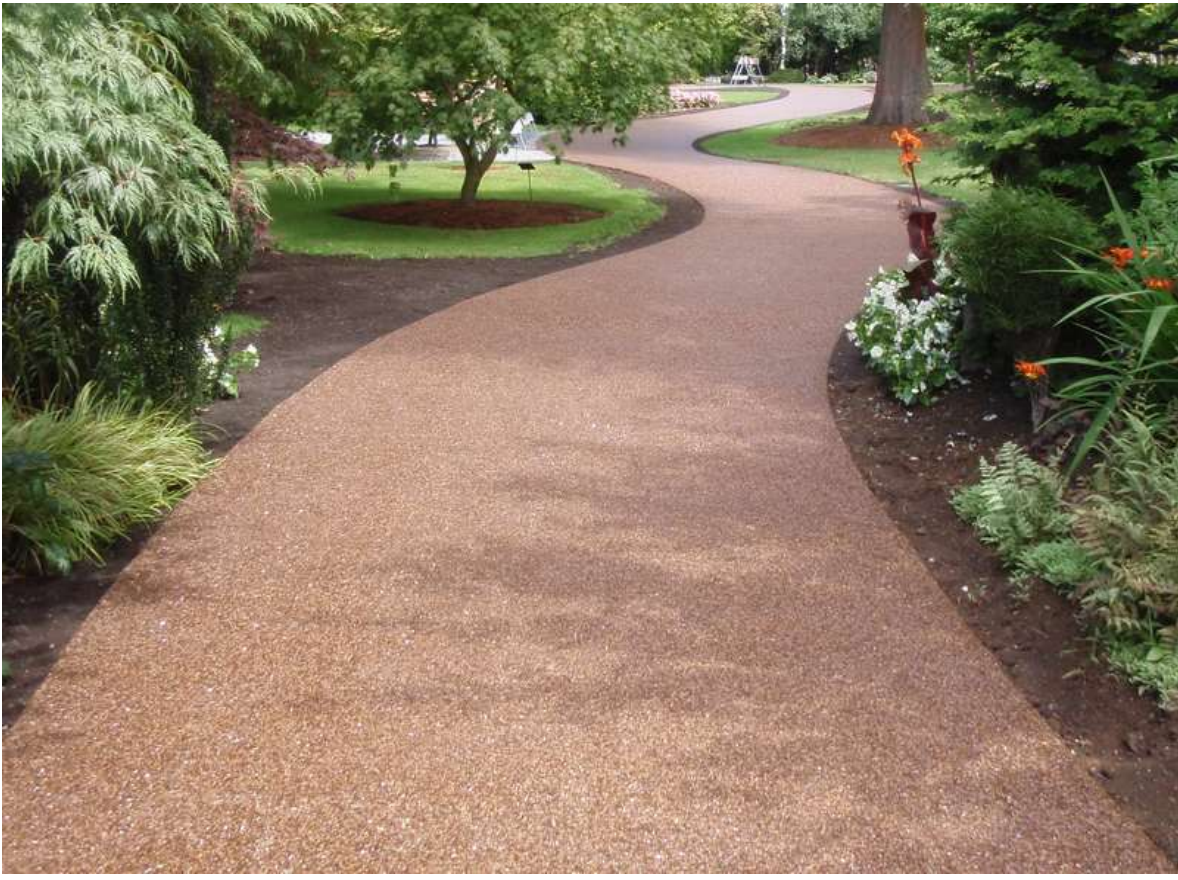




FILTERPAVE Products LLC



FILTERPAVE®
Glass and Stone Series

DISTRIBUTOR HANDBOOK

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FILTERPAVE® INTRODUCTION

INTRODUCTION

Filterpave Product LLC's Filterpave® Sales Model

FPLLC continues to establish a network of distributors and representatives in the erosion control and stormwater industry who work closely with architects, engineers and contractors in their territories. The Filterpave porous paving systems (FPPS) is intended to fit well with other products that these distributors and representatives market and sell. In order to most effectively develop FPPS projects in your territory, many of FPLLC's existing contractors, installers and representatives will be acting as the Filterpave Representative in your territory.

