Concrete Curing Compounds and Surface Hardeners TDS 154

CONCRETE CURING COMPOUNDS:
Curing compounds and surface hardeners are used to seal the surface of fresh concrete and prevent rapid moisture loss. These materials consist of liquids containing film-forming polymers (curing compounds) and metallic or non-metallic materials (surface hardeners).

There are two primary types of curing compounds:

1. Permanent, impervious curing compounds; and
2. Temporary curing compounds, also known as chemically dissipating or oxidizing compounds.

Permanent curing compounds will inhibit the bond of mortars used for installing ceramic tile and stone because they fill the pores of the concrete, preventing the development of a mechanical bond. Complete removal of permanent curing compounds is required to ensure a successful installation using Portland cement–based setting materials. This is achieved by mechanically scarifying the concrete to a depth below the penetration of the curing compound. Scarification opens the concrete pores, allowing the mortar to achieve a strong mechanical bond. Methods of mechanical scarification include shot blasting, bead blasting, high-pressure water blasting, and abrasive blasting.

Temporary curing compounds (chemically dissipating or oxidizing compounds) gradually break down through chemical reaction or oxidation when exposed to sunlight. However, relying on oxidation is not a reliable method unless the concrete is exposed to direct sunlight for an extended period. Even after dissipation, temporary curing compounds may leave a residual film that must be completely removed prior to tile installation. Mechanical abrasion methods such as bush hammering, planing, or grinding can be used for removal. If these methods are not sufficient, mechanical scarification will be required.

There is also a type of curing compound and sealer based on sodium silicate liquids. When applied, a chemical reaction occurs between the sodium silicate and free calcium salts produced during the hydration of Portland cement. This reaction forms calcium silicate, which is insoluble, dense, and becomes an integral part of the concrete. Consult the manufacturer of these products to verify compatibility with direct bond, thin-bed tile or stone installations. LATICRETE recommends mechanical scarification to remove all curing compounds and surface hardeners.

A simple field test can help determine whether a curing compound or sealer is present. Place drops of water on the concrete surface and observe absorption. If the water beads or does not readily absorb into the surface, mechanical abrasion or scarification will be required before proceeding with tile or stone installation. It is also recommended to perform a test area to evaluate bond performance.
Chemical removal of curing compounds using acids is not recommended, as the chemicals must be completely neutralized prior to installation. Improper removal may result in bond failure. Additionally, acids should not be discharged into public drainage systems.

Prior to installing tile or stone over properly prepared concrete substrates, required surface tolerances must be met. As outlined in the Tile Council of North America (TCNA) Handbook for Ceramic, Glass, and Stone Tile Installation:

- For thin-bed ceramic tile installations using cementitious bonding materials (including medium bed mortars):
    - For tiles with all edges shorter than 15" (375 mm): maximum allowable variation is 1/4" in 10' (6 mm in 3 m), with no more than 1/16" variation in 12" (1.5 mm in 300 mm) from the high points.

- For tiles with at least one edge 15" (375 mm) or longer: maximum allowable variation is 1/8" in 10' (3 mm in 3 m), with no more than 1/16" variation in 24" (1.5 mm in 600 mm).
- For modular substrates (e.g., exterior glue plywood panels or adjacent concrete masonry units): adjacent edges shall not exceed 1/32" (0.8 mm) in height difference.

If more stringent tolerances are required by the project design (e.g., 1/8" in 10' [3 mm in 3 m]), they must be clearly specified in the project documents, or provisions must be made to bring the substrate into compliance.

- For thick-bed (mortar bed) installations and self-leveling methods: maximum allowable substrate variation is 1/4" in 10' (6 mm in 3 m).

CONCRETE SURFACE HARDENERS:

Concrete surface hardeners are divided into two categories:

1. Non-metallic hardeners, typically composed of graded quartz or silica aggregate, Portland cement, and chemical additives.
2. Metallic hardeners, consisting of fine iron aggregate combined with anti-corrosion additives and sometimes Portland cement.

Non-metallic hardeners can be used in both interior and exterior applications and are typically applied to fresh concrete at a rate of approximately 1 lb/ft² (4.9 kg/m²). They are broadcast onto the surface during the initial set and mechanically troweled to produce a dense, abrasion-resistant surface suitable for vehicular traffic.

Metallic hardeners are limited to interior, dry environments. Use in exterior or wet areas can result in corrosion, expansion, and surface failure. These hardeners are typically used in heavy-duty industrial environments, such as factory floors subjected to steel-wheeled traffic or high-impact loading. They enhance the concrete's ability to absorb physical shock.

Application of metallic hardeners is similar to non-metallic types, involving surface broadcasting followed by mechanical troweling and finishing. Surface hardeners are not curing compounds; therefore, treated concrete must still be properly cured to achieve full strength.

Hardened concrete surfaces are not suitable substrates for direct adhesive installation of ceramic tile or stone.