Water Proofing .....
Inspired by Nature's Nano Technology...

COMPLETE WATER PROOFING SOLUTION

FROM

Zydex

TOPICS COVERED

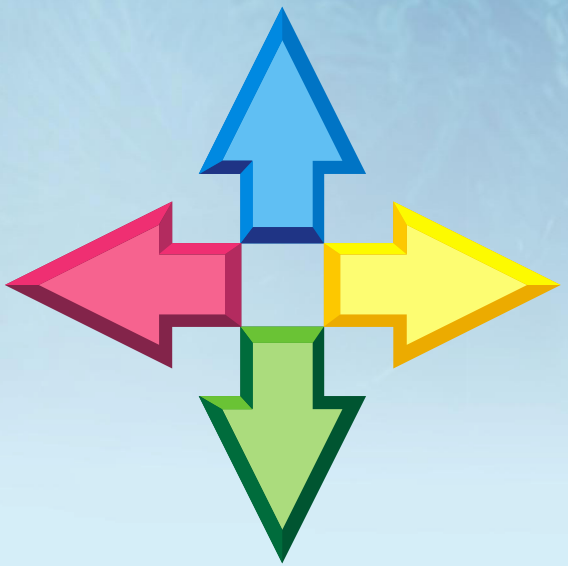
- Zycosil "what water proofing should be"
- Water the "Great Destroyer"
- Failures of Existing Waterproofing Agents
- Uniqueness of Zycosil
- Conventional Technologies Vs Zycosil
- Limitations of Zycosil
- Application Areas
- Standard Testing Methods
- About Zydex…A Genesis

Zycosil : What Water Proofing Should Be !

Long Life* 20+ years

(*abrasion, UV resistant)

Easy to apply



Low cost
7 – 13 SG cents
(4 -8 US Cents)
Per sq. ft.

Eco friendly


W A T E R
the great destroyer

Water : The Great Destroyer

Aesthetic Damage

I) ***Internal***

- Efflorescence
- paint Peel Off/ Blisters

II) ***External***

- Fungus
- Mold (Mildew)
- Dirt Pick Up

Water : The Great Destroyer

Structural Damage Due to Water Seepage

Cement loses its strength due to:

I) **ASR** (Alkaline Silica Reaction)