Filterpave Representative and Master Distributor Partnership

The coordination between the Filterpave Representative and the regional Filterpave Master Distributor (MD) will be critical to the program's success. Initial contractor training activities will be coordinated through FPLLC with assistance from the Filterpave Representative.

The Filterpave Representative in your territory will be responsible for business development activities within your territory. These activities include working with architects, engineers and municipal storm water regulators to develop FPPS projects, specifications, assisting to assure properly designed base requirements and the FPPS wearing course for the intended application. Additionally, the Filterpave Representative will attend appropriate regional trade shows/ construction conferences to introduce and promote the Filterpave technology to the marketplace. A commission will be paid to the Filterpave Representative by FPLLC for all projects in the territory.

Master Distributor who establishes projects on their own will be required to report upcoming projects to their local Filterpave Representative for logging and assistance. The MD recognizes that the representative's efforts promoting FPPS at tradeshow and through engineering and architectural firm visits often yield contacts that will come directly to the Distributor.

All business development activities need to be closely coordinated with the Filterpave Representative as this relationship will become the backbone to positive selling results of the FPPS in the territory. Clear and frequent communication between the Filterpave Representative and the Master Distributor will build successful FPPS projects in the territory.

The Master Distributor and the territory Filterpave Representative will need to coordinate schedule expectations and pricing. While the MD is solely responsible for scheduling and pricing, the Filterpave Representative must be kept informed of MD availability and pricing so that they can confidently interact with the potential customers. As large projects develop, it is critical to inform FPLLC of the tentative raw material requirements and schedule of construction at least three weeks prior to installation to assure adequate material supply is readily available.

Subcontractor Relationship Rights

A Master Distributor may designate different levels of subcontractors. An MD may choose to employ subcontractors for on-site Filterpave batch mixing, site preparation, forming and FPPS finishing tasks. These are acceptable only if the subcontractor is approved by FPLLC and properly trained.



FILTERPAVE® INSTALLATION GUIDELINES

Quality Assurance

The Filterpave Representative will be responsible to assure that the Master Distributor is carrying out Quality Assurance. All phases of the project including base construction, sample procurement and testing and final FPPS finish will be the responsibility of the Master Distributor. FPLLC will rely on the regional Filterpave Representatives to ensure the proper quality of construction is met and will periodically monitor how well this activity is being completed.

Intellectual Property

Filterpave® is a registered trademark of Filterpave Products LLC and products are protected under patent regulations. Use of this document, the trademarks of the system or system components, and the sale or installation of the product by unauthorized representatives, contractors or others is strictly prohibited.

Key Contacts

Filterpave Representative: _____ Territory: _____

Filterpave Business Development Manager

Tim Killday FPLLC, Ph: 573-881-1749 Email: tim@Filterpave.com

FPLLC Marketing and Communications

Kathleen McBee, FPLLC, Ph: 573-819-0548 Email: kathleen@Filterpave.com



FILTERPAVE® INSTALLATION GUIDELINES

INSTALLATION GUIDELINES

Also refer to the Filterpave Quality Control Document for additional details.

Base Preparation

Excavation

1. Excavate the subgrade using low ground pressure (LGP) equipment. Narrow and/or high pressure wheeled vehicles should be avoided as they over-compact the soil and reduce infiltration.
2. Excavate to the design depth of base to meet design requirement, or to the design depth of base required plus 3 inches. A 1.5, 2, or 2.5 inch Filterpave depth may be applicable for pedestrian traffic and light vehicle trailways/driveways. Permeability and CBR testing of subgrade should be performed prior to construction to confirm field porosity and load support capacity in order to facilitate proper base design depth. FPPS should be installed on sites with specific design according to nationally recommended engineering standards and practices adhering to any state and local laws and regulations.

