





## Meeting the Challenge

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# Protecting Tunnels

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Due to their very nature and location, tunnels can be seriously compromised by hydrostatic pressure and water leakages associated with high water tables. Inadequate waterproofing, cracking and joint failure are problems that will result in the deterioration of concrete and the leaking of water into the tunnel. In the short term, this can lead to the loss of functionality and, over time, compromise the structural integrity of the tunnel itself. Xypex has an extensive track record in the waterproofing and protection of tunnels. In Cut and Cover, Bored and Immersed Tube tunnels, Xypex is recognized by major contractors as a key solution for the tunneling industry. For cast or pre-cast concrete and shotcrete, Xypex's non-toxic Crystalline Technology protects tunnels all over the world. Whether used for new construction or the rehabilitation of existing structures, Xypex has gained an exceptional reputation for protecting the structural integrity of concrete and resisting water leakage even under extreme hydrostatic pressure.





# The Structures – The Problems

Xypex products play a key role in the waterproofing of concrete against water leakage, even against extreme hydrostatic pressure. The unique Xypex technology also protects concrete against the effects of chemical attack and crack or joint failure.

## Protecting Tunnels

The waterproofing and protection of concrete in tunnels has the following objectives:

*To prevent the passage of water through the concrete due to hydrostatic pressure so as to protect the interior of the substructure from water-damage, and the reinforcing steel from corrosion. Depending on the local environment, concrete may need to be protected against chemical attack from de-icing materials.*

The nature of concrete and its installation means having to deal with permeability problems created by the natural porosity of the concrete as well as defects (faulty cold and construction joints, honeycombs, rock pockets and tie holes), joint leaks, freeze/thaw damage and drying shrinkage cracks. These problems typically leave the structure open to active leaks and accelerate the possibility of reinforcing steel corrosion and surface deterioration.

Cracks



Leaking Tunnels



Leaking Joints



Construction Defects



## Types of Tunnels

Cut & Cover (Bottom-up)



Cut & Cover (Top-down)



Immersed Tube Slide



Drill & Blast

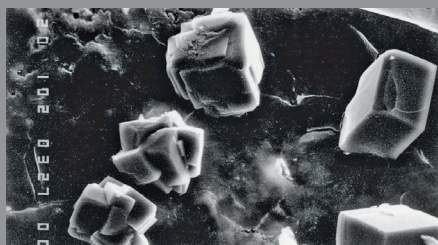


Tunnel Boring Machine

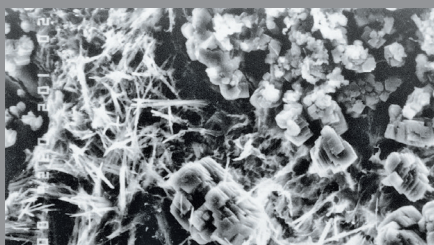




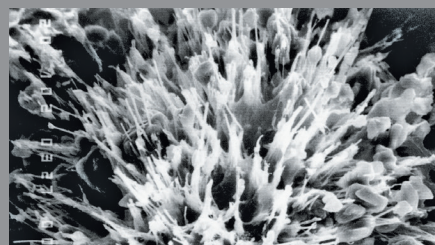
# The Permanent Solution



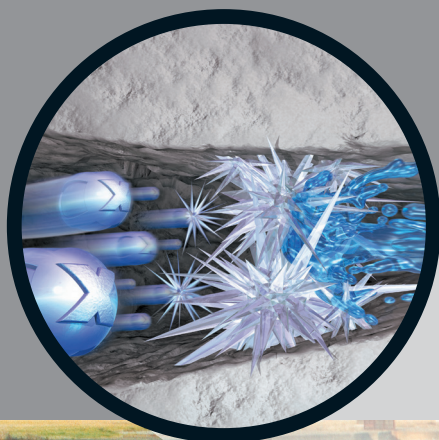
CONCRETE UNTREATED



CRYSTALLIZATION INITIATED



CRYSTALLIZATION MATURE



## Xypex Crystalline Technology

Xypex products use the natural porosity of concrete and chemical diffusion to penetrate its pores and capillaries. Inside the concrete, Xypex chemicals react with un-hydrated cement particles and the by-products of cement hydration to form a non-soluble crystalline structure deep within the substrate. In this condition, the concrete becomes impermeable, preventing the penetration of liquids and chemicals from any direction even under extreme hydrostatic pressure. The chemical resistant properties of the crystalline structure will mitigate the attack of chlorides or other chemicals that may be present in de-icing materials.



## Proven Performance Worldwide

Comprehensive quality systems and standards along with thorough testing in the lab and the field have resulted in Xypex's highly respected position in the concrete industry. Xypex has been extensively tested by independent testing laboratories in the U.S., Canada, Australia, Japan, Europe and other countries.



## The Xypex Advantage

Xypex Crystalline Technology works inside the concrete, thus avoiding typical problems associated with traditional barrier products.

✓ Permanent and reactivates whenever water is present	✓ Requires no additional protection as with preformed membranes
✓ Self-heals static cracks up to 0.4 mm (1/64")	✓ Resistant to chemical attack
✓ May be applied on negative or positive side of concrete surface	✓ Not subject to deterioration problems encountered by surface coatings and membranes



# The Right Products

## Xypex Admix Advantages

- Permanent integral waterproofing
- Enhances concrete durability
- Value engineering
- Non-toxic
- Non-combustible
- Resists damaging effects of water penetration and chemical attack



## Xypex Admix for New Concrete Construction

Xypex Admix is the preferred choice for installing Xypex Crystalline Technology into new concrete tunnel structures. Because Xypex Admix is blended into the mix at the time of batching, it becomes an integral part of the entire concrete matrix, thus reducing the potentially damaging effects of water penetration.



**Precast**



**Cast-in-place**



**Shotcrete**

## Xypex Coating Advantages

- Doesn't require a dry surface
- Apply to either side of the concrete
- Won't puncture, blister or tear
- No costly surface priming or leveling
- Sealing, lapping & finishing, protection during backfilling not required
- Permanent waterproofing
- Enhanced concrete durability
- Doesn't contain VOCs
- Non-toxic and non-combustible
- Can be applied safely in confined spaces

## Other Accessory Products

- FCM 80
- Megamix I & II
- Gamma Cure
- Xycrylic Admix

## Rehabilitation & Repair

Xypex's coating systems and repair products enable transport authorities, engineers and contractors to economically and confidently repair damaged and leaking structures, especially from the negative side. Xypex Concentrate and Modified are applied as slurry coatings to the surface of the concrete. Unlike other materials that need a dry substrate, Xypex products require a moist surface – a condition typical of leaking structures. This type of environment is conducive to the Xypex Crystalline process. Xypex Patch'n Plug, Concentrate Dry-Pac and Megamix products are specifically designed to permanently repair concrete defects such as static cracks and faulty cold or construction joints. These products are also effective at filling tie-holes.



**Coating**  
Concentrate & Modified



**Plugging**  
Patch'n Plug



**Rehabilitation**  
Patch'n Plug & Megamix



Visit us online at [xypex.com](http://xypex.com)  
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