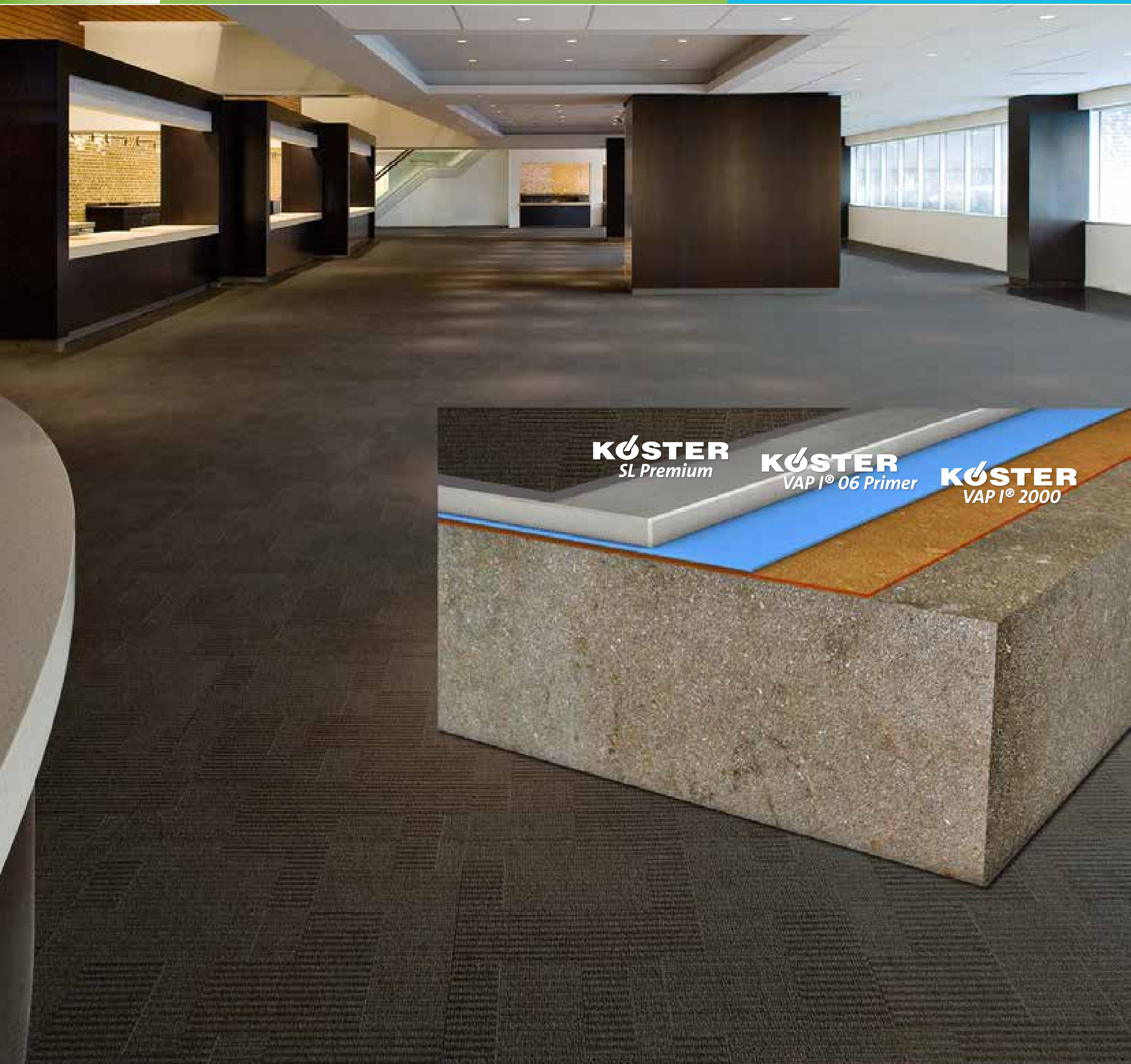
KÖSTER
Waterproofing Systems

# MOISTURE CONTROL SYSTEMS

SINCE 1992



# Contents



*The information contained in this brochure is intended for use by trained professionals, is non-binding and does not release the applicator from his responsibility for a correct application that takes into consideration the specific conditions of the construction site and the intended results of the construction process. The valid standards for testing and installation, acknowledged rules of technology as well as our technical guidelines must be adhered to at all times.*

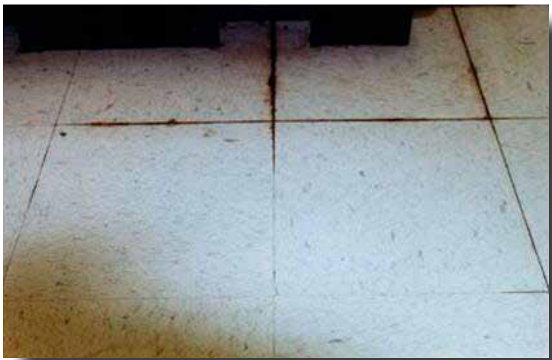
*VersionNov2013*

## Moisture Control Systems

*Concrete is one of today's most important building materials. Most floor slabs are made of concrete. While concrete itself is permeable to moisture vapor, many modern flooring systems have very low moisture permeability and are susceptible to problems caused by moisture vapor. The moisture control systems manufactured by KÖSTER are designed to be applied on concrete to supress moisture vapor and the problems associated with it.*

## Why is moisture vapor an issue?

*Flooring failures due to water vapor in concrete floor slabs have been plaguing the construction industry for decades, causing millions of dollars in damage to our economy. Typical damage patterns indicating a serious failure of the flooring system can be blisters in epoxy coatings, bubbles in sheet goods, unsightly staining at seams, adhesive bond failure, loose, curling and cracking VCT, warped wood floors, and damp and mold infested carpets.*