Geotextile and Under Drain Pipe Installation (if required)

1. If required by design, install an 8 oz non-woven filter fabric, with a minimum infiltration rate of 90 gal/min, per sq ft, on the **bottom and sides** of the excavated area. Overlap textile a minimum of 12 inches at the edge of fabric, and keep seams clear of washed aggregate. Run fabric up the sides of the excavation and tack to the backside of forms to prevent sediment migration into storage reservoir.
2. If underdrain piping is specified, place them over the geotextile and build pipe boots as per project drawings.

Placement of Base Materials

1. Place a clean, crushed, washed 3/8 inch to 1 inch aggregate (may be mixed with recycled glass) in the excavated reservoir in compacted 12 inch lifts to the specified depth. Fines contained in the base should be minimized, and should not exceed 5%. The base course should extend a minimum of 1 foot beyond the edges of the pavement.
2. Level the base course. Angular base stone is required to assure a more true and workable base surface. Add a 1 1/2" choker course of 1/4 - 3/8 inch angular stone as a surface course to the base. This will allow permeability, yet offer a tight and easy-to-grade surface to assure true fine grading for the top of base elevation.
3. **Compact the base with plate compactors or hydrostatic roller to 90% standard Proctor density.**



FILTERPAVE® INSTALLATION GUIDELINES

Forming

Form the area as you would form for the installation of a concrete pour. Plan an area to allow for mixer access, pouring and finishing crews. Set forms securely using steel pins which will punch through the underlying geotextile better than wood stakes. Keep all stakes below the top of the forms to allow for screeds to pass.

Site Considerations

All FPPS systems utilize an adhesive binder. As such, the surface will remain tacky several hours while curing. Blowing debris, dust, and particles from nearby spoils piles may contaminate the surface and discolor it permanently. Appropriate precautions to avoid contamination of the surface shall be taken, such as: covering of spoils piles, wetting un-vegetated areas, etc.

Pouring of the Filterpave® Mixture

Material Preparation

1. All paving mix shall be kept dry until mixed with the polyurethane. Supersaks of glass or stone shall be waterproof or shall be kept under moisture-resistant cover. They shall also be kept from direct contact with the grade to avoid ground moisture by use of pallets or other elevating mechanisms. The mixer hopper, the auger and mixing zone at the bottom of the auger shall be kept dry. Stage glass or aggregate Supersaks at the closest reasonable location at the site that expedites material handling between stockpiles and the mixer.
2. Use a 35-gallon plastic waste drum and portable digital scale to determine glass or aggregate output from mixer. Calibrate Polyurethane content as recommended by FPLLC.
3. Pigment for the Filterpave system shall be either added to the resin totes prior to installation or shall be added via a customized polyurethane pumping system capable of dosing the dispersion agent on the fly. Always agitate pigment dispersions and resins prior to use.

Test Cylinders

1. Once mix ratio is set, and the pour begins, pour a test cylinder in accordance with the established FPLLC procedure, listed below, using a 3" diameter, 6" deep cylinders and send to FPLLC's certified partner for analysis.
 - a. Fill the cylinder 1/3 full and drop on a hard surface, from a height of 3 to 4 inches, 5 times.
 - b. Fill the cylinder to 2/3 full and repeat drop from 3 to 4 inches on a hard surface, 5 times.
 - c. Fill cylinder to over flowing, compact and screed off with a trowel or similar item.
2. Contractors should submit (2) cylinders at the start and (2) cylinder at the end of each continuous pour. If a pour is more than 5000 square feet (2) cylinders should be taken at approximately in the middle of the pour and for each 5000 square feet.

Protection of the Base

1. When it is necessary for equipment to be driven directly on the base aggregate, plywood sheets or a surface protection system should be laid out to maintain the continuity and level elevation of the prepared base.



FILTERPAVE® INSTALLATION GUIDELINES

Installing Expansion Joints

1. Expansion joints shall be placed as per design (at 100 feet continuous) to allow for expansion and contraction. Troweled joints are also acceptable at shorter intervals, but do not substitute for full gap joints. Sawed joints are acceptable and must be filled with compression joint material.

