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Method Statement

Moisture mitigation system for concrete floors with KÖSTER VAP I 2000

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KÖSTER
Waterproofing Systems

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1 General information

1.1 Scope

This method statement is intended for use by developers, contractors and applicators as a general guideline for the application of the moisture mitigation system KÖSTER VAP I 2000.
While this document describes the tools, equipment, materials and step by step process for preparing and installing the waterproofing system, it must be used and referred to, in combination with all other relevant technical information available for the product and its components.

1.2 Manufacturer

KÖSTER BAUCHEMIE AG
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KÖSTER
Waterproofing Systems

1.3 Definitions

Adhesive tensile strength
Is the maximum tensile stress that an adhesive can sustain before failure when applied to bonded substrates. It quantifies the adhesive's ability to resist separation under tension.

Compressive strength
Is the maximum compressive load that a material can bear before failure. For epoxy resin, it indicates how much compressive force the resin can handle per unit area before it deforms or breaks.

Cracks
A construction member cracks if stresses inside of it become larger than the resistance of the construction member. By cracking, the buildup of stresses is relieved. In comparison to the compressive strength, the tensile strength of concrete is quite low. This applies especially to fresh concrete. The most frequently encountered cracks are therefore tensile cracks and bending tensile cracks. There are many reasons why stress is cause in construction members. In most cases, however, it is a combination of the following reasons: stresses through load, shrinkage, ground movement, and dilatation.

The calcium carbide method (CM)
The method is used to determine the moisture content of mineral building materials. For the measurement, a sample with a glass ampule and a fixed number of steel balls belonging to the device is placed in a steel bottle and sealed with a manometer. The steel balls break the glass ampule when shaken. The moisture reacts with contents of the ampule, forming acetylene gas and pressure. The moisture content can be interpolated from the pressure.

The relative humidity test
Relative humidity (RH) is a measure of how much water vapor is in a water-air mixture compared to the maximum amount possible. The RH test measures the amount of moisture vapor present in a concrete slab. The RH percentage value provides an indication of the moisture content within the concrete.

2 System description

2.1 System features

KÖSTER VAP I 2000 is a vapor barrier for priming non-waterproofed interior concrete floors under vapor-tight flooring. Due to its very high interlacing density, KÖSTER VAP I 2000 can reduce the accumulation of water vapor to such an extent that synthetic resin coatings, synthetic resin adhesives, and polymeric coverings are not pushed off the substrate. The material displays good resistance to water, sewage, mineral oil, salt solutions, and diluted acids. The material reduces Moisture Vapor Emission Rates (MVER) and alkalinity to levels acceptable for most resilient or epoxy flooring systems as well as other vapor-tight floorings such as sheet vinyl, VCT, rubber, wood, ceramics, sports flooring, solid-backed carpeting, epoxy, ESD, and almost all other types of finished flooring. It is used on vapor-tight flooring systems e.g. in gyms, industrial halls or hospitals, and schools.

2.2 Characteristics/Advantages

- KÖSTER VAP I 2000 systems withstand a permanently elevated moisture level of up to 100% RH.
- KÖSTER VAP I 2000 systems resist sustained exposure to alkalinity of up to pH 14.
- Serves as a primer by reducing water vapor diffusion before the application of epoxy or polyurethane resin coating or respectively the adhesion of vapor-tight floor coverings such as PVC, rubber, wood, and solid-backed carpet.

2.3 Main products and components

Crack treatment
KB-Pox IN
Solvent-free, 2-component low viscosity epoxy injection resin for crack injection. Due to its high rate of penetration into porous substrates and its excellent adhesion to concrete, stone, masonry and metal, KÖSTER KB-Pox IN permanently seals and bridges cracks and restores structural integrity. The material does not contain any fillers or softeners and thereby sedimentation is avoided. Fields of application: Suitable for restoring the structural bond of cracks, cavities, and defects in concrete. Without pre-injection, KÖSTER KB-Pox IN can be used for filling and closing dry, damp, and wet cracks and voids. Tested according to EN 1504.

See online

Primers
KÖSTER VAP I 06
Ideal and necessary for priming cured KÖSTER VAP I Systems for the subsequent installation of all cementitious self-leveling underlayment. KÖSTER VAP I 06 Primer is a unique, water-based, single-component material for priming absorbent and non-absorbent substrates. Suitable as a primer under terrazzo, marble, and ceramic tiles.

See online

Vapor barrier coating
KÖSTER VAP I 2000
Vapor barrier for priming non-waterproofed interior concrete floors under vapor tight flooring. The material reduces Moisture Vapor Emission Rates (MVER) and alkalinity to levels acceptable for most resilient or epoxy flooring systems as well as other vapor tight floorings such as sheet vinyl, VCT, rubber, wood, ceramic, sports, solid backed carpeting, epoxy, ESD, and almost all other types of finished flooring. It is used on vapor tight flooring systems e.g. in gyms, industrial halls or hospitals and schools.

See online

KÖSTER SL Primer
A transparent curing, low viscosity primer with a slightly sticky surface. KÖSTER SL Primer reduces the absorbency of mineral surfaces such as concrete and screed and equalizes differential absorbency rates in the substrate. It reduces the bubbling effect when working with KÖSTER self-leveling floor products. KÖSTER SL Primer is solvent, plasticizer, and filler free, water resistant, it will not be washed or rained away after curing.

See online

KÖSTER VAP I 2000 UFS
Fast setting vapor barrier for priming non-waterproofed interior concrete floors under vapor tight flooring. Curing time 2-3 hours. The material reduces Moisture Vapor Emission Rates (MVER) and alkalinity to levels acceptable for most resilient or epoxy flooring systems as well as other vapor tight floorings such as sheet vinyl, VCT, rubber, wood, ceramic, sports, solid backed carpeting, epoxy, ESD, and almost all other types of finished flooring.