***Re-emulsification of adhesive...***

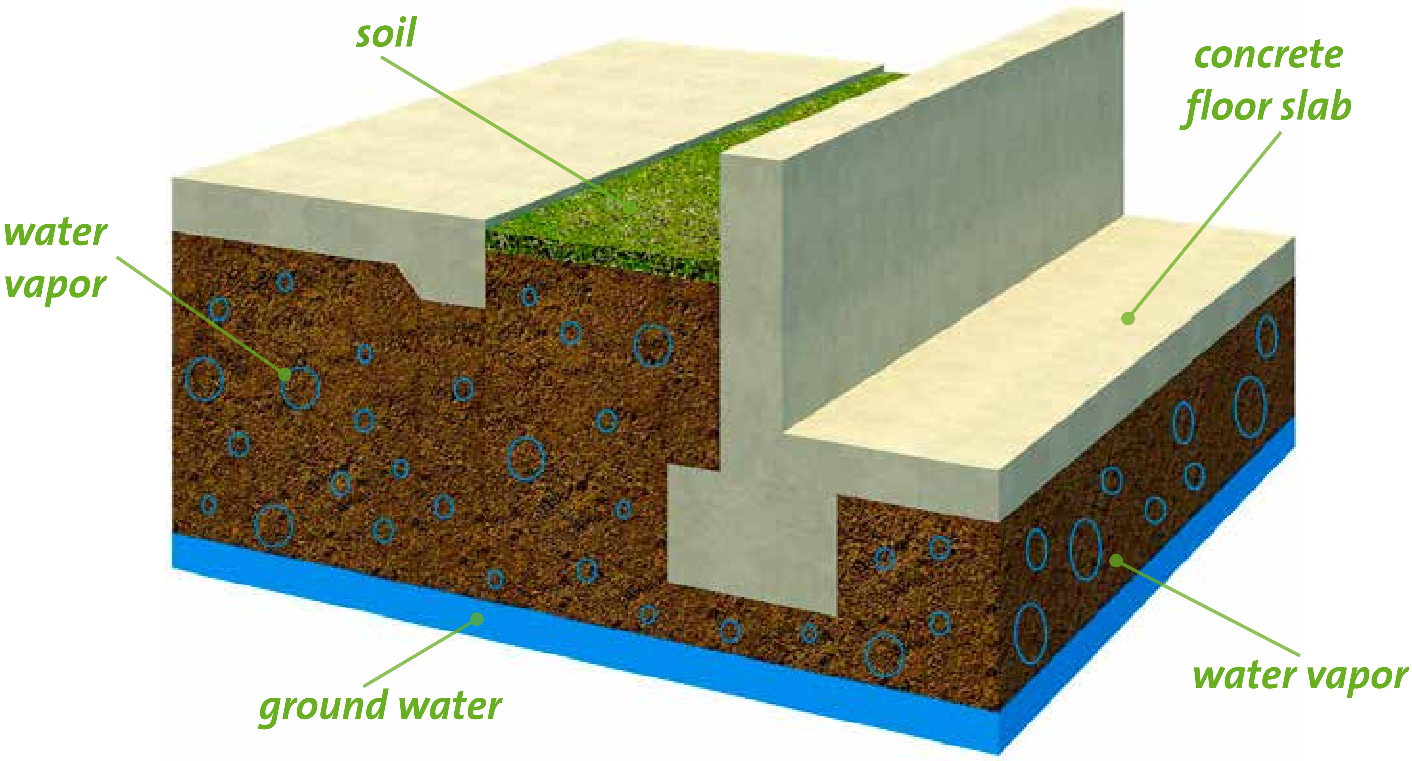

***...resulting in down time***

***Typical blistering...***

***...containing high pH corrosive liquid***

## Where does the moisture vapor in floors come from?

*Water is present in the ground everywhere, in liquid form as ground water or attached to or between soil particles and in form of water vapor between the soil particles. While slabs on grade are unlikely to come in contact with liquid ground water, they definitely will come into contact with the water vapor that rises through the soil. If a below slab vapor retarder is missing or defective, water vapor will be able to penetrate the bottom of the slab and accumulate in the slab if it cannot evaporate. Slabs on grade in contact with moist soil can also lead to capillary moisture transfer into the slab. Basement floor slabs may come into contact with liquid water if submerged in ground water.*




## *There are many sources of water that can lead to damage of concrete floors.*

*Water is an essential ingredient in concrete. At the time concrete is made, it contains liquid water. While a part of that water is used in the hydration of cement, another part of it remains in the concrete and slowly evaporates over time. The more water that is added into concrete at the time it is batched and during curing, the longer it is going to take to dry to a condition that is acceptable for a flooring system.*

*Air conditioning and heating systems de-humidify the air in buildings. Since vapor will move from an area of high humidity to an area of lower humidity, a stream of water vapor from the floor slab into the air is set in motion. This process creates a moisture gradient within the slab; lack of a functional vapor retarder below the slab allows moisture to continually re-charge the slab.*

*Additional sources of water can be broken pipes under a slab, spills onto concrete, building use such as kitchens and bathrooms, cleaning and maintenance, rain and snow, ambient relative humidity, and condensate forming on the concrete.*

# What other factors influence floor moisture vapor?

## In new buildings:

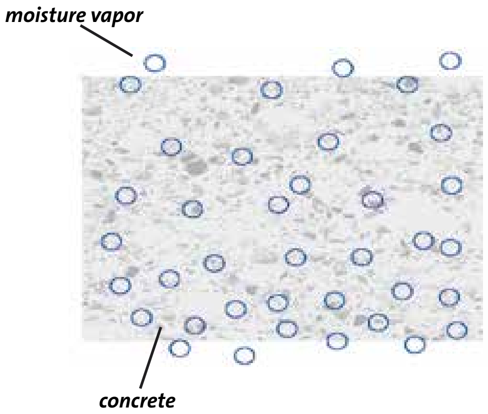
- *Missing or damaged vapor retarders underneath slabs on ground prevent drying of floor slabs.*
- *Fast track construction often requires flooring applicators to install flooring systems before the concrete has had sufficient time to dry.*
- *Elevated slabs are frequently made with light weight aggregate concrete in order to be able to build slimmer structures. When light weight concrete is made, the porous light weight aggregate is saturated with water before it is added to the mix. The water that is captured in the aggregate of the concrete causes the light weight concrete to need longer to dry to an acceptable level than normal weight concrete.*