II) **Freezing/ Thawing**

III) **Carbonation/Acid Rain/Sulphate Attack**

Corrosion of Reinforced Steel Bars

Leading to Loss of Ductility and Strength

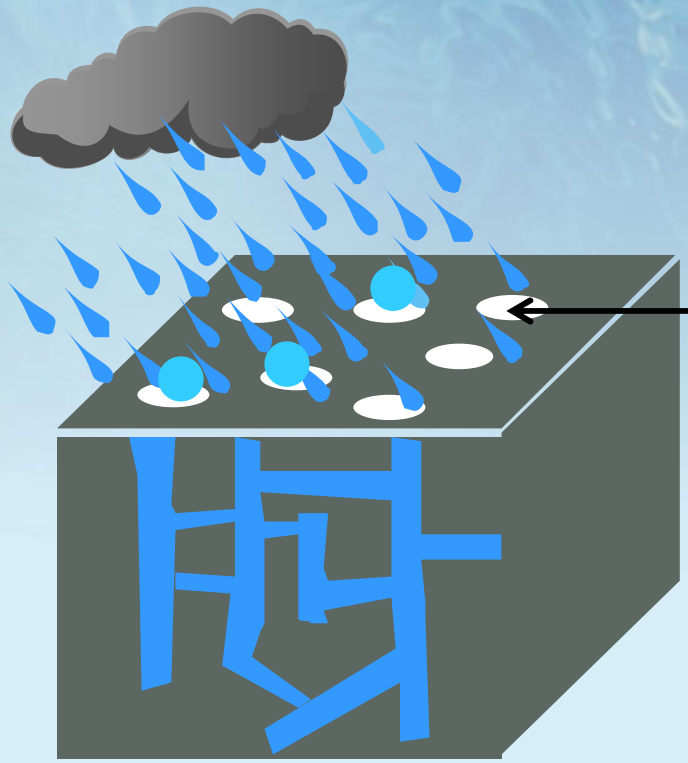
Water : The Great Destroyer

Rain Water seeps into the building through micro cracks & pores

Water = 0.18 nm

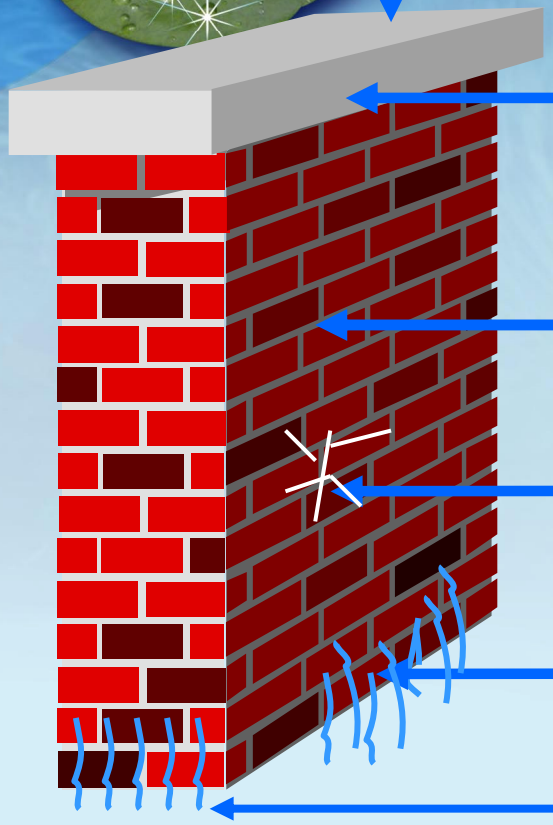
Salt/ Acid rain

≃ 1 - 2 nm



Substrate pore size 5 - 2000 nm

Water : The Great Destroyer



Rain Fall (Roof Top)

Condensation in Capillary
(Due to wide temperature Fluctuations & High relative humidity)

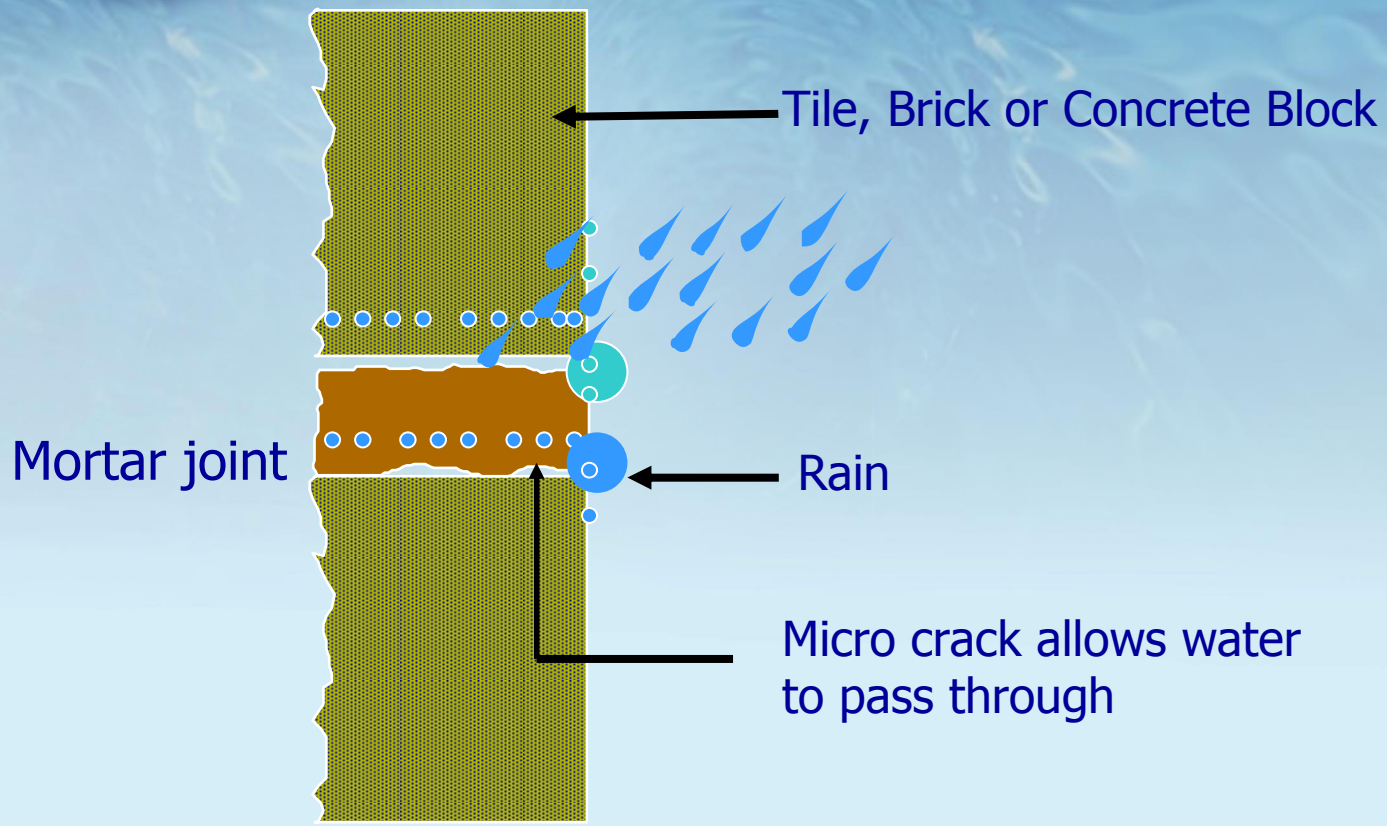
Structural Defects (Micro Cracks)