See online

Self-leveling underlayment KÖSTER SL

A high-quality, fast-setting mineral underlayment that hardens tension-free to a smooth, level surface ready to receive subsequent flooring systems. It hardens within hours to a smooth, strong, and multifunctional leveling layer. KÖSTER SL is easy to mix and spread, is pour- and pumpable, and is self-leveling and highly flowable during application. KÖSTER SL can be used for area covering from 5 to 25 mm, be feathered out to 2 mm, and can fill depressions up to 25 mm. KÖSTER SL hardens crack-free and has a high surface strength and a very good adhesion to the substrate.

See online

KÖSTER SL Premium

Is a high quality, fast-setting underlayment that hardens tension-free and provides a smooth, level surface ready to receive subsequent flooring systems. It hardens within hours to a smooth, strong, and multifunctional leveling layer. It may be applied to a variety of substrates. KÖSTER SL Premium can be applied in layer thicknesses between 5 and 15 mm, can be feathered out to 2 mm, and installed in depressions up to 30 mm.

See online

KÖSTER SL Protect

Is a mineral-based self-leveling underlayment with high resistance to chemical and mechanical stresses. It is an early loadable, directly useable leveling layer over uneven or coarse concrete and cementitious screeds. Due to its high chemical resistance, it is used to protect against light and medium corrosion and serves as a slowly reacting sacrificial layer in areas of high chemical stress. KÖSTER SL Protect is further used for fast repairs and protection in agricultural, industrial, business, workshop, production facilities, and private-use buildings.

See online

2.4 Associated products

KÖSTER KB-Pox IN

See online

KÖSTER Screed Anchor 6 mm x 70 mm

See online

KÖSTER SL

See online

KÖSTER SL Primer

See online

KÖSTER SL Premium

See online

KÖSTER SL Protect

See online

KÖSTER VAP I 2000 UFS

See online

KÖSTER VAP I 06

See online

KÖSTER Universal Cleaner

See online

2.5 Associated literature

- Technical Data Sheet
- Product declaration of performance VAP I 2000
- KÖSTER warranty request form
- System brochure moisture control systems
- Test report: conformance to ASTM F 3010-13 of VAO I 2000 Zero VOC
- Waterproofing report 3-2007
- Certificate of conformance to ASTM F 3010-13
- LEED CERT – KÖSTER VAP I 2000 ZERO VOC
- KÖSTER pre-job checklist
- References

3 Tools, equipment, and cleaning

3.1 Tools

Wire brush

Trowel

Measuring tool

KÖSTER Resin Roller

KÖSTER Resin Stirrer (diameter stirring disc 75 mm and 100 mm)

Double paddle mixer

KÖSTER Squeegee

KÖSTER Gauging rake

KÖSTER Spiked Roller (self levelling underlayment)

KÖSTER Spiked Roller (for epoxy)

Spike Shoes

KÖSTER SL Flow Test Board

Mixing vessels

Measuring cup

3.2 Equipment

Drill

Shot blasting machine

Hand grinding machine

Industrial vaccum

3.3 Cleaning

For resin products:
Clean tools immediately after use with KÖSTER Universal Cleaner.

For cementitious self-leveling underlayments:
Clean tools immediately after use with water. For other products refer to the Technical Data Sheet.

4 Environmental, health and safety

4.1 Personal Protection Equipment (PPE)

The following is a short overview of Personal Protective Equipment and serves only as a guideline. Contractors and Employers are responsible for meeting the occupational safety guidelines in their countries, states, and localities.

Eye protection
Employers must be sure that their employees wear appropriate eye and face protection and that the selected form of protection is appropriate to the work being performed and properly fits each worker exposed to the hazard. Tightly sealed safety glasses must be worn.

Head protection
Employers must ensure that their employees wear head protection if any of the following apply: Objects might fall from above and strike them on the head; they might bump their heads against fixed objects such as exposed pipes or beams; or there is a possibility of accidental head contact with electrical hazards.

Foot and Leg Protection
Employees who face possible foot or leg injuries from falling or rolling objects or from crushing or penetrating materials should wear protective footwear.

Hand Protection
When selecting gloves to protect against exposure hazards, always check with the manufacturer or review the manufacturer's product literature to determine the gloves' effectiveness against specific workplace chemicals and conditions. Gloves commonly used are: Coated fabric gloves and Chemical - and Liquid - Resistant Gloves. When handling chemical substances, protective gloves must be worn with the CE-label including the four control digits. Suitable material: NBR (Nitrile rubber). Penetration time (maximum wearing period): 480 min. Breakthrough times and swelling properties of the material must be taken into consideration.

Hearing protection
Suitable hearing protection must be provided for the job environment.

4.2 Material safety & First Aid

Every KÖSTER product is labeled with specific information and symbols as to the related dangers. Please consult the respective Material Safety Data Sheet for specifics.

If inhaled:
Provide fresh air. In case of irregular breathing or respiratory arrest provide artificial respiration. Medical treatment necessary.

After contact with skin:
IF ON SKIN (or hair): Immediately remove all contaminated clothing. Rinse skin with water [or shower]. Medical treatment necessary.

In case of contact with eyes:
If product gets into the eye, keep eyelid open and rinse immediately with large quantities of water for at least 5 minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Subsequently consult an ophthalmologist.

After ingestion:
Rinse mouth immediately and drink plenty of water. Caution if victim vomits: Risk of aspiration!

4.3 Waste disposal

Disposal recommendations
Do not allow to enter into surface water or drains. Dispose of waste according to applicable legislation.

