

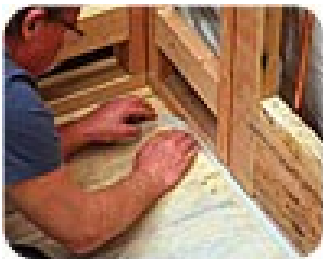
Self-Leveling Underlayments

by Michael Byrne

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Self-leveling underlayment (SLU) is a class of surface preparation materials used by tile and floor covering tile installers to prepare level setting beds for carpet, vinyl, hardwood, and ceramic. Most SLUs that are suitable for use with ceramic or stone tile are made for interior, dry-area installations. Generally, they are site-mixed powders mixed with water or a latex, poured and distributed evenly over a prepared substrate, and allowed to cure and harden. Following the cure, some SLU surfaces must be sealed with a primer for any type of installation, and a crack isolation/waterproofing membrane for wet-area applications.

Not all SLU materials are suitable or recommended for ceramic tile installations, and not all are underlayment grade, and some may only be suitable for patching structurally sound plywood subfloor/plywood underlayment or concrete construction. There are no manufacturing or installation standards for SLU materials, which in this article, refer to those self-leveling materials that when properly installed, can substitute for a mortar bed, backer board, or plywood underlayment on wood construction projects.



Self-sticking foam tape is used to establish a movement joint around the perimeter of this wood-framed SLU installation. Photo courtesy of Paul Winn.

Self-leveling compound (SLC) has long been partnered with the restoration of concrete slabs contaminated by curing compound or other surface-ingrained materials: after removing the top 3/8- to 1-inch of the surface of the affected concrete with bush-hammer, abrader, or shot-blaster, the resulting rough surface is sealed with a primer and covered with a thin topping of SLC. Some SLC materials can be used over wood construction, but only as a surface preparation treatment for structurally sound plywood subfloor/plywood underlayment combinations– not as an underlayment. This may seem like a fine point, but tile installation failures have occurred because an installer used an SLC when an SLU was (or should have been) specified.

The SLU mix must be distributed to all parts of the floor before it can self-level. Photo courtesy of Paul Winn.



Why Use an SLU?

In the past, practically all surfaces to be tiled were neither flat nor level. The reason being that the tile installer's mortar beds would provide a level and flat setting bed for the tiles. Today, an installer with mortar bed skills can make quick work of leveling a floor that does not meet minimum standards, but while mortar beds are still a viable method for leveling a floor or plumbing a wall, the labor force to perform such work is dwindling. As a result, self-leveling products were developed. From my own experience (and I am a person who takes great pride in his mortar beds), I would rather save my mortar bed skills for sloped floors and for wall or ceiling work: for either wood

or concrete floors, I prefer to use SLU materials for obvious reasons – they level themselves – but also for the not-so-obvious. With an SLU, density of the setting bed is very uniform, but with mortar beds, even those that are compacted, density can sometimes be a problem – especially if mortar is used to support hydronic tubing. In my opinion, as long as they are installed properly, SLU materials can provide surface smoothness and compressive strengths far in excess of most mortar beds.

For concrete restoration work, the use of an SLU or SLC is obvious, but on wood construction, there are a number of underlayment choices including plywood, backer boards, or an SLU. The selection process begins at the subfloor: does it meet or exceed the industry standards for flat and level? If so, plywood or backer boards will provide a reasonable level of finish quality. But if the subfloor is out of level, and the installation spec calls for a surface that meets the minimum standards, an SLU can be a best buy when compared to the cost of correcting either the structure or the plywood or backer board underlayments. All three underlayment choices require considerable labor to be installed properly, and all may carry considerable loads, but unless costly structural or surface corrections are made to fix a problem substrate, only an SLU can ensure a level surface.



Seams between plywood sheets are a good place to use up leftover caulk or sealant to prevent the SLU material from draining through the subfloor. Photo courtesy of Paul Winn.

Another application where an SLU makes good practical and economic sense is when an electrical resistance tile warming system is installed beneath the tiles. Many tile-warming systems permit direct application of tile over the heating mat with medium-bed thinset mortar, but this method puts the integrity of the heating element at risk. Instead, I prefer to cover the heating mat with an SLU, let it cure and harden, and then install the tiles – this eliminates accidents during the tiling portion of the installation.

