

VAP FAQs

VAP BASICS

What is KOSTER VAP I® 2000 Moisture Control Coating?

KOSTER VAP I® 2000 is a one-coat, membrane-forming, moisture vapor control system consisting of a unique combination of epoxy resins and other compounds formulated to prevent floor covering failures on concrete slabs with elevated levels of moisture.

How does VAP I® epoxy coating block moisture from concrete?

KOSTER VAP I® epoxy coatings form a thin, continuous, dense layer on an abraded concrete floor surface. The VAP coating has very low moisture permeability and is strongly bonded to the concrete. Moisture can only diffuse very slightly through the coating, so adhered floor coverings and decorative coatings are protected from high moisture in the concrete.

Do KOSTER VAP I® coatings meet any nationally-recognized performance standards?

KOSTER VAP I® 2000 coatings exceed the performance requirements in ASTM F3010-13 *Standard Practice for Two-Component Resin Based Membrane-Forming Moisture Mitigation Systems for Use Under Resilient Floor Coverings*. Due to their unique formulations, KOSTER VAP I® 2000 coatings are extremely effective at blocking moisture, providing less than 0.1 perms moisture vapor permeance.

Why are there several KOSTER VAP I® 2000 products?

VAP I® products have different hardening times designed to meet your project schedule:

KOSTER VAP I® 2000FS hardens in approximately 4 to 5 hrs.

KOSTER VAP I® 2000UFS hardens in approximately 2 to 4 hrs.

KOSTER VAP I® 2000 Zero VOC hardens in approximately 12 hrs.

Hardening times are affected by temperature of the concrete substrate and ambient conditions – higher jobsite temperatures will cause VAP I® epoxy coatings to harden more quickly and cold temperatures can cause slow hardening.

Are VAP I® coatings VOC compliant?

KOSTER VAP I® 2000 coatings are compliant with all state and federal VOC regulations, having VOC content of <10 g/L, which allows installation in sensitive areas such as hospitals, schools, and grocery stores. LEED Indoor Environmental Quality Credits are available for EQ 4.2 (Low-Emitting Materials, Paints and Coatings). VAP I® 2000 FS and VAP I® 2000 Zero VOC are specially formulated to meet requirements for 0 g/L VOCs.

Are VAP I® coatings suitable for use under all types of floor finishes?

When installed according to KOSTER installation instructions, VAP I® epoxy coatings provide excellent moisture blocking for virtually all types of flooring. VAP I® coatings have been successfully used under many types and brands of low permeance flooring such as vinyl composition tile, luxury vinyl tile, vinyl sheet goods, rubber tile and sheet, polymer-backed carpet tile and roll goods, wood flooring, and under polymer coatings including epoxies, PMMA, and polyurethanes.

Is concrete moisture testing required? Is there a concrete moisture limit for VAP I® application?

Moisture testing is not required before KOSTER VAP I® 2000 installation. VAP I® coatings have no upper limit for water vapor emission from concrete floor slabs and can be applied to concrete slabs with relative humidity up to 100% RH. VAP I® coatings provide protection from sustained exposure to pH 14.

VAP I® COATINGS AND CONCRETE SLABS

Is VAP I® suitable for all concrete slabs?

VAP I® coatings can be used successfully on slabs-on-ground (above grade and below grade), elevated structural slabs, slabs in steel deck, toppings on precast plank, and other constructions. If true hydrostatic water pressure is present at a slab below grade, contact the KOSTER Technical Team for advice on moisture mitigation in that situation. Concrete must be structurally sound, free of deleterious materials, and capable of withstanding abrasive shot blast surface preparation. Concrete that has been contaminated with grease, oil, solvents or other substances that inhibit bond may require special pre-treatment before VAP installation. Some concretes may not be suitable for VAP application including: concrete containing active alkali-silica reactions (ASR); other expansive reactions; excessive contamination; low-strength concrete; aerated cellular lightweight concrete. Concrete with steel fibers is generally not a suitable substrate for direct installation of VAP coatings. Contact the KOSTER Technical Team for assistance before starting the job if steel fibers are known to be in the concrete.

Should concrete be analyzed before deciding on VAP I® treatment to control moisture?

It is the responsibility of the facility owner to provide a suitable concrete substrate for installation of KOSTER VAP I® 2000 moisture control systems. Although not required, KOSTER suggests that concrete cores can be obtained from a floor and evaluated for properties that may indicate if there exist potential problems before installation of VAP I® coatings. Contact the KOSTER Technical Team for a list of suggested tests and evaluations.

What happens to the moisture in the concrete under a VAP I® coating?

Coated concrete that has an effective vapor retarder directly beneath the slab, or concrete in steel deck, can have a high moisture condition within the body of the sealed concrete for many years without deleterious effects. With sufficiently high moisture, cement in the concrete will continue to hydrate and embedded steel reinforcement will remain protected from corrosion due continued high internal concrete pH. (Cracks or carbonation that reach embedded steel, or excessive soluble salts, can accelerate steel corrosion in concrete. VAP I® is not a treatment designed for corrosion prevention.)

What about elevated structural slabs?

