TECHNICAL DATA SHEET

Concrete Waterproofing & Durability Enhancing Admixture

SMART CONCRETE®

Krystol Internal Membrane™ (KIM®)

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.

KIM contains Krystol technology. When added to concrete, Krystol chemically reacts with water and un-hydrated cement particles to form insoluble needle-shaped crystals that fill capillary pores and micro-cracks in the concrete and block the pathways for water and waterborne contaminants. Any moisture introduced over the lifespan of the concrete will initiate crystallization, ensuring permanent waterproofing protection.

FEATURES & BENEFITS

- The original and unsurpassed Permeability Reducing Admixture for Hydrostatic conditions (PRAH)
  - 35+ years of history
  - Effective against 140 m (460 ft) of hydrostatic head pressure
  - Reliably self-seals hairline cracks up to 0.5 mm (0.02 in)
  - Reduces concrete shrinkage and cracking
- Outperforms other crystalline admixtures on an equal weight basis (kg for kg / lb for lb)
  - Unique chemical reaction
  - Highest level of permeability reduction
  - Most dependable self-sealing performance
  - Best shrinkage and restrained shrinkage cracking reduction
  - Proven to extend life and protect against corrosion
- Easily added directly to ready-mix truck or to a central mixer
- Safe for contact with potable water
  - Certified by NSF to NSF/ANSI Standard 61
- Replaces the need for unreliable membranes, liners and coatings
  - Impervious to physical damage and deterioration
  - Significant reduction to your construction schedule
  - Reduces the cost of maintenance and repairs
  - Increases revenues with a larger building footprint
  - Lowers overall waterproofing costs
- Essential for blind-wall and shotcrete applications
- Extends life of concrete
  - Protects concrete against corrosion of reinforcement
  - Improves resistance to freeze-thaw
  - Improves resistance to waterborne chemicals such as sulfates, chlorides, and acids

RECOMMENDED USES

Use KIM to provide waterproofing protection for any Cast-in-place, Shotcrete or Precast concretes that will be subject to water, such as:

- Below grade parking structures, basements, elevator pits and foundations of high-rise towers
- Recreational facilities such as aquatic centers, aquariums, zoos, water parks and marinas
- Architectural water features such as fountains and waterfalls
- Traffic tunnels, below grade pipelines and subway tunnels
- Water containment reservoirs, water treatment tanks, sewage and manholes
- Bridges, dams and highway infrastructure
- Concrete homes including basements, foundations, swimming pools, decks, bathrooms, garages and exteriors
- Sufficiently designed roof tops and plaza decks
- Any concrete that requires the highest level of protection and durability.

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KRYTON SMART CONCRETE®

PROPERTIES

PHYSICAL PROPERTIES			
APPEARANCE		Grey Powder	
PARTICLE SIZE		40-150 µ	
BULK DENSITY		~1.4 g/cm^3 (88 lb/ft^3)	
SPECIFIC GRAVITY		~2.8	
CHLORIDE ION CONTENT		<0.1%	
PLASTIC PROPERTIES (OVER CONTROL)			
SLUMP	ASTM C143 / BS EN 12350-2	No significant change.	
PLASTIC DENSITY	ASTM C138 / BS EN 12350-6	No significant change.	
AIR CONTENT	ASTM C231 / BS EN 12350-7	No significant change.	
HARDENED / PERFORMANCE PROPERTIES[1] (OVER CONTROL)			
PERMEABILITY & RESISTANCE TO WATER UNDER PRESSURE (highest permeability reduction and resistance to water under pressure.)			
	USACE - CRD C48–92 1.38 MPa (200 psi) for 14 days	97% reduction in the coefficient of permeability. - *Nelson Testing Laboratories, USA*	No leakage through any of the 7 or 28 day cured KIM treated concrete while control failed at 10 and 45 hours respectively. - *University of British Columbia, Canada*
	DIN 1048-5 0.5 MPa (72.5 psi) for 72 hours	90% reduction in permeability over the same untreated concrete mix design; 3.7 mm (0.15 in) vs 36.7 mm (1.45 in). - *Kuwait University Civil Engineering Testing Center, Kuwait*	
	TAYWOOD VALENTA Modified BS 12390-8: 1 MPa (150 psi) for 96 hours	70% reduction in the Coefficient of Permeability over control samples. - *British Board of Agrément (BBA) Certification, UK*	
	ICBO/ICC Water Percolation Test	Exceeded ICBO criteria of no water passing and well under the 12.5 mm (0.5 in.) water drop limitation after 48 hours. - *Inspection Concepts, USA*	
	NCH 2262.Of 1997 0.5 MPa (72.5 psi) for 72 hours	Average depth of water penetration of 0 mm while control samples were 44 mm (1.73 in). - *Ingeneria Dictuc, Chile*	
SELF-SEALING (typically will stop leaks through cracks up to 0.5mm in width. Many factors will influence self-sealing performance. Results may vary.)			
	Self-Sealing Apparatus US Patent 9,038,477	Stopped water flow from crack sizes of 0.6 and 0.7mm (0.028 in). - *British Columbia Institute of Technology, Canada*	
	Self-Sealing Apparatus Custom	Self-sealed a 0.6 mm (0.024 in) leaking crack. - *The Cement and Concrete Institute, Sweden*	
	Self-Sealing Apparatus US Patent 9,038,477	KIM treated concrete showed self-sealing while controls with the same crack width continued to leak. - *University of Victoria*	
CORROSION RESISTANCE: (proven performance in longest real world field study.)			
	10 year field study	Low half-cell readings and no signs of corrosion after 10 years exposure in Honolulu Harbor. KIM was recommended by name to extend life and protect concrete from corrosion of reinforcing steel. - *University of Hawaii at Manoa, USA*	

1. Concrete is made of locally sourced materials to achieve different properties like strength, workability and durability. Results of testing will always vary based on the unique mix design. Testing listed is over a control and is a compilation of different tests in which Kryton is best in class.

