation, the area shall be cleaned and allowed to dry one day before application.
3. The contractor shall follow Manufacturer's recommendations for preparation, placement and curing.
4. Surface overcoat shall not be subject to rain, sleet or snow for a minimum of four hours after installation.

F. Curing

1. Unless otherwise approved by FPLLC, a minimum of three days shall be allowed for curing prior to vehicular traffic, if ambient temperature does not fall below 60° F (15.5° C) for 72 hours following the pour, five days (120 hours) if ambient temperatures do fall below 60° F. If ambient temperatures fall below 50° F (10° C) methods should be implemented to maintain temperature of the base and the Filterpave material at or above this temperature.
2. During the curing period, protect the FPPS installation from damaging mechanical disturbances, water flow, loading, shock and vibration.

3.3 PAVING RESTRICTIONS

A. Do not place FPPS when the following conditions exist.

1. Unstable or frozen base.
2. During rain or snow.
3. When air temperature is less than **50°F** or more than **100°F**. Do not install Filterpave if frost is expected within 72 hours after the installation without taking certain precautions to protect the base and Filterpave course from frost accumulation. Methods should be implemented to protect the base and the Filterpave material from temperatures falling below **50°F** or rising above **100°F.**

PART 4 MEASUREMENT AND PAYMENT

4.1 MEASUREMENT AND PAYMENT

A. Measurement and payment for FPPS and aggregate base shall be computed by measuring the area of FPPS compacted and in-place in square feet multiplied by the depth of Filterpave in inches. A safety factor for testing, overages and clean-up will be included.

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