

# KIM<sup>®</sup>



SMART CONCRETE<sup>®</sup>

# BioGard

Protection for Concrete Sewer and Wastewater Infrastructure Projects



## Advanced Crystalline Technology will add years to your sewer and wastewater concrete's service life, and eliminate costly maintenance, repairs or replacement.

**KIM BioGard** is an advanced chemical admixture for concrete that is specially designed to protect concrete from the harsh and destructive conditions present in sewer and wastewater environments containing hydrogen sulfide (H<sub>2</sub>S).

KIM BioGard is based on Kryton's Krystol Internal Membrane technology with proven performance over more than 40 years. KIM BioGard contains proprietary technology that will seal the capillary pores, cracks and microcracks of concrete to protect against the penetration of water, sulfates, H<sub>2</sub>S and acidic waters. By creating concrete that is better able to resist corrosive sewer environments, KIM BioGard can add many years to the concrete's service life and eliminate costly maintenance, repairs or replacement.

KIM Bio-Gard technology is more reliable than anti-microbial agents, as these can leach from the concrete or become consumed over time. Anti-microbials can also be rendered ineffective when overwhelmed by bio-film in a sewer environment. Finally, anti-microbial agents are regulated as pesticides and this can create issues for storage, use and disposal. KIM BioGard is pesticide-free.

KIM Bio-Gard is easily added to concrete at the time of batching and becomes a permanent, full-depth part of the concrete. Application errors and time requirements common to surface coatings are avoided completely.



KIM BioGard is recommended for use in sewer and wastewater environments, especially in areas which may develop harmful conditions due to the accumulation of H<sub>2</sub>S gas.

### Typical Applications:



Pipes

Manholes



Lift Stations

Drop Structures

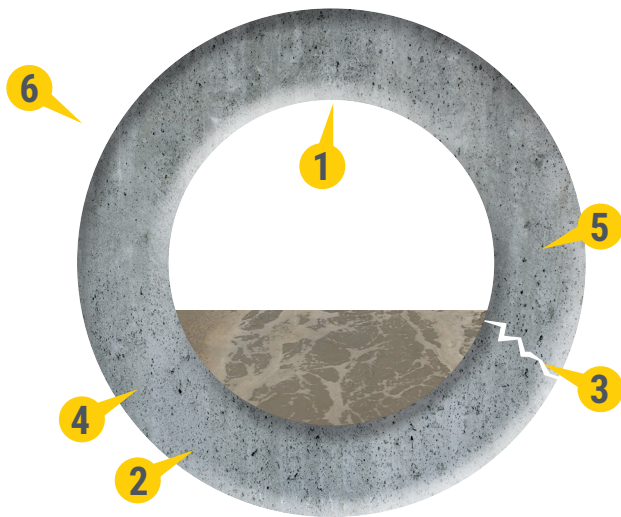


Precast

Wastewater Treatment Plants

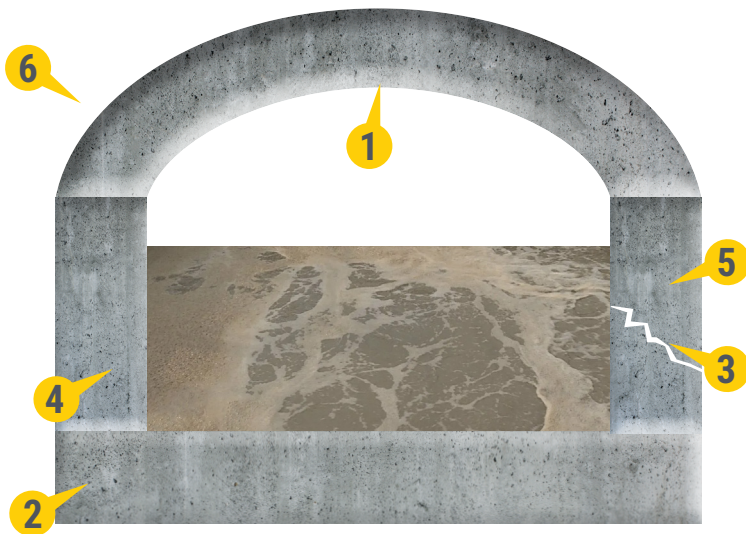
## KIM BioGard Extends the Service Life of Wastewater Treatment Plants and Sewerage.