Capillary Action (Ground Water)

This is how water enters the building envelope

Water : The Great Destroyer

How Water Penetrates De-bonded Joints



Zycosil Treatment can seal the leakage

Water : The Great Destroyer

Fungus

Efflorescence

Premature ageing

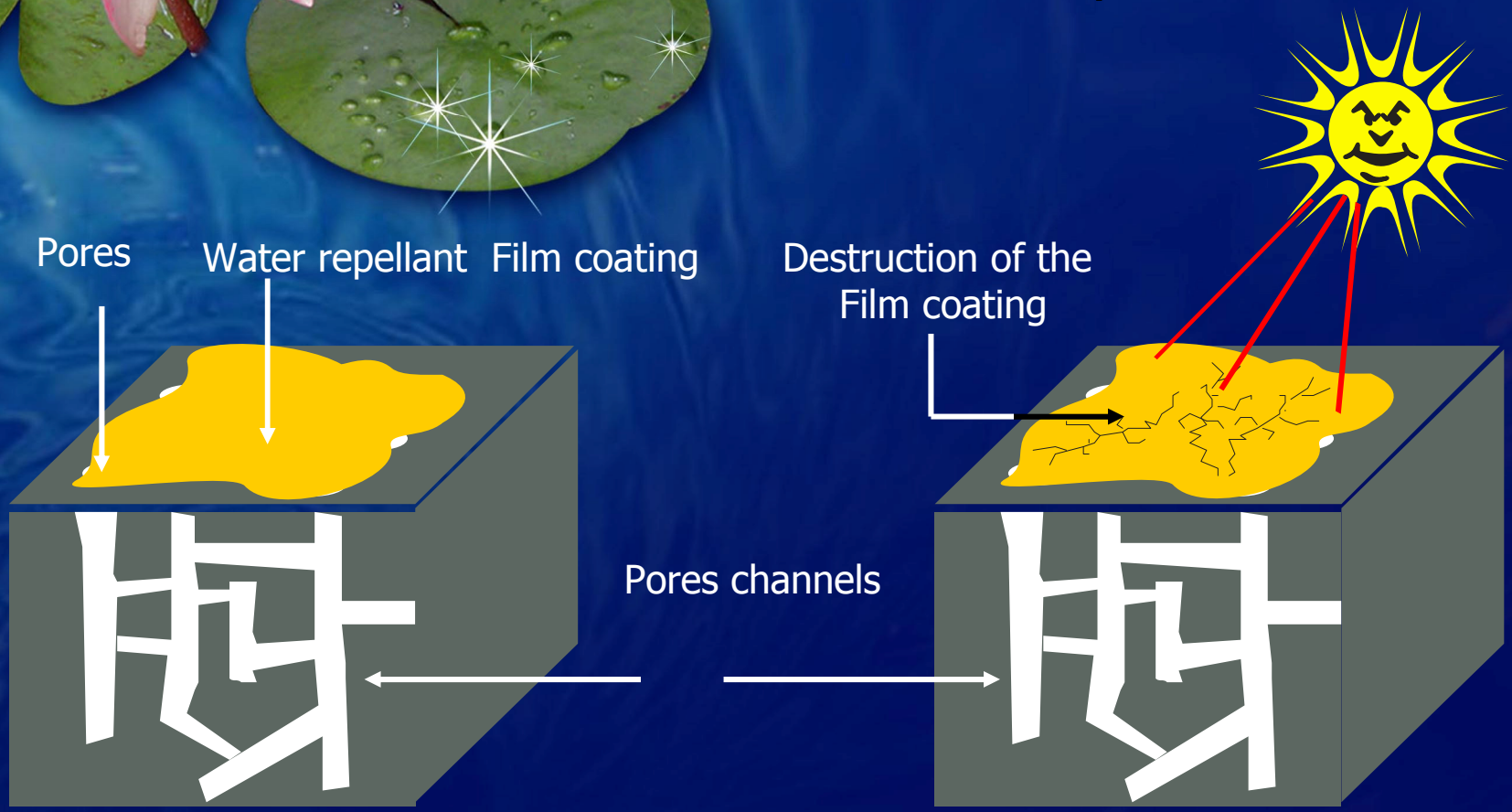
Concrete ageing

Structural damage

Cracks

Failure of Conventional Film Formers

- Blocks Breathability
