



SOLUTIONS POUR  
LA STABILISATION DU SOL  
PAR DES POLYMÈRES

## Product Liquid Dispersion



# LUCOSOIL

**Les sols traités avec Lucosoil® acquièrent la stabilisation qui procure les propriétés mécaniques qui améliorent significativement la portance de la chaussée.**



Construction Sites



Unpaved Roads

## Product

## Dispersion liquide



## Effet

## Liaison des particules



## Application

## Divers secteurs comme par exemple ...

- **Atténuation de la poussière**
- **Maîtrise de l'érosion (Paysages)**
- **Road Stabilization (Construction of Unpaved Roads and Parking Lots)**
- **Stabilisation des routes (Construction de route non revêtues, Parkings)**

# LUCOSOIL PROCURE UN EXCELLENT

## LIANT EN POUDRE POUR LES SOLS



### Mode d'action

**Lucosoil forme avec le sol une matrice très fortement liée.**

### Effect

Polymer treated soils provide stabilization which imparts mechanical properties that significantly improve load bearing properties.

### Demonstration

Polymer treated soil shows a significantly higher compressive strength compared to untreated reference samples.



# LUCOSOIL EXEMPLARY APPLICATION

## Road Stabilization



Construction Sites



Trails and Paths



Unpaved Roads

## Erosion Control



Slopes



Open Pit Mining



Stock Piles

## Dust Mitigation



Helipads



Dusty Roads



Pile Capping

## LUCOSOIL

### Dispersions



### Typical Application Areas

#### Non Traffic Areas

- Construction Sites
- Storage Stock Piles
- Road and Runway Sides
- Mines
- ...

#### Traffic Areas

- Unpaved Roads
- Hiking Paths
- Temporary Parking Lots
- ...

### Application Benefits

- Reduces Nuisance Dust
- Reduces Risk of Dust Related Illnesses
- PM 10 and PM 2.5 Dust Regulation Compliance
- Improves Visibility for Road Safety
- Reduces Maintenance Costs of Equipment
- Substitutes Traditional Watering to Mitigate Dust
- Long Lasting Effect

# SOLUTION FOR DUST MITIGATION ON EXPOSED SOIL SURFACES



## LUCOSOIL



### Mode of Application

- Water Trucks
- Pumps and Hoses with Nozzles
- Hydroseeders
- Hand Pumps
- Aerial Application (e.g. Planes)
- Agricultural Watering or Fertilizing Equipment

### Application Rates

Depending on type of soil/sand you have to add water in Lucosoil acc. your own tests and requirements:

- Type of Soil
- Need for Duration of Effect
- Permeability of Soil
- Climate Conditions
- Inherent Moisture Level of Soil

Solutions for Dust Mitigation on Exposed Soil Surfaces



## LUCOSOIL



### Mode of Application

#### Topical

- Water Trucks
- Pumps and Hoses with Nozzles
- Hydroseeders
- Hand Pumps
- Aerial Application (e.g. Planes)
- Agricultural Watering or Fertilizing Equipment

#### Mix in Application

- Reclaimer
- Farm Equipment (e.g. disk tiller)
- Road Grader

### Application Rates

Depending on type of soil/sand you have to add water in Lucosoil acc. your own tests and requirements:

- Erosion Type (Water or Wind)
- Need for Duration of Effect
- Climate Conditions

- Under Evaluation
- Currently Application Rates Unavailable



## LUCOSOIL



### Typical Application Areas

- Unpaved and temp. Roads
- Sub Base and Sub Grades of Paved Roads
- Road Shoulder and Sides
- Hiking and Golf Cart Paths
- Haul Roads

- Sub Base and Sub Grades of Paved Roads
- Hiking and Golf Cart Paths
- Haul Roads

### Application Benefits

- Use of Existing on Site Soil
- Improves Sub Grade Strength
- Low Cost Alternative to Paving
- Keeps Natural Appearance
- Reduce Road Maintenance

- Reduces Freeze/Thaw Problems
- Use of Existing on Site Soil
- Reduce Road Maintenance
- Maintains Dry Strength Under Wet Conditions

