

Survey of Sealer Options for Concrete Countertops

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Introduction

Sealers are one of the most problematic and misunderstood aspects of concrete countertops. In the past, concrete countertops have had a bad reputation for being stain-prone and high maintenance. It doesn't have to be that way.

There are a number of reasons for the confusion. Historically, simple sealers such as acrylics and wax have been used. There are many more technologies available today, and sealer manufacturers are starting to recognize the demand for concrete countertop sealers.

This recognition is both good and bad, however. Many concrete sealers were developed for flooring usage. The performance and aesthetic requirements for floors are different from the performance and aesthetic requirements for countertops, regardless of the material the floor or countertop is made out of. Manufacturers of concrete flooring sealers sometimes mistakenly recommend a concrete sealer for countertops, when the sealer is really optimized for walking on, not for cooking on.

Ideally, countertops should be stain-resistant, heat-resistant, scratch-resistant, food-safe, easy to clean and maintain, and have a perfectly smooth and hole-free surface. There are types of countertop materials that meet all of these requirements, for example engineered quartz such as Silestone. It is possible for concrete countertops to meet many and even all of these requirements to some degree.

The Ideal Sealer for Concrete Countertops

Bare concrete is porous and vulnerable to staining and chemical attack. Liquids will tend to soak into the surface, carrying stains into the concrete itself. Acidic substances like vinegar and lemon juice will dissolve the cement paste, etching the surface. For concrete to be a practical countertop material, it must be sealed to protect it from stains and etching.

The Ideal Sealer for concrete countertops must satisfy these basic criteria:

Criteria that are important to clients (end users of the countertop):

- Enhance the appearance of the concrete without degrading the look or feel
- Non-porous
- Completely resist stains from food, oil and other common household substances
- Resist any etching from acidic substances like lemon juice and vinegar
- Resist heat from hot pots and pans take directly from the oven or stove top at a wide range of temperatures
- Resist UV degradation and yellowing from sunlight
- Scratch-proof
- Food safe (non-toxic)

- Easily cleaned using common household cleaning products
- Provide long term protection without the need for frequent maintenance or reapplication
- Not peel, flake, chip or bubble
- Easy to repair

Criteria that is important to the concrete countertop maker:

- Inexpensive
- Quick and easy to apply
- Strong client appeal

The Ideal Sealer does not exist. As a concrete countertop maker, you must weigh the advantages and disadvantages of each sealer type and choose one that's best for you and your clients.

Sealing Materials

There is a wide range of sealing materials that offer varying degrees of protection to concrete. Each particular sealer has application, performance, maintenance and other characteristics and requirements that differentiate it from other sealers. There is no perfect sealer, and no sealer meets all the Ideal Sealer criteria. Some come close, many fall far short in one area or another.

Sealers can be separated into two basic groups: penetrating sealers and topical sealers.

One basic consideration when choosing between penetrating and topical sealers is that sealing concrete that is polished or honed with a diamond grit finer than #200 can be a challenge. The surface is too smooth for many film-building (topical) sealers to stick to. When concrete is polished to a gloss, only penetrating sealers, hardeners and wax can be used.

Penetrating Sealers

Penetrating sealers are liquids that are applied to bare concrete, soak in, and then once wiped off and dried, are usually nearly invisible. They often don't affect the appearance of dry, bare concrete. Some leave it looking dry, while a few provide a darker, wet (but not very shiny) look. Penetrating sealers either work by reacting with the concrete to decrease its porosity and increase the surface density (the hardeners/densifiers) or by increasing the surface tension to cause beading (the repellants).

Densifiers

Densifiers (also called hardeners) are water-based chemicals that react with the cement paste in the concrete. The reaction generates additional cementing agents that physically increase the strength of the surface concrete and fill the micropores to densify and decrease porosity. The cementing agents that are generated during hardening often serve to provide some color enhancement. Densifiers are often applied before repellants. Densifiers can sometimes be applied more than once.

