

IDROCRETE SYSTEM

Crystalline admixture for
waterproofing concrete





MAPEI IDROCRETE KR1000
standard single system guarantee
for a period of 15 years



MAPEI DUAL SYSTEM
guarantee for a period of 20 years **

** Valid where IDROCRETE System and agreed MAPEI approved second system have been used

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The durability of concrete is affected by factors deriving from environment exposure. The type and severity of deterioration depends on the proximity and intensity of aggressive agents and on the capacity of concrete to resist to chemical and physical attacks. Designing a watertight concrete, together with its proper placement, compaction and curing, is the starting point for a more durable concrete.





Enhancing the ability of concrete to resist to water penetration means to extend the service life and durability of concrete. The use of superplasticising admixtures to achieve low water cement ratio in combination with proper hydrostatic permeability-reducing admixture (HPRA) and prolonged curing process is the best way to achieve a durable and watertight concrete.

Mapei Idrocrete System is a proven technology which combines the use of a superplasticiser from the **Dynamon** range with **Idrocrete KR 1000** in order to improve the physical and mechanical properties of concrete to make impermeable structures. Mapei Idrocrete System is BBA certified (certificate 20/5754).

The **Dynamon** range is a range of superplasticising admixtures based on PCE technology which, due to their high efficiency, allows to produce highly workable, pumpable and flowing concrete with enhanced strength and durability and they can also mitigate the slump loss problem related to a low water cement ratio.

Idrocrete KR 1000 is a powder admixture from the **Idrocrete** range, which can make the concrete completely watertight thanks to a progressive process of crystallization.

Idrocrete KR 1000 is formulated to react with water which is present in the concrete or is going to penetrate it.

The chemical reaction between water and product forms needles of hydrated calcium silicate and other insoluble crystalline compounds which progressively reduce the size of capillary pores.

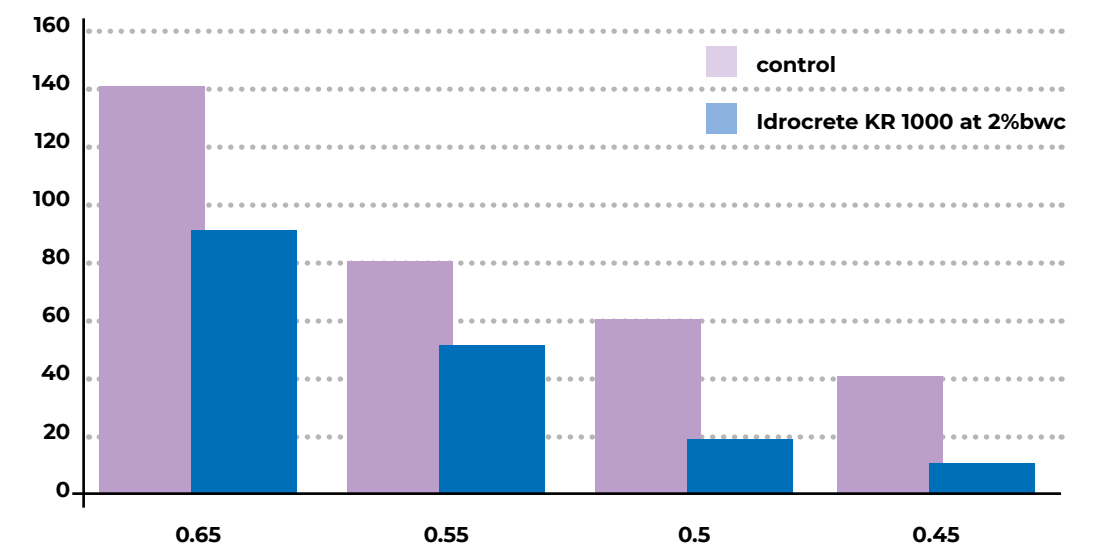
In addition to the activation process of filling material, **Idrocrete KR 1000** provides also the crystallization of nuclei which are necessary for the growth of crystals. These micron-sized nuclei represent the embryo of carbonate and insoluble hydro-silicate crystals which will be responsible for the reduction of concrete permeability.

