

1. What is GS®?

GS® is a non-toxic, chemical treatment for the waterproofing and protection of concrete. GS®'s primary and most distinguishing performance feature is its unique ability to generate a non-soluble crystalline formation deep within the pores and capillary tracts of the concrete - a crystalline structure that permanently seals the concrete against the penetration of water and other liquids from any direction.

2. How does GS® work?

To create its crystalline waterproofing effect, GS® must become an integral part of the concrete mass. This is based on two simple reactions, one chemical and the other physical. Concrete is both porous (capillary tract system) and chemical in nature. By means of diffusion, the reactive chemicals in GS® use water as a migrating medium to enter and travel through the capillary tracts in the concrete. This process precipitates a chemical reaction between GS®, moisture and the natural chemical by-products of cement hydration (calcium hydroxide, mineral salts, mineral oxides and unhydrated and partially hydrated cement particles). The result is crystallization and, ultimately, a non-soluble crystalline structure that plugs the pores and capillary tracts of the concrete. This will continue to migrate through the concrete and the crystalline growth will form behind this advancing front of chemicals. This process will reactivate whenever water is present, thus making the concrete totally sealed against the penetration of water (or other liquids) from any direction.

3. How long does it last?

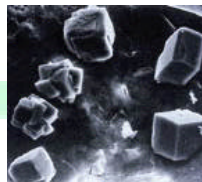
GS® application UNLIKE MOST OTHER SYSTEMS is permanent. The fibrous crystalline growth, due to its unique composition, will not deteriorate under normal conditions. Our children's children will benefit from applications of GS® today.

4. How is GS® different from other products?

The process by which GS® waterproofs concrete is unique in that GS® is a CATALYST. This crystalline growth is highly resistant to extreme water pressure from either side of the concrete and also to most aggressive chemicals. Since the process is catalytic, the crystalline structure can reactivate many years after the original application, to seal or re-seal many defects which might occur in the concrete at a later time.

The crystallization process that GS® causes within the pores and capillary tracts of concrete is illustrated below in electron microscope photos taken by an independent research team.

1. CONCRETE (UNTREATED) A control sample of concrete was sheared through at 50mm below the top surface. The sheared face shows some of the by-products of cement hydration with which GS® reacts. Precipitated calcium hydroxides together with cubic and rhombic particles are visible.



2. GS® CRYSTALLIZATION (Initiation) Taken at 50mm within a GS® treated concrete sample, This photograph shows the initiation of the GS® crystalline reaction after GS® Concentrate was applied to the surface



3. GS® CRYSTALLIZATION (Mature) This photo was taken 26 days after the application of GS® Concentrate at a depth of 50mm into the concrete sample. A dense, fully developed crystalline structure has formed within the capillary tracts of the concrete to completely block the flow of water



The above steps depict the process by which GS® penetrates and blocks the flow of water and other liquids.

5. Why GS®?

GS® introduces a reactive, dynamic densification process, which continues throughout the life of the concrete. Being a permanent enhancement, GS® will extend the service life of the concrete. Unlike barrier methods, GS® penetrates and waterproofs the concrete itself -- not just the surface. While other products degrade over time, GS® continues on.

6. GS® benefits

- GS® is less expensive than other methods such as membranes with protective boards.
- GS® is construction-schedule friendly, and it can be applied immediately after the forms are stripped.
- GS® cannot puncture, tear, or fall apart at the seams -- and it needs no special sealing, lapping, or seam finishing.
- GS® needs no protective layers for backfill, and it leaves no ugly tar line to interfere with landscaping.
- GS® is breathable. It blocks water in liquid form, but allows water vapor to escape, so the concrete can dry completely.
- GS® is self-healing. New cracks in the concrete (up to 1/64") will mend with new crystalline growth.
- GS® protects concrete. Crystalline waterproofing stops transportation of water and rust-accelerating electrolytes to the reinforcing steel.

7. Does GS® add Durability & Protection?

Impermeability against liquids. 50mm thick GS® treated concrete has withstood hydrostatic pressure equivalent to 405 feet of head pressure. This was the limit of the testing apparatus. GS® treated concrete is impervious to: water, chlorinated water, diesel, fuels and other petroleum products.

As the crystals are silica, which is a mineral and not an organic product, GS® significantly increases the chemical resistance of concrete. Numerous tests have shown that GS® treated concrete is not affected by a wide variety of aggressive chemicals.

GS® protects concrete against chloride attack. The growths of GS® crystals into the concrete will help protect reinforcing steel by blocking micro cracks and capillary pathways used by migrating chloride ions. The concrete becomes impermeable and prevents further entry of chlorides or other chemicals. Normally during the course of spalling repairs to concrete structures, chlorides are still trapped and active within the concrete in areas, which have not been repaired. Independent tests have shown GS® not only prevents further penetration of chlorides, but also reduces the level of chloride ion activity within existing structures to below the level required to promote electrolytic corrosion. As a side benefit, the presence of crystalline growth within the concrete also tends to directly interfere with corrosion reactions on imbedded steel.