## In existing buildings:

- *Renovation of flooring systems: In the past, many flooring systems were more resistant to moisture and high pH. Flooring systems often have a limited breathability and the adhesives have limits regarding the moisture and pH they can withstand. After a new, low permeable flooring system is installed, moisture vapor is trapped inside the concrete. That sets the condition for the moisture vapor damage mechanism to start, eventually leading to failure of the adhesive and the flooring.*
- *Changing environmental conditions: Moisture vapor conditions underneath a floor slab on ground can change over time, for example changing seasons, irrigation, or heavy rainfalls over a long time period can increase the soil moisture vapor condition.*

# *How does moisture vapor harm flooring systems?*

## 1. *Concrete without floor covering*

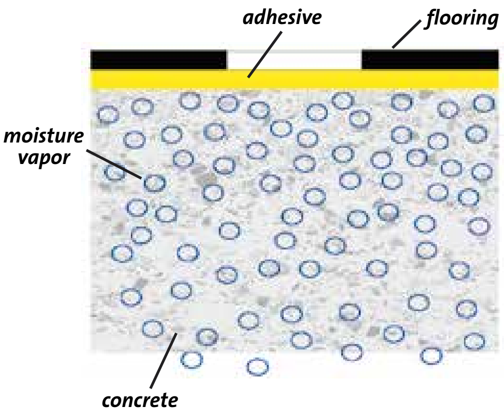



*Concrete is a porous material. It allows moisture vapor to pass through it.*

*As long as moisture vapor can simply pass though the concrete, there will be a moisture gradient with the concrete drier near the top surface and more damp at the bottom.*

*Moisture can transport salts of various types into and through the concrete causing efflorescence on the surface of the concrete. This can be detrimental to serviceability.*

## 2. *Concrete with floor covering*




*When a flooring system is installed, it typically has lower vapor permeability than concrete.*

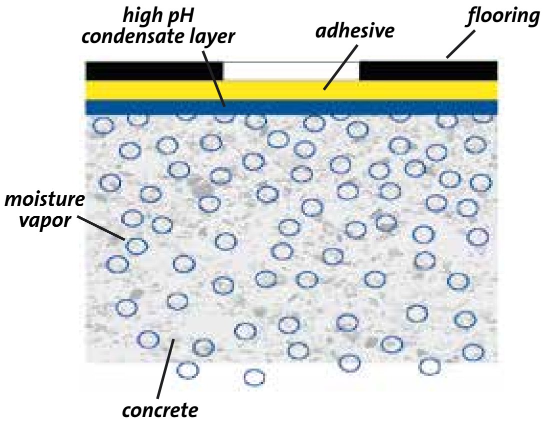
*The water vapor can no longer evaporate from the surface of the concrete. As a result, the amount of water vapor that is present in the slab will slowly increase. This can be measured as an increase in the relative humidity in the concrete slab.*

*Wood floors can expand and buckle when exposed to high moisture over a longer period of time.*

*If concrete contains aggregate that is susceptible to Alkali Silica Reaction (ASR), the increased moisture now present in concrete can cause the reaction to start, leading to damage of the concrete. Also, in old concrete which is already affected by deep carbonation, moisture can cause reinforcement steel that has been embedded in the concrete to start corroding.*

*Microbial growth can develop under floor coverings leading to health hazards for building occupants. Coatings and adhesives can debond when the moisture condition underneath the low permeable flooring becomes high enough.*

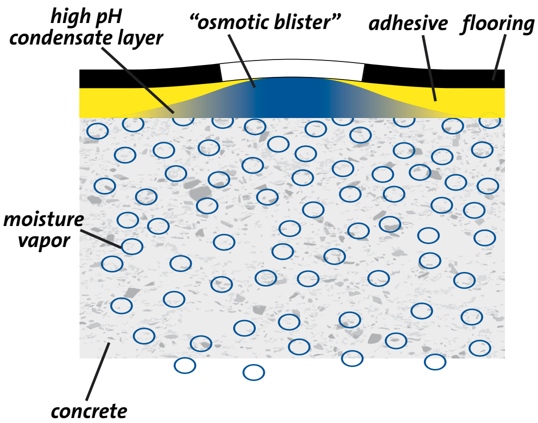
## 3. Development of high pH




*Once the relative humidity in the surface area of a concrete slab is high, temperatures below the dew point of water at the surface of the slab will cause condensation within the surface layer of the concrete slab. Such temperature regimes can for example be caused by the operation of air conditioning systems. Now the pores of the concrete below the surface are saturated with water.*

*Cured concrete contains soluble salts of calcium, potassium and sodium. In contact with water, these salts form hydroxides. Once dissolved in water, conditions develop with pH readings up to 14. Adhesives that bond floor coverings to the concrete can degrade and fail as a result of the high pH and moisture present on the concrete. The high pH that develops at the surface of the concrete due to moisture can also discolor floor coverings.*

## 4. Development of blisters



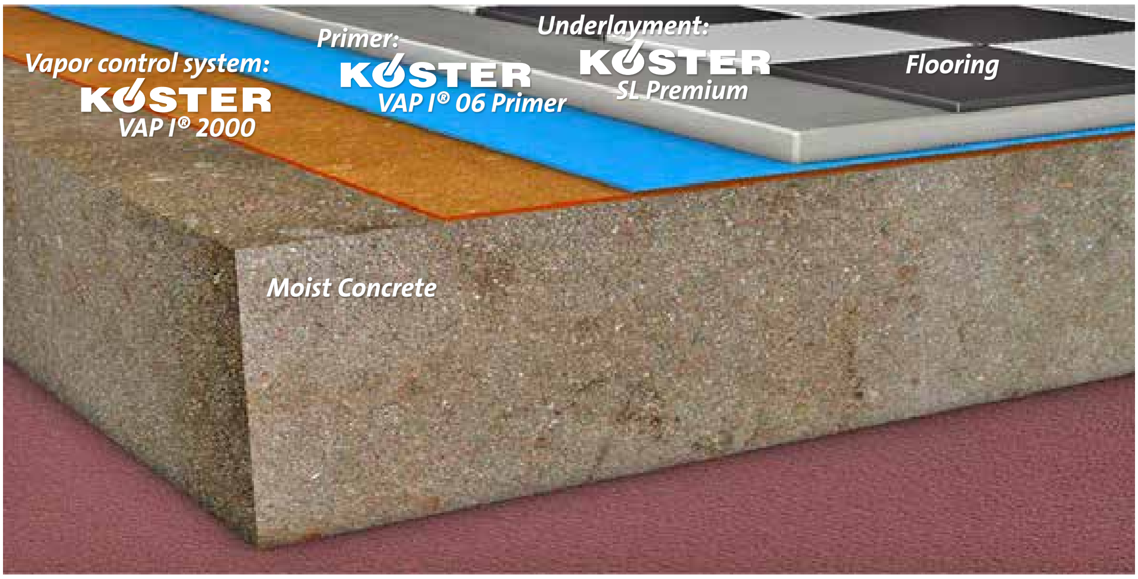

*Once high pH condensation has developed underneath the low permeable floor covering adhered to the surface, the adhesive is directly exposed to the high pH conditions. This is the prerequisite for the formation of liquid filled blisters, which are frequently observed as part of a failure of a flooring system. Such blisters are referred to as "osmotic blisters".*