PERFORMANCE

Concrete specimens prepared with different water cement ratios and cured for 28 days under standard conditions behave very differently upon the penetration of water. The EN 12390-8 European standard describes the method for measuring the maximum depth of penetration of water in a concrete sample after a pre-fixed exposition to the action of water at a pre-determined pressure. The graphic shows that along with the reduction of the cement-water ratio, the resistance of concrete to the passage of water increases. The resistance values to the passage of water are further improved once **Idrocrete KR 1000** is added to the concrete mixture in a ratio of 2% of the cement weight. Depending on the specific project requirements, **Idrocrete KR 1000** can be added at ratios from 1% to 3% of the cement weight.

The product is supplied in water soluble bags (4 kg each bag) or in 20 kg paper bags to be added to the mix together with the other components to ensure a better mixing.

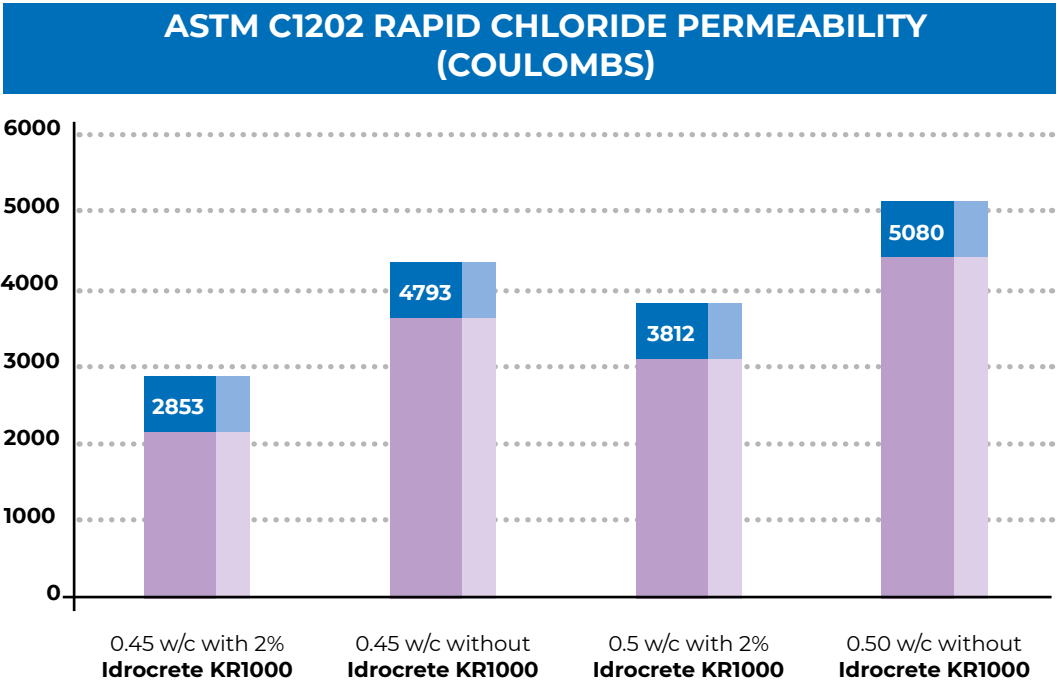
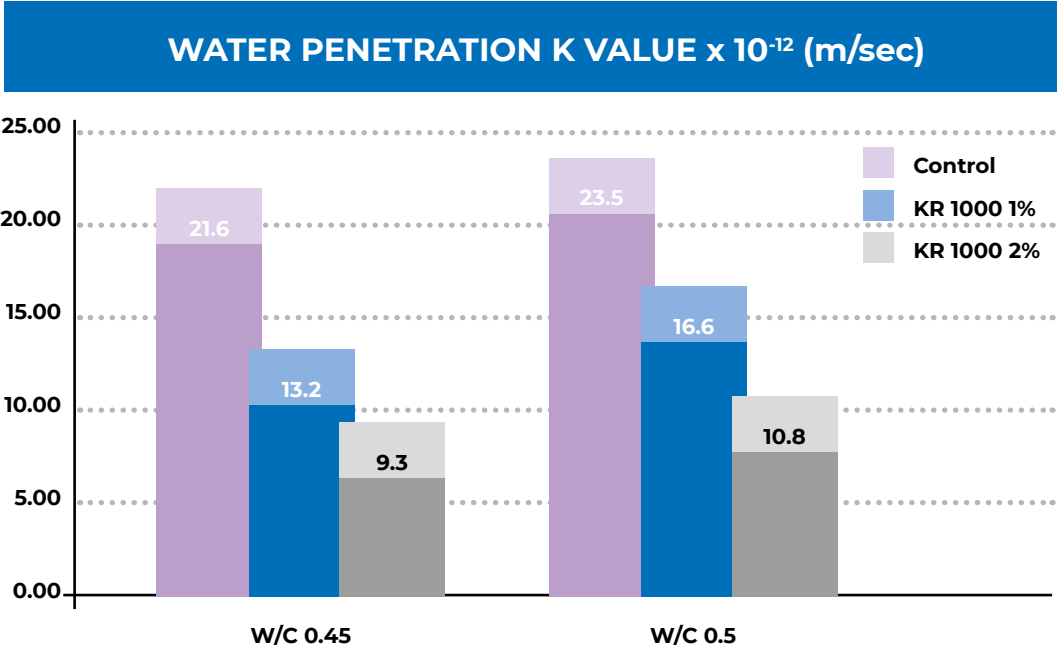
MAXIMUM WATER PENETRATION DEPTH