Equipment Protection Methods

1. If the mixer is used non-continuously or intermittently during pours, continue to run the auger in order to prevent it from locking up with hardening binder material.
2. Do not under any circumstances place hands near auger when it is in operation. Hands should never be placed in the auger zone at any time. Further, all persons should stand more than 3 feet away while the auger cover is open and the auger is in motion during cleanup.

Finishing Procedure for Filterpave® Pavement

1. When using forms, rake the material relatively flat, about one-half inch higher than the top of the forms. Use a metal screed vibra-strike or vibratory power-screed to screed the material level with the top of the forms. Care should be taken to fill low spots along edges. **No wooden screeds are allowed to be used.**
2. Fill all low spots immediately before final finishing. Do not attempt to fill low spots after the material has been in place for more than 5 minutes as it will not bind properly with the screeded slab.
3. Finishing is time-sensitive and must be completed with hand trowels and a Fresno within 10 minutes of screeding. DO NOT rework surface after 10 minutes. In extremely warm climate above 85 to 90 degrees, the work times will be reduced as curing is accelerated by heat.
4. Use walking or hand edger along forms and hand trowel out lines left by the edger. Fresno finishing needs to be done quickly as the mix will begin to set in approximately 10-15 minutes, sooner in extremely hot weather.
5. Edge trowel at construction expansion joint.

Surface Overcoat

1. Two coats, 2-3 mils each, of FPLLC approved surface binder material shall be applied to the Filterpave installation no sooner than 4 hours after surface finish
2. If traffic is allowed to access the Filterpave installation, the area shall be cleaned and allowed to dry before application. The contractor shall follow all recommendations for prep, placement and cure and shall assure that application allows a minimum of four hours to dry before rain or snow falls and a minimum of two hours before dusk.
3. Surface coat shall be placed utilizing a low pressure dual component spray system. 1 kit will provide 6 mil coating for 1250 square foot.

Form Release

1. If using forms, apply the mold/form release agents, such as, Frekote Emralon 329, 100% natural Alderox® ASA-12, Silicon or vegetable oil, to all areas that come in contact with the Filterpave surface.
2. Upon stripping the forms a 2/3 aggregate, 1/3 topsoil mixture should be placed along the edges of the Filterpave installation for protection against tires dropping off the pavement.



FILTERPAVE® INSTALLATION GUIDELINES

Clean-Up and Safety Precautions

1. Clean-up must be affected immediately after the pour is completed. Begin by running dry aggregate material through the mixer until aggregate has picked up all resident wet urethane from within the auger zone.
2. Final clean-up should be completed by running base course through the auger for a minimum of five minutes. The auger must be cleaned out first as a delay or inadequate cleaning of the auger will lead potential lock-up as the binder sets. Other areas to pay close attention to are the straight and swivel chutes as well as all finishing equipment. Areas contacted by the polyurethane that are not properly cleaned may require sandblasting later.
3. Upon completion of cleanup, the grease joints should be recharged.
4. Under no circumstances should hands be placed near the auger when it is in operation or while cleaning. While the auger boot cover must be pulled back for access, it should be done while the auger is not in motion. Further, all persons shall stand more than 3 feet away while the auger cover is open and the auger is in motion. A seized auger may have built up torsional pressure that may release and spin even while the auger drive is off. Hands should never be placed in the auger at any time.
5. If the auger becomes jammed, shut off the mixer and use a pneumatic chipping hammer to clear hardened material.
6. Hand tools, and screeds are best cleaned by scraping excess mix off on a regular basis and thoroughly after project completion. Power buggies and wheel barrows need to be similarly scraped immediately after project completion. Additional material may be removed with Acetone. Mold release agents may allow material to be removed after polyurethane cures.

Curing Times/Temperature Ranges

1. Initial set times of the Filterpave mix will vary with temperature, with warmer temperatures causing a more rapid set up. As temperatures increase, the window of opportunity for finishing will decrease.
2. A minimum cure period of three days should be followed in all cases. When ambient low temperatures dip below 60° F (15.5° C), five days shall be allowed for cure.
3. No material shall be placed when temperatures are below **50° F**. ISO and Resin shall be kept between **70° - 90° F** at all times. Do not install material if frost is expected within 72 hours after the installation without taking certain precautions to protect the base material and keep the Filterpave material above 50 degrees F.



