



Mixing Bulk Bags in a Ready-Mix Truck

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For larger cementitious grout and concrete placement applications, it may be beneficial to purchase the product in bulk and mix it in a concrete/ready-mix truck. In order to mix and deliver a product in a ready-mix truck, the product must be considered “pumpable” and be able to be extended with coarse aggregate.

Many Five Star® products can be mixed via 3,000 lb. bulk bags in ready-mix trucks. Contact Five Star Products to verify the product in question can be mixed in a ready-mix truck and for proper aggregate extension guidelines. It is also critical that the user contact the ready-mix truck supplier prior to ordering the product to ensure that a truck(s) will be available and the truck supplier is willing and able to follow the mixing instructions necessary to properly mix the product.

To mix Five Star® products in bulk bags at a predetermined coarse aggregate extension follow these guidelines:

A. Working Time

The working time of a product starts when the water is combined with the dry mortar. A product must have sufficient working time to be mixed, delivered, and placed. It is sometimes possible to extend the working time of a product with an additive which can either be part of the bulk mix when the product is manufactured or added to the mix water.

In most cases the mortar (bulk bag product) will not get combined with water and aggregate until the ready-mix truck is at the jobsite. Five Star® cementitious materials do not have sufficient working time to allow for transit to the job. 15 to 20 minutes should be allowed for on-site mixing time in a ready-mix truck. The remainder of the working time should be allowed for delivering to and placement of the product in the forms. Hot and cold ambient conditions affect the working time of a material and need to be considered. Published working times for all Five Star® materials are at 70 °F (21 °C). Working time will be reduced by approximately 50% at a temperature of 90 °F (32 °C).

B. Ready-Mix Truck Requirements

Five Star® cementitious materials require a “high sheer” mixing action to release the plasticizers in the product. For this reason, the ready-mix truck must be in good working order. The installer is encouraged to review and verify with the ready-mix truck supplier that the truck has been inspected and is in excellent operating condition prior to use.

The truck should be clean, pre-wetted, and free of all excess washout and wetting water prior to adding any materials. Determine the amount of material that is to be mixed per truck or batch. The volume of material mixed (including coarse aggregate) should not exceed one half the capacity of the truck. Five Star Products recommends limiting the maximum volume of mixed material to two 3,000 lb. supersacks.

C. Required On-Site Equipment

Five Star® bulk packaging is a 3,000 lb. supersack. It will be necessary to have lift equipment on the project site that is capable of safely lifting the bulk package up and over the top of a concrete/ready-mix truck to add the material to the truck. It will also be necessary to have a scaffold, or safety platform, from which a person can safely open the bulk supersack and add the material to the ready-mix truck. Five Star® personnel will not perform these functions.

Plan to mix material and position the truck as close as possible to the pour and promptly discharge mixed product from the truck. It will also be necessary to have an ample supply of potable water that can be dispensed through a garden hose and a disposal area or dumpster that will be utilized for unused material.



For information 1-800-243-2206 • FiveStarProducts.com



FIVE STAR PRODUCTS, INC.
2 Enterprise Drive • Suite 303
Shelton, CT 06484 USA
Phone: +1 203-336-7900

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D. Coarse Aggregate

Five Star® cementitious material must be extended with coarse aggregate to aid in the mixing of the material. Refer to Five Star® Technical Bulletins *Aggregate Extension Guidelines* for detailed information. The standard recommendation is that coarse aggregate shall be clean, washed, and meet the requirements of ASTM C33, or an appropriate DOT specification. The coarse aggregate size typically should not exceed 1/3 the depth of the repair. If the product is to be pumped, the size of the aggregate that can be pumped should also be considered. The weight of the coarse aggregate per batch must be determined prior to adding it to the ready-mix truck.

The most critical criteria for the coarse aggregate is that it be clean and free of fines. Adding fines and sand to the mix will negatively affect the product's properties.

The moisture content of coarse aggregate varies greatly depending on how the coarse aggregate is stored. Coarse aggregate should be stored in a clean, dry location and kept at a temperature between 40°F and 80°F (4°C and 27°C).

