

TERRACERÍAS

SUBRASANTES

SUBBASES

BASES

Mejora la compactación, reduce la expansividad y aumenta la resistencia del suelo al agua.

Terrasil es un producto que se diluye en agua y se aplica con equipo aspersor sobre suelos de diferentes tipos para generar los siguientes beneficios:

Mejor compactación	Reducción de expansividad	Impermeabilización molecular
Logra compactaciones dentro de la norma con menos pasadas.	Reduce las deformaciones y los esfuerzos internos.	Genera estructuras resistentes al agua.
Mejor manejo del suelo para rangos más amplios de humedad óptima de compactación.	Facilita el uso de suelos locales que en principio no cumplen con la norma a costos competitivos.	Rompe el ascenso capilar y asegura la conservación de capacidad de carga durante la vida útil del camino.
Retiene finos a largo plazo, lo que produce menos grietas y baches.		
En dosis adecuadas, puede incrementar los valores de CBR.		
Vida útil prolongada y mantenimiento menos recurrente del camino.		

Uso más eficiente de los recursos, caminos sustentables. 

Mejor compactación

Terrasil genera un escudo eléctrico a nivel molecular que reduce la fricción entre las partículas del suelo y aumenta su lubricidad.

- La densidad Proctor suele ser menor a la máxima debido a distribuciones desfavorables de las partículas, a cargas eléctricas incompatibles y variaciones en el contenido óptimo de humedad.
- TerraSil permite lograr los mismos resultados de compactación, con menos ciclos de maquinaria y con rangos más flexibles en el contenido de humedad.

Curvas de compactación:

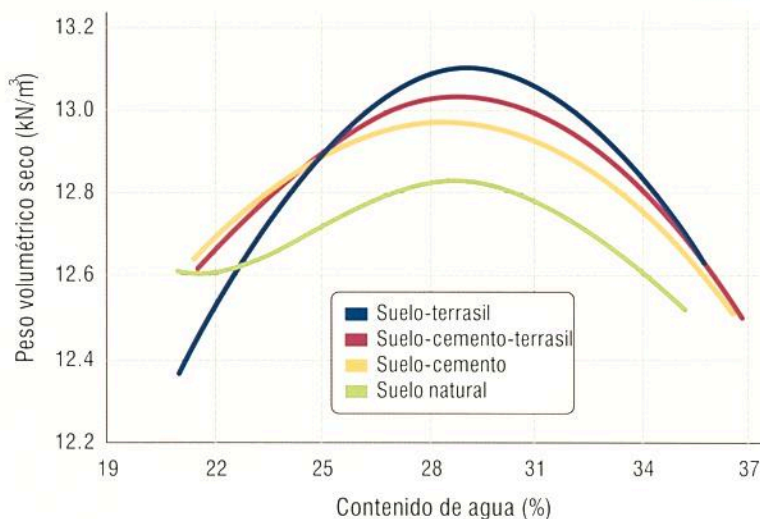
Arcilla expansiva de Querétaro (CH)

Dosificación: TerraSil 1kg/m³

Gs	LL	IP	% pasa malla 200
2.64	64%	38%	76.02

$$w_{opt} = 28.5\%$$

$$\gamma_d = 12.97 \text{ kN/m}^3$$



Reduce la expansividad

Al hidratarse, deshidratarse y/o cambiar de temperatura, los suelos se expanden y contraen generando esfuerzos de fatiga que producen ondulaciones, grietas y deterioro en toda la estructura del camino. TerraSil genera una interacción diferente entre las partículas de suelo y mitiga los efectos expansivos.

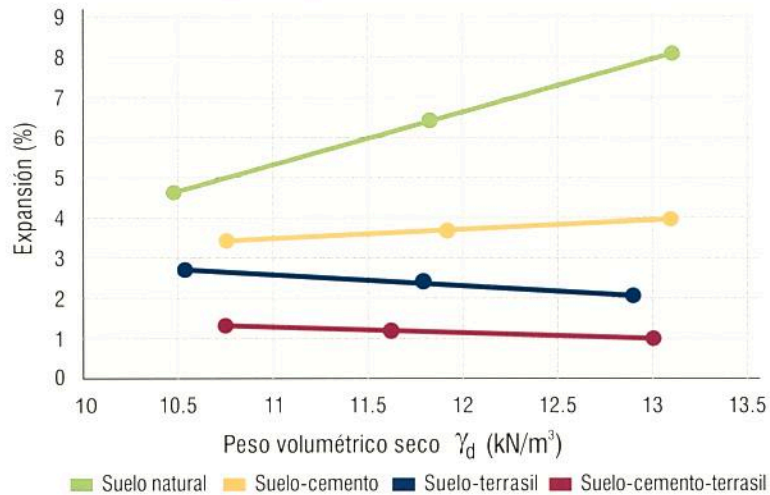
- TerraSil llega a reducir la expansividad hasta en un 90% en suelos con Índice Plástico menor a 50.
- El uso de TerraSil abre la opción de utilizar suelos que en un principio no cumplen con la normatividad.