There are three basic types of densifiers: sodium silicates ("water glass"), potassium silicates and lithium silicates. Of the three, sodium silicates are the most common and the least expensive, while lithium silicates are generally more expensive and less common. Lithium silicates are very reactive and are more effective than sodium silicates.

Repellants

Repellants are a concrete treatment that changes the surface tension characteristics of the concrete so that liquids bead up easily (and therefore roll off or are easily wiped off). They create a hydrophobic water-shedding effect when applied to the concrete.

The three common forms of repellants are silanes, siloxanes and fluoropolymers. Silanes and siloxanes are chemically related. Both are silicone-based compounds that penetrate deeply into the concrete but do not change its appearance. No surface film develops so there is no color, shade or sheen change.

Fluoropolymers are another form of repellant that can either be invisible or be color enhancing. Color enhancement brings out the depth of color and shading similar to water, and it sometimes provides a soft sheen too. Some color enhancing fluoropolymer sealers provide a physical barrier (like a coating) in addition to the repellant qualities.

Repellants have very good resistance to abrasion (they are physically in the concrete, not on it), heat and UV.

Using Penetrating Sealers

Penetrating sealers were developed to provide some protection to warehouse floors and to help keep architectural concrete clean from airborne dust and debris. They do not block contact with the concrete, but inhibit liquids from penetrating into the concrete, thereby making it easier to clean up spills.

Penetrating sealers don't provide much if any protection against long-term exposure to aggressive staining agents (like wine, mustard and oil), nor will they provide much protection against acidic items. In fact, strong acid usually begins to etch the concrete almost immediately.

Penetrating sealers work best for concrete that gets infrequent or brief exposure to water, mild staining agents and non-acidic substances, and where cleanup is likely to happen quickly. Table tops (like end tables or coffee tables), fireplace mantles and hearths are good examples of where penetrating sealers work best. Because they become an integral part of the concrete, they cannot flake or peel off, and they usually don't need to be reapplied at all, or for many years. Heat will not affect them, nor will exposure to sunlight.

One drawback to penetrating sealers (especially repellants) is that once they are applied, no other sealer except wax can be applied over them with any confidence. There is a good chance that the topical sealer will not stick because of the repellant. Wax is commonly used over penetrating sealers. Penetrating sealers are often the only choice available when concrete is polished, since very smooth surfaces don't allow for a good bond with coatings. Generally a densifier is used during polishing and then a repellant is applied after the polishing is completed.

Topical Sealers

Topical sealers (coatings) make up the bulk of the sealers on the market. There is a wide range of types with widely differing chemistries and varying degrees of appearance, performance and longevity.

Wax

The most basic sealer is wax. Wax is both a penetrating and film-building sealer, depending on how much is used and how it is applied. Generally, a high-quality floor wax that contains carnauba and bees-wax, or just pure bees-wax, is used. Synthetic microcrystalline is also used. Automotive paste wax should not be used because of the additives it contains.

Wax produces an attractive, low- to high-sheen finish that brings out the best in the concrete's color and visual texture. Wax will usually darken bare concrete (similar to the way water wets-out or darkens the concrete).

Wax is a very forgiving sealer. It is easy to apply and hard to get wrong. Wax cannot be scratched, although the concrete itself can get scratched or gouged. Wax is easy to reapply and usually must be applied frequently to remain effective. Consider wax to be a sacrificial protectant that must be replenished to remain effective and attractive.

However attractive and easy wax is, it makes a relatively poor -performing sealer. Just about anything will leave some kind of mark or will stain waxed concrete if left on long enough, and exposure times must be fairly brief to avoid any kind of staining whatsoever. Hot temperatures (such as hot sauce pans) can cause the wax to soften or even melt and soak into the concrete. Acids like vinegar or lemon juice tend to strip off the wax and can etch the underlying concrete.

Wax applied over other sealers often adds very little extra protection. It essentially serves little purpose other than to provide a psychological boost to the homeowner, unless the underlying sealer is so poor that the wax actually provides more protection than the sealer itself.

