



Concrete Curing - 01 Issues with Chemical Compounds

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A critical part in the concrete floor installation process is concrete curing. How we cure the concrete will determine the quality, strength **and ability to install a flooring product**. In today's environmentally conscious world, the volatile organic compound (VOC) content of materials has drastically changed the properties of curing compounds, adhesives, and mastics of flooring products. Determining how we are curing the concrete upfront will substantially elevate challenges to the successful application of flooring materials (including sheet rubber, epoxy coatings, VCT, sheet vinyl, carpet, laminates, tile, terrazzo, etc.) due to incompatibility of the curing method and the floor adhesive or floor leveling products.

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Both curing and cure & seal materials have changed greatly over the past decade due to VOC laws.



Curing with a sprinkler

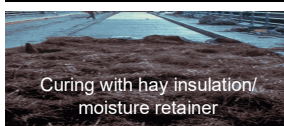
We have found that floor leveling compounds, such as Ardex, are generally **NOT** able to bond to concrete with a curing compound installed.



Curing with a plastic sheet (int)

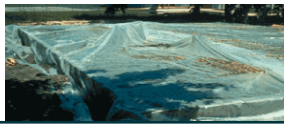
Typically, curing and cure & seal materials must have an ambient temperature of 40 degrees to apply to the concrete.

Temporary curing compounds typically leaves behind a film even after the compound has fully dissipated.



Curing with hay insulation/
moisture retainer

A cure & seal which conforms to an ASTM does not indicate that the cure and seal will be compatible with any flooring adhesive or floor leveling compound only that it conforms to a certain specification with concrete curing requirements.



Curing

- All concrete installations require curing. Proper curing greatly increases concrete strength and durability.
- During the curing period, the concrete surface needs to be kept moist in order to permit the hydration process.
- If water evaporates too quickly from the concrete, there will be cement in the concrete that does not properly hydrate.
- A lack of proper hydration could lead to durability & strength problems. For example, 4000 psi concrete with no curing or lack of curing can result in concrete strength of 2000-2800 psi at the surface.

Methods of Curing

There are three general methods for curing new concrete:

- Water curing keeps a continuous flow, ponding, or fog of water on the concrete surface for at least 7 days.
- **Moisture-retaining coverings such as plastic sheeting, wet burlap, or curing blankets over concrete for 5-7 days.**
- And the application of liquid membrane-forming curing compound or cure and seal compounds.
 - Acrylic, resin, sodium silicate solutions (which do not meet the requirement of a cure and seal per ASTM and they do not retain moisture or promote proper cement hydration in freshly placed concrete), and proprietary formulations.

Why is a curing compound or a cure and seal bad for flooring?

- The challenge is curing the slab and obtaining a good adhesive bond between the flooring and concrete.
- Curing compounds and cure and seals leave a film on concrete surface that can interfere with the adhesion of material.
- Almost all manufacturers require that the concrete be free of all curing compounds prior to adhesive application.
- More often than not, the flooring manufacturer is unwilling to provide a warranty on the floor because a curing compound was applied and not removed.
- ASTM says, "Concrete floors to receive resilient flooring shall be free of...curing compounds, or other substances which may affect the rate of moisture dissipation from the concrete or the adhesion of resilient flooring to the concrete."
- Floor underlayment such as Ardex will not bond to most curing products. We will have to shot blast the floor prior to the underlayment installation in order to get proper bond.
- After shot blasting has taken place, we will need to wait 16-24 hours for the concrete to properly outgas prior to the installation of the flooring or the proper floor testing as required by the floor covering manufacturer(s).

Dissipating curing compounds

- Just like all curing or cure and seal compounds, a dissipating curing compound forms a film, or membrane on the surface of the concrete.
- Dissipating curing compounds over time lose adhesion from the concrete and wear away under traffic and UV exposure.
- Most "dissipating" compounds dissipation depends on the amount of sunlight and traffic the curing compound receives.
- Achieving proper amounts of sunlight and/or traffic on the entire floor is an unknown variable for full dissipation.
- Relying on oxidation (UV light) is not a feasible alternative unless it is exterior concrete construction that is exposed to the sun for an extended period of time.
- Dissipating curing or cure and seal compounds is also dependent on the thickness of the application.
- Dissipating compounds may remain on the surface much longer than necessary for curing, thus preventing the moisture from getting out of the slab quickly, possibly creating a moisture problem later for our flooring.
- Dissipating sealers will most likely need to be removed via pressure washer, chemical removal, or mechanical means.

Testing and proper removal of curing compounds

- All adhesive or flooring leveling compounds would need to be tested for the specific cure and seal product being installed...every time, and in many locations.
- Chemicals could interfere with adhesive bond, and should NOT be used on our projects without first verifying the chemicals with the flooring manufactures.
- Improper removal techniques could cause failure of a tile or floor leveling compound installation. Acids should not be allowed to go into water drainage systems when attempting to remove curing or cure & seal compounds.
- Chemicals may also modify the pH of the floor such that it exceeds the flooring pH maximum requirement.
- **A good and easy test to see if the curing compound has been removed is to place a few drops of water on the surface and see if the water is readily absorbed into the concrete. If it is NOT readily absorbed, then additional removal may be necessary.**
- We must also be sure that we are testing EXISTING SLABS as well as new slabs.

General Recommendations

- **AECOM Constnction Managment should be moist curing concrete with a water retention material, such as plastic.**
- If the plans and specs call for a curing compound, we should address the concerns about curing compounds with the Architect during pricing that the floor will need to be shot blasted in order to obtain proper surface prep for all flooring materials and underlayment.
- Make sure that you schedule your concrete curing time and possibly a mechanical method of the removal if a curing compound is used.
- Always test existing slabs (as noted above) once the existing material has been properly removed. Testing via ASTM F3010, water droplet test.
- When curing concrete at temperatures less than 40 degrees, we need to keep the slab warm per cold weather concrete requirements and look into moist curing or utilizing moisture-retaining coverings. Use a plastic sheet with multiple layers of insulating blankets on top of the plastic.