Arcilla expansiva de Querétaro (CH)

Dosificación: TerraSil 1kg/m³

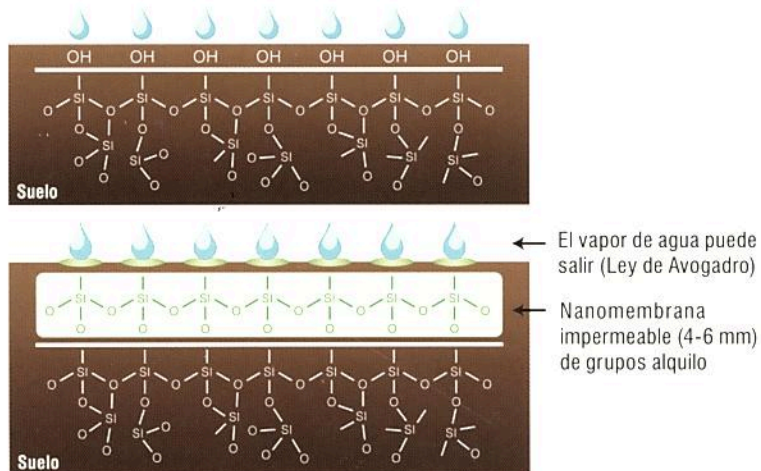
$$w_{opt} = 28.5\%$$

$$\gamma_d = 12.97 \text{ kN/m}^3$$



Impermeabilización a nivel molecular

1. La solución de agua con TerraSil se esparce sobre la superficie del suelo a tratar.
2. Los grupos de silano hidrolizado (SiOH) penetran profundamente en el suelo debido a que éste es hidrófilo (afín al agua), en esta etapa.
3. Al curar, se generan cadenas de alquilo siloxano que crean una nanomembrana que repele al agua en estado líquido, pero permite su paso como vapor.



Almacenamiento

TerraSil no requiere cuidados especiales y su manejo es seguro. Debe almacenarse entre 5-45°C, alejado de la luz solar y en ambiente seco, lejos del calor y fuentes de ignición. El contenedor debe cerrarse completamente tras cada uso.

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Zydex® : "Sustainability through innovation"

TerraSil

Estabilización de suelos /
 Resistencia al agua de Terracerías,
 Subbases y Bases

Nanotac

Riegos asfálticos
 Mezclas en frío
 Morteros asfálticos

ZycoTherm

Mezclas asfálticas
 calientes y tibias

NANOTECHNOLOGY FOR WATER RESISTANT SOIL BASES

For Paved / Gravel / Soil Roads

Soil bases are conventionally stabilized by Cold In-place Recycling (CIPR) and Full Depth Reclamation (FDR) using soil or with additives like Cement, Lime, Bitumen Treatments, etc.

KEY CHALLENGES OF SOIL STABILIZATION

- Poor Flexibility
- Inconsistent Densities
- Loss of strength due to Wet & Dry Cycles (Carbonation & ASR)
- Swell under wet conditions

ZYDEX NANOTECHNOLOGY HELPS OVERCOME THESE CHALLENGES

ZYDEX NANOTECHNOLOGY - PRODUCTS & FEATURES

- **Terrasil** is a water soluble, UV and heat stable, reactive soil modifier to reduce swelling. Spray of **Terrasil** solution waterproofs compacted soil surface up to 10 mm depth.
- **ZycoBond** is a UV and heat stable, cross-linkable soil modifier. It is a nano sized acrylic co-polymer dispersion in water. It complements conventional stabilization methods by imparting water resistance and flexible bonding to the soil.

