



BallistiCrete™ USA Installation Specifications

Bullet Resistant Interior Veneer Plaster

Description

BallistiCrete™ is a state-of-the-art bullet resistant veneer plaster specifically formulated to provide a versatile high-strength interior wall finish over various new and existing wall substrates. The product can be painted or stained, finished in numerous textures, and is suitable for installation over gypsum board, various cement boards, concrete block, conventional plaster walls and properly prepared additional substrates. The product may be installed in one or multiple coat applications depending on specification requirements and desired aesthetic effects. **BallistiCrete™** complies with ASTM E136, ASTM E84, ASTM G21, ASTM C587, UBC 26-3 and NFPA 286 fire rating, NIJ Level III and IV.

Climate

The objective in controlling the interior climate of the building is to assist **BallistiCrete™** cure naturally and perform as intended. Premature surface drying and excessive heat may compromise the inherent strength and performance characteristics of **BallistiCrete™**

Temperature

BallistiCrete™ must be applied on interior walls with a minimum surface temperature and ambient room temperatures between 55°F and 95°F (13°C - 35°C) with a minimum wall surface temperature above 50°F (10°C). In colder environments the building shall be heated long enough to bring the surface temperature of the substrate above 50°F and maintained until **BallistiCrete™** has sufficiently cured. Do not apply **BallistiCrete™** in temperatures above 95°F.

Humidity

The building must have a minimum relative humidity shown in **Table 1** to avoid premature surface drying and consistent curing. If low humidity conditions exist for a given ambient temperature then measures must be taken to increase the relative humidity for the duration of the **BallistiCrete™** application and curing period.

Temp	50°F	55°F	60°F	65°F	70°F	75°F	80°F	85°F	90°F	95°F
	10C	13C	15C	18C	21C	24C	27C	29C	32C	35C
Min. R/H	20%	22%	25%	30%	35%	40%	48%	58%	65%	70%

Table 1 Humidity Minimums

Ideal Drying

Ideal conditions for **BallistiCrete™** application are 73°F with a 50% relative humidity. The general rule of thumb for identifying good drying conditions is the lower the temperature

the lower the humidity needs to be. Conversely, the higher the building temperature the higher the relative humidity should be for proper material curing.

Air Movement	Opening windows and/or assisting air movement with fans can greatly assist in maintaining good drying conditions within a building. In excessively hot and dry areas, minimize air movement across the applied walls and add moisture by wetting the floor or humidifiers. Excessive air movement directly on the surface of the BallistiCrete™ may prematurely dry the surface and create surface cracks. Avoid direct air movement on the BallistiCrete™ surface when using fans or other means of climate control.
Direct Sunlight	Shade the BallistiCrete™ from direct sunlight during the installation and its initial 48 hour cure.
Moisture	Ensure that the application substrate is free of surface moisture prior to the BallistiCrete™ application and that the source of the moisture is properly addressed. BallistiCrete™ shall not be moistened during the application or during the initial cure period

Substrate Preparation

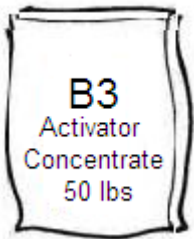
Gypsum Board	Gypsum wall substrates and gypsum board joint treatment in newly constructed buildings must be sealed with an acrylic concrete bonder. Joint compound is not required but if already installed, must be sealed with an acrylic concrete bonder. Joint compound will re-emulsify when wet if it is not sealed adequately prior to the application of BallistiCrete™ . Quikrete Concrete Adhesive is a recommended Acrylic Bonder, do not use PVA bonders as they re-emulsify. Roll on acrylic bonder over gypsum board and apply BallistiCrete directly over the tacky or dry bonder.
Concrete/Plaster	Prior to applying BallistiCrete™ , all concrete wall or concrete block wall substrates must be solid, free of water, excessive moisture, oil, paint, wax, grease, asphalt, latex compounds, curing compounds, adhesives and any contaminant that might act as a bond breaker. It is recommended to mechanically abrade the surface down to sound, solid concrete. Etching is a good method of final cleaning using a diluted muriatic acid solution. Once sufficiently etched, the wall should be thoroughly rinsed with potable water to dilute any acid solution remaining on the wall surface. Applying BallistiCrete™ to totally dry wall surfaces can create rapid drying, the potential cracking and/or poor adhesion of the BallistiCrete™ to the substrate. Seal first with an acrylic bonder, contact GigaCrete for recommendations if necessary.
Magnesium Board	The wall surfaces should be sealed with an acrylic bonder before proceeding with the application. Applying BallistiCrete™ to totally dry wall surfaces can create rapid drying, the potential cracking and/or poor adhesion of the BallistiCrete™ to the substrate.
Note	<i>Exposed metal surfaces contacting BallistiCrete™ on any of the above substrates should be isolated or sealed with a thick primer or other appropriate anticorrosive coating prior to product application. BallistiCrete™ may directly abut approved non-metallic electrical boxes and other non-metallic protrusions such as wood, without treatment.</i>