- Life of Only 2-5 Years



Failure of Solvent based Penetrants

Toxic VOC solvents

Flammability

High Cost

WATER PROOFING SOLUTION FROM ZYDEX

TAKING WATER PROOFING TO THE NEXT LEVEL

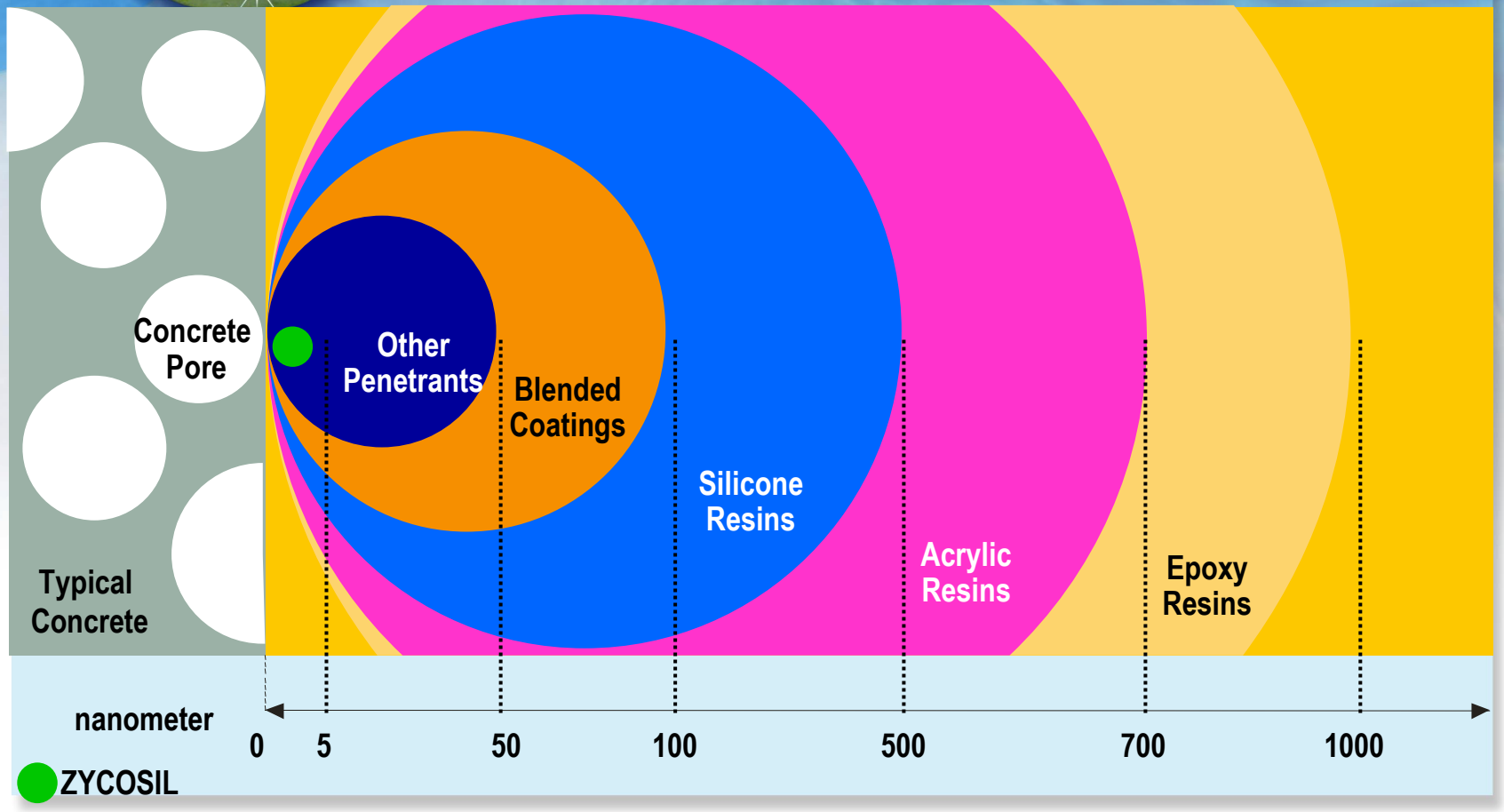
ZYCOSIL

- Water dilutable (1:10 & 1:20), nano technology
- Makes clear, water like solution
- 100 % water repellency on rough & smooth surfaces
- Easy to apply