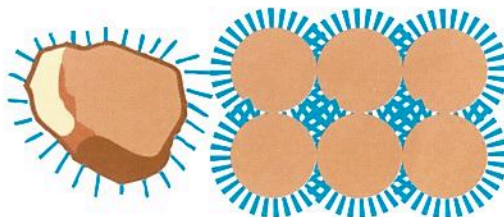
ZYDEX NANOTECHNOLOGY - BENEFITS

Improved flexibility with strong bonding

- **ZycoBond**, the new generation nano polymer (particle size < 90 nm), at its typical dosage per m³ of soil, has almost the same number of polymer particles as soil particles.
- This leads to higher number of contact point for flexible bonding, which improves the fatigue resistance of cement and lime stabilized soils.

Higher Compaction and Consistent Densities

- **Terrasil** chemically converts water absorbing silanol groups to water resistant alkyl siloxane surfaces at ambient temperature.
- Nano layer of alkyl siloxane chains on the soil particles provides charge shielding to reduce the repelling effect between soil particles and gives better lubrication for compaction.
- With **Terrasil & ZycoBond**, field densities of Proctor 100 to 105 are consistently achieved.



Reduced Swell Potential

Terrasil reduces expansiveness typically by 90 %. The resultant lower swelling pressure substantially reduces undulations & cracking.