Whether or not a radiant heat system is incorporated into the SLU installation, there are several general guidelines to follow:

- Scrupulous surface preparation and a clean substrate are paramount.
- Movement joints are mandatory.
- Mixing and distribution must be tightly controlled.
- SLU materials must be fully cured before covering with membrane or tile.

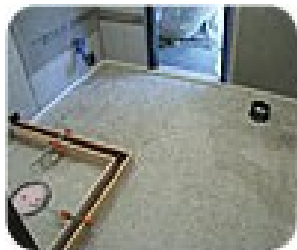
Surface Prep

With concrete, most SLU installations require removal of the surface of the concrete down to a specified depth. For example, new concrete contaminated by curing compound needs to have approximately 3/8" of its surface removed. Old concrete contaminated by exposure to hot oils might require removal of up to 1" of the surface. Concrete cured without a compound, but produced with a slick, steel-troweled finish might require that only 1/16" of the surface be removed. Depending on the brand, some SLU mixes require a primer or reinforcing mesh (or both) for concrete and plywood applications. For best results, rehabbing of any concrete should not take place until all installation materials are in-hand, and the tiles are ready to be installed.

For wood construction, subfloor plywood should be the proper grade and an appropriate thickness. If you want D+ performance, follow the industry minimum standards: upgrading from 5/8" plywood to 3/4" is highly recommended. A thicker subfloor may be stronger, but if its surface is contaminated with dirt, grease, paint, etc., the bond, compression, and shear strength of the SLU will be no greater than if a thinner subflooring was installed – possibly less. For best results, cleanup using a wet/dry vac (such as Shop-Vac) fitted with a HEPA filter instead of a broom.

Movement Joints Required

One of the most overlooked details of any SLU installation is the network of movement joints surrounding the floor. Space for the movement joint slot is most practically made by lining the hard perimeter with self-sticking foam tape. None of my area's tile distributors stock such a product, so I use a product called "Campershell Mounting Tape" instead. It is available from ACE hardware stores in 3/16" x 1-1/4" rolls, and from HD or Lowes in 1/4" x 1-1/4" rolls. The faces of the foam core for both sizes are covered with thin films of adhesive, which, in turn, are covered with a peel-away, bond-breaking paper tape. To apply, I simply peel off one side of the paper and stick the tape to a floor's perimeter, leaving its other paper skin still attached. After the SLU is poured, any foam tape located above the plane of the floor can be slit through with a sharp knife and peeled or scraped off the wall. In wet-area applications, I remove all the foam tape below the plane of the floor (after the SLU has cured), and fill the empty slot with an appropriate sealant before tiling.



This bush-hammered concrete slab is ringed with 1/4"-thick foam tape, and the closet flange is protected with a collar of black paper and tape. Photo courtesy of Paul Winn.

Mixing and Distribution

Mixing of any SLU should not begin until all surface preparation tasks are complete and the floor vacuumed (or damp-mopped) clean. I use several approaches to mixing depending on how much material has to be poured. If only one sack of material is required, I pour the required mixing water into a five-gallon bucket (for 50-pound sacks or less), slowly add the powder, and combine with an electric mixer for the amount of time required by the SLU manufacturer. For more than one sack, I use a mixing container large enough to hold up to three sacks (the amount needed to cover a 40-square foot bathroom floor fitted with a tile warming system). For multi-room applications, I purchase made-for-tile SLU materials, and contract with the local gypcrete installer to pump and distribute the mix.

Regardless of size, all SLU materials need to be distributed around a floor – not just dumped in a pile. For best results, 100% of the floor surface should be wet with mix before allowing the mix's self-leveling properties to take over. Rapid setting is an important property for some installations, but I prefer using slow setting brands because they are capable of providing a smoother, flatter surface than rapid types.

Curing

Finally, all SLU materials must be given the time and the environment to cure properly. This means

providing minimum temperatures before, during, and after the pour (until the end of the curing period, actually), keeping direct sunlight off the fresh SLU surface until curing has finished, keeping dust or paint overspray off the SLU surface, keeping the pour free of shock, vibrations, or stress until the end of the cure, and honoring the time requirements provided by each brand's manufacturer.

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