Concrete Floor Surfacing

Smith & Co. has provided floor-surfacing [floor finishing] materials to businesses engaged in food storage, preparation or sale, as well as to their contractors, for over thirty years. Aircraft hangar floors, car showroom and repair areas, warehouse floors, machine shop and many other industrial and commercial uses, all benefit from a concrete floor that no longer absorbs dirt, oil, water that contributes to mold growth, or allows moisture evaporation that causes staining and efflorescence.

Health inspectors routinely approve kitchen and food storage area floors finished with Smith & Co. products, as outlined in this application note.

We manufacture a wide range of coatings, sealants and adhesives for commercial, industrial and marine construction and maintenance.

To provide a non-porous, easily cleaned surface, our High-Build Epoxy Paint™ is normally used as the topcoat. Sand may be applied between the first and second coats to provide a slip-resistant finish. The most common colors are white, light gray, light blue or brick red. Custom colors can be provided, with a fifty-gallon minimum order. Our surface preparation primer technology is normally compatible with other manufacturers' coatings, should it be desired to use some other topcoat.

Any skid-resistant elastomeric coating may also be applied as a final topcoat.

Step one: Surface preparation and chemical cleaning

The most common substrate is a concrete slab, often old and irregular. There are special adhesion considerations for new concrete, and the contractor is to consult the Smith & Co. Factory for guidance. Concrete takes time to cure to a degree of chemical stability that coatings of any sort will adhere, and this depends on average annual temperature. This application note therefore assumes the concrete is at least two years old at the latitude of San Diego, CA, at least five years old at the latitude of San Francisco, Ca, or at least twenty years old at the latitude of Seattle, WA. In most cases, however, cleaning of the concrete such that there is exposed silica sand on the surface, will give permanent coating adhesion to the embedded silica. Such cleaning is best done by abrasive-grit blasting with a fine abrasive, to remove the film of cement covering the silica. Hydrochloric [Muriatic] acid may also be used. This comes under the heading of mechanical preparation before the first step of chemical surface preparation. Acid etching is normally done first on new concrete, between a month and a year old. This is actually a mechanical, not chemical surface preparation step, removing a cement film from the surface silica grains. Chemical bonds will be established with that silica.

Old concrete which may have absorbed food spills, grease or oil, antifreeze, brake fluid or hydraulic fluid will give adhesion problems if not chemically cleaned. Abrasive-blasting does not remove soaked-in contamination, and that can still dissolve in and come to the surface of the first coating to be applied. This is why a precleaner is necessary before the Damp Concrete Primer, the adhesion-promoting primer that bonds any topcoat to the concrete surface.

The first chemical surface preparation step is to clean and seal the microscopic porosity of the concrete, so that a good chemical bond may be obtained with subsequent coatings. This will flush up any oils or dirt that is in the porosity of the concrete. This is done with Permanent Concrete Sealer™. It is applied at coverage of about 50-200 square feet per gallon, depending on concrete porosity. Ideally one applies as much as soaks into the concrete. It is then covered with a plastic sheet to prevent water evaporation. ***Do not let any of this sealer dry hard on the concrete surface; it will be difficult to remove and will interfere with adhesion of subsequent coatings.*** It is kept covered for five hours at 77F/25C [longer in colder weather]. At the end of that time the plastic cover is removed and the concrete is rinsed with tap water while being scrubbed with a stiff bristle brush, to carry off any dirt or emulsified oil flushed up by the powerful detergent action of this Sealer.

At this point the concrete surface should show water standing, not soaking in. That proves it has been sealed against liquid water and oil absorption. It can still pass water vapor, however. This seal is based on a mineral kind of chemistry similar to the concrete itself. Acrylic-emulsion-type sealers biodegrade and weather away, and need to be repeated. Our technology is 100% Acrylic-free, and ***on fully cured concrete, this seal is permanent.*** This treatment is sufficient to seal concrete against efflorescence. The cause of efflorescence, the white stains commonly appearing on concrete, is dissolved salts left behind when ground-water evaporates from a brick or concrete surface. When the concrete surface is treated with Permanent Concrete Sealer, liquid water cannot reach the surface. This sealer passes water *vapor* only, thus the *evaporation* of the water takes place ***below*** the surface The dissolved salts [usually calcium carbonate, limestone] are deposited within the concrete, below the surface where they cannot be seen and actually contribute to further sealing and densification of the bulk porosity of the concrete.

Step two: The Damp Concrete Primer™

Should we wish to continue with the surface treatment procedure with the goal of obtaining a non-porous surface or bonding some slip-resistant topcoat, the excess rinse water is removed, and the concrete will now appear damp, but with no standing water. Normally, this is the end of a work-day. Fans or open doors are used to provide ventilation to aid in evaporation of the water from the damp concrete.

The next day, the concrete normally appears lighter in color but may not be completely dry. The Damp Concrete Primer may now be applied, to either damp or dry concrete. Smith's Damp Concrete Primer is a waterborne polyurea primer, which develops a permanent silane-polyurea chemical bond to concrete, silica sand, rock or any mineral surface recently treated with Permanent Concrete Sealer. In most cases, on clean concrete treated directly with Damp Concrete Primer, this chemical bond will be directly developed.