List of Wastes Code - used product

080501 WASTES FROM THE MANUFACTURE, FORMULATION, SUPPLY AND USE (MFSU) OF COATINGS (PAINTS, VARNISHES AND VITREOUS ENAMELS), ADHESIVES, SEALANTS AND PRINTING INKS; wastes not otherwise specified in 08; waste isocyanates; hazardous waste.

Contaminated packaging
Clean with water (with cleaning agent). Completely emptied packages can be recycled.

5 Moisture mitigation systems

Concrete is one of the most important building materials of our time. Most floor slabs are made from concrete. While concrete itself is very water vapor permeable, most modern floor coverings and floor coating systems have high diffusion resistance and are therefore prone to problems with water vapor diffusion. KÖSTER VAP I 2000 systems were specially developed to avoid problems and damage resulting from this. The systems are also known as moisture protection systems or "vapor barriers", they reduce the water vapor diffusion to a level that is harmless to the floor coating.

5.1 Why is water vapor diffusion an important issue?

Rear-facing moisture penetration under floor coverings and coatings has caused millions in damage over the decades. Typical damage patterns are, for example: "osmotic blistering" in industrial floor coatings, strongly discolored seams, failure of adhesives, loose, warping, or tearing PVC tiles and coverings, warping wooden floors, and damp and mold-infested carpets.

Moisture and high pH values dissolve adhesives ...

... and causes downtime and high repair costs

Typical blister formation, the content of which is ...

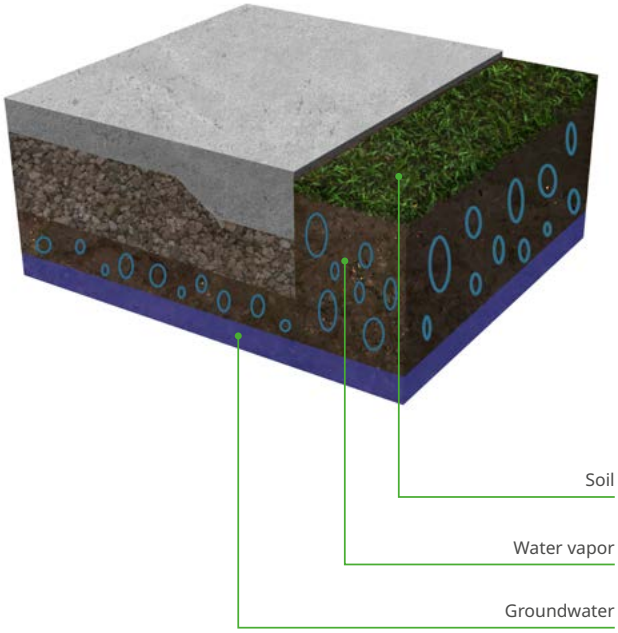
... a highly alkaline liquid.

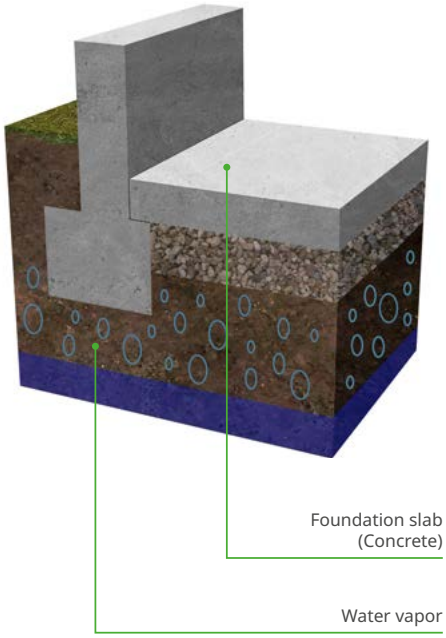
5.2 Where does water vapor in concrete floors come from?

Water is present almost everywhere on the building site, in liquid form as groundwater or as water vapor. Floor slabs and concrete basements are surrounded by damp soil or are even partly standing permanently in the groundwater. Moisture can also rise through capillary action from the groundwater level or rise as water vapor and thus come into contact with the concrete.

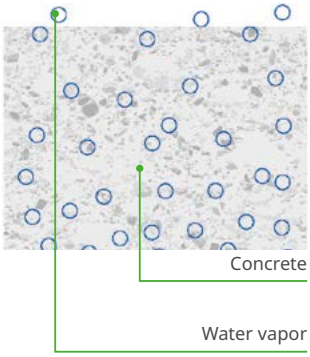
The causes of moisture in concrete floors are numerous

Water is an essential component of concrete and is required in its manufacture. While part of this water is chemically used and bound during the setting process, the rest of the water remains in the concrete and evaporates away over a longer period of time. The more water that is added to the concrete during manufacture or processing, the longer it takes to dry to a moisture level suitable for floor coatings or floor coverings. Air conditioning systems dehumidify the air in buildings. Since water vapor always moves from an area of high humidity to an area of low humidity, a vapor diffusion flow is set in motion. This process creates a moisture gradient in the floor slab. A lack of floor slab waterproofing can therefore ensure a regular replenishment of moisture from the ground in older floor slabs. Other sources of water can also be burst pipes under a floor slab, leaked water on the concrete, kitchens or sanitary rooms, cleaning and maintenance, rain and snow, humidity or condensation.





Concrete without
a floor coating

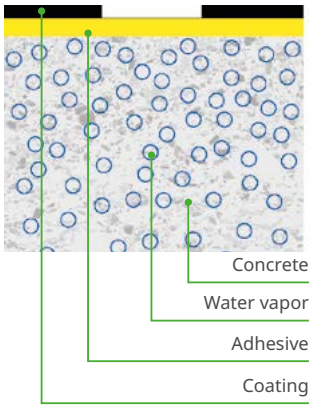


5.3 How are floor coatings damaged by moisture?
Concrete is a porous material. Therefore, water vapor can travel through concrete. This process is called water vapor diffusion.