FILTERPAVE® TOPCOATING GUIDE

Surface Overcoat Guide

In order to provide additional UV protection and to help strengthen the surface, a two-component aliphatic polyurethane overcoat is applied at least 4 hours after the Filterpave installation is completed. The overcoat must be supplied by Filterpave Products LLC which consists of a two part system to be applied with a low pressure dual component spray system or a professional grade air sprayer with a proper spray top. Pigment is optional on a job by job basis

The following steps describe the process.

Materials Needed:

- Leaf Blower/Leaf Vacuum
- Stiff bristled push broom
- Low pressure washer (optional)
- Pigment
- Acetone
- Mixing sticks
- Gloves
- Eye Protection
- Tape
- Dry Fine Sand

1. Ensure that the pavement is clean of debris and dirt and is **dry**. Depending on site conditions and the time between the completion of the installation and the application of the overcoat, this is accomplished using one, or a combination, of the following: leaf blower, leaf vacuum (similar in form to lawnmower), hard bristled push broom, and/or low pressure washer. If the surface is pressure washed, wait for the surface to dry completely, typically overnight, before applying topcoat.
2. Tape off all areas that abut Filterpave area to prevent overcoat from getting on other surfaces.
3. If using pigment, add 250 grams of pigment into the 3-gallon "B" side container. A small rubber scraper is best used to remove the majority of the pigment from the container. Mix well and if using a power mixer take care to refrain from getting air bubbles that may homogenize in the material. The material will have an even color throughout with no pigment swirls present when fully mixed. Some colors and/or applications may call for a larger dose of pigment. Please consult FPLLC when needed.
4. For a dual component sprayer, prepare the spray rig to receive and apply material. Always use a new static mixer wand when starting. Always change the static wand if material rests in the wand for more than 3 to 4 minutes.
5. Pour the pigmented B side material into the sprayer pot designated for the B side material. Pour the A side material into the sprayer pot also designated for the A side material.
6. Before starting, spray material for at least 30-60 seconds into a waste container to ensure that a full and even flow of material is going through the spray nozzle. One 5 gallon kit will cover 1250 square feet at 6 mils thickness.
7. If using an airless sprayer, mix the A and B sides together, on ratio, thoroughly with a power drill and mixing bit for 60 seconds. It's best to consume the entire dose through the sprayer within 25 minutes of combining the A & B sides.
8. Spray the first layer 2-3 mils thick over a section in a horizontal pattern.
9. Spray a second layer also 2-3 mils thick, at a pattern 90 degrees to the first layer over the same section. Continue this process until the desired area is covered at approximately 10 mils thick.
10. (Optional, but recommended on grades of 5% or greater.) For high friction surfaces, apply sand to the top coated surface while still tacky on the top layer. Using a hand lawn seeder, evenly broadcast sand on the surface at a rate of approximately 1 lb of sand per 100 square feet.



FILTERPAVE® INSTALLATION RATES

11. Do not apply additional overcoat to areas that are already becoming tacky as this will prevent the material from thoroughly setting up.
12. Do not walk on wet or tacky overcoat surface.
13. The material will completely set up in approximately 4-8 hours. Surface must be dry for at least 4 hours after the application is complete. Prevent any traffic on areas until the day after the application.
14. Apply only when temperatures are above 50 degrees Fahrenheit. If temperature is below 70 degrees the material will need to be heated to maintain proper viscosity for spraying. If the nights are cooler than 60 degrees, store material in a covered, heated area.
15. Some applications may require or be better served with a rolled on application. In such cases refer to the Filterpave Quality Control document for proper procedures.