Idrocrete KR 1000 is recommended to be used in any concrete structures exposed to moisture, water salt or hydrostatic pressure water such as basements, docks, car parks, tunnels, liquid storage facilities, bridges, water reservoirs, drainage channels and swimming pools.

Idrocrete KR 1000 reacts with water and other no-soluble components of concrete to create insoluble crystals into the voids of cement matrix. The growth of crystals is able to close cracks and voids up to a width of 0.4 mm.

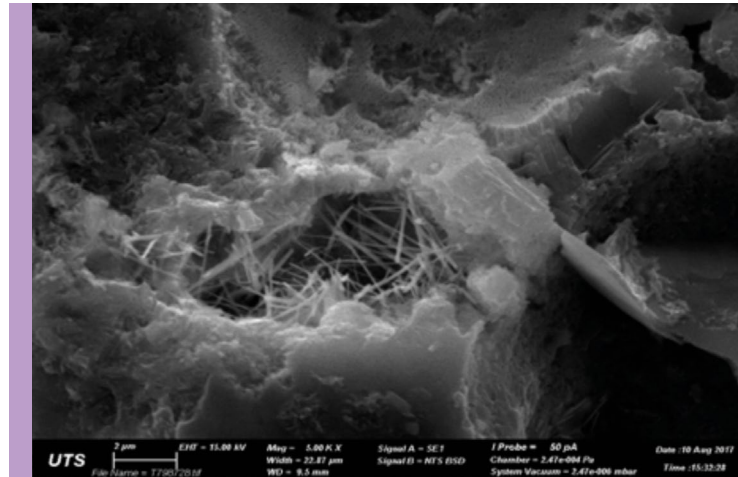
The rapid chloride permeability test carried out according to ASTM C1202 on concrete specimens treated with **Idrocrete KR 1000** shows a significant reduction in the total transported charge compared to a control mix.