As long as water vapor can flow through the concrete unhindered, a moisture gradient is created. On the surface the floor slab is drier, closer to the ground it is more moist.

Moisture can transport various salts into and through the concrete. This leads to efflorescence on the concrete surface.

Concrete with
a floor coating



When a floor coating is applied, it typically has a higher diffusion resistance than concrete.

Water vapor can therefore no longer flow through the concrete unhindered. As a result, the amount of water vapor in the concrete slowly increases. This can be measured via the relative humidity in the concrete.

Many floor coverings are damaged if they are exposed to moisture for an extended period of time.

If the aggregates contained in the concrete are susceptible to alkali-silica reaction (ASR), the moisture built up in the concrete can set this reaction in motion and lead to the destruction of the concrete matrix.

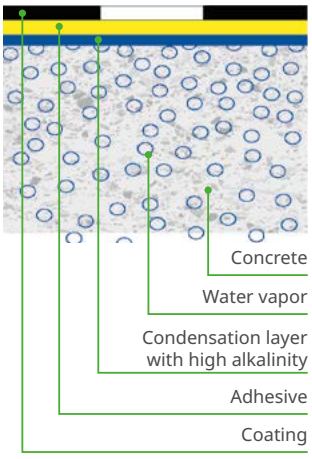
Bacteria and mold can form under floor coverings, which pose serious health risks for residents. When the moisture level is high enough, most floor coatings and adhesives will begin to peel away from the substrate.

Hardened concrete contains soluble salts including Calcium, Potassium, and Sodium. In contact with water, these salts form a highly alkaline solution with pH values of up to 14.

Adhesives, which ensure that floor coverings adhere to the concrete substrate, are attacked by a high moisture content and high alkalinity in the substrate and can fail.

The high pH value that arises on the concrete surface due to moisture can also lead to the discoloration of floor coverings.

Development of high alkalinity

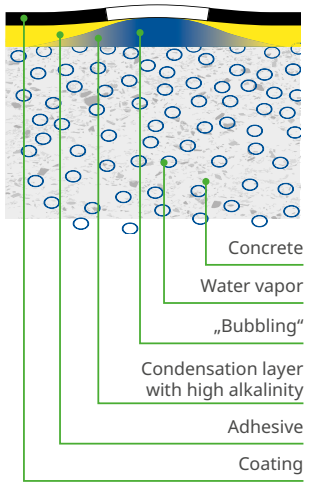


Once such a highly alkaline condensation layer has formed under a vapor-tight, firmly bonded coating, the primer and adhesive are directly exposed to this aggressive environment. Due to the moisture and the high pH value, the adhesive can degrade over time.

The exact period in which this process takes place depends on the diffusion pressure, the exact structure of the floor coating, and the exact composition of the concrete. The liquid in the blisters can have a pH of up to 14.

The damage mechanism typically takes around 3 to 6 months to delaminate coatings and floor coverings from the substrate. However, this period can vary greatly.

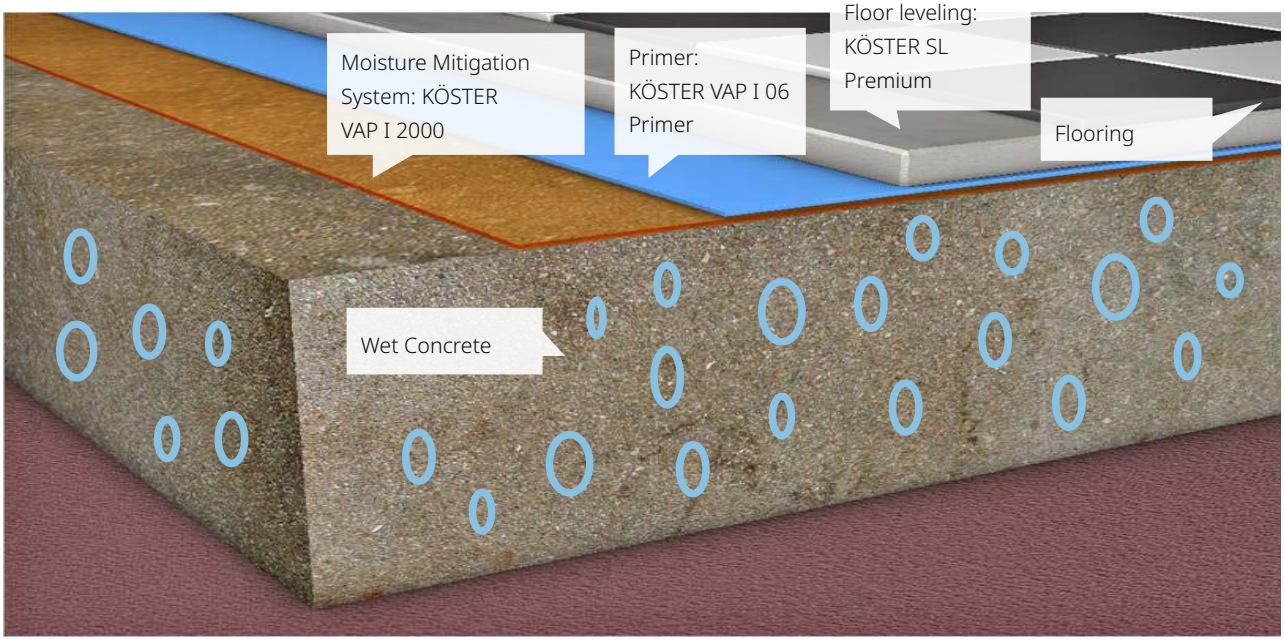
Formation of "osmotic bubbles"



5.4 How can floor systems be protected against vapor diffusion?

If preliminary tests indicate an increased level of moisture in the concrete, something must be done. Otherwise, there is a risk that the floor coating or the floor covering will be damaged after a short time. Even if the concrete floor slab is not exposed to a continuous source of moisture, it can take several months to dry out to acceptable levels.

