

Handling Dry-Densified Force 10,000®: Delivery and Storage

Introduction

Force 10,000® D, dry-densified silica fume, is specially processed to be both virtually dustless and lump free. It is designed to be hauled in bulk cement tankers; it flows easily, and it can be transferred into ordinary cement storage silos through pneumatic lines or by bucket elevator. This technical bulletin describes procedures for handling Force 10,000 D, dry-densified, in bulk. The “Silica Fume User’s Manual” by the Silica Fume Association and printed by the Federal Highway Administration, FHWA-IF-05-016, also contains good information for handling dry-densified silica fume.

Pneumatic Bulk Truck Trailers

Force 10,000 D, is typically delivered in 40 m³ (1,400 ft³) bulk cement trailers. These large tankers allow delivery of up to 23 metric tons (25 tons) per load. **All bulk tankers delivering Force 10,000 D must have aeration pads** in the trailer compartments to prevent packing and bridging in the hoppers. Vibration alone should not be used as it packs the Force 10,000 D into the bottom of the hopper and the outlet tube, clogging the system.

Storage and Delivery

- **Storage Silos**—Storage silo capacity should be at least 80 m³ (2,800 ft³) to allow the storage of at least 2 truck loads of Force 10,000 D that will minimize delivery scheduling problems. The silo should be vented and have an adequate dust collection system (bag house) of at least 10 m³ to 14 m³ (100 ft³ to 150 ft³). The dust collection system should be cleaned before delivery so that the pneumatic truck pumps into minimum back pressure.
- **Grounding**—It is important that the silo has provisions for connecting a heavy grounding strap to the bulk trailer. This will minimize static charge and reduce pump-off time.
- **Inlet Pipe Type and Configuration**—The inlet pipe material and configuration are critical to pumpability and discharge time. The optimum inlet pipe is a 150 mm (6 in.) diameter rubber hose fastened to the silo approximately every 3 to 5 m (10 to 15 ft) so that the pipe can vibrate and self-clean. The pipe should have smooth sides and should not be corrugated or ridged type. All bends, particularly at the top input, should have smooth, large radii of at least 1.5 m (5 ft). The pipe should discharge into the top of the silo as close to the mid-point as possible. This will allow the Force 10,000 D to drop directly into the silo without obstruction. Avoid long horizontal runs and right angle bends (90°) in the pump line that drastically increases pumping time and can cause clogging. If the existing pipe is steel [130 to 150 mm (5 to 6 in.)] with a restricted input radius at the top of the silo, a vibrator should be attached to the top bend to prevent build-up and clogging. The vibrator will reduce the build-up of Force 10,000 D along the steel pipeline. This build-up is caused by static electrical charge on the silica fume particles. Using rubber pipe will lessen this charge. If the silo is now equipped with steel pipe and will be used for storing Force 10,000 D for a long period, the pipe should be changed to rubber.
- **Discharge Time**—In general, densified silica fume does not pump vertically as well as does cement, but it flows downward more freely and at a faster rate. However, if rubber pipe is used and correctly routed, a 23 metric ton (25 ton) delivery can be pumped off in one to two hours.
- **Batching into a Weigh-Hopper**—The storage silo should be equipped with aerators in the cone section to assist discharge into the weigh-hopper. Force 10,000 D moves easily in a gravity or air slide connection to the weigh-hopper. If a cement screw is used, the gate opening should be adjusted to restrict the flow since, as the material flows faster, it can clog the screw.

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