Damp Concrete Primer is provided as a concentrate, and one part of the concentrate is to be mixed with two parts tap water, and then applied, usually by roller, at the coverage of 400 square feet per three-quart batch. The Pot Life [Working Time] is four hours once mixed with water, and unused stale material is to be discarded. If more is needed a fresh portion must be prepared. After application, one waits about 2 to 6 hours, depending on temperature and ventilation. The opaque tan color of the material will have become a clear, brown oily film, tacky or almost tack-free. Any epoxy or polyurethane or elastomeric coating may then be applied. The following procedure now refers to a topcoat of epoxy paint, typically for restaurant kitchen floors or food-preparation and storage areas.

Step three: The first coat of High-Build Epoxy Paint

After application of the Damp Concrete Primer to the concrete surface, one waits about two to eight hours depending on the weather; later in colder weather, sooner in warmer weather. Then the High-Build Epoxy Paint is applied. Application may be by brush, spray or roller, with roller usually being the most convenient and efficient, especially for large floor areas. Typical coverage is 400 square feet per gallon per coat. If the entire surface were smooth and no edge coving were required, two coats a day apart would finish the floor-coating process.

There are, however, usually rough spots and pits that need to be filled, and a coving is normally required in food preparation areas, food storage warehouses, retail establishments selling food, and similar areas. The Fill-It Epoxy Filler™ is therefore used between the first and subsequent coats of the epoxy paint.

The walls:

To apply an epoxy coving between wall and floor, the wall must be of compatible construction, and the cove must extent high enough to meet a nonporous wall surface, or to satisfy local requirements. Walls of cement board, masonry, tile , brick and wood can all be made compatible with these epoxy materials, but gypsum sheetrock is not. It has a physically weak paper-over-gypsum surface, and cannot develop a high bond strength for that reason. Appropriate surface preparation is essential before applying the Fill-It Epoxy Filler. If the wall is mineral in nature, the previously described procedure using Permanent Concrete Sealer, Damp Concrete Primer and High-Build Epoxy Paint is appropriate. For wood, whether old or new, apply first Smith's Clear Penetrating Epoxy Sealer™, and second the High-Build Epoxy Paint.

Step Four: Filling pits and rough spots

Fill-It Epoxy Filler will chemically bond to the High-Build Epoxy Paint, even if the paint is fully cured, days or weeks later. It will also chemically bond to itself, even if fully cured.

After applying one or more coats of the High-Build Epoxy Paint, the filler is used to fill all pits, holes or rough areas of the floor and adjacent wall. If steel-wheel carts are used to move materials around on the floor, pressure loadings may be severe. Floor defects and low spots in such traffic areas should be filled with a very high-strength filler. One adequate product for this application is a mixture of sand and our Layup & Laminating Resin™. That mixture will have a compressive strength of many thousands of pounds per square inch, and has been found adequate for steel-wheeled carts.

In order to minimize sanding of the cured Fill-It Epoxy Filler before final painting, and to obtain a finished surface entirely free of tooling marks, a sheet of new, clear 4-mil polyethy(xturec-.00.0029appl5l p)6.1(ow

Step Five: the Cove

Making a cove of the Fill-It Epoxy Filler is done by applying the mixed filler in the corner of the room, in sufficient quantity along the wall, and using a putty-knife to tool the filler in a thin film against wall and floor. This forces the paste filler to wet the surface, and is essential if one is to obtain a good bond.. Then a further amount of filler is applied along the wall/floor edge, sufficient to make a cove. A form tool is then used to tool the filler to the desired profile. Excess filler will give beads above and in front of the shaped cove, and a putty-knife may be used to remove the excess and place it further along, where a further section of cove is tooled with the form-tool.

Correct estimation of the volume of Fill-It Epoxy Filler required may be done by measuring the length in inches] of cove to be formed, and estimating the cross-sectional area of the cove in square inches. Multiplying these gives an estimated volume in cubic inches. ***There are 231 cubic inches in a gallon of anything.*** Dividing the total number of cubic inches of filler by 200 gives the filler requirement in gallons and makes some allowance for the losses and waste of the mixing and application process.

The day after applying the filler cove, a light sanding with 80- grit paper may be done as desired to remove any bumps and ridges, and give a surface adequately smooth for painting.

Step Six: The final painting

Two further coats of the High-Build Epoxy Paint a day apart complete the Non-Porous Floor Coating process. Allow a further 48 hours at 77F/25C for full chemical cure before placing equipment or driving fork-lifts on the surface.

Repairs and slip-resistant-finish issues:

If repairs are necessary at some future date, the damaged or worn epoxy surface may be sanded to clean it, and repainted with the High-Build Epoxy Paint. If wear exposes bare concrete, an application of the Damp Concrete Primer should be done first. If stair steps or other areas require a slip-resistant finish, the following has been effective: Sandblasting sand (20-40 mesh) may be sprinkled in the High-Build Epoxy Paint while it is still wet. The next day a second coat is rolled over the sand-treated areas. This locks the sand grains in place, with about half the grain embedded in the epoxy and half the grain showing above. This provides a long-wearing slip-resistant surface for industrial areas or other appropriate locations. In public areas, an elastomeric slip-resistant coating may be preferable. While we do not make elastomeric coatings, any such coating may be applied over the Damp Concrete Primer, and should form a permanent chemical bond. The user should do their own tests, however, to confirm this.

All products listed are available from:

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