Usually, this is not an acceptable time frame. In many cases, a moisture mitigation system on the concrete is the only solution. The moisture protection system reduces the water vapor diffusion to a harmless level for the subsequent floor covering and protects them from contact with the highly alkaline environment that forms in the concrete.



5.5 Choosing the right moisture mitigation system

Every coating project is different and each has its own technical challenges. The KÖSTER BAUCHEMIE AG is a specialist in the field of moisture mitigation systems and has developed products that protect floor coverings from damage over the long term. These unique systems consist of a bonded epoxy resin system with 100% solids content and no fillers. These moisture mitigation systems can be applied to the concrete just 7 days after the concrete has been poured and in a single layer. The KÖSTER VAP I 2000 systems were developed to permanently withstand up to 100% relative humidity and a pH value of 14.

The corresponding test reports demonstrate conformity in accordance with the AgBB guidelines of the DIBt (Deutsches Institut für Bautechnik) and can also be used as evidence of low-emission floor systems for a classification according to LEED (Leadership in Energy and Environmental Design) specifications.

The two available products differ mainly in the curing time:

1. KÖSTER VAP I 2000
2. KÖSTER VAP I 2000 UFS

KÖSTER Moisture mitigation systems: over 20 years of success

Technical product information	KÖSTER VAP I 2000	KÖSTER VAP I 2000 UFS
Overworking after*	12 hours	3 hours
VOC content (Volatile Organic Compounds)	Zero	Low
Diffusion coefficient μ**	> 140,000	> 135,000
Equivalent still air layer thickness Sd (at 0.4 mm layer thickness)**	> 60 m	> 65 m
Relative humidity of the concrete	Up to 100%	
Rest moisture of concrete	Can also be used on moist concrete (> 6 %)	
Application layers	Single	
Resistance to high pH value	Up to 14	

* The curing time may vary depending on the concrete and the temperature

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

KÖSTER Moisture mitigation systems: over 20 years of success

Technical product information	KÖSTER VAP I 2000	KÖSTER VAP I 2000 UFS
Age of concrete after pour	KÖSTER VAP I 2000 Systems can be used on concrete that is at least 7 days old	
Overnight projects	No	Yes
LEED points (EQ Credit) 4.2	Yes	Yes
Compatible floor coverings/coatings	• Adhered floor coverings • Glue • Coatings / seamless systems • Cementitious leveling compounds • Medicinal floors • Rubber floor coverings • Sports floors • Terrazzo / floating floors • Linoleum / PVC	

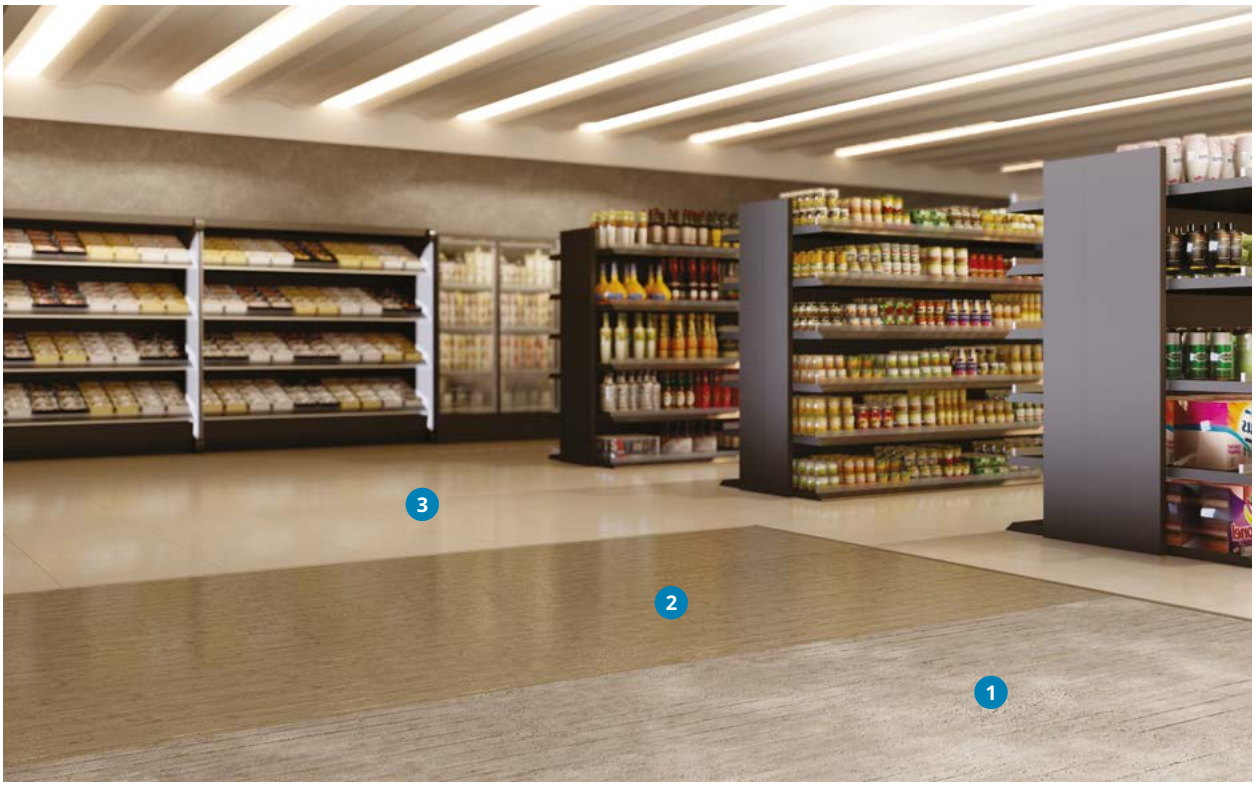
6 Fields of application

6.1 General fields of application

KÖSTER VAP Systems is a special resin for application on unsealed concrete floors such as:

- Industrial and multi-purpose halls
- Offices
- Hospitals
- Schools
- Supermarkets
- Manufacturing facilities
- Airplane hangars
- Storage, and retail space
- Commercial and residential construction which is exposed to moisture from the underside due to faulty or missing waterproofing of the concrete

6.2. Example 1: Moisture mitigation system



1)	Substrate	Moist concrete with high alkalinity
2)	Vapor barrier	KÖSTER VAP I 2000 KÖSTER VAP I 2000 UFS
3)	Floor coating	KÖSTER LF-VL

Installation Process:

Moisture infiltration into concrete slabs can lead to significant issues for subsequent flooring systems. Elevated levels of moisture and alkalinity, as determined by testing, can result in the degradation of flooring adhesives and cause delamination of coatings due to osmotic pressure.

Even with relatively low moisture vapor emission rates (MVER), increased alkalinity can undermine the integrity of even the most durable flooring system adhesives.

To mitigate these risks, it is essential to prime the concrete slab with a material that can effectively adhere under these challenging conditions. KÖSTER VAP I 2000 is a specialized solution that meets these requirements, featuring very low permeance (ASTM E96 wet: 0.04 - 0.09), exceptional bonding capabilities, and resistance to prolonged exposure to high alkalinity (pH level of 14).

The KÖSTER VAP I 2000 vapor reduction system is de-

signed for application on shot-blasted, solid concrete substrates that are free of any bond-inhibiting materials. Following the curing process, a covering layer, such as KÖSTER LF-VL or any other final flooring solution, may be installed.

If an underlayment is necessary, use KÖSTER SL Premium in conjunction with KÖSTER VAP I 06 Primer on top of the moisture mitigation system.

Always adhere to the specifications in the respective Technical Data Sheets.

6.3. Example 2: Levelling for floor areas exposed to moisture

1)	Substrate	Concrete
2)	Surface preparation	Shot blasting
3)	Vapor barrier	KÖSTER VAP I 2000 KÖSTER VAP I 2000 UFS
4)	Primer	KÖSTER VAP I 06
5)	Self levelling underlayment	KÖSTER SL Premium
6)	Insulation	Footfall sound insulation
7)	Floor covering	Parquet

Installation process:

For a thorough waterproofing solution on concrete substrates susceptible to moisture infiltration, the system commences with the preparation through shot blasting.

Following this, KÖSTER VAP I 2000 is applied. This vapor barrier is specifically designed for non-waterproofed interior concrete floors. This advanced material effectively reduces Moisture Vapor Emission Rates (MVER) and alkalinity, ensuring a suitable environment for various types of flooring systems.

Once the KÖSTER VAP I 2000 has fully cured, the KÖSTER VAP I 06 Primer is applied. This primer is specifically designed to prepare the surface for the subsequent installation of KÖSTER SL Premium.

This water-based, single-component primer is versatile and suitable for both absorbent and nonabsorbent substrates.

Finally, the application of KÖSTER SL Premium, a high-quality, fast-setting underlayment, results in a tension-free curing process, yielding a smooth and leveled surface that is prepared for the installation of various flooring systems.

KÖSTER SL Premium is suitable for application in thicknesses ranging from 5 to 15 mm. It is designed to

accommodate various substrate conditions and is capable of feathering out to 2 mm and filling depressions up to 30 mm. It offers versatility and effectiveness in a variety of construction projects.

Once cured, it provides a robust and multifunctional leveling layer, ready to support the installation of tiles and other finishes. This ensures a durable and resilient flooring solution.

6.4. Example 3: For concrete contaminated with water-soluble silicates

1)	Substrate	Contaminated concrete with water-soluble silicates
2)	Primer	KÖSTER SL Primer
3)	Self levelling underlayment	KÖSTER SL Protect
4)	Vapor barrier	KÖSTER VAP I 2000 KÖSTER VAP I 2000 UFS

Installation process:

Silicates are widely used as concrete finishing agents. If water-soluble silicates are present in the concrete at a certain concentration, this concrete can only be repaired by mechanical measures such as milling or heavy shot blasting. Often times even this is not enough.

In such cases, a separation layer, such as with KÖSTER SL Protect, can be applied to the concrete before a subsequent vapor barrier or floor coating can be installed. In this case, KÖSTER SL Protect can also be used to avoid very time-consuming concrete removal. KÖSTER SL Protect is applied directly to the shot-peened concrete. KÖSTER SL Protect is permanently resistant to high humidity and an alkaline environment. This creates a buffer layer between the silicate-contaminated substrate and the vapor barrier.

KÖSTER SL Protect is self-leveling and therefore easy to use. KÖSTER VAP I 2000 is applied to a slightly “brush-blasted“ surface after the KÖSTER SL Protect has cured.