# SOLUTION FOR SOIL EROSION

## TOPICAL SPRAY APPLICATIONS PROVIDE PROTECTED SOIL SURFACE TO PREVENT DUSTING AND EROSION

Equipment <b>1</b>	Preparation <b>2</b>	Application <b>3</b>	
The additive solution can be sprayed onto the soil using hand held hoses, hydroseeders or water trucks	Prepare the additive solution with mixing the additive with water in a hydroseeder or water truck	Spray the additive solution equally over the treatment area.	Soil type and desired performance may require repeated spraying
			

# SOLUTION FOR SOIL EROSION

ROAD CAN BE CONSTRUCTED WITH A „MIX IN „ PROCEDURE  
IN A FAST AND EFFECTIVE WAY

Preparation <b>1</b>	Application <b>2</b>	Distribution <b>3</b>	Finishing <b>4</b>
Prepare for additive application by ripping the old road surface (un-paved or paved roads).	Apply the Lucosoil by spraying onto the sub grade	Distribute the additive treated sub grade by mixing it into the soil at the recommended depth.	Finish the road by grading and compressing. <i>Apply seal coat or asphalt layer if desired.</i>
			





## Sand Dune Stabilization



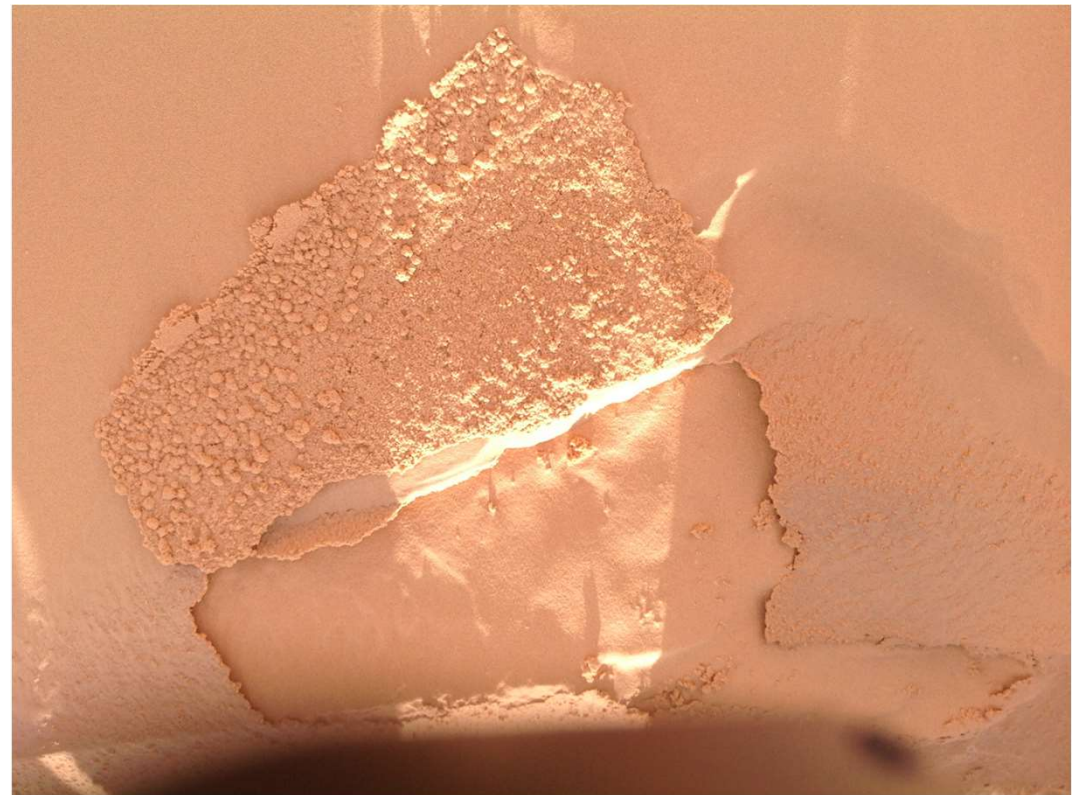
**Apply Lucosoil at Algeria**





**Apply Lucosoil at Algeria**

## Sand Dune Stabilization



## Road Stabilization



# ADVANTAGES IN USING POLYMER SOIL STABILIZER



- Less expensive
- More effective
- Easier to apply
- Superior binding capacity
- No special handling procedures
- No special equipment or heating tanks
- Environment friendly





