FACT DATA SHEET & INSTALL GUIDE
FORTA-FI®

Fiber Reinforcement for Asphalt

FORTA-FI® asphalt fiber features millions of high-tensile strength fibers that are dispersed into each ton of asphalt mix during the plant production process. FORTA-FI is the simplest way to reinforce asphalt. Benefits achieved include greater resistance to fatigue, reflective, and thermal cracking, rutting, and crack propagation. FORTA-FI reinforced asphalt mixes build stronger, more durable pavements, significantly reducing life-cycle costs of your roadway.

Features /

- High Tensile Strength Aramid Fibers
- Complete and Uniform Dispersion & Distribution
- Feeds Easily into Batch or Drum Plants
- Superior Technical Support and Guidance

Benefits /

- Stronger, More Durable Asphalt; Increased Service Life
- Fatigue, Reflective, and Thermal Cracking and Rutting Resistance
- No Change to Mix Design or Construction Process
- Easier Compaction

FORTA-FI Reinforced Asphalt /

FORTA-FI fiber blend is added directly to the asphalt mix during production creating a three-dimensional material reinforcement throughout the entire asphalt layer. This reinforcement helps control thermal, reflective, and fatigue cracking, as well as reduce rutting and raveling.

FORTA-FI is a cost-effective way to improve the durability and longevity of a variety of pavement applications such as airports, streets, highways, interstates, and industrial parking lots, etc. Additionally, FORTA-FI can be used as a stabilizing agent in SMA's and OGFC's.

FORTA-FI

Physical Properties /

Fiber	Aramid	Polyolefin
Specific Gravity	1.44	0.91
Density	2,427 lb/cu yd (1,440 kg/cu m)	1,534 lb/cu yd (910 kg/cu m)
Tensile Strength	400 ksi (2,758 MPa)	N/A*
Operating Temperature	-100 – 800°F (-73 – 427°C)	N/A*
Length	0.75 in (19 mm)	0.75 in (19 mm)
Form	Monofilament	Serrated
Color	Yellow	Yellow
Acid Resistance	Inert	Inert
Alkali Resistance	Inert	Inert

* Fibers will melt or become plastically deformed during asphalt mix production.

Table 1.

Delivery, Storage, and Handling /

Deliver FORTA-FI fiber-reinforcement in sealed, undamaged containers with labels intact and legible, indicating material name and lot number. Deliver fiber-reinforcement to plant location convenient to where it will be introduced into the mixing process. Material should be covered and stored off the ground. **Do not allow boxes to become wet.**

PACIFIC GEOSOURCE

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Plant Introduction: Continuous Drum Plant /
FORTA-FI reinforcement fiber will be added at a rate of **one pound per ton** of asphalt concrete.

A. For projects larger than 3,000 tons with daily production quantities exceeding 1,000 tons per day, it is recommended that fiber-reinforcement be added using a fiber metering device (FMD).

The FMD will be supplied by Pacific GeoSource and will be accompanied by an experienced technician who will set up and run the machine for the duration of the project. If an FMD is purchased or leased, certified personnel from Pacific GeoSource will provide fiber feeding training and certification for plant personnel as needed.

Figure 1: *Voyager* Portable Fiber Feeder.

1. The FMD requires a 240/480 volt electrical hookup at the plant and should be installed and tested prior to the start of asphalt production.
2. The FMD holds 300 pounds of fiber-reinforcement in the storage hopper at one time. Fiber should be loaded into the FMD in bulk without any plastic bags. During production, the hopper should be refilled prior to reaching a minimum fiber quantity of 30 pounds.
3. The FMD is a weigh-in-motion drum and blower system which utilizes highly sensitive load cells to precisely meter and dispense the fiber. This innovative fiber feeding system certifies the feed rate matches the plant production rate ensures a dosage rate of one pound per ton. Fiber metering data is recorded and can be downloaded from the device as required.
4. Fiber-reinforcement is fed from the FMD into the drum via a flexible 4-in clear hose through the RAP port or other suitable entry point. The fiber injection point should be after fines collection and before the addition of liquid asphalt, so that mixing may occur within the hot aggregate prior to coming in contact with liquid binder.
5. A minimum plant production temperature of 220°F is recommended.

