

Technical Information

GENERAL GUIDELINES - PUMPCASTING RESCO CASTABLES

A. STORAGE:

1. Resco Castables are packaged in moisture resistant bags, however, they should be stored in a dry place free from excess dampness. Storage on dry concrete, asphalt, or other impervious surface will prevent moisture from the ground condensing under the plastic pallet cover and wetting the bags of material, which may result in loss of strength.

B. PREPARATION:

1. Use clean tools and equipment. It is recommended that any mixer that has mixed Portland concrete within the previous 24 hours is not used. Contamination can affect setting and strength of castables.
2. Waterproof all forms and surfaces. Mold release agents may be used.
3. Use only clean water suitable for drinking. For Sureflow Castables, the water temperature should not be higher than 45°F (7°C).
4. Mixer: Select a mixer with enough mixing capacity to keep up with the pump and make sure it is located as close to the pump as possible.

Preferred - A Paddle-Type Mechanical mixer is preferred. The mixer should have a minimum capacity of 20 ft³ (0.56 m³). If possible, use 2 mixers so that you can alternate mixers, thus having a fresh batch of material ready for the pump.

Alternative: - A Continuous mixer can be used if the auger is a minimum of 6 to 7 ft (1.8 to 2.1 m) long to insure that adequate mixing takes place.

5. Pump: A variety of commercial concrete pumps can be used. The pump should be located so as to minimize pumping distance, turns, elbows, and change in elevation. Type of pumps that can be used include:

Ball Valve Feed: Mayco HD30

Swing Tube Feed: Allentown Powercreter, Mayco ST30, Schwing 750, Schwing BPA 450-10, Putzmeister, Whiteman-Conspray

Progressive Cavity: Moyno Model MP-2J6

Products containing Stainless Steel Needles - Swing Tube Feed Pump is recommended.

A pump with a 3 to 4 in (75 to 100 mm) diameter cylinder or cylinders will work best because it minimizes or eliminates the need for reducers in the line. However, with the proper pipe and hose set up, a pump with a 6 in (150 mm) diameter cylinder will work very well. Pumps with long piston stroke lengths (>24 inches) do not work as well with light weight castables (<115 pcf).

6. Pipe and Hose Reduction: All reduction should be done using reducers that are as long as possible. Reduction should be done in increments. Too much reduction over a short distance will cause the aggregate to pack in the reducer. If you reduce the diameter of the line from 5 inches to 3 inches, you have reduced the cross sectional area of the line by 64%.

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For example, a given pump has a 5 in (125 mm) diameter take-off. Exit the pump with a 10 ft (3 m) long reducer that narrows the diameter from 5 in (125 mm) to 4 in (100 mm).

If possible, use a section of 4 in (100) diameter hose or pipe followed by another 10 ft (3 m) long reducer that cuts the diameter from 4 in (100 mm) to 3 in (75 mm). Run the remaining distance with 3 in (75 mm) diameter pipe or hose.

7. Pipe and Hose Setup: The minimum recommended hose and pipe diameter is 2-1/2 in (64 mm). A 3 in (75 mm) diameter is best. Where possible, use pipe instead of hose; the friction generated in 10 ft (3 m) of hose is equal to the friction generated in 100 ft (30 m) of pipe. An ideal set up will use pipe for all but the last 25 to 50 ft (7.6 to 15.2 m) of the assembly.

Use steel elbows for turning corners. The friction in a 90° steel elbow is equal to 20 to 40 feet of straight pipe, therefore, keep the number of elbows used to a minimum. Do not use an elbow as the first section of pipe out of the pump, or immediately before or after a reducer. Elbows are an area where the aggregate can pack and stop the flow of material.

Use steel pipe to pump vertically. If possible, use pipe that is no smaller than 4 in (100 mm) diameter from the pump to the top of the vertical rise. Any reduction should be done near the end of the line.

8. For best results, material and ambient temperatures should be 60-85° F (16-29°C) during mixing, placing, and curing. Material temperature should be less than 75° F (24° C) for Sureflow Castables.

