



ARDEX Technical Note 3.3:

Specify Natural Stone Wall and Floor Tiling – Adhesives & grouts

Natural stone is the fundamental primary, durable construction material dating back to prehistory. The main reason to choose natural stone is the aesthetic beauty and elegance. The variety of colours, textures and finishes provide never ending possibilities for architectural design.

A successful stone installation requires stone is fixed solidly in place to withstand the rigours of daily service and remain immaculate with regular cleaning. There are some issues that will need extra attention when it comes to fixing due to the nature of stone.

Common issue 1 - staining & discolouration

Although natural stone is viewed as an impervious material it is very much susceptible to staining or discolouration by various mechanisms. There can be many reasons which lead to staining:

- ▶ Dirt can be entrained in the surface even in seemingly polished sealed surfaces. Liquid stains can reside and be very tough to remove. Infrequent, improper or incorrect cleaning can also lead to surface stains. Where the surface has a semi-open texture this problem can be exacerbated.
- ▶ Moisture from the fixing product or the substrate migrates through the stone, dissolves minerals and re-precipitates elsewhere or at the top surface as it reaches the atmosphere and evaporates.
- ▶ The mortar bed or grout has contaminants which enter the stone and show through as brown or dark stains. Typically this is due to organic matter or metals.
- ▶ The silicone or grout used has water or solvents which enter the side of the stone and give a translucence or picture frame effect. More often than not this is permanent. Considering the calculation above about water added to cements and grouts to achieve wet properties then to leave after hydration this water is a genuine problem.
- ▶ As the adhesive and grout are alkaline and have an excess of lime (calcium hydroxide), this will dissolve and when it reaches the atmosphere it reacts with carbon dioxide to deposit unsightly calcium carbonate scum as white blooms or encrustation.

Common issue 2 - warping & movement

Where a stone has an absorption capacity, it also has an expansion tendency, as the inclusion of water in the pore structure will add mass, likely resultant volume to the surface absorbing the water. If only one side is absorbing water and expanding, then there is a net curvature created as one expands relative to the other side and both are no longer the same length but remain parallel; hence a curve or warp is formed.

This water comes from either the adhesive bed or the substrate and can even be from the grout. The phenomenon is not necessarily permanent but is detrimental as it can either occur rapidly after fixing or be delayed. At the same time the adhesive is trying to bind the stone to the substrate or matting, and movement of the stone can weaken or disrupt this bond. All it takes is fractions of a millimetre away from the adhesive, the bond is lost if the adhesive is hardened as it cannot stretch.

This can also occur in stone which are saturated when fixed and the top surface is allowed to dry. The underside is wet and fixed to the adhesive so is restrained, but the top is losing water so mass and volume shrinks. This creates a tension and causes the stone to bow upwards at the corners.

Despite the common perception for a flexible adhesive, it cannot be the cure. Nearly no adhesives have the flexibility to follow and accommodate such curling movement.





Specifying adhesives

To overcome these common problems with natural stone installation, it would be good practice to specify a suitable cement-based adhesive with rapid dry technology that reduces residual water release.

ARDEX Rapidry® technology ensures all the water added to the screed or substrate levelling compound is chemically bound to form part of the solid structure and negate the risk of the moisture staining or curling described above. The Rapidry® formula should not be confused with adhesives which are solely rapid setting or rapid hardening.

ARDEX screeding cements A35 and A38 contain such technology, for internal and external applications respectively. ARDEX X32 has water repellent properties and will not let water pass through. It's ideal for fixing large uncalibrated natural stones and slabs externally like a bedding mortar, and will not deform or extrude under the weight of very large slabs.

It's also important to remember that some stones, such as marble may be translucent and that a grey based adhesive will have a tendency to show through the stone, for translucent tiles, or if in any doubt specify a white adhesive.

For very large format natural stone floor tiles with varied thicknesses, a pourable thick bed adhesive help succeed in solid bed fixing without the need to butter the back of the tile.

Specifying grouts

Migration of mix water from the grout can enter the stone laterally on all sides to give a dirty margin to the entire stone. It would be good practice to specify a rapid drying marble and natural stone grout, available in a shade which is formulated to complement most natural stones and virtually eliminates the risk of water staining.

ARDEX MG grout will bind the mix water within the grout. It's especially suitable for light coloured stone such as limestone and marble, and can be walked on after just 90 minutes. Also note that the use of inappropriate movement joint sealants can lead to edge staining. Ardex ST silicone sealants are available for use with moisture sensitive stones.

The demand for a stylish natural stone finish is ever lasting, the need for correct information on the stone is critical, as well as a keen understanding of the issues associated with fixing. For further guidance please refer to:

- ▶ BS 8298: Code of Practice for the Design and Installation of Natural Stone Cladding and Lining.
- ▶ BS 5385-5: Wall and floor tiling – Code of Practice for the design and installation of terrazzo, natural stone and agglomerated stone tile and slab flooring.