Mixing Station

It is recommended to take the time to establish a well organized mixing station. Batching accurately and efficiently will keep the installation on schedule and profitable. The following list provides a checklist for necessary items and practices:

- Tarp off the entire mixing area for easier cleanup
 - Water hose or suitable water source
 - Power source with GFI receptacle kept away from water usage
 - Spare mixer available in case one fails
 - Weight scale (optional)
 - Graduated water containers for measuring
 - Plastic barrel for quickly drawing clean/potable mixing water
 - Additional plastic barrel for rinsing/cleaning
 - Level surface at “bench” height for measuring water
 - Designated area for stocking dry product
 - Trash barrel or designated area for opened bags and Trash
- Safety Equipment:
- Protective eye wear
 - Dusk mask
 - Rubber gloves
 - Rubber sole work boots
 - Long pants
 - Long sleeve shirt

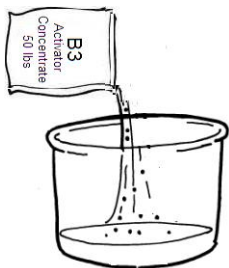
Creating the modified water (B3 activator)



Accompanying BallistiCrete bags

Activator + Water = B3 Activator

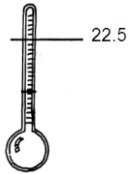
Mixing BallistiCrete™ Activator (Modified water, Part “B”)



1. Empty the **50 pounds of B3 Activator Concentrate** into a plastic barrel capable of holding at least 15 gallons. A clean trash barrel will work fine. Make as much as possible to fill the barrel. This becomes the modified “water” for mixing BallistiCrete.



2. Add **8 gallons + 1 pint (31 liters)** of cool water and stir to fully dissolve all crystalline solids. Blend with plaster mixer and allow the activator solution to rest 8 hours – preferably overnight. Cover the barrel to prevent evaporation and to keep out possible contaminants. Store in cool area and prevent the B3 solution from exceeding 70°F prior to use.



3. B3 Activator and water creates a solution much denser than water. The target density is **22.5° Baume or a specific gravity of 1.18**. Using an appropriate hydrometer available from GigaCrete, check the B3 solution for actual density and adjust accordingly. Higher density will require adding water and lower density will require more concentrate. Consult a GigaCrete representative with questions.



4. Pour approximately **7 to 7 1/2 quarts (6.6 - 7 liters)** of **B3 Activator** into a 10 gallon (38 liters) mixing bucket.



5. Add the entire contents of the **BallistiCrete™** bag and mix to a lump free consistency. Mix time is 3 minutes, slowly break up and add small bag of glass fibers and continue to mix thoroughly for 1-2 minutes. Add additional B3 Activator solution if needed.

6. **DO NOT TEMPER AFTER MIXED (NO REMIXING)**

7. Mix only what can be immediately installed.

- Mix using B3 solution only. **DO NOT MIX WITH PLAIN WATER.**

- Ensure all B3 concentrate has fully dissolved

- B3 solution greater than 70°F will greatly reduce material pot life.

