

Safety and Health

Review the Safety Data Sheet (SDS) before using this product. The SDS contains important information concerning potential health hazards and protective measures for these hazards. Contact your supervisor or safety director to obtain a copy.

Storage Requirements

- For best performance, store the product in a dry location at temperatures between 60°F and 80°F.
- HWI packages its conventional castables in poly-lined paper bags or super sacks protected with plastic wrap to ensure dry product delivery. This packaging is not intended for outdoor storage. If no dry storage is available, contact your HWI sales and technical representative for alternate solutions.
- Always store conventional castables on a dry flooring surface to prevent ground moisture from condensing into the package.
- Avoid storage in direct sunlight to prevent the packaging from deteriorating over time.
- Ensure that your inventory is rotated on a regular basis. Conventional castables have an average shelf life of 6 months. Refer to the product data sheet for specific shelf life recommendations. If product usability is questionable due to age, consult your HWI sales and technical representative.
- Compaction during shipping and storage can cause soft lumps to form in the material. This is not detrimental to product performance if the lumps can easily be broken by hand.
- If the material becomes damp during shipping and storage, a partial reaction of the binders can occur causing hard lumps to form. If the lumps cannot easily be broken by hand, do not use the product without first consulting your HWI sales and technical representative.

Form and Backup Requirements

- Ensure that all casting forms are stout and watertight.
- Waterproof all porous forms, such as wood, and all porous backup linings before casting. Porous surfaces can reduce product properties and flow, resulting in a substandard installation.
- If installing over existing refractory, remove all loose material, debris, or contaminants prior to installation.
- Remove wood forms prior to dryout and heatup. Allowing wood forms to catch on fire can cause localized overheating and possible spalling of the refractory.

Installation Equipment Requirements

The product can be installed as a castable with or without the use of a concrete type pump.

Mixer

- HWI recommends medium- to high-intensity paddle or pan mixers for best results.
- Ensure that the water delivery and measurement system is capable of supplying the required water within a 30-second timeframe.
- Mixing time will vary according to installation method and from mixer to mixer:
 - For non-pump casting, a mixing time of 5 to 7 minutes is typically recommended.
 - For pump casting, a mixing time of 3 to 5 minutes is typically recommended. (It is acceptable to reduce the mixing time in the mixer because the material will continue to be mixed at the pump.)
- Clean all mixing and handling equipment prior to and immediately following use. Residual material in the mixer may affect the set of the product.

Pump

- Commercially available swing tube piston pumps, from manufacturers such as Allentown, Blastcrete, and HPC, are acceptable for installing this product. Ideally, the pump should have a 3- to 4-in. piston.

Installation Guidelines

Piping and Hoses

- HWI recommends the use of hard (slick) pipe between the pump and the flexible hose. 2- or 3-in. pipe diameters are acceptable.
- To minimize pressure and friction, limit the length of flexible hose as much as possible. HWI recommends 50 ft or less of flexible hose between the hard pipe and the point of installation. Depending on the output required, use 1½- or 2-in. flexible hose.
- HWI recommends the use of elongated reducers to minimize clogging at the point of reduction.
- HWI recommends the use of long sweep elbows to minimize clogging and excessive pressure when making directional changes.

Environmental Conditions

- For best results, ensure that the temperature of the product is between 60°F and 80°F prior to mixing. Temperature extremes affect working time, final set time, and final product quality.
- For hot weather installations, the mixing water may be cooled to extend working time. **In extreme hot weather conditions, add 70-80% water to the mixer prior to adding dry mix to allow for shorter mixing times.**

Water Quality

For best results, use drinkable water with a pH of 6 to 7.5 and a temperature of 60°F to 80°F.

Water Addition

- Accurate water measurement is critical to achieve proper installation and optimum product properties. Refer to the product data sheet for water specifications.
Note: The product data sheet will have different water specifications depending on the method of installation, vibration casting or self-leveling.
- Water must be measured by weight or by volume.
- The water requirements for conventional castables vary. The information given on the product data sheet is a target value. Mix the first batch at the target value, then adjust the amount of water in subsequent batches based on the required flow for the installation.
- Varying the amount of water more than 1% above or below the target value shown on the product data sheet is not recommended without consulting your HWI sales and technical representative.

Installation Methods

The product is designed for vibration casting, pumping, or self-leveling installation. The flow characteristic of the material is determined by varying the water required as specified on the product data sheet.

