

What is considered hot weather and what impact will it have on tile installation?

Hot weather is defined by the NTCA (NTCA Reference Manual) as "any combination of high air temperature, low relative humidity, and wind velocity that affect the performance of setting and grouting materials." Although it may seem counterintuitive to consider all three of these conditions as "hot weather", each has a similar and significant impact on the performance of setting and grouting materials. We recommend installing our setting and grouting materials between 50 and 90 °F. If applying outside these temperatures, precautions must be taken.

Setting and grouting materials will have a reduction in performance when the air temperature is above 90 °F, the humidity is below 50%, and/or there are high winds impacting the placed material. Hot weather can have the following effects:

- Decreased set time or flash setting
- Shrinkage and cracking
- Decreased bond strength of tile to mortar bed.
- Grout haze setting on the tile before removal
- Increased need to retemper the material leading to weakening and discoloration
- Decreased strength development

These impacts can range from mild to severe but should always be taken seriously. This bulletin will lay out ways to combat hot weather, from mild to extreme.

What steps do I need to take to address hot temperatures?

When the air temperature is above 90 °F, you should begin to take precautions to avoid the impacts hot weather can have on your installation. Depending on the product, for every 15 °F to 20 °F above 70 °F, the product will take half the time to cure. To avoid this, your goal should be to keep the temperature of the mixed material as close to 70 °F as possible. To achieve this, the following steps may be taken:

- Use a high-performance mortar such as an ANSI 118.15 polymer-modified mortar. They have increased working time, open times, and water retention, so are ideal for hot temperatures. If possible, use an "E" rated mortar (extended open time). Mortars carrying the "E" designation have a 50% higher open time.
- Use cool or iced water to bring down the temperature of the final mix. It is important to ensure the iced water has no remaining ice when mixed in.

- Keep your mixing area and material storage shaded. Keeping your material in an air-conditioned area will be better but may not be realistic depending on your project.
- Protect the application area from direct sunlight, substrate should be as cool as possible. Ideally, the protection should be set up the day before application because concrete and other substrates will absorb heat. Dampening the substrate can help lower the substrate temperature.
- Do not use tile or a substrate that is hot to the touch. Applying material to a hot surface will cause shrinkage, cracking, delamination, and flash setting.
- Adjust your work schedule to work during cooler periods of the day.
- For epoxy-based materials, store in cool temperatures prior to use and use cool water for cleanup. Adjust your work timing to account for shorter working times in hot weather.
- Cautions
- Never retemper a cementitious product with additional water. You may remix the material without adding water, but that should not be done more than once. Retempering with additional water will break up the forming crystal structure, causing the mix to weaken and grout will change color.
- When using a fast-setting mix, high temperatures may cause flash setting, ruining equipment and your installation.
- Do not mix the material longer than the directions state as that will generate heat into the mixture.

What steps do I need to take to address high winds?

In conditions with high winds, your goal should be to protect the material from wind for as long as possible, both before and after application. High winds can cause surface moisture loss which can lead to shrinkage cracking and delamination. To this, the following steps may be taken:

- Set up barriers to protect your mixing area and application area from wind. Wind can cause moisture loss from the adhesive mortar's surface, preventing wet transfer causing bond loss with any tiles you set into it. Before setting tile into mortar, check that the mortar is still fresh on the surface.
- After application, cover the material to protect from the wind and keep the surface from drying. Surface moisture loss can cause uneven discoloration, cracking, and create soft surfaces. Use breathable material such as Ram Board or similar so excess moisture is not trapped.

- Cautions

- AC systems can help maintain lower temperatures but be careful to protect your installation from drafts coming from the AC system.
- When laying tile, check the back of the tile frequently to ensure the mortar bed hasn't skinned over and is still bonding.

What steps do I need to take to address low humidity?

When the relative humidity is below 50%, the surface of the setting or grouting materials will dry out significantly faster than in normal conditions. Your goal should be to limit the amount of moisture lost

- Dampen the substrate before applying thin set, the backs of the tiles before laying, and tile before grouting. This will prevent the substrate and tiles from pulling moisture out of the thin-set or grout.
- Immediately begin moist curing after application, do not wait until you are done with the area.
- Cover the grout with a breathable material such as Ram Board or 30 lb kraft paper to hold in moisture.
- Use a high performance, polymer modified mortar with high water retention (look for an "E" rating) to minimize moisture loss.
- Cautions
 - In interior applications, the AC system can drastically decrease the relative humidity.
 - Covering grout with plastic or another non-breathable membrane can cause condensation to form on the grout. This will cause the grout to not cure properly, causing it to be soft and discolored.

What are other extreme weather conditions that will affect my tile installation and how do I address them?

- When humidity is over 75%, most products will have extended curing times and condensation may form on substrates and the surface of installation products. Condensation can cause improper curing, surface softening, and discoloration. A dehumidifier may be necessary to decrease humidity. Contact Custom Technical Services for specific guidance.
- Use caution when applying liquid applied membranes in areas exposed to UV. If the liquid applied membrane is exposed in exterior conditions for 72 hours, contact Custom Technical Services for Guidance.
- Epoxy based materials will have lower open times and faster cure times in hot weather conditions. Epoxy grout may also discolor with high UV exposure.