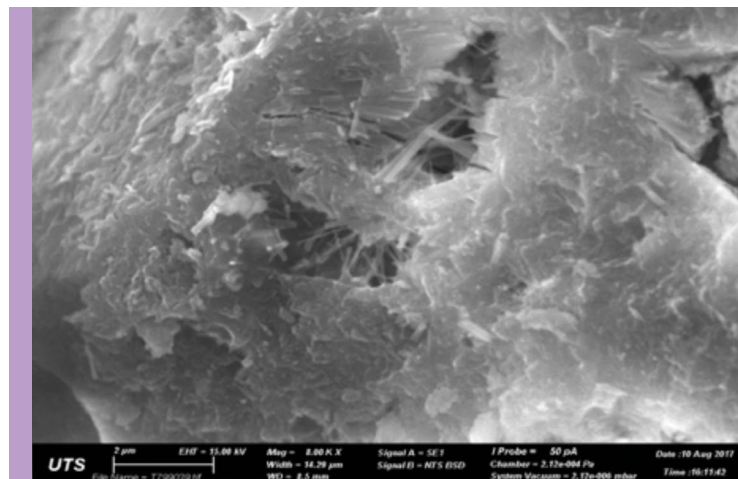
An additional test was carried out according to CRD-C 48. The concrete cylinders have been wet cured over 28 days until the beginning of the test and subsequently tested at 200 psi for 14 days. The flow rate was measured after 5 days of testing and K values are reported in the water penetration K value chart.

A SEM-EDS assessment was carried out at different ages on mature concrete of different composition. The SEM images of a control mix with 75% of shrinkage Limited cement and 25% of fly ash and a control mix with 50% of SL cement, 30 % of fly ash and a control mix with 50% of SL cement, 30 % of fly ash and 20% of Slag do not show the presence of any new crystal in the concrete structure. The same mixes treated with **Idrocrete KR 1000** at 2% bwc show the presence of needle-like crystalline products. The crystals have a short length of approximately 2-5 micron and appear to partially block the cement matrix voids.

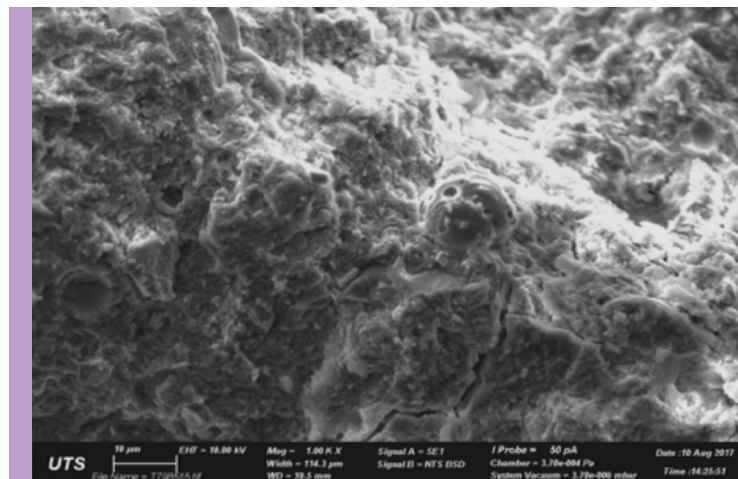
Concrete mix with 75% of shrinkage limited cement and 25% of fly ash and 2% of **Idrocrete KR 1000**: presence of needle-like crystalline products at 8 months.



Concrete mix with 50% of shrinkage limited cement, 30% of fly ash, 20% of slag and 2% of **Idrocrete KR 1000**: presence of needle-like crystalline products at 8 months.



Control mix with 75% of shrinkage limited cement and 25% of fly ash: no evidence of crystals growing at 8 months.



HOW IT WORKS

Idrocrete KR 1000 is added to the concrete mix at the batching plant. The concrete, once hardened, has a porous structure with voids and microcracks which allow the passing of water or moisture.

Idrocrete KR 1000 has a hydrophilic nature and reacts with the present moisture to form crystal needles. Crystalline deposits provide a pore-blocking effect into the microcracks and capillaries. The resulting concrete has a better and improved resistance to water penetration even under pressure.

