



Five Star® Cementitious Products Mix Water Procedure

Five Star® prepackaged cementitious products are formulated with additives (corrosion inhibitors, plasticizers, water reducing agents, etc.) which take effect only when water is added to the dry material and the product is thoroughly mixed with a high shear mixer. Cold or iced potable water should always be used for the product's "mix water" unless the product is being installed in ambient conditions less than 40°F (4°C).¹

Many Five Star® cementitious products appear too dry until the additives in the mix react with the water.

If the minimum water volume has been added and the product still appears dry, the product probably hasn't been mixed thoroughly enough or long enough. Mix the product for an additional minute before adding additional water.

The published minimum water volume per bag/unit is the amount of water that must be added to make a mixture usable and activate the additives in the product.² The published maximum water volume per bag/unit is the amount of water that if added will result in the material performing and developing the properties described on the Five Star® Technical Data Sheet.³

Adding less than the minimum water volume, not thoroughly and completely mixing the product, and/or adding more than the maximum water volume will result in the Five Star® product not performing as described on the Technical Data Sheet.

The product will mix more completely if the user adds the water in multiple steps. Wherever possible, the user is encouraged to use a volume of water that is less than the maximum water volume. The lower the water content in the mix the higher the strength of the material.

Through extensive testing and observation, Five Star Products has found that if 90% of the maximum mix water is added on the initial mix, the remaining 10% of the mix water often does not need to be added to achieve a desirable consistency.

A. Prior to Mixing Product

The following needs to be determined:

- Minimum water volume per bag
- Maximum water volume per bag
- 90% of maximum water volume per bag
- Number of bags/units to be mixed at one time (based on size of the mixer, coarse aggregate extension, etc.)⁴

Calculate the minimum water, maximum water, 90% of the maximum water volumes, and the number of bags of Five Star® product for each batch. These volumes are referred to as "batch mix water volumes" in the Mixing Procedure on Page 2.

Refer to charts on page 3 for 90% and 10% calculations per bag.

¹ Five Star Products (FSP) recommends that cold or "iced water" be used when mixing Five Star® products unless conditioning the product for cold weather installation. FSP has found that cold water maximizes the effectiveness of the water reducing agents in the product.

² Certain Five Star® cementitious grouts can be dry packed. When dry packing these grouts, less than the minimum published water will be used.

³ The properties shown on Five Star® Technical Data Sheets reflect typical results based on laboratory testing under controlled conditions at 70°F (21°C). Reasonable variations may result. Installation and curing at temperatures below 70°F (21°C) will result in the material developing lower strength properties.

⁴ If coarse aggregate extension is required, refer to Five Star® Technical Bulletins for *Aggregate Extension*.

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B. Mixing Procedure

Total mixing time per batch is approximately 5 minutes. Mixing longer than that will add heat to the mix and shorten the working time of the material.

1. Prior to mixing the first batch:
 - Inspect and clean the mixer; the blades must be in good physical condition and be able to make contact with the walls of the mixer.
 - Wet down the inside of the mixing chamber with potable water and drain the water out. This is referred to as “wetting out the mixer.” Note: Wetting out the mixer is also an effective way to cool off the mixer if it is at a temperature greater than desirable.
2. Accurately measure 90% of the batch mix water volume in one container and in a second container accurately measure 10% of the batch mix water volume.
3. Add 90% of the batch mix water volume to the mixer.
4. Start the mixer.
5. Add the correct number of bags of Five Star® product.
6. Mix for 3 – 4 minutes at high speed. The product should develop a flowable, non-dry consistency once the additives in the product react to the mixing and the water.
7. Stop the mixer and check the consistency of the batch and whether the product is flowable enough to be installed.
8. If more water is necessary, start the mixer and slowly add a portion of the remaining 10% of the batch mix water (in intervals) and allow the material to thoroughly mix. Do not add more water than is published on the bag or an amount that will cause segregation.
9. Stop the mixer and check the consistency of the batch and whether the product is flowable enough to be installed.
10. Repeat steps 8-10 as required but stop adding water once the desired consistency is achieved, or the maximum amount of batch water is added (the 10% container is empty).

NOTE: Steps 7-10 should take approximately 2 minutes or less.

For additional information, contact your Five Star® Technical Sales Representative.