An elevated concrete structural slab that is sealed on top with VAP I® epoxy coating may continue to dry from the bottom concrete surface depending on environmental conditions in the space below the floor (typically plenum space between the concrete and a suspended ceiling). Over many years, the internal slab moisture condition generally will decrease.

Can VAP I® coatings be used on slabs-on-ground with no vapor retarder beneath the slab?

Yes, VAP I® coatings are effective when properly installed on slabs even without a vapor retarder beneath the slab.

How old must concrete be before applying VAP I® moisture control coating?

Concrete must be seven days old and cured to have sufficient strength at the surface to withstand shotblasting.

What about concrete that contains polymer fibers?

There are many types of fibers that are sometimes used in concrete as secondary reinforcement to control cracking or provide additional structural properties such as increased flexural strength. Short polymer microfibers and longer polymer macrofibers can become exposed after shot blasting. If these fibers stick up from the surface of the concrete, they can cause VAP I[®] coatings to “tent” or “bubble” at the fibers. Exposed polymer fibers can be removed by burning with a torch, if permitted by jobsite work rules and applicable laws. Heat guns generally are ineffective for removing exposed fibers. Contact the KOSTER Technical Team for assistance if fibers are encountered on a job.

Can VAP coatings block moisture from lightweight aggregate concrete slabs in steel deck?

Yes, VAP I[®] coatings are just as effective on lightweight concrete slabs as they are on normal weight concrete slabs. Special care may be needed to avoid excessive surface roughness when shot blasting lightweight aggregate slabs, but otherwise they can be treated with VAP I[®] epoxy coatings like normal slabs.

Does trapped moisture increase in untreated areas under walls and cabinets?

Moisture vapor within a slab does not increase in untreated areas. Moisture also does not move much horizontally in most concrete slabs-on-ground and elevated slabs. So, untreated areas adjacent to treated areas do not become “worse” than before application of VAP I[®] epoxy coatings.

KOSTER VAP I[®] COATING INSTALLATION**Does KOSTER offer VAP I[®] installation training?**

Yes, KOSTER American offers intensive classroom and hands-on training for you to become an approved VAP I[®] applicator. KOSTER VAP I[®] products are sold only to trained applicators. Contact KOSTER American Corp. at 757-425-1206 or check our website www.kosterusa.com for upcoming training dates at KOSTER Virginia Beach Headquarters.

Why do I need to shot blast concrete before applying VAP I[®] epoxy coatings?

Steel shot blasting produces rough, fractured surfaces of hardened cement paste and aggregates that provides the best profile for adhesion of VAP I[®] epoxy coatings. Troweled, sanded, buffed, or ground surfaces do not have the fractured roughness suitable for best adhesion.

Can I profile with a diamond grinder rather than a shot blast machine?

Diamond grinding should only be used in areas not reachable by shot blasting. Grinding produces flat surfaces of aggregates and only slightly roughens the hardened cement paste so that VAP I[®] epoxy coatings do not adhere as well to ground surfaces as to shot blasted surfaces.

Why is ICRI Concrete Surface Profile CSP3 specified? Isn't rougher better?

A CSP3 profile produced by steel shot blasting has a specific depth profile. Blasting deeper can expose voids in the concrete and create deep pockets where air bubbles are unable to escape completely as VAP epoxy hardens. These are places where air bubbles, pinholes, and possible blisters can form, which compromise the effectiveness of the VAP I[®] coating to block moisture. Also, a rougher surface cannot be coated to the necessary film thickness at the recommended coverage rates of 150 or 100 ft²/gal. There will usually be some variation across a concrete slab as it is shot blasted. However, CSP3 is the target surface profile for best VAP I[®] coating performance.

If I blast to a rougher surface profile, can't I just apply a thicker coat of VAP I®?

No, a thick single application of VAP I®, for example 70 ft² / gal, makes a thick epoxy film that can trap air bubbles on the rough surface that form voids in the coating. The correct blast profile and correct application rate specified in KOSTER installation instructions will provide the best moisture protection for your flooring system.

How are VAP I® coatings installed?

KOSTER VAP I® 2000 coatings are provided in plastic buckets, precisely proportioned in two parts – Resin Part A and Hardener Part B. The two parts must be thoroughly mixed in these proportions according to KOSTER installation instructions before spreading on the floor. Mixed VAP I® is spread with a notched squeegee at specific coverage rates, backrolled to a smooth, uniform thickness using an epoxy-rated, non-linting roller, then allowed to harden.

If there are pinholes in an application of VAP I®, does it mean that I have to apply a second coat?

Always inspect hardened VAP I® coating to ensure it is a continuous, adequately thick membrane free of visible defects. Properly applied VAP I® coating should have a glass-like, smooth, glossy surface free of pinholes, bubbles, ridges, or other defects. Repair any defects in accordance with KOSTER installation instructions before proceeding with finish flooring installation.

Can I dilute VAP I® with solvent to get better concrete penetration?