Idrocrete System performances:

The concrete treated with **Idrocrete System** is proved:

- to be resistant to water high hydrostatic pressure
- to reduce ion chloride permeability
- to reduce the carbonation effect
- to enhance mechanical strength
- to reduce capillary absorption
- to accelerate self-healing capacity
- **Idrocrete KR 1000** has been independently tested by the British Board of Agrément

Packaging:

Idrocrete KR 1000 is available in different packaging containers:

- 20 kg bags
- 4x4 kg water soluble bags
- bulk size

Low permeability is often specified by a coulomb value and the maximum water penetration value. Laboratory tests demonstrate as the combination of a **Dynamon** superplasticiser together with the crystallizing product **Idrocrete KR 1000** strongly improves the watertight properties of concrete. Furthermore, impermeable concrete must have a very low water cement ratio ($<0,5$) that, combined with an extended wet curing time, achieves excellent permeability resistance to air, water and chloride ions. Concrete must always be well designed, proportioned and cured to maximize performance and fulfil all the specification requirements. Further evaluation tests have been carried out by independent and accredited laboratories around the world. All the external reports are available on request.



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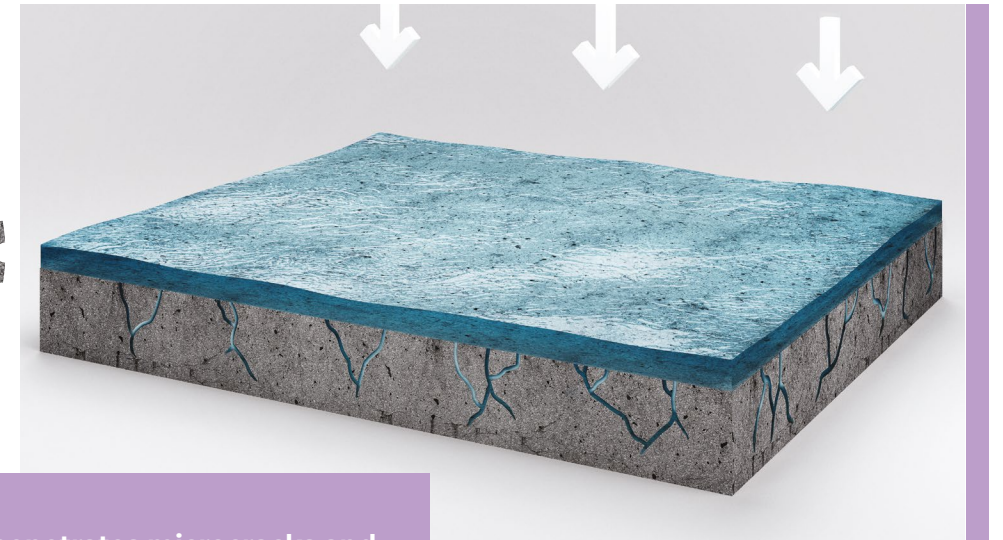
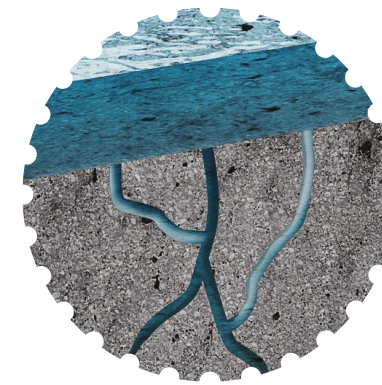


Photo 1

The water under pressure penetrates microcracks and capillary pores of the concrete