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Technical Bulletin 407

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Five Star® Potable Mix Water Charts

CEMENTITIOUS GROUTS	WEIGHT	MINIMUM WATER	MAXIMUM WATER	90% OF MAX*	10% OF MAX*
Five Star® Grout	50 lb. (22.7 kg)	3.5 qts (3.3 L)	5.5 qts (5.2 L)	5 qts (4.7L)	0.5 qts (0.47L)
Five Star® Fluid Grout 100	55 lb. (25 kg)	4.5 qts (4.2 L)	FLUID: 5.5 qts (5.2 L)	FLUID: 5 qts (4.7L)	FLUID: 0.5 qts (0.47L)
Five Star® High Strength Grout	50 lb. (22.7 kg)	2.75 qts (2.6 L)	3.75 qts (3.5 L)	3.25 qts (2.8 L)	0.5 qts (0.47L)
Five Star® High Strength 130 Grout	50 lb. (22.7 kg)	3.25 qts (3.1 L)	4.5 qts (4.2 L)	4.0 qts (3.8 L)	0.5 qts (0.47L)
Five Star® Hybrid Grout	50 lb. (22.7 kg)	3.25 qts (3.1 L)	3.6 qts (3.4 L)	3.25 qts (3.1 L)	0.35 qts (0.33 L)
Five Star® HTR Grout	50 lb. (22.7 kg)	3.0 qts (2.8 L)	3.5 qts (3.3 L)	3.0 qts (2.8 L)	0.5 qts (0.47 L)
Five Star® Special Grout 400	49 lb. (22.2 kg)	6.0 qts (5.7 L)	6.5 qts (6.2 L)	6.0 qts (5.0 L)	0.5 qts (0.47 L)
Five Star® Instant Grout	55 lb. (25 kg)	3.0 qts (2.8 L)	3.5 qts (3.3 L)	3.0 qts (2.8 L)	0.5 qts (0.47 L)
Five Star® Clarifier Grout	50 lb. (22.7 kg)	3.5 qts (3.3 L)	4.5 qts (4.2 L)	4.0 qts (3.8 L)	0.5 qts (0.47L)
Five Star® Cementitious Underwater High-Strength Grout	50 lb. (22.7 kg)	4.0 qts (3.8 L)	4.25 qts (4.0 L)	4.0 qts (3.3 L)	0.25 qts (0.24 L)
Five Star® NSG Grout	50 lb. (22.7 kg)	3.0 qts (2.8 L)	4.5 qts (4.2 L)	4.0 qts (3.8 L)	0.5 qts (0.47L)

*Values may be approximated or adjusted to be at least equal to the Minimum Water to make measurements easier in the field.

STRUCTURAL CONCRETE	WEIGHT	MINIMUM WATER	MAXIMUM WATER	90% OF MAX*	10% OF MAX*
Structural Concrete®	50 lb. (22.7 kg)	2.5 qts (2.4 L)	3.0 qts (2.8 L)	2.75 qts (2.6 L)	0.25 qts (0.24 L)
Structural Concrete® ES	50 lb. (22.7 kg)	2.5 qts (2.4 L)	3.0 qts (2.8 L)	2.75 qts (2.6 L)	0.25 qts (0.24 L)
Structural Concrete® ES-60	50 lb. (22.7 kg)	2.5 qts (2.4 L)	3.0 qts (2.8 L)	2.75 qts (2.6 L)	0.25 qts (0.24 L)
Structural Concrete® V/O	50 lb. (22.7 kg)	3.0 qts (2.8 L)	4.0 qts (3.8 L)	3.5 qts (3.3 L)	0.5 qts (0.47 L)
Structural Concrete® HTR	50 lb. (22.7 kg)	2.5 qts (2.4 L)	3.0 qts (2.8 L)	2.75 qts (2.6 L)	0.25 qts (0.24 L)
Structural Concrete® S300	50 lb. (22.7 kg)	2.25 qts (2.1 L)	3.0 qts (2.8 L)	2.75 qts (2.6 L)	0.25 qts (0.24 L)
Structural Concrete® UW-HP	36 lb. (16.3 kg)	3.5 qts (3.3 L)	4.0 qts (3.8 L)	3.5 qts (3.3 L)	0.5 qts (0.47 L)
Structural Concrete® UW-PG	50 lb. (22.7 kg)	3.0 qts (2.8 L)	4.0 qts (3.8 L)	3.5 qts (3.3 L)	0.5 qts (0.47 L)

*Values may be approximated or adjusted to be at least equal to the Minimum Water to make measurements easier in the field.

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