

Frequently Asked Questions

What type of cement may I use? The recommended cement is Portland I, either white or grey. To achieve certain colors the white may be needed.

What kind of vermiculite do I need? You need expanded vermiculite. This is a form of the natural mineral mica that expands when it is heated. The following is a chart with the various grades.

TYPICAL SIZES, DENSITIES, AND NAMES OF EXPANDED VERMICULITE¹

SIZES			DENSITIES		GRADES OR SIZES	
MM	IN	U.S. Standard Inch/Sieve	KG/CU M	LB/CU FT	U.S. SYSTEM	INTERNATIONAL
8 to 16	5/8	5/16 to 5/8	56-72	3.5-4.5	N/A	Premium (6)
4 to 8	5/16	5 mesh to 5/16 inch	64-85	4.0-5.0	1	Large (4)
2 to 4	5/32	10 mesh to 5 mesh	72-90	4.5-5.5	2	Medium (3)
1 to 2	0.08	18 mesh to 10 mesh	75-112	4.7-7.0	3	Fine (2)
0.5 to 1	0.04	35 mesh to 18 mesh	80-144	5.0-9.0	4	Super Fine (1)
less than 0.5	0.02	less than 35 mesh	90-160	5.6-10.0	5	Micron (0)

Although any grade theoretically will work, it is generally recommended that grades 2, 3, or 4 be utilized. The grade of vermiculite utilized depends on what the mix is to be used for. The smaller and finer the vermiculite, the better read you will get. For example, the Grade 4 (super fine) will give you a better, more detailed read than the Grade 3 (fine). For example, if you are desire a more detailed read, for example, you are doing something like the "wood look" where you want to see the fine detail of the wood grain, use Grade 4. If you are doing something like sound barriers and the detail of the design is not intricate or fine, the Grade 3 would probably be ok.

So, in essence, you may want to purchase several grades of vermiculite and experiment before making your own decision based upon what result you want. **IMPORTANT:** we recommend the **#4 specialty vermiculite from W.R. Grace**. However, whomever you get vermiculite from, **do NOT purchase an SCA (Stabilized Concrete Aggregate) vermiculite**. This is vermiculite that has been coated to prevent the absorption of water. This has traditionally been used for light-weight concrete made with vermiculite, but as discussed later, this material has never been able to achieve strengths of greater than 325 psi. Our mixture achieves approximately 8-10 times those levels. To do that, we need for the vermiculite to absorb the water and the chemicals. (More about this subject later.)

How much does vermiculite cost and is it readily available? Vermiculite is a natural mineral that is mined all over the world and is readily available. Obviously, the cost will vary depending upon how much you buy and from whom you purchase it; however, generally, vermiculite costs less than sand (to compare it to another possible aggregate).

What type of coloring may I use with CarpenterStone? Any regular color methodology used with standard precast concrete may be used with CarpenterStone. We recommend the use of water-based liquid color. In addition to impregnating the color throughout the mix, you may also paint or stain the material. Staining the material with a traditional water-based wood stain is especially effective when making products that replicate wood.

How may the mix/material be dispersed? Due to its' viscosity, the material may be poured, extruded, sprayed, or tamped.

What kind of molds can I use with CarpenterStone? Due to the lightness of CarpenterStone, molds may be used that would not normally be of sufficient strength to be used with standard precast concrete. We have manufacturers who have used molds made of plastic, metal, vinyl, wood, rubber, and foam. As you know, each of these has its' own advantages and disadvantages. Generally speaking, the heavier the material that the mold is made out of the more pulls you will be able to get from that mold. Since one of the advantages of CarpenterStone is its' ability to read detail better than concrete, the better the mold is, the better result you will get. The CarpenterStone mixture reads plastic molds best. However, if you want to use rubber molds (which is acceptable), please refer to the following questions for more detail.