Uniqueness of Zycosil

	Category	Particle size
FILM FORMERS		
	Acrylic	500-800 nm
	Silicones	50-500 nm
	Waxes	50-100 nm
	Urethane	500-800 nm
	Epoxy	700-1000 nm
PENETRANT		
1)Solvent based	Silane	3-6 nm
	Silane / Siloxane	50-100 nm
2) Water based	Zycosil	4-6 nm

Uniqueness of Zycosil



Particle sizes for different types of water repellents

Some Unique Applications

Window joint & Door frame joint

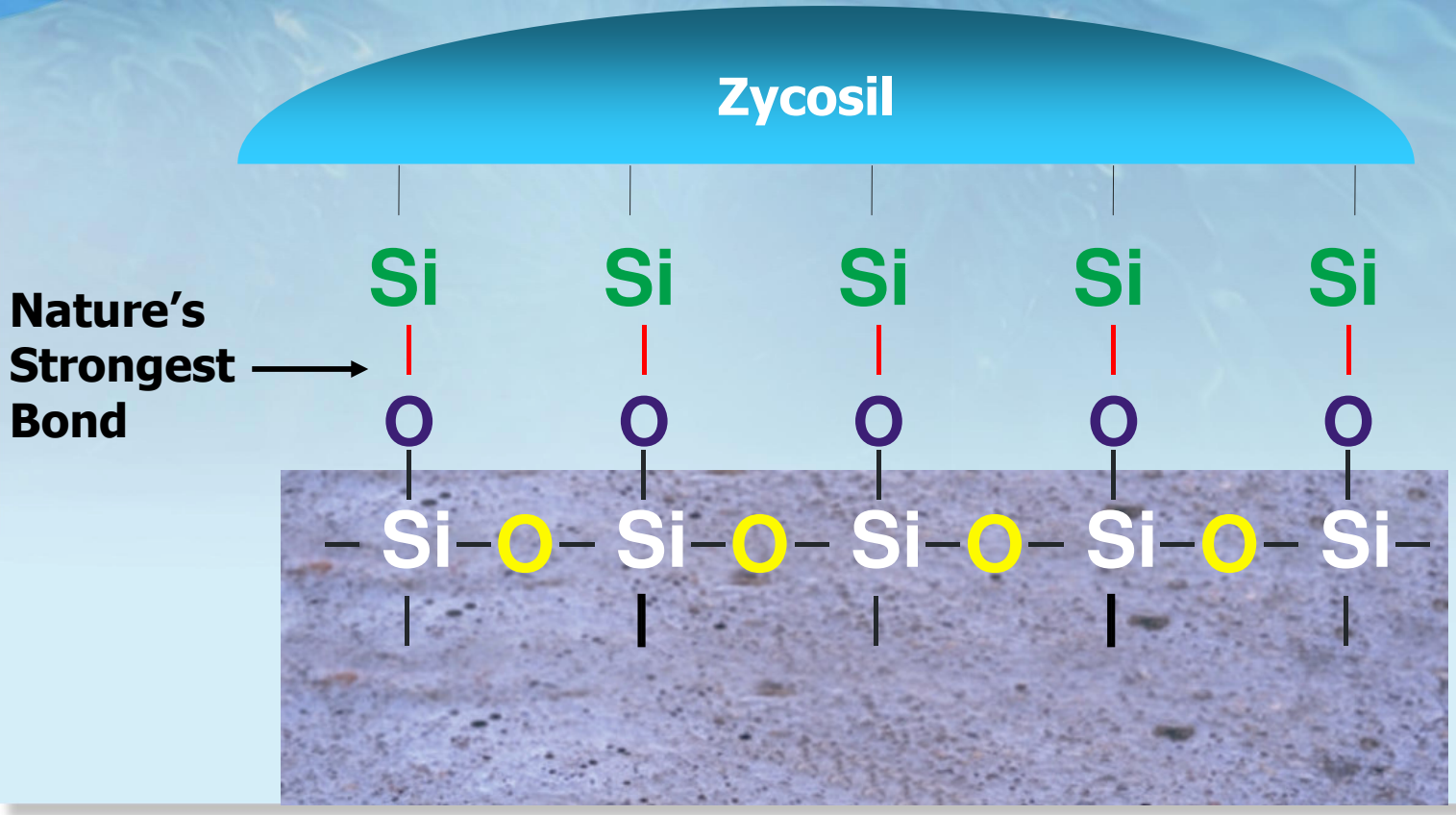
Uniqueness of Zycosil

Aesthetics – Fresh & Clean

Only Zycosil (penetrant) prevents Fungus and Mold formation and maintains fresh and clean Exterior and Interior surfaces for 20 + years