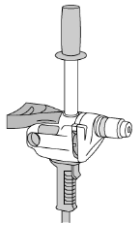
- B3 Solution must be allowed to “age” before use. **Immediate use is not recommended**

Ensure B3 is at the correct liquid density before using

B3 solution is corrosive to unprotected metals and contains water and chlorides



Mixing Equipment



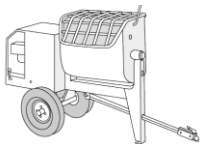
Mixing BallistiCrete is easy but can be made difficult without the right mixing equipment. Smaller projects are generally batched one unit at a time and mixed in a standard five gallon bucket. Drills with plaster mixing paddles are commonly used for this purpose. A ½" (12mm) 7 amp variable speed drill with 650 rpm is commonly used for bucket batching.



Standard mixing paddles are used with heavy duty ½" (12mm) drills for bucket batching.



Direct drive mixers are ergonomically designed and minimize torque reduction that increases batch efficiency. Most are equipped with variable speed options that reduce product overflow while blending the dry product with activator. Direct drive mixers are recommended over heavy duty ½" (12mm) drills for bucket mixing.



A standard mortar mixer may be used for larger volume projects. Ensure that the bulk batch volume matches the application volume consumption and fresh material is continuously used.

Mixing



4 to 5 mins @ 50°F - 75°F =



7.5 QTS (7 liters) / 75#

Add approximately seven (7) quarts (6.6 liters) of activator per 75 lb. (34 kg) package of dry **BallistiCrete™** and slowly mix glass fibers in using typical plaster mixers for bucket batching or standard mortar mixers for bulk batching. Always add the total activator amount to the mixing vessel before adding the dry material. **DO NOT MAKE TOO WET**, or add more powder. It is recommended to use exact measuring equipment to duplicate liquid amounts for each batch mixed. Avoid using water less than 50°F and more than 75°



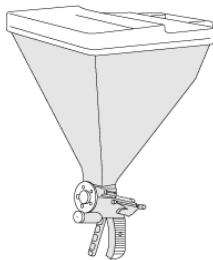
4-5 Minutes

BallistiCrete™ requires less water (activator) than typical plasters and mortars. It is extremely important to allow sufficient time for the product to adequately dissolve and liquefy. Mixing time is approximately 4 to 5 minutes. **DO NOT ADD MORE SOLUTION BEFORE INITIAL ACTIVATOR HAS BEEN BLENDED.**

The most common mistake is adding more activator before all dry ingredients have absorbed. Very small amounts may be added after 3 minutes of mixing. **DO NOT TEMPER AFTER INITIAL MIXING HAS TAKEN PLACE.**

Spray Equipment

BallistiCrete™ may be applied by hand trowel, hopper gun texture sprayer or stucco/plaster type spray equipment. When using spray equipment, it may be necessary to adjust the air flow rate, nozzle orifice size and feed rate to maximize application efficiency. Adjust application speed in order to achieve the desired application depth and aesthetic affect. Testing spraying/pumping equipment and material prior to installation is strongly recommended.

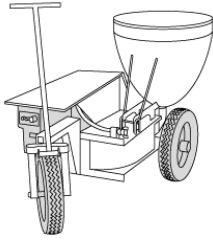


Hopper Gun

Hopper texture guns may be used to apply **BallistiCrete**. Hopper guns are typically used for smaller volume projects and are typically used for producing textures such as orange peel, splatter and splatter knock downs. A Marshalltown Sharpshooter 693 is recommended when considering hopper gun applications.

Spray Specifications

Nozzle	Material Orifice	Air Orifice	CFM	Max Hose Length
Blow cap	1/4" (6mm)	1/8" (3mm)	4	50'



Peristaltic Pump

or “Squeeze Pump”

Peristaltic pumps offer the same benefits as rotor stator pumps but are much more user friendly. Material never interfaces with pumping parts reducing the set up and wash out time. Peristaltic pumps use less pressure – delivering material safely and effectively. Various output options and sizes are available.

ACCESSORIES

Control Joints

Control joints are necessary to compensate for potential structural movement, settling, thermal and humidity expansion or contraction and provide installation stop and start points. It is recommended that joints are placed at regular spacing's; however depending on wall heights it is best to follow industry standard plaster control joint spacing. Plastic 093V by Trim-Tex or other Plastic Components joints typically used in the plaster and wallboard industry are installed by hot knifing or cutting a groove into the EPS allowing the joint flanges to rest flush with the surface. They may be fastened through the flange with nails or by adhering with low expansion urethane foam adhesive. Plastic “V” joints are preferred as it is easier to maintain the target installation depth along a temporary tear away strip that runs along each side of the center groove.