B. For projects smaller than 3,000 tons, it is recommended that fiber be fed manually via one of two procedures.

<u>One Pound Bags</u>

1. Place individual one-pound bags onto the recycled asphalt pavement (RAP) belt at a rate matching the output of the plant in tons per hour (TPH) per Equation 1.

   Equation 1:

   3600/Tons per Hour

   For example, for an operation at 300 TPH, the dosage rate is

   3600/300 = 12 (place 1 bag every 12 seconds)


Figure 2: One pound bags on RAP belt.

2. Plastic bag will melt instantly when bag enters drum and fibers will disperse into the mix. A minimum plant production temperature of 275°F is recommended to fully melt the plastic bag.
3. Adding multiple one-pound bags at once is not recommended.

Little Shot Fiber Feeder

1. Provided by Pacific GeoSource on a short-term lease, the Little Shot is a small portable unit which requires an air compressor and a 4-in diameter hose to direct flow of loose fibers through the RAP port.

Figure 3: *Little Shot*™ Fiber Feeder.

2. The Little Shot should be used when the temperatures inside the drum at the RAP entrance are insufficient to immediately melt the plastic bag to release the fiber. Scenarios in which this could occur include warm mix processes where drum temperatures are less than 315 °F or high and/or saturated RAP contents.

3. Individual one-pound bags of FORTA-FI are opened and feed into the Little Shot at a rate matching the output of the plant (see part 1 above).

Plant Introduction: Batch Plant /

FORTA-FI reinforcement fiber will be added at a rate of **one pound per ton** of asphalt concrete.

One Pound Bags

1. Add individual one-pound bags to the aggregate in the weigh hopper. Plant operations are typically unaffected, and modifications are not needed. However, depending on plant operations, slight modifications to dry or wet mixing times may be required.

2. One-pound bags are to be added to match batch plant production. For example, for a batch operation of 3 tons, three bags of FORTA-FI would be required to meet the dosage of one pound per ton.

3. The plastic bag will melt, and fibers will disperse into the mix.

Figure 4: Manual Bag Feed at Batch Plant.

Big Shot Fiber Feeder

1. Provided by Pacific GeoSource by lease or available for purchase, the Big Shot Fiber Feeder unit requires an air compressor and 8-in PVC piping to direct flow of 1-lb fiber bags into the weigh hopper. Plant operations are typically unaffected, and modifications are not needed. However, depending on plant operations, slight modifications to dry or wet mixing times may be required.

2. The correct number of individual one-pound bags of FORTA-FI are fed simultaneously into the Big Shot based on batch size (see part 1.i. above).

Quality Assurance /

Asphalt producer should visually inspect the mix prior to sending trucks to the jobsite to ensure proper blending of fiber into the asphalt has occurred. Inspection should take place at the drum discharge point and also in the back of the first trucks to leave the plant. Verify fiber dispersion a minimum of every two hours.

Observe mix for undispersed clips and aramid bunches. Spot check asphalt mix in the truck and while paving. Look carefully as binder-soaked clips are difficult to see.

If unblended fibers are visible, minor adjustments to mixing operations may be needed to correct. This may be accomplished by adjusting the angle of the loose fiber feed tube, raising production

temperature (when high RAP% is used), or lowering the TPH production rate, with the ultimate goal of increasing the time for fibers to disperse in the hot aggregate prior to injection of liquid binder.

Record fiber feeding data manually or using the FMD automatic data logging system to provide verification of fiber dosage as needed to comply with project specifications.

Fiber supplier will provide technical assistance during feeding operations and support during construction as needed.

Packaging /

	US Short Ton	Metric Ton
Bags	1.0 lb	0.5 kg
Cartons	35 bags	35 bags
Bulk Carton	35 lb, loose in carton	16 kg, loose in carton
Pallets	16 cartons/560 bags	12 cartons/210 bags
Gaylord Pallets	600 lb	273 kg

Table 2.

Limited Warranty /

Pacific GeoSource Products are warranted to be free of defects in material and will meet all published physical properties as set forth herein.

Except for the express limited warranty set forth herein, neither Pacific GeoSource nor any person on Pacific Geosource's behalf has made or makes any express or implied representation or warranty whatsoever, either oral or written, including any warranties of merchantability, fitness for a particular purpose, title, or non-infringement, whether arising by law, course of dealing, course of performance, usage of trade or otherwise, all of which are expressly disclaimed.

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