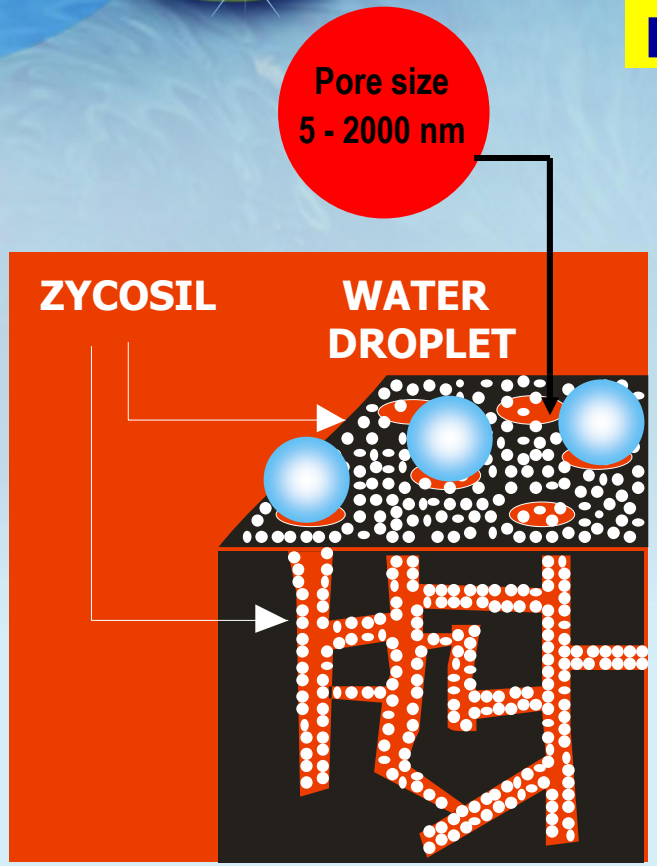
Uniqueness of Zycosil

Zycosil - Does not leach out or wash out with persistent rains over 20+ years

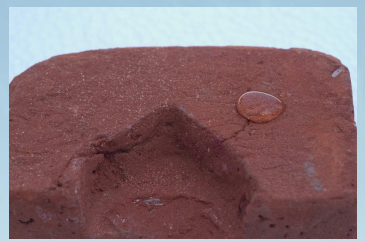


Uniqueness of Zycosil

Zycosil works by changing surface properties of the substrate



Stone Pores 5-200 nm



Brick Pores 100-2000 nm

Plaster Pores 50-3000 nm

Concrete Pores 10--200 nm

Uniqueness of Zycosil

Eco-Friendly

- Conventional solvent based Silanes & Silane/Siloxane mixture contains flammable volatile organic solvents which are released into the environment

- **Zycosil** is applied in substantially diluted form (10 to 20 times water) releasing significantly less amount of **Volatile Organics**