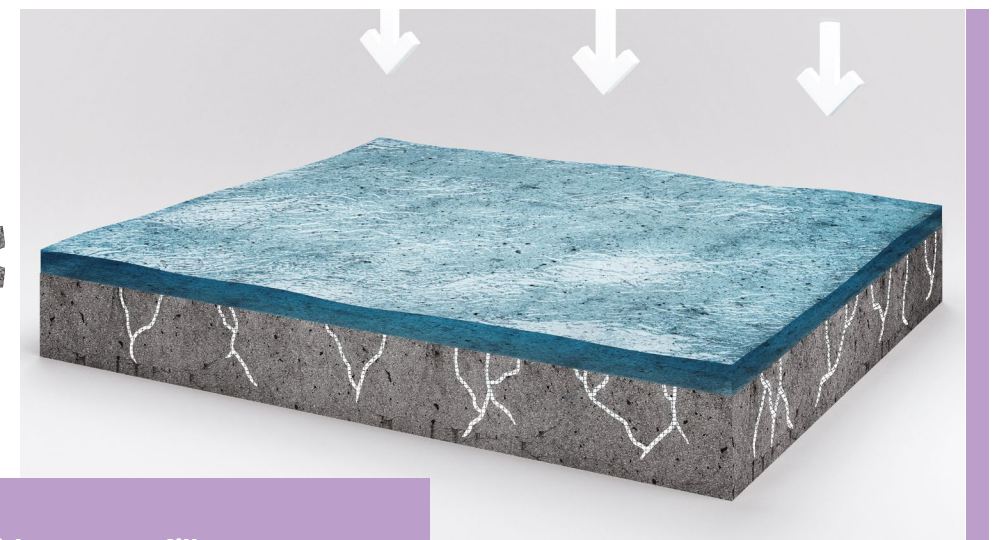
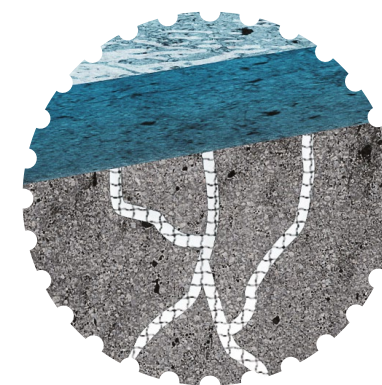


Photo 2

Idrocrete KR 1000 reacts with water to fill microcracks with crystalline deposits

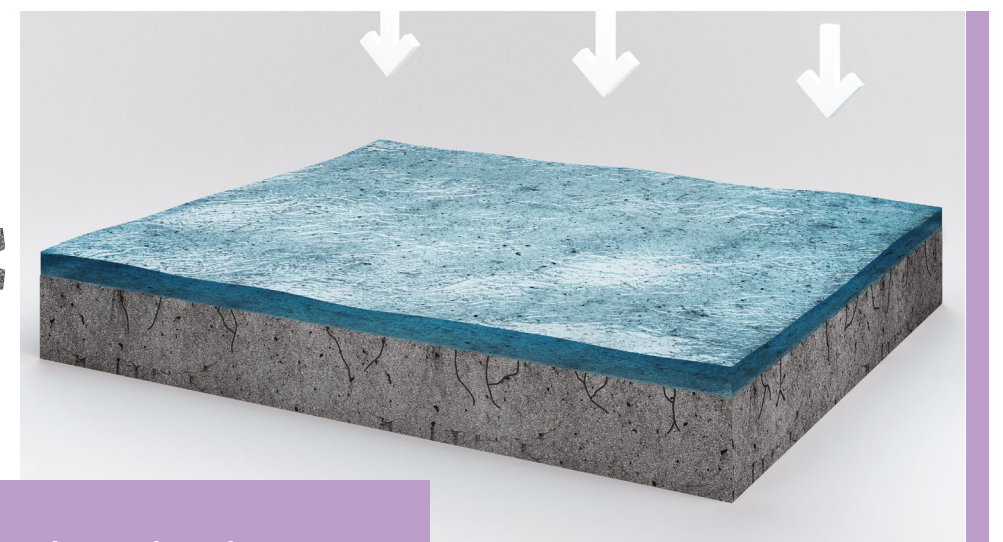
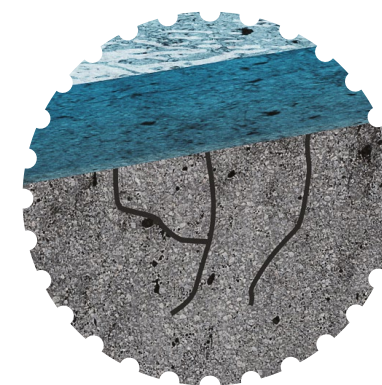


Photo 3

Cracks have been reduced and pores have been progressively blocked. Concrete watertightness is improved

NOTES

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NOTES

Lined area for notes on page 11.

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