Acrylics

Acrylics, either solvent based or water based, are the next most basic and common concrete sealers. Acrylic is a single-component polymer. Solvent based acrylic sealers don't "cure", but merely dry out and harden. They are water-clear and UV-resistant. Acrylic sealers are fairly easy to use, commonly available and relatively inexpensive. They were developed for sealing floors and driveways, and offer modest protection. Solvent-based acrylics will darken the concrete, but not as much as water will. Most water-based acrylics should be avoided if a dark, wet look is desired. They tend not to wet out the concrete, so it will look pale like it does when it is dry.

Acrylics are thin-bodied liquids that are brushed, sprayed or rolled onto the concrete. While they claim to soak into concrete (only in very porous concrete like a driveway), in practice they only sit on the surface of dense, impermeable concrete that is used in most concrete countertops. Acrylics offer fairly good stain protection but are easily scratched. Scratches often leave the concrete completely bare and unprotected. Acrylic sealers often require frequent reapplication because they tend to scratch and wear off, especially if the surface they were applied to was not properly prepared.

Solvent based acrylic sealers are fairly simple to touch up because the sealer will melt into itself. Water based acrylics will not melt into themselves because the solvent is water, which will not dissolve the acrylic resin. Because solvents will dissolve the acrylic resin, acrylics are not resistant to most solvents like acetone, toluene or xylene.

Acrylics generally provide modest heat resistance but are UV resistant.

Epoxies

There are hundreds of different kinds of epoxies, but the epoxies used for sealing concrete are all generally similar. Epoxy is a two-component system that chemically reacts when mixed. The reaction is irreversible, and the end result is a very durable, very hard surface. They are usually used for sealing floors, and are generally tinted. Epoxies are expensive, and because they require careful measuring and rapid application, can be a challenge to apply correctly. There are three basic types of epoxies: solvent based, water based and 100% solids. Epoxy that is 100% solids means there is no solvent or thinner in the epoxy; all of the material that is mixed together reacts and forms the coating.

Epoxies are very tough and can provide very good stain resistance. Epoxies are generally vulnerable to UV exposure, and yellowing and chemical breakdown can occur if a UV inhibitor or pigment is not used.

Even then the best marine epoxies (for use on wooden sailboats) start to break down after only a few years exposure. Epoxies are also heat sensitive.

Epoxies are hard and are usually very glossy and build to a noticeably thick film. Because they are hard (for a sealer) they can scratch easily (hardness is relative and not necessarily always beneficial). The appearance of epoxies can be a problem. A thick, plastic-looking coating that scuffs and scratches easily is not usually acceptable to the clientele who want concrete countertops.

Another difficulty with epoxies is that application can be tricky. Many epoxies are very sensitive to moisture and can bubble if applied to even slightly wet concrete. Bonding issues can occur as well, resulting in peeling.

Urethanes

Urethanes are a class of sealers that share many of the Ideal Sealer characteristics. Some urethanes are single part, and others are two part. There are water-based urethanes and solvent-based urethanes too. Urethanes, in general, are very stain and heat resistant, provide good or excellent UV resistance, are tough and scratch resistant, and are usually very glossy, but there are also matte versions available.

Urethanes are usually very sensitive to the surface they are applied to. Many urethanes must be applied over a primer, which is often epoxy. Because of this, they tend to look plasticky because of the thick glossy film of sealer and primer that builds up. There are versions of urethanes that do not require a primer and can be applied to bare concrete.

Urethanes can be tricky to apply correctly; they must be measured out precisely and mixed thoroughly. The surface they are applied to must be properly prepared. If these conditions are not met the finish will peel or at least perform poorly. Lastly, urethanes are tricky to repair, since they tend not to stick to themselves, and they are fairly expensive.