C-1. MIXING EZ³ or Furna³ Products

1. Mix enough castable to keep up with the pump, but only as much as can be pumped immediately
2. Use a paddle-type mixer. Pre-dampen mixer prior to mixing first batch.
3. Add the dry material to the mixer and dry mix for 30 seconds. Determine the total water amount to be added and mix 2/3 of this amount in with the dry material initially.
4. Mix the dry material and the initial water addition for 3 minutes. Add the remaining 1/3 of the total required water and mix for an additional 2 to 3 minutes. If mix appears too dry after the 5 to 6 minutes of mixing, water can be added in 0.1% increments, making sure to stay within the recommended water range for the product. Allow 1 to 2 minutes of additional mixing time between water additions.

C-2. MIXING Other Pumpable RESCO Brands

1. Mix only as much castable as can be placed immediately. Under ideal conditions, 20 minutes is the maximum placement time. Material left in pails or mortar box may develop a "false" set making it difficult to properly place.
2. Pre-dampen mixer prior to mixing first batch.
3. Add the dry material to the mixer. For the initial batch, determine the minimum recommended water level for the product being mixed. Then, quickly add the minimum amount of specified water to the mixer while mixing.

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4. Mix the dry material and the water addition for 5 to 6 minutes. If mix appears too dry after the 5 to 6 minutes of mixing, water can be added in 0.1% increments, making sure to stay within the recommended water range for the specific product. Allow 1 to 2 minutes of additional mixing time between water additions. Once an acceptable water level is reached, use that amount as the starting point for the next batch.

D. PUMPCASTING

1. Before pumping, check all pipe and hoses for cleanliness, and flush with water.
2. The hose and pipe to be used must be lubricated prior to pumping. A pre-packaged lubricant can be purchased from Resco Products, Inc. As an alternative, lubricate the system with slurry made by screening out the fines from a castable or a fireclay. Mix with water to a soupy consistency. Do not pump the slurry or pre-packaged lubricant into the form; dispose of it. Each section of hose or pipe should be lubricated individually and completely. This is best accomplished by adding hose/pipe sections one at a time after lubricating the previous section.
3. The pumping process should be continuous. This cannot be over emphasized. Stopping for any length of time can allow the material to stiffen and clog the hose. This is a result of the constant shearing of the material in the line. If there is a need to stop, immediately purge and rinse the entire system (mixer, pump, hoses, and pipes).
4. When switching from one product to another, immediately purge and rinse the entire system.
5. Don't overwork or excessively trowel the surface. A smooth surface inhibits moisture removal during curing and drying by bringing fines to the surface. Do not burn out wood forms.

E. CURING:

1. Cover all exposed surfaces with a polyethylene film, or spray with a commercial curing compound, or periodically water mist for at least 24 hours after casting. This will prevent water evaporation required for proper hydration and maximum properties.
2. Do not disturb casting during the first 24 hour period after installation.

F. EXTREME WEATHER PRECAUTIONS

1. Extreme Cold Weather:
 - Keep the material, and installation area above 60°F (16°C) during installation and 24 hour curing period.
 - Do not allow lining to freeze during 24 hour curing period. After the curing period, the lining may be subjected to freezing conditions, however, the castable should be at least 60°F (16°C) before dry out is started.

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2. Extreme Hot Weather:

- Keep the material below 75°F (24°C), and installation area below 85°F (29°C) during installation and 24 hour curing period. Elevated temperatures may cause stiffening in the lines, and cracking due to surface dryout.
- Store the dry castable in a cool area prior to mixing.
- Use cold water, less than 45°F (7°C), preferably 33°F (1°C) during mixing. The temperature of the wet mix should be less than 80°F (27°C) when discharged from the mixer.
- Keep pipes or hoses out of direct sunlight.
- Cover pipes or hoses with wet insulation or wrap with a water hose.
- It is critical to keep the pumping process continuous.