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PROPERTIES (CONTINUED)

SHRINKAGE & CRACK REDUCTION[2]		
	BS 1881-5	25% reduction in drying shrinkage over control concrete. - *British Board of Agrément (BBA) Certification, UK*
	AS 1012.13-1992	20-25% reduction in drying shrinkage over control. - *Boral Materials Testing & Environmental Services, Australia*
	ASTM C1140 (modified)	80% reduction in restrained shrinkage cracking compared to control. - *AMEC Earth & Environmental Ltd, Canada*
	ASTM C1579 – 06	53% reduction in average crack width over control. - *British Columbia Institute of Technology, Canada*
FREEZE / THAW RESISTANCE		
	BS 5075-2	87% reduction in freeze/thaw expansion compared to control. - *British Board of Agrément (BBA) Certification, UK*
CHEMICAL RESISTANCE		
	US Bureau of Reclamation Sulfate Resistance Test	Outperformed control specimens after 21 cycles of soaking in Na_2SO_4 solution then oven drying. - *R. M. Hardy and Associates, USA*
	British Board of Agrément	The lower permeability of KIM concrete will reduce the ingress of sulfates. - *British Board of Agrément (BBA) Certification, UK*
	AASHTO T277-89	Chloride Ion Resistance (Coulombs) KIM improved resistance over control concrete by 34.5% after 28 days, 36% after 56 days, and 44.8% after 90 days. - *The Port Authority of New York & New Jersey, USA*
	ASTM C1202-97	Reduced Rapid Chloride Permeability over control mix design by 45% after 28 days. - *AMEC Earth and Environmental, Canada*
STRENGTH[3]		
	ASTM C39	Increased compressive strength over control by 5.3% after 7 days and 13.9% after 6 months. - *The Port Authority of New York & New Jersey, USA*
	BS EN 12390-3	Increased compressive strength by 9% after 28 days over the equivalent untreated concrete. - *British Board of Agrément (BBA) Certification, UK*

2. Kryton does not recommend eliminating standard shrinkage control joints. Follow ACI guidelines and Kryton's published literature for waterproofing joints.
3. Do not assume strength increase will occur. Do not reduce strength class or cement, or increase water compared to starting mix. Plan for no changes to strength.

CERTIFICATIONS

KIM is used around the world and has a number of certifications, including:

- NSF to NSF/ANSI Standard 61: Drinking Water System Components
- International Code Council – Evaluation Services (ICC-ES): International Building Code Compliance, ASTM 494 Compliant: Report ESR-1515
- Dubai Municipality: Certificate of product conformity
- BRANZ , Appraised No 661
- CE Marked to BS EN 934-2
- REACH Compliant
- British Board of Agrément (BBA): Certificate 05/4217
- British Board of Agrément (BBA): Certificate of Conformity of the Factory Production Control 0836-CRP-14/F086
- Singapore Green Label

APPLICATION

Read and distribute Application Instructions 1.11 (Cast-in-place concrete) or 1.21 (Shotcrete) before using this product.

A pre-pour meeting with the general contractor, forming contractor, finisher, concrete supplier and materials testing engineer is strongly recommended. Treat construction joints and penetrations in accordance to Application Instructions 4.11-4.31 (as applicable). Dose KIM up to a maximum 8 kg/m^3 (13.5 lb/yd^3) in consultation with an authorized Kryton representative. Trial batches are required to determine actual plastic properties. Allow KIM to thoroughly mix at medium/high speed for minimum 1 minute per cubic meter/yard in the batch and a minimum of 3 minutes. Place and finish in accordance with ACI guidelines. Proper placement and curing are essential to achieve the performance and benefits of KIM. Cure in accordance with ACI 308.1 guidelines.

Drawings and Specifications:

For section drawings, CAD details and specification language related to this product, visit www.kryton.com/technical-info/ or contact your authorized Kryton representative.

LIMITATIONS

KIM is an effective waterproofing system for rigid concrete structures only and may not reliably self-seal dynamic, moving cracks and joints.

SAFETY

Read the Safety Data Sheet (SDS) for this product. For professional use only. Avoid contact with skin or eyes. Avoid breathing dust. Wear a dust mask, long sleeves, safety goggles and impervious gloves.

PACKAGING

KIM is available in 5 kg (11 lb) and 25 kg (55 lb) re-sealable pails as well as pulpable mixer-ready bags in custom sizes to match your mix design.

SHELF LIFE

When stored in a dry enclosed area, KIM has a shelf life of at least 5 years for unopened pails. When packaged in mixer ready bags, KIM has a shelf life of at least 4 years when kept in the original pallet wrapping and must be used within 4 months of opening the original pallet wrapping.

WARRANTY

Kryton International Inc. (Kryton) warrants that Kryton products are free from manufacturing defects and comply with the specifications given in their respective technical data sheet. Because conditions of use, such as site conditions, surface preparations, workmanship, concrete ingredients, weather, structural issues and other factors are beyond the control of Kryton, no warranty can be given as to the results of use. Purchaser agrees to seek the advice of qualified professionals and to determine for themselves the suitability of the products for their intended purpose and assumes all risks. Purchaser's sole remedy is limited to replacement of any product proven defective or at Kryton's option refund of the purchase price paid. THIS LIMITED WARRANTY CONTAINS THE ENTIRE OBLIGATION OF KRYTON. NO OTHER WARRANTIES, EXPRESS OR IMPLIED, SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. KRYTON SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. No representative of Kryton has the authority to make any representations or provision except as stated herein. Kryton reserves the right to change the properties of its products without notice.

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