

## MINERAL ADMIXTURE

### **ADVANTAGES**

- Lowers concrete permeability.
- Significantly increases concrete durability.
- Increases ultimate strength gain.
- Beneficial in all types of high strength concrete applications.
- Improves bond strength to steel.
- Significantly reduces alkali-silica reactivity.
- Provides excellent resistance to sulfate or seawater attack.
- Reduces steel corrosion.
- Improves freeze/thaw durability of concrete.

### **DESCRIPTION**

Fritz-Pak Silica Fume is a finely-divided mineral admixture, available in both uncompacted and compacted forms. It is a pozzolanic material which is composed of highly refined silicon dioxide in the non-crystalline form. Silica Fume will chemically react with the calcium hydroxide released by the hydration of portland cement to form compounds possessing superior cementitious properties. This ultra-fine material will better fill voids between cement particles and result in a very dense concrete with higher compressive strengths and extremely low permeability. Silica Fume is recommended for all types of concrete where improved concrete performance with reduced permeability is required to reduce the effect of corrosive chemicals, such as deicing salts, on structural steel. Silica Fume is also recommended where higher density and ultimate strengths are desired. Silica Fume does not contain calcium chloride, nitrates, nitrites or other potentially corrosive materials and is compatible with all standard concrete admixtures.

### **DIRECTIONS**

1. Determine the amount of Silica Fume required. See Recommended Dosage Rate.
2. Add Silica Fume prior to, during or after the normal batching sequence. Trial batches will determine the optimum batching sequence.
3. Mix at high speed for 5 to 7 minutes to insure that the Silica Fume is uniformly dispersed throughout the mix.

### **RECOMMENDED DOSAGE RATE**

Silica Fume is recommended for use as an addition to cement at a dosage rate of 5 to 30% based on the total weight of cement. Permeability and strength

requirements will determine the required dosage rate. Typically, Silica Fume concrete will have increased water requirements for a given slump. Fritz-Pak Supercizers are recommended to help control water:cement ratios and provide improved workability. Silica Fume should be included in calculation of total cementitious materials for admixture dosage determination. Concrete temperature, ambient temperature or concrete mixes containing accelerators, retarders, or special admixtures may require dosage rates outside the recommended range. Contact your Fritz-Pak distributor with any questions concerning the dosage rates and for any information concerning the placing, finishing and curing of Silica Fume concrete. It is recommended that testing be done to determine the suitability of Silica Fume to your mix designs.

### **COMPATIBILITY**

Silica Fume is compatible with most air-entraining admixtures, calcium chloride and other admixtures. When used with other admixtures, each one must be dispensed separately into the mix.

### **APPLICABLE STANDARDS**

ASTM C-1240-93 and AASHTO M-307-90.

### **PACKAGING**

Fritz-Pak Silica Fume (Compacted)

- 50-lb (22.7-kg) paper bag, 40 bags per pallet (item #95800)
- Bulk (item #95902)
- 25-lb (11.35-kg) repulpable bag (item #95800R)

Fritz-Pak Silica Fume (Uncompacted)

- 50-lb (22.7-kg) paper bag, 40 bags per pallet (item #95905)
- Bulk (item #95903)
- 25-lb (11.35 kg) repulpable bag (item #95905R)

### **FAQs**

- Q. What is Silica Fume?  
A. It is a by-product in the production of certain types of steel.
- Q. What is special about Silica Fume?  
A. The particles are much smaller than cement. They are over 90% silicon and can react with the calcium hydroxide in cement. When

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they react they are able to fill and seal the space between particles of cement.

- Q. What are the primary properties imparted by Silica Fume in concrete?
- A. Low permeability, high compressive strength and high abrasion resistance. The low permeability is desirable in concretes that have steel and are exposed to de-icing salts or saltwater such as in bridge decks and marine docks.
- Q. Do I just need to add Silica Fume to concrete to make it stronger?
- A. No. Silica Fume needs to react in a low water:cement ratio environment to be able to develop high strength and low permeability. Silica Fume should be used along with a water reducer for best performance.



- Q. Are there any other applications for Silica Fume?
- A. Yes. In shotcrete it is used to reduce the rebound of material and to impart high strength.
- Q. How is color affected when using Silica Fume?
- A. Silica Fume is dark gray in color. Concrete with Silica Fume will be darker in color.
- Q. Are there any special requirements for placing, finishing and curing concrete with Silica Fume?
- A. Yes. Since Silica Fume concrete has a low water cement:ratio it is important to prevent drying and moist curing is very important. For additional information contact Fritz-Pak.

- Q. Is Silica Fume harmful to humans?
- A. No. Silica Fume is an amorphous form of Silicon and does not promote silicosis in humans. However, respirators are required for handling the product, since Silica Fume particles are very small and can easily become airborne.
- Q. Are Silica Fume and Fumed Silica the same?
- A. No. Silica Fume is a by-product of steel production. Fumed Silica is a precipitated form of silicon dioxide that is produced chemically. Fumed Silica is much more expensive than Silica Fume and does not provide the same characteristics to concrete.

### **PRECAUTIONS**

All Fritz-Pak Concrete Admixtures should be stored in a dry location, protected from breakage, deterioration and contamination. They are not subject to damage from freezing temperatures.

### **WARRANTY**

The information and recommendations in this publication are, to the best of our knowledge, reliable. Suggestions made concerning uses or applications are only the opinion of Fritz-Pak Corporation and users should make their own tests to determine the suitability of these products for their own particular purposes. Because of numerous factors affecting results, Fritz-Pak Corporation makes no warranty of any kind, expressed or implied, including those of merchantability and fitness for purpose. Statements herein, therefore, should not be construed as representations or warranties. The responsibility of Fritz-Pak Corporation for claims arising out of breach of warranty, negligence, strict liability, or otherwise are limited to the purchase price of the materials.

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