*The time frame in which this delamination takes place depends on vapor drive and the composition of the coating as well as that of the concrete. The liquid in blisters can have a pH of 14.*

*Typical for this damage mechanism is that it usually takes 3 to 6 months for coatings to delaminate without surface/substrate residue adhering to the flooring.*

## How can moisture vapor problems be controlled?

*If test results indicate an elevated moisture vapor condition in the concrete, something needs to be done to be able to install the desired floor covering without producing a failure. Even if the concrete slab is not exposed to a constant source of moisture, drying of the slab may take many months or years. Usually that is not an acceptable alternative. In most cases the installation of a moisture control system is the only solution. The moisture control system blocks rising moisture vapor, and prevents adhesive and flooring from coming in contact with the high pH that develops in the concrete.*




## KÖSTER VAP I® 2000: Moisture Vapor Control Systems

*Successfully introduced to the flooring market in 2001, KÖSTER VAP I® 2000 systems have an impressive track record over more than 10 years with thousands of satisfied customers. KÖSTER VAP I® 2000 systems have been developed for the sole purpose of protecting flooring systems against moisture vapor damage. KÖSTER VAP I® 2000 materials have been specially designed to provide successful long-term solutions even in dificult scenarios:*

- ***KÖSTER VAP I® 2000 systems withstand a permanently elevated moisture condition up to 100% RH***
- ***KÖSTER VAP I® 2000 systems resist a sustained exposure to pH 14.***
- ***KÖSTER VAP I® 2000 systems provide a high degree of user friendliness due to their ease of installation and one coat application.***

## Choosing the right moisture control system

*KÖSTER, the specialist in the field of moisture vapor control systems, has developed reliable systems that protect flooring from damage. These unique formulations are 100% active ingredients, contain no fillers and are one coat systems. The materials can be applied to green concrete after 7 days, allowing for the fast tracking of flooring projects. KÖSTER VAP I® 2000 systems have been formulated to withstand 100% relative humidity (RH) and up to pH 14.*

*The three available systems differ from each other mainly with regard to the curing times: KÖSTER VAP I® 2000 (12 hours), KÖSTER VAP I® 2000 FS (fast setting, 4-5 hours) for overnight installations, KÖSTER VAP I® 2000 UFS (ultra fast setting, 2-3 hours) for very fast installations.*

*KÖSTER VAP I® 2000 products have an outstanding vapor diffusion resistance. While all of KÖSTER's VAP I® 2000 products have always been low VOC and low odor, KÖSTER now has two systems that are zero VOC: KÖSTER VAP I® 2000 and KÖSTER VAP I® 2000 FS. The according test certificates prove LEED compliance.*

## KÖSTER Moisture Control Systems have a successful track record of over 10 years!

| Technical product information | KÖSTER VAP I® 2000  | KÖSTER VAP I® 2000 FS  | KÖSTER VAP I® 2000 UFS  |
|---|---|---|---|
| Time to proceed with flooring* | 12 hours | 4-5 hours | 2-3 hours |
| VOC´s | Zero | Zero | Low |
| Vapor diffusion resistance in $\mu$** | 144.960 | 172.718 | 135.296 |
| Vapor diffusion resistance in $S_d$ (at 400 g/m²)** | 52,2 | 62,2 | 48,7 |
| Relative humidity | warrants to 100% RH | | |
| Residual concrete moisture | applicable on damp concrete (> 6 %) | | |
| Layers | True one coat system | | |
| Withstands alkalinity | up to pH of 14 | | |

| Product usage | | | |
|---|---|---|---|
| Fast tracking of flooring projects | KÖSTER VAP I 2000 systems application to green concrete at the earliest after 7 days | | |
| Overnight projects | No | Yes | Yes |
| LEED points (EQ Credit) 4.2 | 1 | 1 | 1 |
| Compatible flooring systems | • Adhered floor coverings<br>• Coatings / seamless floor systems<br>• Medical floors<br>• Sports floors | • Adhesives and setting systems<br>• Cementitious levelers and toppings<br>• Rubber flooring systems<br>• Terrazzo / Poured in place flooring | |
| Areas of application | • Industrial facilities<br>• Schools<br>• Sports facilities<br>• Residential buildings | • Retail stores<br>• Hospitals<br>• Warehouses | |

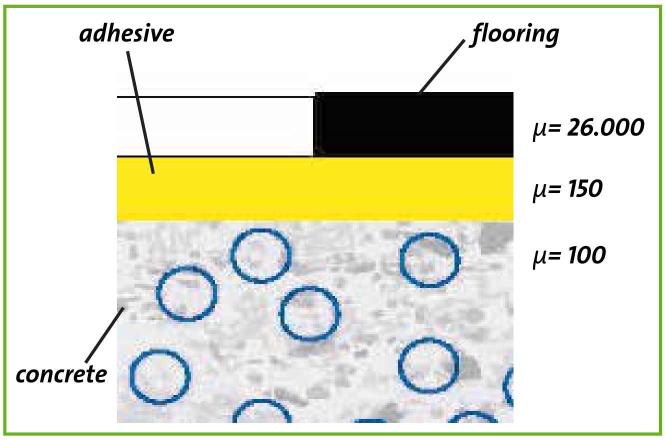
| Additional product information | |
|---|---|
| Application training required | Yes |