Ideally coarse aggregate should be at a Saturated Surface Dry (SSD) condition before adding it to the mix. In other words, damp but not wet/dripping excess water. It is advisable to pre-test the aggregate before use with any Five Star® product.

E. Mix Water Requirements

Potable water shall be used for mixing Five Star® cementitious material. Mix water quantities shall be given in minimum and maximum volume per bag or supersack. For each truckload batch, it will be necessary to know the total (maximum) amount of mix water that can be added. Do not exceed the maximum mix water or the properties of the material will be affected.

The cooler the mix water, the more control there will be over the temperature of the material after mixing. Ice water is often used. It is recommended to have at least 1 pallet of Five Star® bagged cementitious material available to use if necessary to adjust the consistency of the mixed material. Five Star® bulk cementitious materials should be stored in a clean, dry location and kept at a temperature between 40°F and 80°F (4°C and 27°C).

F. Mixing Instructions

Ready-mix trucks may arrive at the jobsite with the initial mix water and the coarse aggregate already in the mixer drum or empty.

Ready-mix Truck Arrives with Initial Coarse Aggregate and Water in Truck:

If the initial mix water and coarse aggregate are to be added to the truck at the ready-mix plant, Five Star recommends the installer verifies the following with the ready-mix truck supplier:

1. The truck was inspected and is in excellent operating condition prior to use.
2. The truck was empty/clean and "wetted-out" prior to the materials being loaded.
3. The weights and volumes for the raw materials to be added for each truckload batch are verified.
 - * 80 - 90% of the potable water required per batch is added to the truck.
 - * Total volume of coarse aggregate per batch is added to the truck.

NOTE: If feasible, an Owner/Contractor representative should be present at the ready-mix plant to verify steps 1-3. If this is not feasible, the truck driver must provide paperwork and batch certification documentation stating that steps 1-3 were followed.



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F. Mixing Instructions (continued)

Ready-mix Truck Arrives Empty:

If the ready-mix truck arrives empty, the initial mix water and coarse aggregate will be added at the jobsite. NOTE: These materials must be accurately measured.

1. Verify the weights and volumes for the raw materials for each truckload batch.
2. Inspect the truck to verify that it is clean, wetted-out, and empty.
3. Add 80-90% of the potable water required to the truck. Add the total volume of coarse aggregate to the truck.

Once the initial mix water and coarse aggregate are in the truck mixer drum:

4. Start or adjust the ready-mix truck drum turning at slow speed.
5. Open the top of the bulk bag.
6. Using a forklift or crane position the discharge of the bulk bag over inlet to truck.
7. Cut open the bottom of the bulk bag and empty all of the bulk bag into the truck. Note: Partial bulk bags may not be used because the material in the bulk bag can settle and segregate in shipping.
8. After loading the last bulk bag, use approximately 5 gallons of the 10-20% held back water to wash the truck inlet and discharge chutes.
9. Mix thoroughly for approximately five minutes at slow speed to a uniform consistency.
10. Reverse drum to check consistency.
11. Add remaining water as needed and mix to a uniform consistency. Do not exceed maximum allowable water content as stated on the product's packaging or add an amount that will cause segregation. It may also be necessary to add some bagged material to stiffen the batch.
12. Once the desired consistency is achieved, increase the drum speed to high and mix thoroughly for 5 minutes. Note: Mixing will increase the temperature of the material.
13. Record the time and temperature of the batch, this is the start of the product working time.



DISCHARGING BULK BAG CONTENTS INTO TRUCK INLET

G. Discharge and Placement

Position the truck as close as possible to the pour and promptly discharge the material. Do not add more water than the maximum water to aid in the discharge and placement. If pumping the Five Star® material pass it through a screen to remove any clumps prior to entering the pump hopper.

Contact your local Five Star® Technical Sales Representative for additional information and assistance.

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FIVE STAR PRODUCTS, INC.
2 Enterprise Drive • Suite 303
Shelton, CT 06484 USA
Phone: +1 203-336-7900

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