  2 gm Vs 10 gm per Ft^2 coverage

- **Zycosil** meets the toughest ***VOC standards***

Zycosil-Comparative Performance

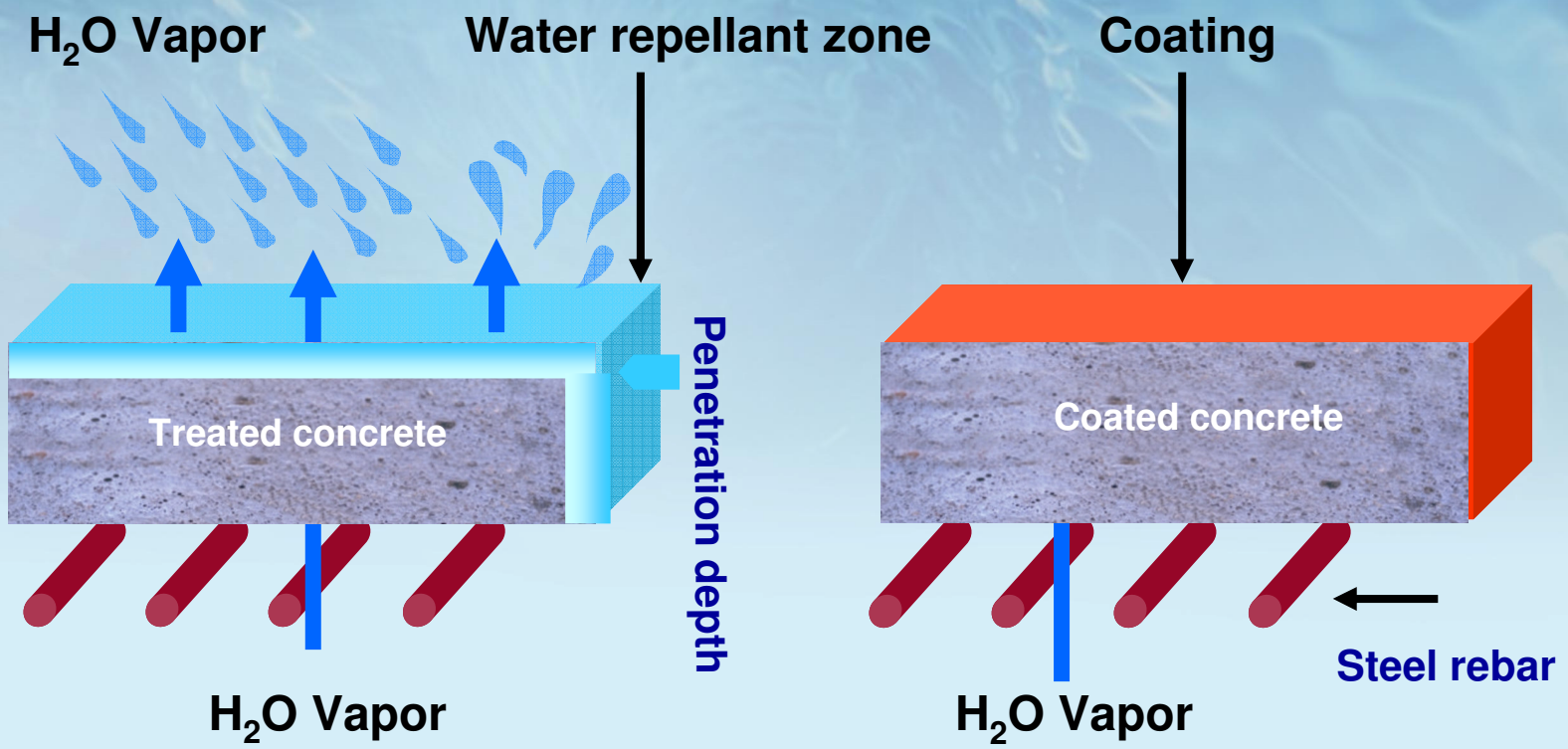
Property	Film Formers	Zycosil
Size (nm)	100-500	4-6
Water repellency Mechanism	By coating and closing pore of the substrate	By Nano level Hydrophobation
Diluents	Hydrocarbon/ Water	Water
10 Years Simulated Abrasion Test	Loses 90% protection	Loses only 2% protection
UV Stability	Not Stable	Stable
Breathability	Not breathable	Breathable
Depth of Penetration (mm)	< 0.2 mm	> 3 mm
Fungus / Mildew Protection	Limited Protection	Excellent Protection
Corrosion Protection	Limited Protection	Long Term Protection
Micro-cracks Protection	Not protected	Protected
Durability	< 5 Years	20+ Years

Zycosil-Comparative Performance

Property	Solvent Based Penetrant	Zycosil
Size (nm)	3-4	4-6
Water repellency Mechanism	By Nano level Hydrophobation	By Nano level Hydrophobation
Diluents	Hydrocarbon/ Alcohols	Water
VOC Per Ft^2 Application	8-15 grams	1.7 grams
Flammability	Extremely Flammable	Non-flammable
Safety (Inhalation)	Requires Protection	Not Required
Solvent Toxicity	Exposure may cause serious heath effect	Completely safe
Material Cost	40 to 80 SG cents per Ft^2	7-13 SG cents per Ft^2

Uniqueness of Zycosil

Breathability
Penetrants vs. Film Formers



Penetration into the Substrate

Penetration of Zycosil into brick

Penetration of Zycosil into Concrete

High penetration depth = Long service life

Zycosil - Limitations

- Cannot be applied on acrylic paint
- Zycosil treated surface can not directly be painted with cement paint
- Cannot seal major cracks
- Once diluted, must be used within 48 hrs
- Will not allow re-plastering and fixation of tiles, stones, granites etc.