7 Substrate preparation

7.1 Project site conditions

7.1.1 Application temperature

The A and the B components are recommended to be mixed between +10 °C and +30 °C in the given mixing ratio by weight 2:1 (A:B) using an electrical stirring device below 400 rpm until a homogeneous consistency is achieved. Repot the material and remix it to avoid defects due to insufficient mixing.

7.1.2 Relative humidity

The maximum relative humidity during application should not exceed 85 %.

7.1.3 Rain and frost

KÖSTER VAP systems should be protected from all external sources.

7.2 Substrate requirements

Suitable substrates include concrete, screed, and KÖSTER self-leveling underlayments. The surface to be sealed must be clean, absorbent, free of dust, oil and grease and other adhesion reducing substances. Any kind of surface contamination like adhesives, coatings, curing compounds, efflorescence, dust, grease, oils, etc., have to be removed completely by shot blasting. Smooth concrete surfaces must be roughened by sand or shot blasting. The surface must be prepared by suitable means (preferably shot blasting).

The substrate must have a minimum adhesive tensile strength of 1.5 N/mm^2.

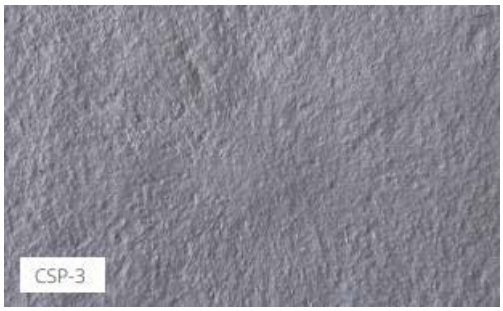
The minimum age of the concrete surface to be sealed must be 7 days.

During application and curing the surface must have a minimum + 3 °C above the dew point. The concrete must be free of alkali-sensitive aggregates, and the surface free of water-soluble silicates as often found in surface hardeners, sealing agents, and crystalline waterproofing products.

7.3 Surface preparations

The substrate must be prepared mechanically by shot blasting, based on the specifications of the ICRI (International Concrete Repair Institute) with a Concrete Surface Profile (CSP) of 3 to 4.

Grinding is only allowed in areas that cannot be reached with a shot blasting device, such as in corner areas. After finishing shot blasting and grinding and before installing KÖSTER VAP I 2000 systems, the concrete surfaces must be freed from dust, dirt, and other residues with an industrial vacuum cleaner. Do not use sweeping aids as they may contain oils.



7.4 Levelling and repairing the surface

Cracks in the floor should be treated beforehand with KÖSTER KB-Pox IN through the saturation method and allowed to cure for 24 hours before commencing with the coating work.

Uneven, horizontal floors are previously leveled with KÖSTER SL Protect / SL Premium. For this purpose, prime the prepared substrate with KÖSTER SL Primer. Then apply KÖSTER SL Protect / SL Premium in the appropriate layer thickness. Before the application of KÖSTER VAP I 2000/KÖSTER VAP I 2000 UFS, slightly brush blast the surface after the KÖSTER SL Protect / SL Premium has cured.

8 Application techniques

8.1 Mixing of the KÖSTER VAP I 2000

The A component is first mixed briefly. The B-component is added to the A-component and mixed intensively with a slowly rotating mixer below 400 rpm until a homogeneous consistecy is achieved. Repot the material and remix it to avoid defects due to insufficient mixing.

8.2 Applying the KÖSTER VAP I 2000

The material is poured onto the floor surface immediately after mixing. The container must be completely emptied.

KÖSTER VAP I 2000 systems are applied in one step and distributed with a notched rubber squeegee so that a minimum unbroken layer thickness of 0.4 mm is achieved.

Immediately afterward, this layer must be rolled over with a short-pile epoxy resin-compatible roller in a cross pattern (at 90° angle to the working direction of the squeegee). This ensures that the vapor barrier is evenly distributed on the substrate without any pinholes.

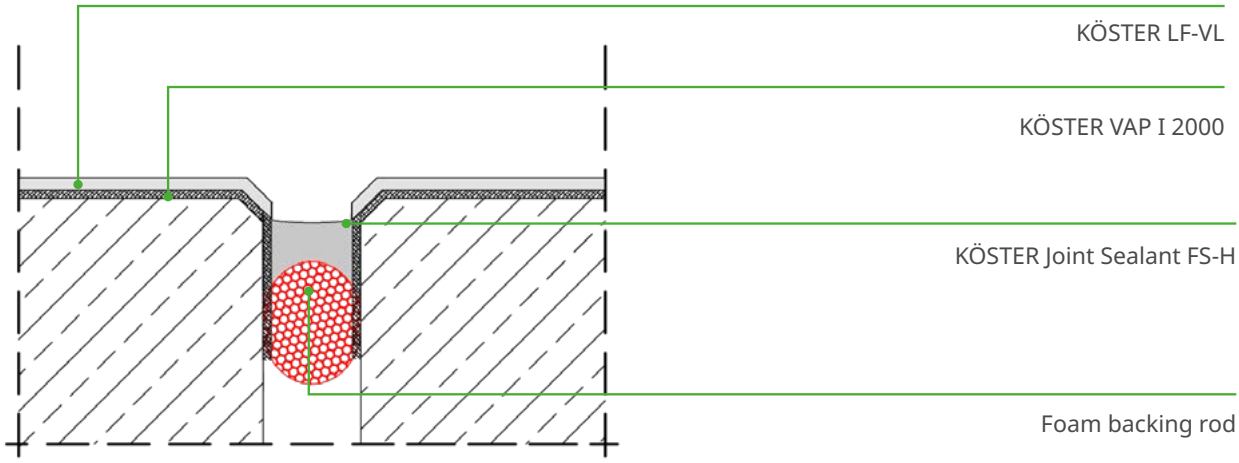
If a second coat is necessary to achieve the minimum layer thickness, it is to be applied between 12 and 24 hours after the first coat. After a waiting time of min. 12 hours, subsequent work steps such as applying sealants, coatings, or coverings can be carried out. To avoid air entrapment, use only solvent-free or respectively water based.

8.3 Following coating work

Before overworking with a subsequent floor coating, the KÖSTER VAP I 2000 vapor barrier must be clean, free of dust, dirt, and any other residue. Grinding is not allowed. The maximum waiting time for revisional work is 24 hours. KÖSTER VAP I 2000 products do not form an amine haze on the surface and can be coated over even after a long period of time as long as the coating surface is clean. KÖSTER VAP I 2000 coatings must not be exposed to direct sunlight for longer than 48 hours. For PMMA coatings, the maximum waiting time before re-working is 48 hours after the KÖSTER VAP I 2000 system has fully cured. KÖSTER VAP I 2000 systems should only be used by specialist companies and only after having completed a training course at the KÖSTER BAUCHEMIE AG.

9 Expansion joints

The expansion joint must be designed in such a way that the joint runs through the entire floor build-up, including all coatings for example the floor coating KÖSTER LF-VL. The prepared joint flanks are coated with KÖSTER VAP I 2000. After a hardening time of 4-12 hours (depending on the product), a round foam backing rod and the joint filler can be installed. KÖSTER FS Primer 2C is not used if the joint filler is applied directly to the KÖSTER VAP I 2000 products. You can find further information on this in the KÖSTER system brochure "Waterproofing Construction Joints".



Cracks and dilation joints

10 Quality control and inspection

Quality control and inspection are paramount in the application of floor coatings as they ensure that the finished surface meets the desired standards for appearance, durability, and functionality. By conducting thorough quality control and inspection procedures throughout the coating process, any defects or inconsistencies can be identified and addressed promptly, preventing costly rework or repairs later on. This includes monitoring the thickness and coverage of the coating, checking for proper adhesion to the substrate, assessing the uniformity of the finish, and evaluating resistance to chemicals, abrasion, and other environmental factors. Through meticulous quality control and inspection, the integrity and performance of the floor coating can be upheld, ultimately prolonging its lifespan and enhancing the overall safety and aesthetics of the space.

11 Consumption rates

Consumption (CSP 3 Profil)	Layer thickness (in mm)	KÖSTER VAP I 2000 Equivalent air layer thickness*	KÖSTER VAP I 2000 UFS Equivalent air layer thickness*
400 g/m²	0.36	S_d= 52.2 m	S_d= 48.7 m
500 g/m²	0.45	S_d= 65.2 m	S_d= 60.9 m
		μ = 145000	μ = 135000

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

12 General notes

12.1 Material storage

Store the material at +10 °C to +25 °C. If stored in originally sealed packages it can be stored for 1 year.

12.2 Packaging

KÖSTER VAP I 2000

CT 230 002	2.95 kg combi package
CT 230 010	10.13 kg combi package
CT 230 025	25.32 kg combi package

KÖSTER VAP I 2000 UFS

CT 234 002	2.96 kg combi package
CT 234 010	10 kg combi package

12.3 Important considerations

- Wear appropriate Protective Personal Equipment (PPE) when installing the material. Observe all governmental, state, and local safety regulations when processing the material.
- Mixed material must be used immediately and entirely after mixing. Material residues must be stored outdoors as they develop a high reaction heat and smoke may form. This also applies to large-volume applications.
- Liquid polymers react to temperature fluctuations by changing their viscosity and/or curing behavior. Low temperatures will slow the reaction; high temperatures will accelerate the reaction rate. Mixing large volumes will also increase the reaction rate. Coating work should therefore only be carried out at falling or constant temperatures. The instructions given in the Technical Data Sheets must be followed.
- A dew point distance of +3 °C must be maintained during and for at least 12 hours after coating work. Coatings must be protected from moisture in all forms until completely cured. At material temperatures below +15 °C the consistency changes - the material becomes more viscous.

12.4 Limitations

Do not install KÖSTER VAP I 2000 over any gypsum-based products.

13 Certifications

Certifications for KÖSTER VAP I 2000:

- CTL Test Report, Standard Test Methode for Vapour Transmission of Materials, ASTM E-96-10, Project Nr. 28326, 18.3.2013.
- Report: Study of the permeability of impurities through a coating of KÖSTER VAP I 2000 from 4.9.2017 VAHANEN BUILDING PHYSICS LTD, FINLANwD
- LEED Compliance Test By Berkley Analytics, “VOC Emission Test Certificate”, Certificate Nr. 170815-04, Aug 15, 2017.
- AgBB Test certificate, H 6939 FM-2, Emissions Testing acc. to DIBt principles for the health assessment of construction products, 12.10.2012.

Certifications for KÖSTER VAP I 2000 UFS:

- Offizieller Prüfbericht: “Standardprüfverfahren für die Wasserdampfdurchlässigkeit von Materialien”, Law Project Number 281382 (LAW Engineering, Inc. Atlanta, USA), 19.7.2013, in englischer Sprache”
- LEED Compliance Test by Berkley Analytics, “VOC Emission Test Certificate”, Certificate Nr. 170825-01, Aug 25, 2017.

14 Legal disclaimer

This method statement reflects general cases with standard parameters. It is not suitable as a step-by-step guide for all and each waterproofing project as the conditions on site at the moment of the application cannot be foreseen. It is solely the applicator's responsibility to decide on the actual procedure considering the specific situation on the construction site. In any case, KÖSTERs Terms of business are valid and can be viewed under www.koster.eu