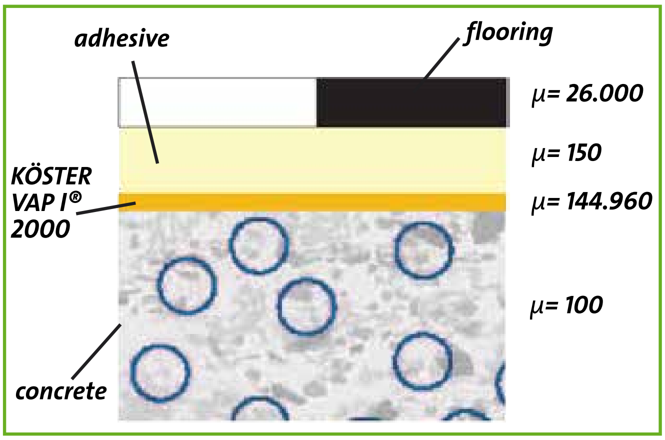
* Coating curing time may vary due to concrete condition & temperature
**Calculated average values on the basis of test results by CTL Group according to ASTM E96

## Why is the vapor diffusion resistance of a moisture control system important?

*Moisture vapor transmission rates are measured by standardized test methods. The vapor diffusion resistance is expressed as "µ-value". The µ-value is the factor by which a material is more resistant against water vapor then air with the same thickness.*

## *A moisture control system has to reduce the amount of moisture vapor to the level that the finish floor covering can tolerate.*




*Typical dry concrete has a vapor diffusion resistance of µ = 100. For a 10 cm slab this equals an equivalent air layer thickness of 10 m. Many floor coverings have a much higher diffusion resistance to water vapor. Among floor coverings, rubber flooring stands out because of its very high diffusion resistance. Several manufacturers of rubber flooring state that their products have a vapor diffusion resistance of approx. µ = 26.000. For a 1 mm floor covering this equals an equivalent air layer thickness of 22,1 m.*

*As an example, let us consider the following flooring system: Rubber flooring bonded with an adhesive directly to a slab on grade made of concrete. The concrete slab - which has a diffusion resistance of µ = 100 - allows much more water vapor to pass through than the rubber flooring does - which has a µ = 26.000. Of the 100 % of water vapor that passes through the 10 cm concrete slab over a certain period of time, less than half can pass through the 1 mm thick rubber flooring over that same time period. The remainder of the moisture vapor accumulates under the adhesive and the rubber floor covering. The high levels of moisture and the high pH that develop degrade the adhesive and lead to a floor failure.*

*To prevent this damage mechanism, a moisture control system has to be installed directly onto the concrete before the flooring is installed. This moisture control system has to bond to the concrete despite moisture and high pH. It also has to reduce the amount of moisture vapor that passes through it to a level that the flooring and adhesive can tolerate.*

*The KÖSTER VAP I® 2000 moisture control system can do all of this. It withstands the moisture and high pH that develops underneath it and, if installed at 400 g/m², it delivers a vapor diffusion resistance which is considerably higher than that of the rubber flooring used in the example. The amount of moisture vapor which the moisture control system allows to pass through it is lower than the amount of moisture vapor that the rubber flooring allows to pass through.*

*Flooring manufacturers publish the maximum acceptable moisture levels for their products in their technical literature. In order to protect a flooring system, a vapor control system must reduce the amount of moisture vapor that it lets pass to meet the given requirements.*

# *Is the concrete slab dry enough to receive flooring?*

*28 days is often cited as the minimum length of time for concrete to "cure" and develop strength. This time period of 28 days is often incorrectly interpreted as the time necessary for the concrete to dry sufficiently to receive a flooring system. Concrete does not dry at the same rate at which it develops mechanical strength.*

*As a rule of thumb: If Type 1 cement was used, the drying time for a concrete slab in a climate controlled environment is approx. one month per 2.5 cm thickness. For a standard 10-15 cm slab the drying time would consequently be approx. 4 – 6 months.*

*Several factors can extend the drying time. To accurately determine a floor's moisture condition, the flooring manufacturer´s guidelines and the industry standard ASTM F710 should be adhered to, which state: "All concrete slabs shall be tested for moisture regardless of age or grade level".*

## *The relative humidity test*


*There are several tests that can be used to quantify how much moisture is in a floor slab. The CM testing is a widely accepted standard method. It is a destructive testing to determine the moisture content of mineral building materials. A probe of the moist material is weighed and inserted into a pressure container. Together with calcium carbide in a glass container and steel balls the material is mixed. The method is based on the reaction of calcium carbide with water. The acetylene gas pressure resulting from this reaction is measured and indicates the moisture level relating to the probe´s mass*

*The relative humidity (RH) test is currently becoming a more and more popular alternative. In the US market it is already the most widely accepted test and has become the industry standard. The RH probe test according to ASTM F 2170 is conducted as follows:*

*For slabs on ground a hole with a depth of 40 % of the slab´s thickness is drilled. Probes are placed in the borehole and the results are read after an equilibration time of at least 72 hours. The relative humidity test determines relative humidity in the slab. Three tests are carried out for the first 100 $m^2$ with 1 per additional 100 $m^2$. The test results according to ASTM F2170 should not exceed the RH specified by the flooring manufacturer (e.g. www.RHspec.com).*

### *Advantages of using the Relative Humidity Test*

- *Less impact of ambient conditions due to measuring inside the concrete*
- *Becoming a more and more popular testing method, flooring industry accepts RH testing*
- *Easy to understand for project participants (easy to use for non-trained personnel)*
- *Moisture profile of concrete possible, when measuring at different depths*
- *RH tests reveal moisture conditions deeper in the concrete*
- *RH probes can quickly re-measure slab moisture conditions*

*Moisture testing should be carried out by independent and certified experts. Proper testing requires background knowledge and experience, so that all project participants can be assured of the quality and objectivity of the test results. This is important, as elevated moisture levels in the concrete can cause delays in the construction schedule or require additional, often not budgeted expenses. Therefore moisture vapor problems should be anticipated during the planning phase and hence be part of the specifications. Flooring contractors should be especially aware of this topic and, if a moisture control system is not specified, talk about this topic as soon as possible with owners and planners - in everyone's interest.*

## Concrete testing: What else to look for?

When dealing with new concrete, sufficient reliable information is usually available. In new construction, usually the concrete mix design is available as well as information about curing compounds used.

