

Krystol Internal Membrane™ (KIM®)

Instructions for Mix Design & Batch Plant

DESCRIPTION

Krystol Internal Membrane (KIM) is a hydrophilic crystalline admixture used to create permanently waterproof concrete.

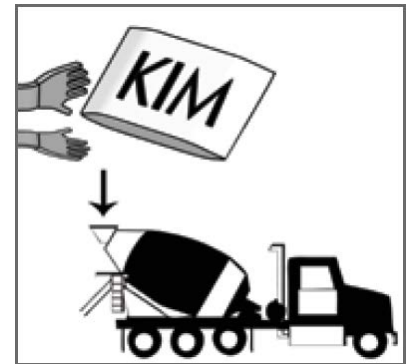
KIM lowers the permeability of concrete, and is used in place of surface applied waterproofing membranes. By stopping the transmission of water through concrete, KIM adds durability and longevity to concrete by protecting it against chemical attack and corrosion of reinforcing steel.

EFFECT ON PLASTIC CONCRETE

KIM admixture has been specially formulated to meet the requirements of projects in different climate conditions as follows:

- KIM-HS: This version of KIM is used for most common applications. KIM-HS is compatible with common admixtures, such as plasticizers, accelerators, retarders and air-entrainers.
- KIM-AE: This version of KIM is specially designed for concrete requiring air-entrainment to resist freezing and thawing cycles. KIM-AE will increase air content by 3-5 %. Adjust or remove any air-entraining admixtures accordingly.
- KIM-ES: This version of KIM is specially designed for use in hot climates and mass concrete. KIM-ES will prolong the slump retention of the concrete and delay the initial setting time. Adjust or remove set retarding admixtures accordingly.

All versions will typically delay the setting times of concrete. Consult your Kryton representative for the most appropriate grade of KIM admixture for your project. Be aware of the differences in air entrainment and retardation between KIM-HS, KIM-AE & KIM-ES.



COMPATIBILITY WITH OTHER CONCRETE ADMIXTURES

- KIM is compatible with other concrete admixtures, such as accelerators, air-entrainers and plasticizers. However, care must be taken when using water reducers or plasticizers that may delay the setting time.
- Type A (water reducing) and Type F (water reducing, high range) admixtures are preferred for slump control when using KIM.
- KIM admixture, Type B admixtures (set retarding), Type D admixtures (water reducing and set retarding), fly ash and slag may all retard the setting time of concrete. Avoid using all of these materials in the same mix design without first testing for acceptable setting time at the expected concrete placement temperature.
- Accelerating admixtures are known to increase the risk of cracking and should be avoided when possible. If an accelerating admixture is used, then use only the minimum level necessary.

MIX DESIGN CONSIDERATIONS

- Dose KIM at 2% of total cementing materials by weight, to a maximum dosage of 8 kg/m³ (13.5 lb/yd³).
- Recommended total cementing materials content is 335 kg/m³ (560 lb/yd³), and minimum is 300 kg/m³ (500 lb/yd³). Of this, at least 250 kg (420 lb/yd³) should be OPC, but must not be less than 150 kg (250 lb/yd³).
- Minimum 28-day design strength is 28 MPa (4000 psi).
- To minimize shrinkage and cracking, use the largest size aggregate possible and as much large aggregate as possible in your well-proportioned mix.
- KIM-HS and KIM-ES have a minimal effect on air content and will increase air less than 1.0%.
- KIM-AE will entrain 3-5% air and reduce the water demand for a given slump. Adjust or remove air-entraining admixtures (AEA) according to the results of your trial batches.



- In many cases, Type B or D admixtures can be used at a lower dose or eliminated when using KIM. Consider using Type A or F admixtures instead.
- Aggregates, cements and supplementary cementing materials vary in properties from region to region. Test batches are required to assess the local plastic and hardened properties to determine appropriate mix designs.
- It is recommended that cast-in-place concrete be batched at a water to cement (w/c) ratio of approximately 0.40 (0.37 for shotcrete). The maximum total w/c ratio is either 0.45 (0.40 for shotcrete) or the specified maximum w/c ratio. This includes all water present in the concrete and any added on route and on site.
- Ideal slump before the addition of KIM is 50 mm - 180 mm (2 in. – 7 in.). This provides sufficient shear for pulpable bags to disperse and to allow for complete mixing of KIM. If initial slump is above or below this range, it is recommended to open, empty and discard the paper bags.

BATCHING CONSIDERATIONS

- Do not use recycled water unless test batches show acceptable results.
- The use of recycled aggregates is not recommended.
- When using multiple admixtures in the same batch of concrete, they should be dispensed separately into the concrete to avoid intermixing and possible interference of the admixtures. It is recommended that KIM be added first before any other admixtures.
- Before opening KIM pails, loosen compacted material by turning the pail over once or twice. Dispense directly into concrete mixer.
- KIM in bags can be thrown un-opened into the concrete mixer. The bags are designed to disintegrate in the mixer.
- Store any unused portions in an airtight container to prevent moisture contamination.
- Mix concrete at medium to high speed for 1 minute per cubic meter/yard in the batch and a minimum of 3 minutes.
- If the slump is below specification, add a mid or high range water reducer to achieve the required slump. Only add additional water with the approval of the quality control technician. Record all water additions on the batch ticket and do not exceed the specified w/c ratio.
- If possible, add only a portion of the specified HRWR when batching, and send the rest to the jobsite to be added just prior to unloading.
- The addition of water without supervision and approval may void the manufacturer's warranty.