May I use a release on the molds; and, if so, does it matter which ones I use? Yes, in order to assure the best results, you may; and you should, use a release on the molds. These can be the same releases that you normally use on a standard precast concrete mix. However, it's recommended that you use a bio-degradable release; and, generally, that you do not use fat-based or oil-based releases. (We've seen some manufacturers use Crisco as a release and these can work well. However, we would recommend that you not use these if you intend to use a sealer on the piece.) Instead, we recommend releases developed specifically for use in the precast industry. Also, you may use a cooking spray, such as Pam.

If you use rubber molds, you will sometimes you will experience an increase in the number of pin holes compared to using other types of molds. If so, we recommend that you use a release especially designed for rubber molds, such as Cresse T880. This often results in a significant reduction in the amount of pin holes that you get.

Do I need to use vibration of the molds? Generally, CarpenterStone's viscosity allows it to fill the voids of the mold better than standard precast concrete; and, consequently, vibration generally is not necessary. However, vibration will speed up the filling of the molds. Also, if you are not getting the "read" that you desire, vibration may improve your results. However, this should be a gentle to moderate vibration, such as achieved through the use of a vibration table, roller line, sander, or by hand (puddling). It is important that the fibers remain evenly distributed throughout the mix; you do not want the vibration to cause the fibers to "settle" to the bottom of the mix.

How does CarpenterStone cure? Like standard concrete, CarpenterStone is a naturally, self-hydrating cure. No heat is required for this process.

When can the piece be pulled from the mold? The ideal cure time in the mold is 24 hours. However, in most instances, eight hours is sufficient. Also, this period may be further shortened through the use of accelerators; however, you should be certain to test the end results over time to verify any possible effects from this strategy.

How should I remove the piece from the mold? As with standard precast concrete, when you remove the product from the mold you should remember that the product is still in a green state and that it should be handled with care. The possibility of damage can be decreased by remembering to remove the mold from the product rather than taking the product out of the mold.

What about handling the product during the curing stage? Once again, as with regular precast concrete, many of the curing issues are the same for CarpenterStone. For example, your local climate and the time of year are factors that will affect the curing time. Specifically, the impact of heat/cold and humidity should be taken into consideration. In colder climates, it may be beneficial to cure the product in an environment in which the humidity and temperature are controlled to both expedite curing and control the hydration process. By contrast, in a hotter climate, it may be beneficial to leave the product indoors to cure for 24 hours (once removed from the mold) prior to exposing the product to the direct sun. Baking in the sun during the heat of the summer while in a green state can and will often lead to cracking. To assist with avoidance of cracking in extremely hot weather (i.e. during the summer) consider plastic wrapping to keep moisture in when drying. This will help control the hydration and further reduce the potential for cracking. Finally, when in doubt, you should exercise the same judgment with product made with the CarpenterStone admixture that you do with other cementitious mixes. Also, remember that if due to the fact that you are able to make thinner pieces with our admixture, you are making product that is thinner and lighter than concrete, you should exercise additional care and consideration of these factors. As always, common sense and practical quality control standards should be exercised.

What is the recommended curing time? The recommended curing time is 28 days; however, similar to concrete, CarpenterStone will continue to strengthen even after this time period. In fact, product made with CarpenterStone will continue to gain even greater strength over time since the vermiculite allows the water to slowly release.

When and how may the product be shipped? As with all of these questions, the general rule of thumb, if you are not certain of the answer, is to treat the product like concrete. Though the actual time period can be dependant upon what type of product it is, the size and shape of the piece, how it will be shipped, etc. the following provide some guidelines. Generally, the product should not be shipped prior to 14 days. When shipping, make sure product is not strapped down too hard, especially if done during initial green stage. Also, make sure that the pallet is not moving on the truck. If delivering to a job site, make sure that the product is not stacked on top of each other at the job site.

How may the end product be cut? If you are making product using the CarpenterStone admixture that consists of cement, vermiculite, and fiber, the products will not have sand and gravel in them. In this circumstance, the material may be cut, screwed, nailed, routed, drilled, etc. with regular wood tools. Masonry tools may also be used. However, there is no reason to use a concrete saw, nor are diamond blades necessary.