When dealing with older concrete, reliable and comprehensive information is usually not available. Substances that have a negative effect on the bonding of the flooring system may have been introduced to the concrete over time. If such substances are present in the concrete that is to be coated they can be evaluated by analyzing a sample of the concrete.

| New concrete | Old concrete |
| --- | --- |
| • The mix design can be reviewed and evaluated for problematic ingredients that can cause bonding problems for vapor control systems.<br><br>• Topically applied curing compounds can act as bond breakers.<br><br>• Adequate drying time for the concrete should be built into the construction schedule and moisture testing should be carried out before any flooring is installed. | • Ion Chromatography Analysis is used to determine if contaminants such as Sodium and/or Potassium rich metasilicate residues and byproducts (commonly applied as curing compounds, surface densifiers, and hardeners), sulfate-rich surface precipitates, and excess chloride salts are present in the concrete.<br><br>• Thin Section Petrography Analysis is routinely used to find out if ASR and sulfate degradation are taking place in the concrete.<br><br>• Infrared Spectroscopy is used to identify and to determine if there are organic contaminants (e.g. oils, grease, etc.) in the concrete, that can interfere with bonding of the moisture control system. |

## Reference: New Meadowlands Stadium, New Jersey

- The New Meadowlands Stadium is today called Met Life Stadium. It is located in East Rutherford, New Jersey and serves as a venue for the New York Giants as well as for the New York Jets. It is the only NFL stadium shared by two teams. It provides seating for a maximum of 82,566 people.
- Construction started in 2007 and finished in 2010, when it became successor of the former Giants stadium. Construction costs add up to a total of approximately $ 1.6 billion.

# *KÖSTER provides reliable solutions even in difficult cases.*

## *Core testing*

*Core testing means that a piece of concrete is removed from the top of the slab approx. 50 cm in diameter and 50 cm in depth and sent to a suitable laboratory for analysis. The core should be removed dry, meaning no water should be used in the drilling process to cool the diamond drill.*

*Based on the results of the lab analysis, the KÖSTER technical staff can recommend the right system for the specific projects. KÖSTER holds frequent seminars on moisture vapor control systems for all interested professionals: applicators, engineers, architects, general contractors, facility managers, etc.*

*The ease of use and the long term track record for a broad range of applications are the main success factors of KÖSTER VAP I® 2000 systems. Even in difficult cases, KÖSTER provides reliable solutions. Our customers benefit from more than 20 years of experience in the field of moisture vapor control systems.*

*Our technical team provides detailed pre-job checklists and helps to identify possible problems during the planning phase, recognize relevant conditions, and evaluate test results.*

*KÖSTER technical staff can help review the concrete mix design before a KÖSTER vapor control system is applied.*

- *The tightly scheduled construction required a reliable Moisture Control System for the protection of subsequent flooring systems.*
- *The contractor decided to go for a high quality Solution: KÖSTER VAP I® 2000. All concrete basement slabs and upper floor slabs were protected.*
- *KOSTER American Corporation was awarded the Starnet Preferred Vendor 2011 for this project.*

# Application of KÖSTER VAP I® 2000 systems

*KÖSTER recommends testing to determine the moisture vapor condition in the concrete. Moisture testing utilizing RH probes in situ tests (ASTM F- 2170) is considered the industry standard. The CM testing has been used for this purpose in the past but now is being used less often.*

*We recommend testing old concrete for contaminants such as excessive soluble salts, ASR (Alkali Silica Reaction) susceptible aggregate, unreacted water soluble silicates, and other deleterious compounds that may act as bond breakers. We strongly recommend core sample testing on slabs with existing floor failures to identify the cause of the failure.*

### Substrate preparation:



*Concrete substrates to receive KÖSTER VAP I® 2000 systems must be structurally sound, solid, absorptive and meet acceptable industry standards as defined in ACI Committee 201 Report "Guide to Durable Concrete". Surfaces must be free of adhesives, coatings, curing compounds, concrete sealers, efflorescence, dust, grease, oils, and other materials or contaminants that may act as a bond breaker. The concrete surface must be at least 3 °C above the dew point* temperature. Avoid application in a low dew point atmosphere, when the ambient relative humidity is above 95% or the concrete surface is wet.*

*(1) Shot blast the substrate to an ICRI Concrete Surface Profile (CSP) 3 to 4. (2) Grinding is permitted only in areas inaccessible to shot blasting or for edging purposes. Upon completion of the shot blasting and grinding, the concrete slab must be vacuumed free of all dust, dirt and debris prior to the installation of KÖSTER VAP I® 2000 systems. Do not use sweeping compounds as they may contain oil.*

### Mixing:

*Pre-mix the A component. (3) Then pour the B component into the short-filled A component container while continually mixing (4).*

*Mix using a slow speed electric mixer (<400 RPM) and "Jiffy-type" mixing paddle for 3 minutes.*



** Definition: The dew point is the temperature, at which, in dependence of the relative humidity (water vapor pressure), condensation of water vapor takes place. The dew point is reached at a relative humidity of 100%, which means that the saturation vapor pressure of water is hit."*

### Application:

(5,6) Pour the mixed material onto the substrate immediately after mixing. Completely empty the mixing container.






KÖSTER VAP I® 2000 systems are applied in one coat. (7,8) After being poured onto the concrete the material is spread using a notched squeegee, providing a 0.36 mm layer thickness.

(9) The material is then backrolled using a 10 mm nap epoxy rated roller, preferably at a right angle (90 degrees) to the direction of the squeegee application. Thereby the product is evenly distributed with no missed areas.

### Coverage:

**Minimum coverage at CSP 3: 400 g/m²**

If standard concrete prepared to a CSP 3 is coated with KÖSTER VAP I® 2000 at 400 g/m², the cured coating can be expected to have a layer thickness of approximately 0.36 mm. A rougher surface profile and/or a porous or absorptive concrete will require the use of more material or a second coat resulting in a sufficiently thick, continuous layer needed to achieve a sufficiently low permeability.