## ➤ Lucosoil soil stabilizers



**Lucosoil  
L13126**

**Lucosoil  
L13142**

**Product A**



**Lucosoil  
L14099**

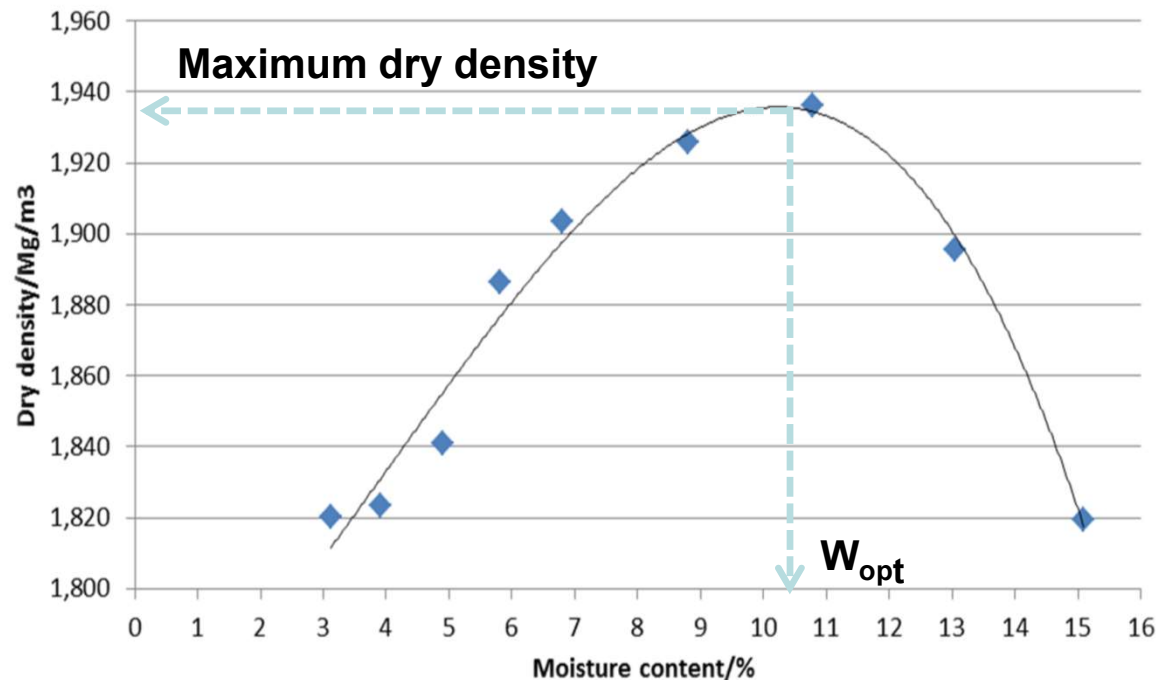
**Lucosoil  
L14101**



**Lucosoil  
L13140**



- relation dry density – moisture content



**Sample without Emulsion Polymer**

**$W_{opt}=10.3\%$   
Maximum dry  
density=1.935Mg/m<sup>3</sup>**

# SAMPLE PREPARATION



**Materials**



**Weigh**



**Mixing**  
**Time: 5 mins**



**Sample**  
**Diameter: 100 mm**  
**Height: 150 mm**



**Compaction**  
**Until the *Hight* of sample**  
**reach 150 mm**



**Mould**  
**Diameter: 100 mm**