Summary of Sealer Properties

Type	Stain Resistant	Heat Resistant	Scratch Resistant	Sheen Comments	UV Stable	Easy to Apply	Easy to Maintain or Repair	Other Comments
Penetrating Densifiers: <ul style="list-style-type: none"> sodium silicates potassium silicates lithium silicates Repellants: <ul style="list-style-type: none"> silanes siloxanes fluoropolymers 	N	Y	Y	Sheen and color enhancement vary	Y	Depends on exact chemical and manufacturer	Y	Once repellants are applied, no other sealer except wax can be applied over.
Wax	N	N	N	Natural medium to high sheen	Y	Y	Y	Has to be reapplied frequently.
Acrylic <ul style="list-style-type: none"> Solvent-based Water-based 	Slightly	Slightly	N	Solvent-based: wets out Water-based: dry look	Y	Y	Solvent-based – Y Water-based – N	Easily scratched, needs to be repaired frequently.
Epoxy <ul style="list-style-type: none"> solvent based water based 100% solids 	Y	N	N	Glossy, thick, plastic look	N	N	N	Stain-proof, but, makes concrete look like plastic.
Urethane <ul style="list-style-type: none"> 1-part/2-part water-based/solvent-based 	Y	Y	Y	Usually glossy, but matte versions available. Often thick, but there are techniques to apply thinly.	Y	N	N	Tricky to apply, very dependent on surface preparation.

The Importance of Surface Preparation

Successful sealing often begins with good surface preparation. This generally means concrete that is clean, dust free and air dry.

Bare concrete slabs must first be cleaned before sealing. Always follow the sealer manufacturer's instructions on surface preparation. Hardeners and densifiers react with the alkaline compounds in concrete, so acid washing is generally forbidden. Use only plain water to clean the concrete. Topical sealers generally like a clean, neutralized surface. Usually the concrete is washed with a very dilute acidic solution to remove any residual cement haze (unless they were acid-stained). Use about 1/4 to 1/2 cup muriatic acid in 1 gallon of water. Sometimes vinegar is used instead. It is normally not necessary to chemically etch the concrete with a stronger acid wash. However, very smooth surfaces might require some etching to ensure good bonding when a topical sealer is used.

Always neutralize the acid with a solution of water and ammonia. Add about 1 cup of ammonia to 1 gallon of water. Rinse the slabs with the neutralizing solution to flush the acid, dust and any residue off of the slabs. Squeegee the slabs and rinse with clear water. Remove excess water with a clean, lint-free cloth or towel.

Allow the concrete to air dry for the amount of time called for by the sealer manufacturer. Usually the surfaces of the slabs must be completely clean and dry before sealing.

Conclusion

There is no bad sealer for concrete countertops. There are only incorrect expectations. Regardless of what type of sealer you choose to use, you must set clients' expectations, right from the start.

During the sales cycle, tell clients exactly how the sealer will behave in terms of staining, scratching, heat resistance, etc. Include disclaimers and detailed care and maintenance instructions *in the contract*, so that you have a written record that you conveyed expectations.

When you install or finish the countertops, give the client detailed instructions for cleaning and maintenance, and anything they might need to perform the instructions (wax, buffing pad, etc.). The number one reason for callbacks on concrete countertops is sealer problems. Many times these are not actually problems, but normal, expected maintenance issues. If the client is educated about maintenance and has detailed instructions, she or he will be less likely to call you back or be dissatisfied.

The accuracy and completeness of manufacturers' instructions for concrete sealers vary widely. Even if the manufacturer gives you detailed instructions, *test those instructions*. Practice with the sealer to make sure you can apply it confidently and consistently. Test the manufacturer's performance claims. Put red wine, olive oil and lemon juice on the sealed concrete and see what happens. Put a hot pot on the concrete. Drag it around. Cut the sealer with a knife. Try to scrape it off. Then test the repair instructions. Use the results of your tests to write detailed instructions for your clients.

If you understand the sealer you're using and help clients understand it, concrete countertops can develop a reputation for being both practical and beautiful.