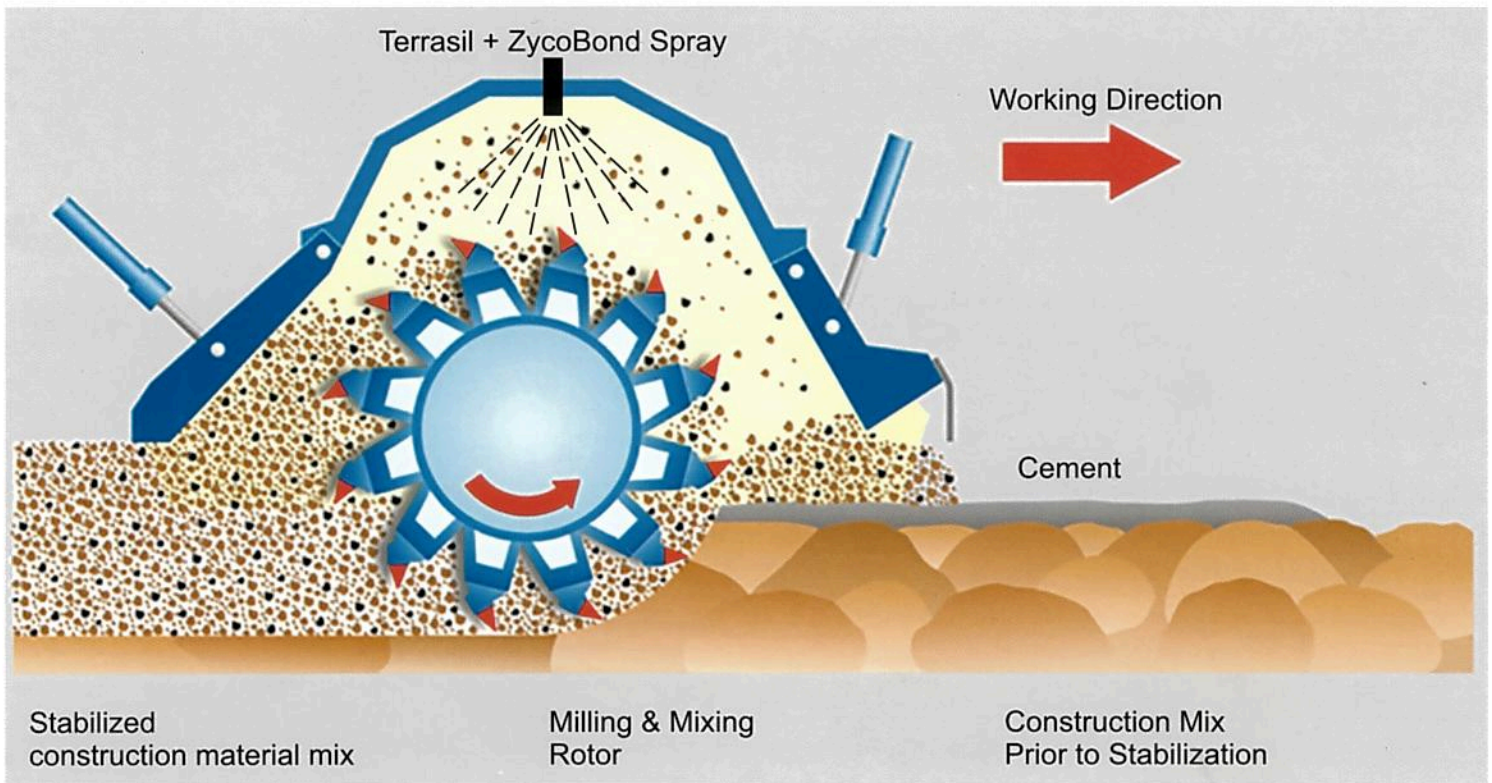
Reduced Permeability

- Surface waterproofing with Terrasil & ZycoBond ensures reduction in permeability to the tune of 10⁻⁷ to 10⁻⁸ cm/second up to a depth of 10 mm. (This means water will require 100 days to travel through this 10 mm barrier).
- This layer is breathable, as it does not allow water to get in but allows vapor to escape.
- As a result, even if some water enters the soil base, it eventually evaporates and escapes through the breathable waterproofed layer.
- This can also prevent capillary rise at the base and water ingress from the top, keeping the bases dry throughout all seasons.



The net result - A stabilized soil base which is flexible with higher density, low swelling pressure and waterproof, resulting in improved durability

DOSAGE & APPLICATION



- Soil base of up to 200 mm to be opened up and mixed with specified amount of cement as per the mix design, typically up to 3%.
- **Terrasil & Zycobond** (1:1) solution in water should be sprayed for achieving OMC.
- The dosage of **Terrasil** and **Zycobond** can vary from 0.3 kg to 1 kg per m³ of compacted soil, based on clay content and expansiveness (PI). Clayey and r expansive soils need higher dosage.
- After thorough mixing, the soil at OMC, can now be compacted using vibro roller.
- The compacted soil surface, should now be spray-saturated with **Terrasil + Zycobond** solution in water (1 : 1 : 200) typically @ 3 ltrs / m².

STORAGE AND SHELF LIFE

- **Store Terrasil** between 0 to 45 °C (32 – 113 °F) in a shaded, dry area away from sunlight, heat, source of sparks, rain and standing water. Fasten the container lid securely after every use.
Its shelf life is 48 months.
- **Store Zycobond** between 5 to 45 °C (41 – 113 °F) in a shaded, dry area away from sunlight, heat, source of sparks, rain and standing water. Fasten the container lid securely after every use.
Its shelf life is 24 months.

DISCLAIMER

Whilst the information contained herein is true, accurate and represents our best knowledge and experience, no warranty is given or implied with any recommendations made by us, our representatives or distributors, as the conditions of use and the competence of any labour involved in the application are beyond our control.

ZYDEX : SUSTAINABILITY THROUGH INNOVATION

ZycoTherm / ZycoTherm - EZ
Warm / Cool Hot Mix

Nanotac
Tack Coat / Cold Mix

Terraprime
Prime Coat

Terrasil
Soil Stabilization / Waterproofing

Zydex Industries

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Nwe technology for DUST CONTROL, EROSION RESISTANCE and WATER RESISTANCE

Zydex®



ZycoBond
TerraSil™

Dust control on road surface is done using Calcium / Magnesium Chloride or blended brines or frequent water spray. However, these treatments do not give any bonding to soil particles and get washed away during wet spell.

SURFACE WATERPROOFING, DUST & EROSION CONTROL WITH ZYDEX NANOTECHNOLOGY

ZycoBond, a UV and heat stable reactive bonder, is a nano Acrylic Co-polymer dispersion. It offers water resistance, strong bonding, and imparts flexibility to soil surface. It also gives excellent dust control and erosion resistance for unpaved roads & shoulders.

Terrasil is a water soluble, UV and heat stable, reactive soil modifier to waterproof soil.

The combination of Terrasil and Zycobond ensures improved water resistance, dust control and erosion resistance



DOSAGE

Area	Terrasil (Kg)	Zycobond (Kg)	Water (<1000 ppm TDS) Liter	Dosage Liter per m ²
Soil / Gravel surface	0	1	300	3 or till saturation
Clayey Soil	1	1	400	3 or till saturation

Treated with New Technology

Over a period of time, as and when cracks are observed on the treated surface, a maintenance spray is recommended in order to ensure Surface Waterproofing and Dust Control.

We also recommend a maintenance spray, after every quarter, in the initial two years. The solution for such maintenance spray is to be prepared in the ratio given above. Spraying should be till saturation. Allow it to dry.

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