### Sewer Pipe



- 1 Protects Against Hydrogen Sulfide & Acidic Waters
- 2 Prevents Infiltration & Exfiltration
- 3 Seals Hairline Cracks Against Leakage
- 4 Heals Microcracks—Maintains Physical Properties
- 5 Protects Against Sulfates & Chlorides
- 6 Non-Leaching, Non-Consumptive Technology

### WWTP Digester



#### Microbially Induced Corrosion (MIC)

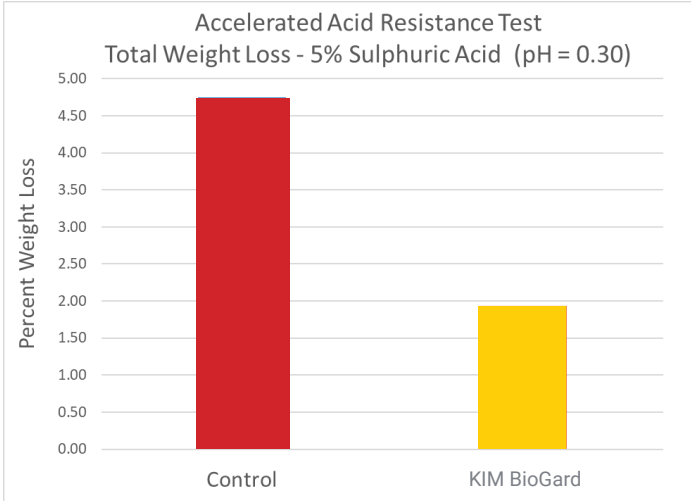
MIC is a serious deterioration mechanism that is common in enclosed sewage systems. Sewage emits hydrogen sulfide gas (H<sub>2</sub>S) which combines with oxygen to form sulfuric acid.



Protecting concrete against acid penetration is essential to extending the concrete's lifespan.

## Protects Against Acidic Water and Bio-Acid Attack

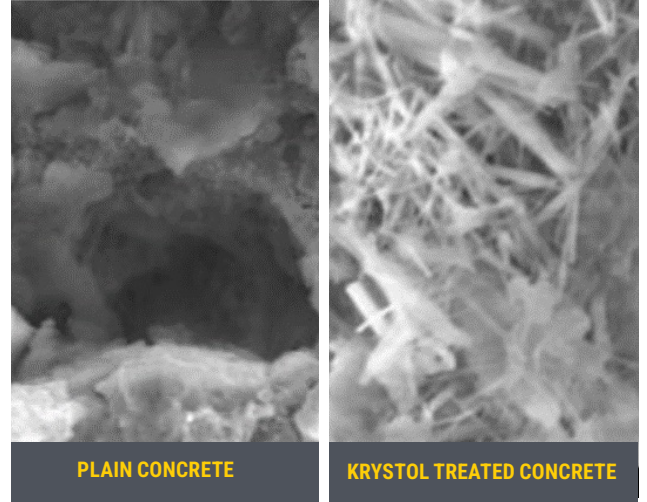
**Immersion Test:** Plain and treated samples were exposed to a highly corrosion 5% sulfuric acid solution (pH < 1). Treated samples a 59% reduced rate of acid attack.



Concrete Research Center, Kryton International Inc.

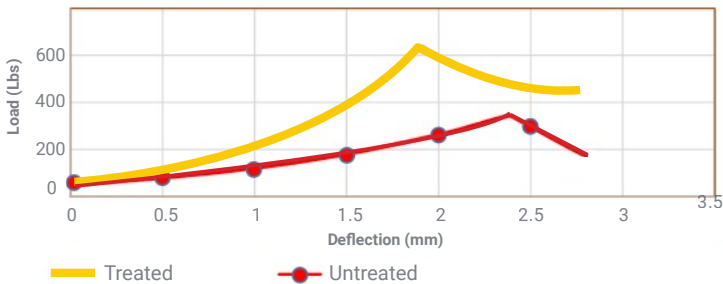
## Contains Advanced Crystalline Technology

**KIM BioGard** contains Kryton's industry leading crystalline technology. Krystol resists high hydrostatic pressure and provides permanent protection that is not consumed and does not break down with time.



University of Victoria (UVIC), Department of Civil Engineering,  
Facility for Innovative Materials and Infrastructure Monitoring (FIMIM)

**H<sub>2</sub>S/Bio-Acid Test:** Krystol treated concrete pipe retained 85% better toughness under load point testing after exposure to sewer generated bio-acid attack.