INSTALLATION RATES

1. For installations at 3 inches depth, 1,000 square feet can be poured per hour. Larger mixers may allow for an increase in productivity.
2. The limiting factor for production rates tends to be very detailed finish requirements for a particular site design and aggregate material handling/loading.
3. Use of an all terrain extendable boom forklift (telehandler) will greatly expedite the movement of Supersaks of material from the staging area into the mixer.
4. Power buggies are helpful to allow for stationary “mobile plant” use of the Filterpave mixer and are particularly useful in pathway construction where access is difficult.
5. Finish crew should be maintained in close proximity to the pouring crew in order to provide the best surface finish possible.



FILTERPAVE® MAINTENANCE DOCUMENT

ORDERING GUIDE

Credit Application

Before material can be ordered, the Master Distributor must complete a credit application and be approved for a credit line or will be required to pay for material in advance (see credit application with supply agreement).

Material Ordering & Calculation Guides

An Excel spreadsheet is available from FPLLC to use as a calculation tool. Orders will not be valid without a purchase order from an authorized agent of the Master Distributor. The third tab of the spread sheet is an order form that is automatically filled with values from the calculator. This order form can be submitted as a suitable PO.

The Master Distributor shall give early prior notice of approaching projects. Actual orders must be received no later than 21 days in advance of shipment. Shorter lead times will be granted only when possible. Be sure to allow for shipping time in addition to 21 days advance notice.

All aggregates are to be ordered directly from an FPLLC approved vendor. Master Distributors are also allowed to produce their own aggregates that meet the FPLLC QC specifications. Master Distributor will handle all freight arrangements related to aggregate. FPLLC will help and assist whenever possible.

Waste Estimates

(Glass weighing 92.9 lbs per cubic foot) (Stone weighing 100 lbs per cubic foot)

Filterpave Glass Series Pavement: One ton (2,000 lbs) of 40/60 glass series covers 77 square feet at a 3 inch depth and 123 square feet at a 2 inch depth.

Filterpave Stone Series Pavement: One ton (2,000 lbs) of granite covers 80 square feet at a 3 inch depth and 84 square feet at a 2 inch depth.

Glass and stone will vary slightly in gradation and density. Therefore aggregate weights can vary. The FPLLC calculation tool has been designed to allow the contractor to input the actual weight of the aggregate selected for a particular job. This will help to more accurately calculate the amount of material required for a job. This calculator also allows for a mix of glass and stone to produce different mix ratios.

Note: We use 3.3 inch for material calculation purposes of 3.0 inch depths and 2.25 inch for material calculation purposes of 2.0 inch depths, a 10% safety factor in each case.



OPERATION & MAINTENANCE NOTES

OPERATION & MAINTENANCE NOTES

Refer to the Mixer Manufacturer's Manual for Complete Instructions and Recommendations.

SUGGESTED MINIMUM TOOL LIST

- 3/8 Socket Set
- Combination Wrench Set 5/16-1½
- Ball Peen Hammer Medium/Heavy Weight
- Punch, Long
- Chisel ½ in blade
- Slip Joint Pliers
- Medium Adjustable Wrench
- Vise Grips
- 1 Pipe Wrenches (18 in and 24 in)
- Phillips Screw Driver
- 1 Flat Screw Drivers, (One very small blade, One medium blade)
- Air Chisel or Nibbler
- Voltage Tester
- Can of Lubricant or Liquid Wrench

RECOMMENDED SPARE PARTS LIST

Item	Contact Information
Two (2) ea. (min.) Drierite desiccant disposable vent drier cartridges, Stock # 40451.	W.A. Hammond Drierite Co. Ltd. Xenia, OH Ph: 937-376-2927 Email: drierite@aol.com www.drierite.com
Two (2) ea. Drierite cartridge drum adapters, Stock # 50001.	
Ten (10) ea. Static disposable plastic tube mixers, Stock #7701063 (162A-632)	Nordson.EFD East Providence, RI P: 1-800-556-3834, 1-401-431-7000 or Email: info@nordsonefd.com www.nordsonefd.com

REGULAR MAINTENANCE

Refer to the complete Mixer Manufacturer's Manual for Compliance. **Daily, Bi-Weekly and Monthly Checklists** are attached.

SAFETY & OPERATION PRECAUTIONS

Refer to the complete Mixer Manufacturer's Manual for Compliance.