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CUSTOM BUILDING PRODUCTS

Moisture Sensitive Stone

Classifications Explained

TECHNICAL INFO

Moisture and how it interacts with natural stone has always been a topic of interest. However in recent years the historical practice of processing and installing relatively thick stone slabs has changed. The trend now is to supply and install much thinner slabs as well as to produce man made artificial stone alternatives. Several of the reported advantages are reduced cost and more recently a reduced carbon footprint by way of a reduction in freight volume. However this transition to thinner natural stone and artificial alternatives has resulted in some new problems surfacing on the job site. Perhaps the most important of these is the question of dimensional stability, specifically in terms of the stone's sensitivity to moisture.

It is understandable that stone products expand, and sometimes warp, during installation due to the moisture present in the substrate and installation materials. Warping can occur with a moisture sensitive stone when the rate of expansion and contraction between the bonded, wet side of the stone, is significantly lower than that of the exposed top surface. This differential creates dimensional instability, manifesting itself as warping. Traditional concerns of warping are generally associated with certain types of green marble and slate, some Serpentines and some of the artificial stones that use, especially, polyester resin binders.

It is the current trend of supplying and installing thinner stone slabs as well as the supply of artificial stones that has seen an increase in the problems and risk of warping. Due to this increase it has become important to know how sensitive different stone materials are to warping when exposed to moisture. This information is a major factor in identifying the correct type of adhesive to use for installing stone materials.

Classifying Moisture Sensitive Stone

The classification of moisture sensitive stone involves dividing stone into three specific classes, each based on a specific maximum range of warping. The test method used to measure and determine this dimensional instability or warping is EN 14617-12. The three classes are:

Class A: <0.3mm

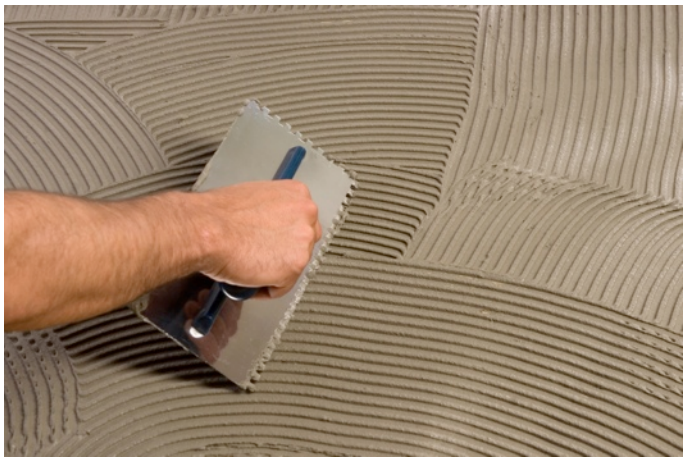
Class B: 0.3mm < / < 0.6mm

Class C: > 0.6mm

Materials in class A that warp less than 0.3mm (when exposed to moisture but no actual adhesive), are considered dimensionally stable and the choice of adhesive does not depend on the materials ability to warp due to moisture.

Instead other factors should be considered such as the stone's sensitivity to efflorescence, sensitivity to water borne mineral staining, the size of the stone module and of course the type and condition of the substrate. (*Note that in general normal rapid setting adhesives are considered preferable for the installation of stone as they significantly lower the risk of these more common problems such as efflorescence and water marking)*

Materials that warp in excess of 0.3mm and cannot be included in class A are considered moisture sensitive and hence dimensionally unstable, falling into either class B or C. These can be re-tested, this time using a rapid setting cementitious adhesive, for re-classification. Once re-tested with a rapid setting adhesive those stones that warp ≤ 0.3mm can be shifted back into class A. These stones should only be installed using a specialized rapid setting cement adhesive formulated especially for moisture sensitive stone (class C2FS1 as per EN 12004) or adhesives that contain no water such as 100% solid epoxy mortars.



Materials that warp >0.3mm after re-testing with a rapid setting adhesive are classified in classes B or C respectively, depending on their specific deformation. Stone materials in these two classes should only be installed with adhesives that contain no water such as 100% solid epoxy adhesives. Note that care should be taken when considering using stones in class C as they represent the highest degree of dimensional instability. They should only be used in totally dry areas and with all other measures in place to manage the high degree of deformation. Stones in the lower classes may also not be suited to wet environments, regardless of the installation materials used, so it is advisable to consult with the stone supplier to determine suitability.

In summary knowing and classifying the dimensional stability of stone materials helps to determine the proper adhesive for moisture sensitive stone - *either specialized rapid setting cement adhesives (C2FS1) or 100% solid epoxy adhesives are the materials we recommend*. It also allows the "newer" thinner stone slabs and artificial stones to be installed with confidence.