Preparation of Cast-In-Place Concrete

TDS 168

Every day, the tile and stone installation community encounters a common condition: the preparation of cast-in-place (poured-in-place) formed concrete walls. These include, but are not limited to, foundation walls (basements), swimming pools, structural walls, tilt-up concrete walls, and precast concrete panels.

It is important to recognize that cast-in-place concrete walls require formwork during placement. As a result, form release agents are typically applied to the forms to facilitate their removal after the concrete has hardened. Therefore, it must be assumed that form release agents or other potential bond breakers are present in **ALL** such conditions, and appropriate surface preparation measures must be taken.

For the benefit of all project stakeholders (tile contractor, general contractor, owner, etc.), it is **CRITICAL** to ensure that proper steps have been taken to prepare the substrate to receive LATICRETE® installation materials. This guidance also applies to precast and tilt-up concrete elements that may have been treated with form release agents or curing compounds during manufacturing.

Additionally, the recommendations in this document apply to any substrate that may contain bond-breaking or bond-inhibiting materials (e.g., curing compounds, surface hardeners, sealers, etc.).

A typical substrate preparation requirement, as stated in LATICRETE product data sheets, installation guides, specifications, and execution statements, is as follows:

"All substrates must be structurally sound, clean, and free of dirt, oil, grease, paint, laitance, efflorescence, concrete sealers, or curing compounds."

This means that any substance that may inhibit the bond of directly adhered materials must be completely removed prior to installation.

It should be noted that it is not the responsibility of LATICRETE International to define the specific "means and methods" required to achieve proper surface preparation. LATICRETE establishes the performance requirements for acceptable substrates; however, it is the responsibility of the contractor and other contractually obligated parties to determine and implement appropriate methods to meet those requirements.

Therefore, the following methods are recommended for preparing formed concrete (as excerpted from the *Technical Design Manual for Direct-Adhered Ceramic Tile, Stone, and Thin Brick Facades*):

Water Blasting

High-pressure water blasting, using pressures of 3,000–5,000 psi (20.6–34.5 MPa), removes the surface layer of concrete and exposes aggregate, creating a clean, rough surface. After blasting, the surface must be thoroughly rinsed to remove weakened cement paste (laitance) and debris.

This method is recommended only for concrete substrates, as the high pressure can damage less dense materials such as cement board or brick masonry.

Mechanical Chipping, Scarifying and Grinding

For wall preparation, these methods are recommended when defects or contamination are localized and require removal exceeding 1/4" (6 mm) in depth. Common techniques include chipping with a pneumatic square-tip chisel or grinding with an angle grinder.

Shot-blasting

Shot blasting uses specialized equipment to propel steel pellets at the concrete surface, removing contaminants and profiling the surface. The system is self-contained and simultaneously removes debris. This is a preferred method for removing thin surface layers, coatings, or contaminants such as paint. However, for vertical applications, only handheld equipment is typically available, making it less efficient for large areas.

Sandblasting/Grit-blasting

Modern grit blasting methods use cleaner, safer, and less intrusive materials, such as water-soluble, low-silica media (e.g., sodium bicarbonate). Sandblasting is acceptable when other, less intrusive methods are not available.

Dustless Blasting

Dustless blasting introduces water into the blasting process to suppress airborne dust. This may be achieved by mixing water with the abrasive media or injecting water at the nozzle. This method significantly reduces dust generation and is often preferred for compliance with current OSHA regulations.

In addition to the above mentioned methods, other methodologies which mechanically abrade contaminants from concrete also exist. After the substrate preparation has been performed, a final cleaning is also necessary. Note the following excerpt from the same technical design manual:

Final Surface (Residue) Cleaning

The final and most critical step of substrate preparation is thorough cleaning of all residues from contamination removal processes, as well as airborne dust and loose particles.

A pressure washer with 1,000–3,000 psi (6.9–20.6 MPa) is recommended. This step represents the minimum preparation requirement for all substrates.

Wall surfaces intended for direct-adhered cladding are often exposed to airborne contaminants, including construction dust. Therefore, cleaning with pressurized water (or standard water with mechanical agitation if pressure washing is unavailable) is necessary to eliminate dust films that can inhibit bond.

In some environments—such as coastal, desert, or industrial areas, airborne contaminants like salt, sand, or pollutants may require repeated cleaning prior to installation, especially if there is a delay between substrate preparation and installation of finishes.

There are no exceptions to this requirement; the only variable is the drying time required prior to application of adhesive materials.

Once the concrete surface has been properly cleaned and prepared, it must also meet required surface tolerance standards to receive tile or stone installations.

As stated in ANSI A108.01 (Section 2.6.2.2) and the TCNA Handbook for Ceramic, Glass, and Stone Tile Installation:

- For tiles with edges shorter than 15" (375 mm): Maximum variation is 1/4" in 10' (6 mm in 3 m), with no more than 1/16" in 12" (1.5 mm in 300 mm), measured from the high points.
- For tiles with at least one edge 15" (375 mm) or longer: Maximum variation is 1/8" in 10' (3 mm in 3 m), with no more than 1/16" in 24" (1.5 mm in 600 mm), measured from the high points.
- For modular substrate units (e.g., exterior glue plywood panels or adjacent concrete masonry units): Adjacent edges must not exceed 1/32" (0.8 mm) in height difference.

If more stringent tolerances are required (e.g., 1/8" in 10' [3 mm in 3 m]), they must be clearly specified in the project documents, or additional surface preparation must be included to achieve compliance.

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

Building sites located near the sea, deserts, or industrial areas may be subject to airborne salt, sand, or acidic rain/pollution contamination, especially if there is a significant lapse of time between the completion of the substrate work and adhesion of the cladding or cement plaster/render.

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