Casing Bead

Casing beads are necessary to isolate **BallistiCrete™** from dissimilar building materials such as unprotected (non-corrosion coated) metal door frames, metal window frames, ceilings, floors and walls. Plastic Flat Tear Away by Trim-Tex (or similar) is preferred as it is flush mounted to the EPS and provides a temporary removable strip to trowel against. Fastening may be done with roofing nails or low expansion urethane foam adhesive.

Outside Corner Bead

Outside corner beads are optional but recommended.

Finishing

Direct Application to Wall surfaces (plaster, drywall or block walls)

Preparation

Remove all possible bond breakers such as dust, dirt, oil, moisture, wall paper etc. Coat cleaned surface with an ACRYLIC BONDER, typical to concrete adhesives (Quikrete is ideal). Do not use PVA bonders as these re-emulsify when wetted. Contact GigaCrete for recommendations, however, the big box stores, Home Depot, Lowes, Maynard's etc carry acrylic bonders in the masonry/stucco departments. Survey the substrate for irregularities that may adversely affect the application such as minor protrusions and voids. Walls must NOT be wet or moist or contain moisture trapped within the walls.

Depth Screed Strips

When thickness is required for larger caliber protection, it is advised to create depth gauges by making vertical screed strips, usually from wood cut to the depth required. For demonstration purposes herein, we shall describe 1" depth requirements: Cut a strip of wood 1" wide and 1" deep and as long as the wall height. Cut the first layer of mesh supplied by GigaCrete and loosely attach to the corner of the wall at the ceiling in a vertical drop much like hanging wallpaper and cut off at the floor. After mesh is loosely suspended like wallpaper hanging down, attach the 1" deep strip with screws to the wall trapping the edge of the mesh in the corner of the room and pin back the mesh out of the way of the first thin coat of BallistiCrete. Apply a thin coat of BallistiCrete directly to the surface and then un-pin the mesh and fold over the mesh and press into the thin coat of plaster. Fill all the gaps in the mesh with material and put excess BallistiCrete back in the mixing bucket, ready to be used again for the next and following coat. Now attach the second strip of wood 3" in from the edge of the mesh leaving about 2" of exposed mesh. (If the wood strip is 1" wide, there will be 2" of mesh visible.) Apply the second thicker coat of BallistiCrete and screed off with a float or straight edge wider than the screed placements. A 48" or longer Darby or aluminum straight edge works best for this type of installation (typical to concrete finishing or plastering tools). Do not overwork the material; this is not the final finish. You now have exactly 1" thick BallistiCrete installed over the surface. Wait until the material is almost set and remove the first screed and fill the gap. Only one screed is now used to continue the process as the thickness of the previous coat can be used as the depth screed. Overlay the next layer of thin coat and mesh over the previous 3" of mesh left showing and repeat the process. Go back over the 1" wide gaps and fill with BallistiCrete as you move down the wall. It will bond perfectly to itself. Apply the final finish coat to whatever thickness is desired over the previous coat. If 2" overall thickness is required, use the same screed strips again. If it has dried overnight, apply the acrylic bonder again to stop the suction of B3 solution out of the second coat.

Reinforced Mesh

Heavy duty fiberglass mesh from GigaCrete is a critical part of the **BallistiCrete™** application. A 1/4" (6mm) minimum coat of **BallistiCrete™** is applied to the wall surfaces and worked flat. Pre cut the mesh (like hanging wallpaper) and embed into the first coat working material through while ensuring that the mesh is flat and free of wrinkles. Butt adjoining mesh sheets, overlapping is not required as additional offset layers of lath will cover any joint lines. Additional coats of **BallistiCrete™** are now applied over each layer and built up to the desired thickness. Layers of 3/8" to 5/8" (9mm to 15mm) can be applied each time depending on methods used.