Solution to Limitations

Zycosil should always be applied after application of cement paint

Zycosil should not be applied on acrylic paint

Use **Zycoprime** on a Zycosil treated surface, prior to Cladding of Tiles, Granites etc.

Affordability

Material Cost

- General film formers costs INR 2 - 3 per ft^2 (5 – 7 US cents per ft^2)
- Solvent based Silanes, Silane Siloxane mixture cost Sg cents 40 to 80 ft^2.
- Water based **Zycosil** costs INR 7-13 SG cents/ft2

Affordability

Application Cost

- **Ease of application**
  - Needs less time as compared to film formers, hence minimal cost
- **No Protective Equipment (e.g. masks etc) required**
  - Increases productivity of the applicator
  - Saves protective equipment cost

Application Techniques

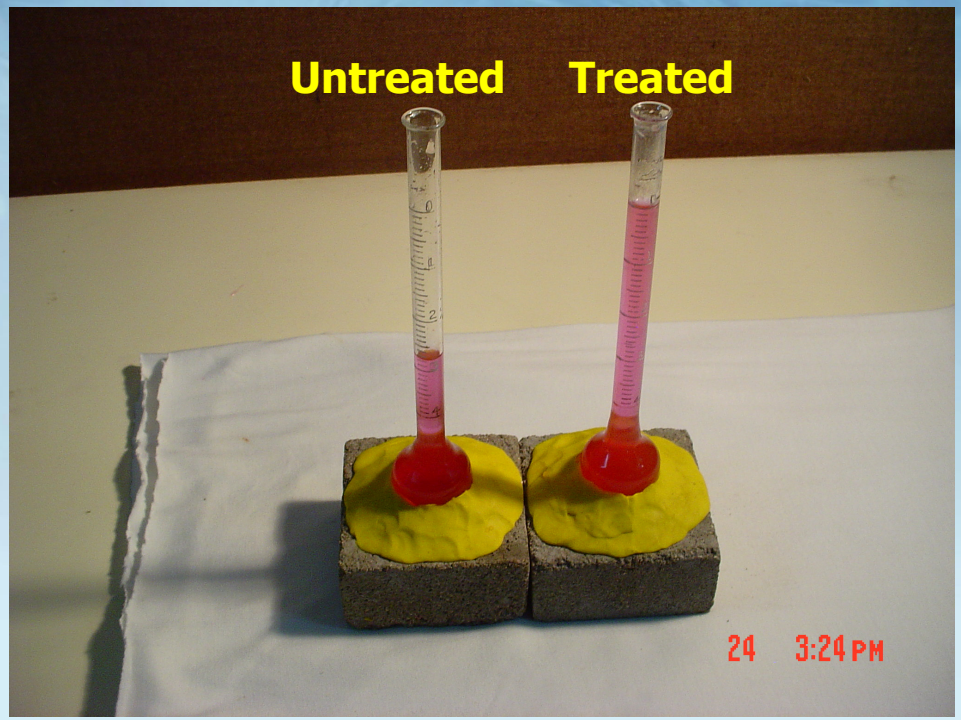
Application Areas

- New Buildings
- Existing / Old Buildings
- Coastal Areas
- Cement Sheets
- Concrete Paved Area
- Cement Articles
- Clay Articles / Tiles / Pots
- Stones

Industrial Applications

- Cooling Tower
- Waste Water Treatment Facility
- Cement Concrete Pipes
- Cementitious Surfaces
- Bridges
- Rail Road Sleepers
- Flyovers
- Cement Sheets
- Tunnels
- Marine Piers
- Docks
- Ship Yards

Field testing is easy with RILEM tubes



Differences in Treated & Untreated concrete block show Up Fast

Waterproofing Tests

WATER ABSORPTION RATE (RILEM) TEST

The Rilem tube was affixed on the substrate surface. Water was filled up to 5ml mark. Rate of water absorption was measured. The hydraulic pressure generated on the surface was equivalent to 140 Km/hr wind driven rain.

Reduction in water absorption rate

Brick	**Over 98 %**
Concrete	**Over 99 %**
Plaster	**Over 99 %**
Cement Sheet	**Over 99 %**
Sand stone	**Over 99 %**

Waterproofing Tests

ACCELERATED WEATHERING

Weathering Cycle: UV exposure according to ASTM G-154 (21 hours), followed by rain showers (1 hour) and drying at 110 ^{o}C (2 hours).

The samples, Concrete blocks, Bricks, Plaster, Sand stone, and Cement Sheet have undergone over 80 cycles.

All the Samples retained over 98 % of water repellency, after 80 cycles

Damage due to capillary rise

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STACK: