



Setting Tile During Extreme Weather Conditions

Every tile installer will encounter situations where tile must be installed despite adverse or even severe weather conditions.

The temperature may be too hot or too cold, the humidity extremely high or overly dry, or the location to be tiled is very windy. This article will provide guidance for setting tile when the weather does not cooperate with scheduling the work. While these extreme conditions are usually experienced on exterior installation projects, the recommendations also apply to work inside buildings under construction that lack climate control.

*By Steve Taylor
Director of Architecture
and Technical Marketing,
Custom Building Products*



CUSTOM[®]

TILE INSTALLATION SYSTEMS

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IDEAL TILING CONDITIONS

When installation products are formulated in a laboratory, the work is conducted in a controlled environment. There is no wind, the temperature is 72° F and the relative humidity is 50%. These parameters are required by ANSI to eliminate outside variables that could skew the testing results and discredit comparative evaluations of the products. Unfortunately, most tile is not installed in these ideal conditions. Tile installation product manufacturers try to anticipate less-than-ideal conditions by field testing their products under a variety of weather parameters. From that information, they will generally recommend installation of tile when the temperature is between 50° F and 100° F. By understanding the chemical reactions of the products and how they are affected by the weather, you can make better decisions about whether to proceed with caution (and spot testing) during bouts of extreme weather.

COLD WEATHER

Most chemical reactions are affected by ambient temperature and this includes the hydration process of Portland cement. A mortar based on Portland cement will not reach its stated bond strength to the substrate if it is continually exposed to low temperatures during the curing cycle. Low temperatures can extend the time before you are able to grout the installation and will delay opening the tiled surface to traffic. What can be done if the temperature is approaching 50° F (or even a little below) and the area cannot be heated? Keep in mind that the surface receiving the tile may be colder than the air temperature above it. If you must install tile in an environment near the recommended 50° F minimum, the installation may benefit from an accelerated or rapid-curing mortar. A mortar like CUSTOM's ProLite® Rapid Setting Tile & Stone Mortar is formulated with unique cements that accelerate the cure and strength development of the mortar. All the benefits of a rapid setting mortar will not be evident when it is used in cold weather, but in most cases, it will be ready to grout the next day and can often open to traffic as soon as the following day. Since every environmental situation is unique, it is always best to tile a test area first and see if the results meet expectations.

HOT WEATHER

Tile installers and the dry-set mortar they use both suffer when working in very hot conditions. Hot weather also accelerates the hydration process. It may even happen so fast that the mortar stiffens before it can get placed. As Portland cement mortar cures, it goes through a state where it has a plastic consistency that will not stick well to surfaces, including the back of the tile. High heat can also cause the surface to dry and skin over, inhibiting the bond of the mortar to the tile.

To solve this problem, be sure to store bags of mortar in a cooler location, away from direct sunlight. It is also important to use cool water. In extreme cases, the use of ice as part of the mixing water will help extend the working time and improve the bond to the tile. Never retemper the mix by adding additional water to a mix that has become too stiff to work with. This material should be discarded and a fresh batch should be mixed up.



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CUSTOM advises the use of a mortar with extended open time, like MegaLite® Crack Prevention Mortar, for tiling in high temperatures. The extended open time will help keep the surface of the trowel-applied mortar from skinning over even when the weather is hot. The open time of MegaLite will not be extended in hot weather; instead, it will act more like a standard mortar under these extreme conditions. Careful planning to work in the coolest part of the day, shading the installation area and using the right mortar will help assure the success of your tile installation on those days when the temperature approaches triple digits.

WINDY CONDITIONS AND LOW HUMIDITY

It is impossible to get a satisfactory bond to a ceramic or natural stone tile when the wind is blowing across the installation site. Mortar is applied with a notched trowel and those ridges have nearly twice the surface area of the substrate that it is being applied to. As the wind blows across the exposed surface of the ridges, it quickly evaporates water from the mortar. Without water, the hydration process stops at the mortar surface - and so does the buildup of strength. The dry surface of the mortar will lose its ability to stick to the back of the tile when installed and if it does adhere, it will be a very weak bond. The best way to solve this problem is to block the wind. Even a slight breeze should be blocked from blowing across the installation. As with hot weather, the use of a mortar with an extended open time will help to hold the water in the mortar and keep the surface of the ridges open. The ANSI standard for dry-set mortar will help you identify mortars that have extended open time. The letter "E" is added to the number designation to identify those mortars with extended open time, e.g., ANSI A118.15E. CUSTOM's MegaLite Mortar meets the requirements of ANSI A118.15E and is ideal for tiling during windy conditions.

Moisture is needed for the proper hydration of the Portland cement in ceramic and natural stone tile bonding mortars. If there is too little moisture, the mortar will not cure properly and attain its full strength. The relative humidity can be very low in desert climates like the Southwestern United States, but it can also be low when the temperature drops. Like wind blowing across the trowel-applied mortar, low humidity will draw moisture out of the mortar and stop the hydration process. The surface of the mortar is likely to become dry and powdery and there will be a reduction in bond strength to the tile. As in the windy scenario, the use of a dry-set mortar with extended open time will help ensure a proper bond. It is advisable to spread small areas at a time and immediately cover the mortar with the tile. An impervious tile will help to hold the moisture in the mortar and will allow maximum cure time.

HIGH HUMIDITY

While high relative humidity is beneficial to the hydration of the Portland cement in the mortar, it can be a hindrance to the coalescence of the polymer in the mortar. As the latex polymer in the cement mortar loses moisture, it will begin to coalesce or solidify. Once sufficient moisture is removed, the polymer will become the hard plastic it is intended to be. The fully cured polymer improves the bond strength to difficult surfaces and tiles. Normally, this occurs



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as the Portland cement hydrates and removes water from the mortar. However, when the humidity is very high, the mortar does not lose enough moisture to initiate the coalescing process of the polymer. The Portland cement will cure with the additional moisture and the strength will build, but the polymer is not given an opportunity to improve the bond to the back surface of an impervious tile. The complete curing process will eventually happen, but it will take much longer than under ideal conditions. The solution is to use a rapid setting mortar, such as CUSTOM's ProLite Rapid Setting Tile & Stone Mortar. Rapid setting mortars can be identified by the addition of an "F" to the ANSI designation. ProLite meets the requirements of ANSI A118.15F. The hydration process in the rapid-setting mortar is accelerated and will use up the mix water quickly. As the water is consumed in the chemical reaction, the coalescing of the polymer occurs and the mortar achieves maximum strength.

While it would be best to wait for bad weather to change, it is not always possible due to deadlines and scheduling issues. With the proper selection of installation materials, sufficient personnel and careful planning, it is possible to install ceramic and natural stone tile in the most adverse weather conditions. As these are typically exterior installations, make sure to protect the tile from thermal expansion and contraction by inserting the ANSI recommended movement joints. Also, when tiling a patio or balcony that abuts an inhabited space, always follow TCNA guidelines, including a proper slope in the assembly to direct water drainage away from the building.

For information on grouting during severe weather conditions, see CUSTOM Technical Bulletin 78: Extreme Weather Grouting at custombuildingproducts.com.



ABOUT THE AUTHOR

Steve Taylor is Director of Architecture and Technical Marketing for Custom Building Products and has more than 30 years of experience developing products for the construction industry.

Steve is a member of the Tile Council of North America (TCNA) and Materials & Methods Standards Association (MMSA). In these roles, he helps to determine proper tile installation methods and standards. This includes simplifying the tile installation process to save tile professionals time and money.

Custom Building Products
Technical Services 800-282-8786
custombuildingproducts.com