- For vibration casting, either form vibration or immersion (pencil) vibration can be used.
 - For form vibration, ensure that you can control the frequency and time of the vibration. Vibration should be sufficient to densify the product without causing the material to segregate. **Do not over-vibrate.**
 - For pencil vibration, insert the vibrator to the bottom of the casting. Move and extract the vibrator slowly to avoid creating an air pocket.
- For pump installation:
 - Lubricate all lines with ANH® BENTONITE HOSE LUBE before pumping. Other commercial products are available but most are designed to be used with concrete and may not be compatible with refractory cements. Mix ANH® BENTONITE HOSE LUBE with water to a paint consistency.
 - Pump the material to clear all surplus hose lubricant from the hose. Discard this material.
- For self-leveling installation:
 - Little or no vibration is needed to install the product.
 - “Rodding” the wet material may help to remove trapped air.
 - If using vibration, **do not over-vibrate** the material; this will cause severe material separation.
- Install the product promptly after mixing. Mixer and batch sizes should be as large as possible to minimize the number of batches.
- Never continue to install subsequent batches if the first batches start to set. If this occurs, use a cold joint casting design between the current casting and the subsequent casting.
- Do not trowel or slick the surface. This practice will prevent proper water removal during dryout.

Installation Guidelines

Curing

- Ideal curing temperatures are between 70°F and 100°F.
- For installations above 60°F, cure the product for a minimum of 24 hours.
- For installations below 60°F, longer times are required to reach a hard set. Apply heat (not exceeding 120°F) to accelerate curing in cold conditions.
- Dryout and heatup can begin after the recommended minimum cure time as long as a hard set has been achieved.
- A hard set can be determined by striking the surface of the casting with a metal bar. A distinctive ring indicates a hard set.
- During curing, keep the surface covered and damp to avoid drying and cracking. Avoid direct water spray on the surface during curing.
- Avoid allowing the material to freeze prior to reaching a hard set or preferably prior to dryout (complete water removal).
- During curing, avoid applying excessive weight, such as equipment, to the cast surface.

Dryout

IMPORTANT: During dry out of a castable lining, only some water escapes via the hot face while most of the water is driven through to the cold face. If material is cast directly against a steel shell or other impermeable material without the use of weep holes, the water remaining in the lining will have no path to escape, and as the dry out schedule proceeds, internal steam pressure will rapidly increase resulting in probable lining damage and/or steam spalling. Dry out schedules issued by HWI assume that an unobstructed path exists through the cold face so that water can easily escape through the vessel/furnace shell. In most cases, weep holes are required to facilitate the removal of water/steam. Where weep holes are not allowed or a path to the weep holes is lengthy or not direct (such as a furnace hearth) some type of wicking should be used to create a path toward the weep holes or to the outside of the furnace.

Dryout and heatup can begin any time after a hard set has been achieved. Refer to the curing and dryout schedule specified on the product data sheet for more detailed information on the appropriate curing, dryout, and heatup procedures.

Tips

- When using metallic anchor systems, such as V-anchors, a coating on the tips is suggested to allow for anchor expansion during heatup.
- Wet down mixers, hoppers, and pumps before beginning the mixing process.
- If your application requires weep holes, ensure that they are maintained before beginning installation.
- When using forms, apply a good mold release or grease before installation.
- The swing tube pump should be positioned as close to the installation as possible to reduce pump pressure, potential for clogging, and material waste.
- For applications where the target installation point is a significant vertical distance above the pump, many contractors have found that using a 2-in. line reduces the static pressure on the pump.
- For large installations where visual contact is not possible, headset communication between the nozzle operator and the pump operator is recommended.
- Properly maintained pumping equipment is critical to a quality installation. Always make sure that you follow the manufacturer's maintenance and lubrication schedule.
- Wash out all equipment as soon as installation is complete. A power washer is recommended.
- Always time the mixing process. **Don't guess.**
- For water, less is always best. Don't guess. **Measure.**
- Never use additives such as set extenders or accelerators without first consulting your HWI sales and technical representative.
- Most HWI low cement self-leveling castables can also be used for shotcrete installations by following HWI Shotcretes—Standard (S-1) Installation Guidelines. However, these products do not have the same ideal installation characteristics as a product designed for shotcreting.