If I use CarpenterStone to make a product that is to be installed in, or on, a building, when can I first install the piece? Although it is always best to wait until the product is fully cured before installation, the product should cure a minimum of 14 days prior to installation.

On what substrates may products made with CarpenterStone be installed? Due to the lightness of the weight, products may be installed directly to almost any substrate, including concrete block, metal, plywood, Goldboard, foam, etc. This is especially important for companies who are currently using standard precast concrete to produce product since the same product made from the same process can now be installed over many additional substrates. This provides the manufacturer with the ability to greatly expand the product's application and dramatically increases the market potential.

How may product made with CarpenterStone be installed? As discussed previously, since any product made with CarpenterStone does not have sand and gravel and since the resulting weight is so much lighter than concrete, there are several methods of installation that may be acceptable, depending upon the use and the substrate, the product may be attached by the use of screws, nails, staples, tap cons, or through the use of a foam adhesive, liquid nail, etc. However, when determining the method of installation, you should use your judgment and experience taking into consideration all relevant factors. For example: the type of substrate on which the product is being installed, the size and thickness of the pieces, the weight of the pieces, the experience of the installer, the potential for harm, etc. (In many instances, the installation method will have been specified by the architect, engineer, and/or designer.) It is recommended that you do NOT use thin set.

Material made with CarpenterStone may be installed by either mason or carpenters. However, there can be significant cost saving by using carpenters rather than masons.

My product does not seem to have the strength that I need? First, it is important for you to determine which mix formula is correct for the specific performance data that you need for the particular product that you are making (i.e. should you be using a 4:1 mix, which provides greater compressive strength but is heavier; or, could you use an 8:1 mix which is lighter, but has approximately half the compressive strength of the 4:1 formula?).

However, please remember that CarpenterStone and CarpenterStone Extreme are admixtures for cementitious mixes such as concrete and mortar. And, just like when you use various admixtures in concrete (or mortar), your results may differ from our test results. The recommendations are only based upon our experiences. The type of mixer, size of the batch, heat/cold, humidity, timing, amount of water, etc. can all affect your results.

Regardless, assuming that you have chosen the formula correctly and that you have measured all of the ingredients accurately and followed the process correctly, the most common errors that we see are a couple of the same ones that we see in standard precast concrete mixes. Either the person making the mix put in too much water, in an effort to speed up the mix and achieve a more flowable mix, or the person making the mix does not adjust the mix to account for the degree of humidity in the air, or the mix was not allowed to run long enough for the chemical reaction to take effect. (Please refer to mixology manual.)

How do I know when the mix is ready? When the chemicals have fully reacted within the mix, you should be able to see that the mix is sticky to the touch and is somewhat "shiny" in its'

look and feel. You should also be able to tell by the viscosity of the mix. In other words, there should be no “balls” of the material within the mix. (Once again, please refer to the mixing guide and view the video on the CarpenterStone website to actually see how a correct mix should look.)

What is the shelf-life of the admixture? The admixture should be fine for at least six months. However, if you let the admixture sit for long periods of time without use, you should agitate the liquid before using again.

What happens if the admixture freezes? Care should be taken to maintain the admixture above freezing; however, freezing and subsequent thawing should not harm the material if thoroughly agitated. Never agitate the mixture with air or an air lance. However, if you need to agitate the admixture, attempt to ensure that all of the chemicals are thoroughly dispersed throughout the mix. Under extreme conditions in which the admixture remains frozen for long periods of time, or in which the same container of admixture goes through repeated freezing and thawing, we are not certain of the effect. There could be damage to the admixture.

What kind of mixer do I need? You can use any standard concrete or mortar mixer. However, the time that you will need to mix the batch will depend upon the size of the batch relative to the mixer and the speed and efficiency of the mixer. Since one of the important elements in creating a good mix is to allow the CarpenterStone admixture to activate, the mix must run long enough for the chemistry to react. You can tell this by the look and feel of the mixture itself. Once the mix begins to “shine”, the mixture is “sticky” to the touch and you can see the mix “holding together”, the chemistry has activated.) A higher speed mixer will reduce the time that is necessary for this to take place. Of course, just like concrete, you do not want to run the mix too long either. That’s where the science and art meet. Generally, the mix should be in the range of 15 – 20 minutes with a standard mixer, but it could be more or less.