Testing shows the following relationship between coverage, layer thickness and vapor diffusion resistance:

| | | KÖSTER VAP I® 2000 | KÖSTER VAP I® 2000 FS | KÖSTER VAP I® 2000 UFS |
|---|---|---|---|---|
| Consumption (CSP 3 profile) | Layer thickness (in mm) | Equivalent air layer thickness* | Equivalent air layer thickness* | Equivalent air layer thickness* |
| 400 g / m² | 0.36 | $S_d$ = 52,2 m | $S_d$ = 62,2 m | $S_d$ = 48,7 m |
| 500 g / m² | 0.45 | $S_d$ = 65.2 m | $S_d$ = 77.7 m | $S_d$ = 60.9 m |
| | | μ = 144.960 | μ = 172.718 | μ = 135.296 |

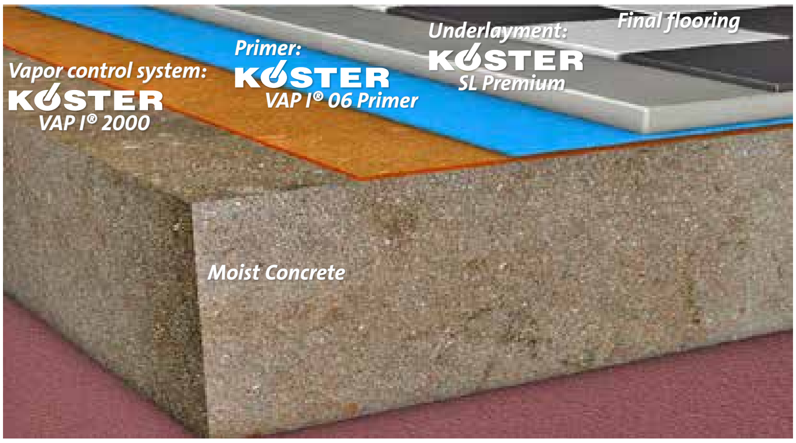
*Calculated average values on the basis of test results by CTL Group according to ASTM E96

### Next layers

Prior to the installation of a subsequent flooring system, the cured KÖSTER VAP I® 2000 systems must be clean and free of all dust, dirt and debris. Sanding is not required. The maximum recoat time is 24 hours. KÖSTER VAP I® 2000 products do not develop an amine blush and can be re-coated or covered with primer and underlayment at later ages as long as the coating surface is clean. KÖSTER VAP I® 2000 coatings must not be exposed to direct sunlight for more than 48 hours after application on concrete . If installing MMA's or PMMA's, the maximum recoat window is 48 hours after KÖSTER VAP I® 2000 systems have cured.

KÖSTER VAP I® 2000 systems may only be applied by KÖSTER trained and approved installers.

## Components of a flooring system




*Moisture control systems are a key part of successful flooring systems. However they are a first step prior to a whole range of flooring options like cementitious levelers, epoxy-, PU-, MMA coatings or Terrazzo, Rubber floors. All of these systems are generally compatible with KÖSTER VAP I® 2000 systems.*

*Cementitious products require a primer in order to develop a good bonding to the nonporous epoxy based moisture control systems.*

### KÖSTER VAP I® 06 Primer for cementitious underlayments


*Installers´ biggest concerns with nonporous substrate primers are usually time and money. That is one of the major reasons why KÖSTER developed the KÖSTER VAP I® 06 Primer. This product is a one component primer, specifically designed to bond to cementitious products, providing maximum adhesion between non porous substrate such as KÖSTER VAP I® 2000 and the cementitious leveling compound.*

*KÖSTER VAP I® 06 Primer is a water based, solvent free system for priming KÖSTER VAP I® 2000 moisture mitigation systems, terrazzo, marble, metal decking, ceramic, and quarry tile prior to the installation of cementitious products such as underlayments or separation screeds. The combination of quality, ready to use packaging, and the rapid drying time of the material have set a standard for non-porous substrate primers in the industry.*

- *No mixing required, single component*
- *Rapid drying*
- *Excellent bonding*
- *Water and pH resistant*
- *VOC compliant*
- *Water based*
- *Solvent free*

*Technical data:*

| | |
|---|---|
| Packaging: | 9.5 kg jerrycan |
| Coverage rate : | 70 – 100 g / m² |
| Working time: | approx. 3 hours (at 21° C) |
| Drying time: | 30 Min – 1 hour (at 21° C) |

### KÖSTER SL Premium - cementitious underlayment


*KÖSTER SL Premium is a high quality, fast setting, fiber reinforced, low shrinking underlayment. It provides a smooth, level surface ready to receive flooring systems. KÖSTER SL Premium accepts all major floor coverings and is compatible with most adhesives. It is resistant to abrasion and wear. If the underlayment is installed onto smooth, non absorbent substrates such as a KÖSTER VAP I® 2000 coating, the substrate must be primed with KÖSTER VAP I® 06 Primer. Absorbent substrates such as concrete are primed using the KÖSTER SB Bonding Emulsion.*

- *Self leveling*
- *Fast curing (rapid strength)*
- *Low shrinkage*
- *For all major flooring systems*
- *Tenacious bond to substrate*
- *Can be pumped or poured*
- *Single component*

*Technical data:*

| | |
|---|---|
| Packaging: | 25 kg |
| Compressive strength: | 40 N / mm² after 28 days |
| Working time: | approx. 20 min (at 21° C) |
| Foot traffic: | after approx. 4h |
| Ready for Flooring: | after approx 24h |

## System for concrete slabs that are contaminated with water soluble silicates

### KÖSTER Self-Levelling IB (Isolation Barrier)

*Unreacted water soluble sodium and/or potassium silicates are often the cause for flooring failures. These substances move under the influence of water to the concrete surface where they act as a bond breaker. Silicates are widely used as curing compounds, in floor polishing, as densifiers, as concrete additives. When water soluble silicates are present in concrete at a certain concentration, they need to be removed mechanically, (e.g. by grinding or shot blasting). Often, even that is not sufficient. In such cases the isolating underlayment KÖSTER Self-Levelling IB must be installed before the flooring system can be applied. KÖSTER Self-Levelling IB can thus be used to avoid excessive, time consuming, and messy concrete removal.*