University of British Columbia, Faculty of Civil Engineering

## Self-Sealing

**Krystol technology** reactively seals hairline shrinkage cracks up to 0.5 mm to maintain watertight performance in concrete pipes and tanks.



## Sulfate Resistance

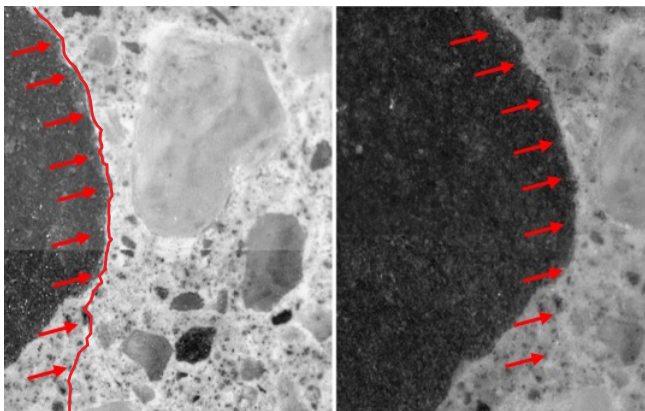
**Krystol technology** is proven to protect concrete from sulfates and outperforms competitive technology in a high sulfate environment.

SPECIMEN	RESULT
PLAIN CONCRETE	-14% STRENGTH (LOSS)
KRYSTOL TREATED CONCRETE	+3% STRENGTH (GAIN)
COMPETITOR	-4% STRENGTH (LOSS)

*Sulfate Resistance - RM Hardy and Associates (AGRA, AMEC), Canada*

## Healing of Microcracks

**Krystol technology** fills and heals unseen microcracks, keeping permeability low and maintaining long term protection at a microscopic level. Only Krystol technology has been shown to heal micro-cracks, allowing concrete to better heal internal damage and maintain its integrity over time.



*University of Ottawa, Department of Civil Engineering.*

## Protects Against Corrosion

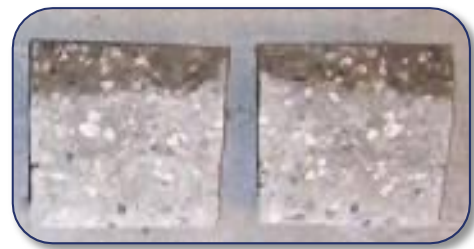
Wastewater sources containing chlorides can induce corrosion in water treatment plants, particularly in the disinfection and discharge areas or for plants in a coastal environment. KIM BioGard provides unmatched protection against chloride ingress and reinforcing steel corrosion.

## Prevents Infiltration and Exfiltration

**KIM BioGard** withstands an industry leading 460 feet of head pressure. When combined with self-sealing performance, BioGard protects all concrete parts of the wastewater handling system against infiltration and exfiltration.

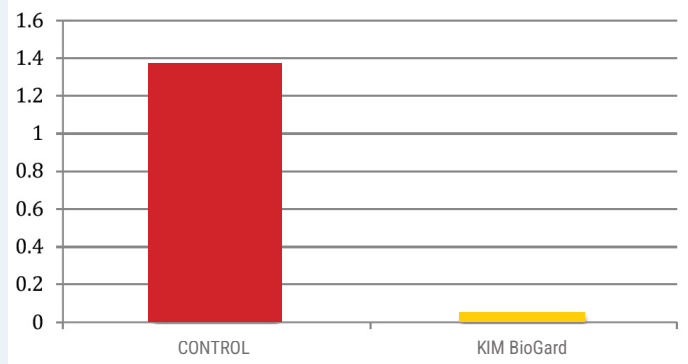


PLAIN CONCRETE



BIOGARD TREATED CONCRETE

### CRD-C48 - Average Flow Rate (cm<sup>3</sup>/hr)



*Permeability Testing: USACE CRD C48 (200 psi) – Nelson Testing Laboratories, USA*

# Featured Projects



**Aquatera's Wastewater Treatment Plant**  
Grande Prairie, Canada



**Georgetown Grade Separation Project**  
Toronto, Canada



**Natura Wastewater Treatment Plant**  
Tijuana, Mexico



**Northfield Wastewater Treatment Plant**  
Minnesota, USA



**Las Maravillas**  
Tijuana, Mexico



**St. Petersburg Wastewater Treatment Plant**  
St. Petersburg, Russia