No. Today's VAP I® products are professionally formulated to block moisture by forming an effective barrier on the concrete surface. *Never* dilute VAP I® epoxy with solvent such as xylene, toluene, acetone, or similar substances for several reasons: 1) Solvents increase the permeability of VAP I® and therefore weaken its ability to block moisture; 2) Solvents carry some of the VAP I® into concrete below the surface and therefore dilute what should be a dense epoxy layer designed to block moisture; 3) VAP I® products are sold specifically as Low-VOC or Zero-VOC materials and adding solvent disqualifies their use in these categories; 4) Using solvents increases respiratory hazards that workers may be exposed to during VAP application and may contribute to indoor air pollution; 5) Solvents may contribute to coating failure through blister formation.

VAP I® COATINGS AND FLOORING INSTALLATION

Must I put a self-leveling underlayment on VAP I®?

Adhered floor coverings most often use adhesives designed to be applied on cementitious surfaces with some absorption for the water or solvents in the adhesives. A thin layer of self-leveling underlayment (SLU) or cementitious skim coat (SC) is usually needed above the VAP I® coating to meet this requirement. KOSTER VAP I® 06 Primer must be applied in a thin layer (500-600 ft²/gal) to adhere cementitious compounds to a cured VAP I® coating. VAP I® coatings can be covered directly with certain types of decorative, colored or functional polymer coatings or with adhesives designed for non-porous surfaces. Consult the KOSTER Technical Team for details.

What about joints and cracks?

Proper treatment of joints and crack is critical to provide moisture protection for applied floor finishes and to avoid “mole trail bumps” or “reflections” of cracks and joints through applied floor finishes.

How do I treat sawcut control joints when applying VAP I®?

Sawcut control joints are designed and located to permit concrete to crack under the straight-line sawcut as the concrete dries and shrinks. Some saw-cuts do not “activate” (they do not actually crack) while others do, controlling where the concrete cracks. Control joints that have activated (cracked) should be checked for vertical displacement: Place a foot-long straightedge on the concrete across the crack—if it rocks up and down, then the crack is vertically displaced and must be repaired before VAP application. Consult the KOSTER VAP I® Installation Instructions for details how to repair the crack before applying VAP epoxy coating. Control joints that did not activate (not cracked) can be treated by cleaning then applying a coating of VAP to the walls of the sawcut joint, followed by filling the joint with thickened VAP I®. Follow instructions for use of KOSTER TA thickening agent for this use.

Do movement joints and non-movement joints get treated differently?

Joints designed to accommodate building movement are called “isolation joints” and are specified by the architect or structural engineer to allow freedom of vertical and horizontal movement between the floor and adjoining building members such as walls, columns, footings, or other points of restraint. Isolation joints are typically filled with preformed joint filler. Never attempt to seal over isolation joints with VAP I® coatings because VAP I® is not designed to accommodate movement. Consult KOSTER technical literature and the KOSTER Technical Team for instructions on KOSTER products and methods for treating movement joints.

How are random cracks in concrete treated when applying VAP?

Thin cracks due to ordinary drying shrinkage that are less than approximately 10 mils (0.010-in.) width and not vertically displaced can simply have normal application of VAP I® epoxy over the concrete and the crack. Spread with the appropriate notched trowel for the specified coverage rate and backroll. The VAP I® epoxy will fill the upper portion of the crack and provide a continuous membrane. Inspect the hardened VAP I® coating to be sure there are no bubbles or gaps in the coating at the crack. Apply an additional coat of VAP where needed to maintain a continuous hardened membrane barrier to moisture.

What about cracks wider than 10 mils?

Drying shrinkage cracks wider than approximately 10 mils (0.010-in.) may be vertically displaced due to curling. Place a foot-long straightedge on the concrete across the crack—if it rocks up and down, then the crack is vertically displaced and must be repaired before VAP I® application. Consult the KOSTER VAP I® Installation Instructions for details how to repair the crack before applying VAP epoxy coating.

Can a VAP I® coating be used over a structural crack?

Cracks can be caused by building structural issues such as negative moment slab bending over beams or from structural movement. Epoxy-filling a structural crack may result in cracking or spalling of adjacent concrete. Consult the KOSTER Technical Team for advice if structural cracks are encountered. A special repair may be necessary in such areas.

Can VAP I® 2000 products be used for radon mitigation?

No, KOSTER VAP I® 2000 epoxy coatings are not recommended or approved for radon mitigation. ASTM and EPA Guidelines for radon remediation do not recommend coatings on the surface of concrete slabs. See [ASTM E1465-08a Standard Practice for Radon Control Options for the Design and Construction of New Low-Rise Residential Buildings](#) and [ASTM E2121-13 Standard Practice for Installing Radon](#)

[Mitigation Systems in Existing Low-Rise Residential Buildings](#) and the EPA *Consumer's Guide to Radon Reduction*.

Can VAP I® coatings be used as a finished floor covering?

KOSTER VAP I® moisture control coatings are not intended as wearing surfaces. KOSTER manufactures products for use as wearing-surfaces including decorative chip and quartz systems, shop-floor, anti-skid, and anti-slip systems. See the KOSTER website pages devoted to our finish floor coatings:

http://www.kosterusa.com/us_en/foa-96-49/floor+coatings.html