Spraying

Spraying is both faster and allows thicker build up per layer. **BallistiCrete™** may be applied by hawk and trowel but spray application is recommended for best results. Spray in a fashion that allows the trowel person to stay in close proximity to the sprayer and allows a continuous wet edge. Working wall areas in sections from top to bottom works best.

Hawk & Trowel

BallistiCrete™ is hand applied like most conventional plaster material.

Trowel Timing

Dry and set times depend on material viscosity, temperature and humidity. Generally, the first trowel pass is approximately 20 minutes after the initial application and in 20 minute intervals for subsequent trowel passes. Trowelling from top to bottom each time helps to keep a good wall profile.

FINISHES AND TEXTURES

Smooth

For a smooth wall finish a steel trowel typically used for conventional plaster may be used. It is important to allow **BallistiCrete™** to take an initial set (gel stage) before attempting to finish it smooth. It is acceptable to finely mist the finishing trowel and/or the surface of the wall with water to assist with the finishing process. However, avoid over watering the wall

surface. Surface blistering may occur if the **BallistiCrete™** is finished prematurely and/or the wall surface is over wetted.

Decorative

When **BallistiCrete™** is specified as the wall finish (exposed not painted) it is advisable to allow it to fully cure and then add a thin coat of PlasterMax (same product without adding glass fibers) then additional trowel passes are necessary beyond the acceptably smooth stage. Make passes from top to bottom at 15-20 minute intervals using the usual trowel pressure until the surface begins to mottle and shine. Extra pressure is not necessary as the material will begin to polish regardless. Surface blackening becomes more pronounced with each additional pass. Subtle mottling is generally more desirable so use caution not to over trowel. After the material has fully cured, it can be waxed with floor polish and buffed to a high gloss finish. When color is added, it looks a lot like Venetian Plaster. Consult with GigaCrete on colors and finishes.

Texture

Spray textures such as orange peel, splatter and splatter knockdown are also possible. Texturing is performed during the second coat application. Stamped texturing is achieved with a 9" urethane texture roller. Liquid or "bubble gum" release agent is lightly sprayed on the surface and on the roller. A wide variety of textures are possible with this method.

Surface Protection and Decoration

Paint	Wall paint is most commonly used to seal, protect, and provide a consistent decorative finish to cured BallistiCrete™ . Breathable latex primers and paint typically used for conventional plasters are recommended after a minimum 7 day cure period. In cooler and/or more humid environments additional cure time is needed.
Sealer	BallistiCrete™ that is not being painted must be sealed with siloxane masonry sealers. Always try a chosen sealer in a small area to check for compatibility before applying to large areas.

Clean Up

All mixing, spraying and finishing equipment must be thoroughly washed immediately after use. Potable tap water is sufficient for cleaning.

Curing

Drying and curing times may vary widely due to temperature and humidity differences from one location to another. It is important for **BallistiCrete™** to be fully dry before applying any surface treatment or decorative product. Questions regarding drying and curing may be directed to GigaCrete authorized technical assistance representative.

Limitations

1. **DO NOT** over wet, as this may lead to product failures.
2. **DO NOT** temper the material with additional activator after initial mixing as this may lead to product failures.
3. Metallic surfaces such fasteners, other than stainless steel or brass, should not directly contact **BallistiCrete™**. **Seal all exposed metal surfaces contacting BallistiCrete™ with a suitable heavy primer or other anticorrosive coating** prior to product application or separate by using plastic components trim or gaps with silicone caulking.

Coverage

Each 75 lb. (34 kg) of **BallistiCrete™** covers approximately

12 sq. ft. @ 5/8"

7.5 sq. ft. @ 1".

5 sq. ft. @ 1-1/2"

3.75 sq. ft @ 2" thickness.

Packaging

BallistiCrete™ is packaged in 75lb. (34 kg) sealed plastic lined paper bags.

Storage

BallistiCrete™ bags should be stored in a secure, indoor and dry space. It is important that bags maintain their seal and are free of puncture or tear. In cold climates, **BallistiCrete™** should be brought to room temperature 24 hours prior to being mixed.

Shelf Life

When properly stored in original sealed packaging, **BallistiCrete™** has a shelf life of one year from the date of manufacture.

Tech Support. For additional technical assistance, please contact GigaCrete, Inc. at (702) 643-6363. PST