*KÖSTER Self-Levelling IB is applied directly to the shot blasted concrete. It creates an isolation barrier between the substrate and the moisture vapor reduction system. KÖSTER Self-Levelling IB is permanently tolerant to moisture and high pH, and provides a barrier against contaminants such as unreacted water soluble silicates. The product has self-levelling properties which make it easy to apply. KÖSTER VAP I® 2000 systems are applied on top of the cured isolation barrier after preparing the surface by shotblasting.*

- *Withstands permanent high pH*
- *Resistant to re-emulsification*
- *Self-levelling properties*
- *Specially designed for KÖSTER VAP I® 2000 systems*

*Technical data:*

| | |
|---|---|
| Packaging: | 25 kg bag |
| Coverage rate : | 2 kg / $m^2$ / mm layer thickness |
| Compressive strength: | 40 N / $mm^2$ (after 28 days) |
| Pot life: | 20 Min |
| Resistant to foot traffic: | After approx. 4 hrs. |


## Treating moving cracks and expansion joints

### KÖSTER Joint Sealant FS-H

*Moving cracks and expansion joints must be filled with a material that can follow the substrate movements elastically. A joint waterproofing must allow for movement in the construction without causing damage to the construction itself. Moving joints up to a width of 35 mm can be waterproofed with KÖSTER Joint Sealant FS-H, which is a self-leveling, rubbery-elastic sealing compound with high chemical resistance. Therefore, it is an ideal material to waterproof horizontal joints in heavy construction, foundations, waste water treatment plants, garages, tunnels, etc.*

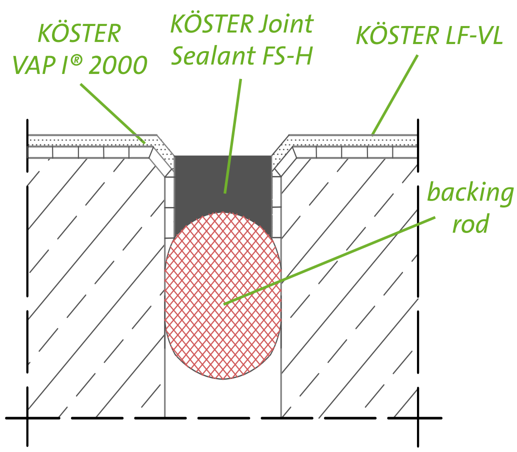

- *High mechanical load capacity*
- *Good chemical resistance*

*Technical data:*

| | |
|---|---|
| Max elongation at break: | approx. 15% |
| Shore A-hardness: | approx. 35 |
| Consistency: | Castable, Self-leveling |
| Pot Life: | approx. 20 min |
| Curing Time: | approx. 24 hrs |

The expansion joint must be installed so that the joint runs through the entire flooring system, including all final floor coatings such as e.g. KÖSTER LF-VL. The prepared joint flanks are coated with KÖSTER VAP I® 2000. Allow KÖSTER VAP I® 2000 to cure for a minimum of 4-12 hours (depending on the product) before installing the backing rod and the joint sealant. Do not use the primer if the Joint Sealant is installed directly onto the vapor control system.

See also the KÖSTER Brochure on "Waterproofing Construction Joints."

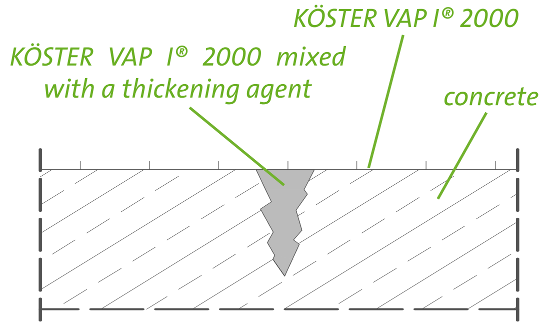



## Treating non-moving cracks and voids

Non-moving cracks and voids should be completely cleaned and repaired using KÖSTER VAP I® 2000 mixed with KÖSTER Thickening Agent.


Chase with a thin diamond blade or angle grinder, do not widen or deepen more than necessary. Cracks on existing concrete slabs that may be contaminated should be cut out 10 x 10 mm to remove the contaminants from the side walls.

First, the prepared crack is primed with




KÖSTER VAP I® 2000 (brush application). Then the crack is filled using a mix of KÖSTER VAP I®2000 and KÖSTER Thickening Agent.

## KÖSTER VAP I® 2000 Systems
## Equipment for proper installation

### Squeegee Kit

For the application of KÖSTER VAP I ® 2000 moisture control systems a notched squeegee is used. Squeegee kits provide everything needed to spread resins in order to ensure a uniform application of the material onto the substrate.

A typical squeegee kit should include:

- 2 Handles
- 2 Squeegees width approx. 60 cm
- 2 Replacement blades
- 2 Chip brushes 7.5 cm
- 2 Pairs of latex gloves

### Squeegee Frame and Squeegee Blades

To meet the applicators needs and the required layer thickness, proper tools are needed. It is important that suitable squeegee frames, (width approx. 60 cm) and notched squeegee blades are used, providing a layer thickness of 0.4 mm.

# KÖSTER Product Range

1. External basement waterproofing
2. Internal basement waterproofing
3. Horizontal barriers/ Restoration of masonry
4. Crack and hose injection
5. Concrete protection and repair
6. Sealing of expansion joints
7. Bathroom and wet room waterproofing
8. Mould control
9. Floor coatings / Moisture control systems
10. Façade protection
11. Balcony and terrace waterproofing
12. Roof waterproofing
13. Water tank and reservoir waterproofing




*KÖSTER BAUCHEMIE AG develops, produces, and supplies a comprehensive range of special construction materials in the areas of waterproofing and concrete repair. Founded in 1982 in Germany, the KÖSTER Group consists meanwhile of 24 companies which are represented in more than 50 countries. It is our policy to offer construction materials of the highest quality, durability and general performance.*

*Service you can depend on*

*With our service and distribution network in many countries world-wide we can offer you professional advice and technical support immediately and on the spot. Your required waterproofing materials can be delivered promptly and will protect your property efficiently and lastingly.*

*For further information, please contact:*

KÖSTER
Waterproofing Systems

*KÖSTER BAUCHEMIE AG | Dieselstraße 1–10 | D-26607 Aurich | Germany*
*Phone: +49 (4941) 9709-0 | Fax: +49 (4941) 9709-40 | info@koster.eu | www.koster.eu*