GS® crystalline growth reduces carbonation in concrete structures by a factor of up to 40%.

The filling of capillaries within the concrete significantly increases strength. In Admix treated concrete, the increases in strength are typically 5 - 20%. GS® Admix (GS 110) promotes an extended hydration process within concrete thereby achieving its design strength at around seven (7) days.

8. How does GS® stand up to harsh conditions?

PH Range	-from 3.0 to 11.0 constant contact 2.0 to 12.0 periodic contact
Temperature Range	-from -25 °F to + 265 °F constant -from -301°F to + 2786 °F periodic
Humidity	-no effect
Ultraviolet	-no effect
Oxygen level (oxidization)	-no effect

9. Does GS® protect concrete against freeze / thaw damage?

Yes. By blocking the intrusion of water into concrete, GS® helps protect the concrete from the damaging effect of repeated freeze/thaw cycles.

10. Is GS® toxic?

No. GS® contains no volatile organic carriers (VOC) and can be applied safely in enclosed surroundings. Numerous country and state health and waterworks departments for use on structures, which contain potable water or foodstuffs, approve GS®.

11. Can GS® be applied against extreme hydrostatic pressure?

Yes. Because GS® is not dependent upon adhesion to the concrete surface and instead becomes an integral part of the concrete mass through crystallization, it is capable of resisting extreme hydrostatic pressure from either side (positive or negative) of the concrete.

12. What are some typical GS® applications?

- Water / Waste water treatment plants
- Reservoirs/Tanks
- Secondary Containment Structures
- Foundation Slabs
- Below-grade work
- Parking Structures
- Tunnels/Manholes
- Underground Vaults
- Swimming Pools
- Elevator Pits

13. How is GS® different from other products?

- GS® the material and its technology are completely unique in the market, not one other product or combination of products creates the same crystalline growth within cementitious materials.
- GS® creates a crystalline structure deep within the pores and capillary tracts of the concrete mass to prevent the penetration of water and aggressive chemicals. In contrast, barrier-type products function only at the surface of the concrete.
- GS® will seal hairline cracks up to 0.4mm.
- GS® is not subject to the deterioration problems encountered by membranes.

14. What are the advantages of using GS® instead of membranes?

The crystalline nature of the GS® waterproofing system provides many application advantages over traditional barrier products:

- GS® does not require a dry surface; in fact, a wet surface is necessary.
- GS® does not require dry weather to be applied.
- GS® does not require costly surface priming or leveling prior to application.
- GS® cannot puncture, tear or come apart at the seams.

- GS® does not require protection during backfilling or during placement of steel, wire mesh or other materials.
- GS® can be applied on either side of the concrete surface, the negative or the positive (water pressure) side.
- GS® does not require sealing, lapping and finishing of seams at comers, edges or between membranes.
- GS® is less costly to apply than most other methods.

15. Are there additional benefits to GS®?

- Resists extreme hydrostatic pressure from either positive or negative surface of the concrete
- Becomes an integral, permanent part of the substrate
- Self-healing capacity for static cracks up to 0.4mm in width.
- Corrosion protection
- Neutralizes chloride ion activity
- Highly resistant to aggressive chemicals
- Reduces carbonation
- Prevention of alkali aggregate reaction
- Gains in concrete design strength
- Added durability
- Allows concrete to breathe
- Non-toxic
- Less costly to apply than most other methods
- Increases flexibility in the construction schedule

16. Is GS® used to waterproof cracks, joints and other defects in concrete?

Yes. GS® has a specific repair system that utilizes its unique crystalline waterproofing technology to stop water flow through cracks, faulty joints and other defects. In the case of expansion joints or chronic moving cracks, a flexible sealant is recommended.

17. Does GS® have limitations?

Yes. GS® will not heal moving cracks. Moving or unsettled ground causes cracks to move and GS® will not work. GS® will not work with non-cementitious material. GS® requires Portland cement to create the crystals.

18. How long will GS® last?

GS® application, unlike most other systems, is permanent. Its unique, dendritic crystalline growth will not deteriorate under normal conditions.

19. What are the cost savings of GS® treatments?

There are numerous Cost Savings other than the initial price for the treatment. The long-term benefit of the GS® treatment may only be fully realized by future generation

20. Summary

Applied to concrete, GS® products cause a catalytic reaction which, in contact with moisture, forms crystals of dendritic fibers in the natural voids and capillary tracts of the structure. This nonsoluble crystalline growth is so small as to ensure that water cannot pass through.

The ability of chloride ions to migrate through concrete is dependent on salt solutions penetrating into the structure. The integral waterproofing achieved by GS® Crystallization prevents the ingress of such solutions. Once treated with GS®, concrete structures are protected from penetration.