How long do I run the mix? As noted previously, you can use any standard concrete or mortar mixer. However, the time needed to mix the batch will depend upon the size of the batch relative to the mixer and the speed and efficiency of the mixer. Since an important element in creating a good mix is allowing the CarpenterStone admixture to activate, you must let the mix run long enough for the chemistry to react. You can tell this by the look and feel of the mixture itself. Once the mix begins to “shine”, the mixture is “sticky” to the touch and you can see the mix “holding together”, the chemistry has activated.) A higher speed mixer will shorten the time that is necessary for this to take place. Of course, just like concrete, you do not want to run the mix too long either. That’s where the science and art meet. Generally, the mix should be in the range of 15 – 20 minutes, but it could be more or less.

Is this considered to be a “green” material? The composite material consists of the following ingredients, cement, vermiculite, fiber, water, and the admixture. Since the admixture (chemicals) comprises a very small percentage of the overall weight of the mix, the material does generally meet the standard to be considered a green material.

How does the weight and strength of the material compare with concrete and wood? The comparison depends upon the specific formulation of CarpenterStone you are using; however, for a general comparison, please see the following chart.

	Compressive Strength (PSI)	Wet Weight (Lbs. per Cu. Ft.)
carpenterstone™	1,500-2,200	55-58
Concrete	3,000-7,000	140-150
Wood	450-850	22-58

Why do you say that products made with CarpenterStone are non-combustible?

Since the mixture has such a high content of vermiculite and since the vermiculite has already been burned, the material is considered to be very fire resistant. This is why vermiculite is often used as a fireproofing material. The fireproofing characteristics of vermiculite cement are widely recognized nationwide by insurance companies, state rating bureaus, and local building officials. In fact, Underwriter’s Laboratories have assigned up to a 4-hour ratings to systems that employ vermiculite as one of the components. The mixes discussed here, of course, use significantly higher amounts of vermiculite.

What is the weight and compressive strength of the range of composite materials made with the CarpenterStone admixture and how do they compare to previous vermiculite/cement mixtures?

The following information is the data as tested. However, your actual results may vary based upon the size of the mix, the type of mixer used, the amount of heat and humidity at the time the mix is conducted, etc. The following chart provides the historical results of traditional vermiculite/cement mixes and the relative weights and strengths of mixes made utilizing the CarpenterStone admixture and following our mix instructions. Results may also vary based upon actual product applications.

	Mix	Dry Weight Lbs/Cu Ft	Compressive Strength (PSI)
Regular Vermiculite / Cement	6:1	22-28	125-225
carpenterstone™	6:1	43-45	1,500-2,200

(Although we are always continuing to conduct additional tests, recent tests have certified the 6:1 formulation to achieve an average compressive strength of 2,287 PSI. We will continue to update this information.)

What about the tensile and flexural strength of CarpenterStone? Due to the vermiculite being more absorbent than sand, materials made with CarpenterStone are less brittle than concrete. The high fiber content also aids the material in achieving tensile and flexural strengths ranging from 650 to 1,000 PSI, depending upon the formulation.

What are the insulating properties of this material? Though not specific to a particular formulation of CarpenterStone, generally, vermiculite cement is considered to have excellent

insulating properties. One inch of vermiculite cement is equal in insulating value to approximately 20 inches of regular concrete.

Is there an issue with the material when used in areas of the world that have freeze-thaw conditions? Material made with the CarpenterStone admixture was submitted to freeze-thaw testing in accordance with ASTM C-666, Procedure "A", "Test Method for Resistance of Concrete to Rapid Freezing and Thawing" for 300 cycles and received a Relative Durability Factor of 101.61. A factor of 80 is considered to be passing.