# CONCLUSIONS



**Curing temperature: 23 °C**

**Curing moisture: 40%**

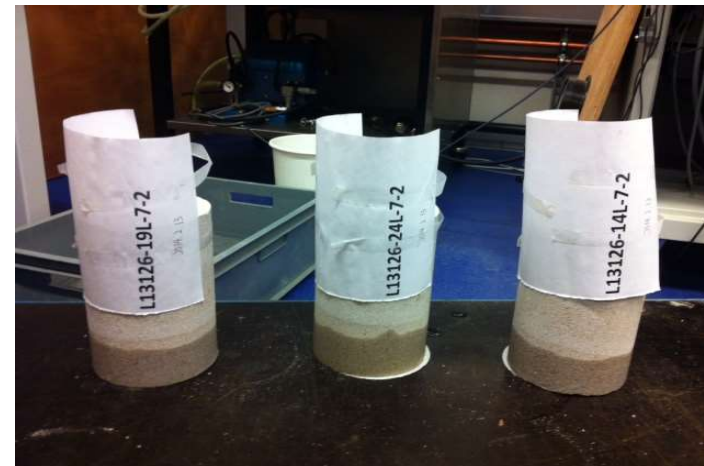
**Curing time: 7days, 14days, 28days**



## SOAKING SPECIMEN



**Place specimen on the 25mm depth water bath for 15 minutes, then remove it from water and wait for five minutes before testing.**





# COMPRESSION TEST



**Unsoaked  
compression test**

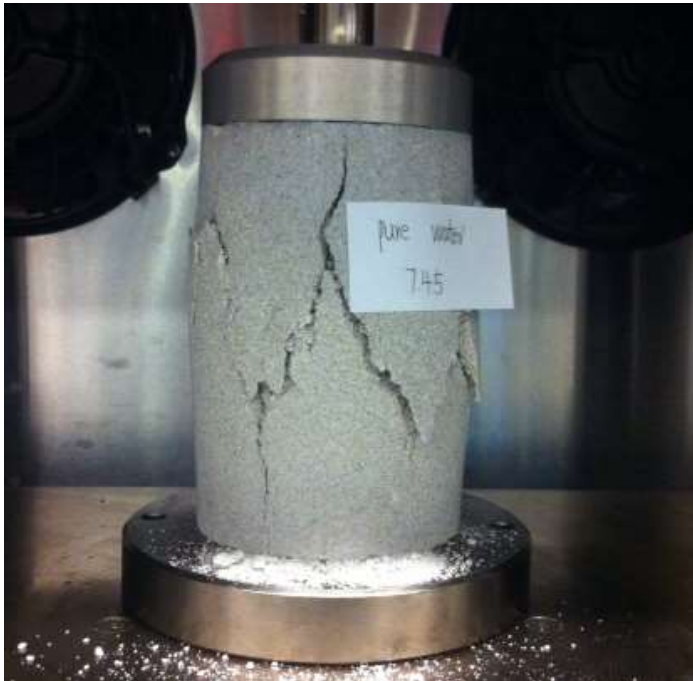


**Soaked  
compression test**

**Test temperature: 25 °C; Loading speed:  
0.042mm/s**

# SAMPLE FAILURE PATTERN

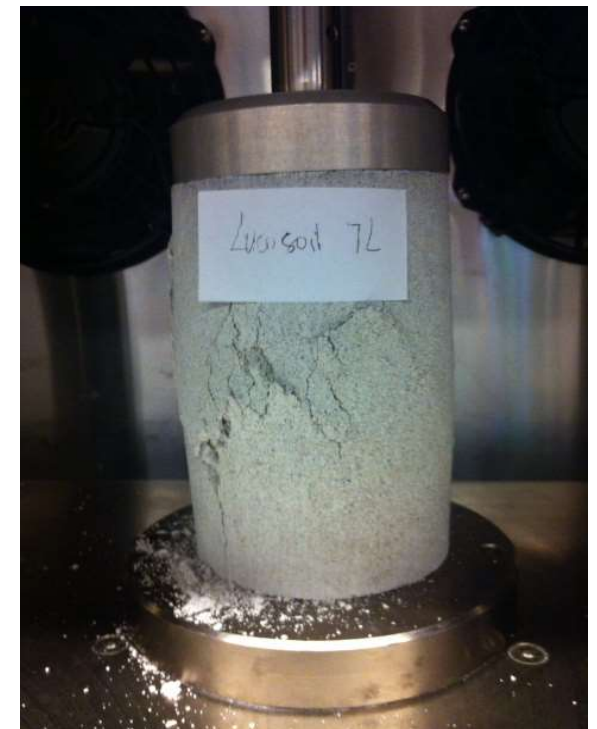
## pure water case



## Soaked case

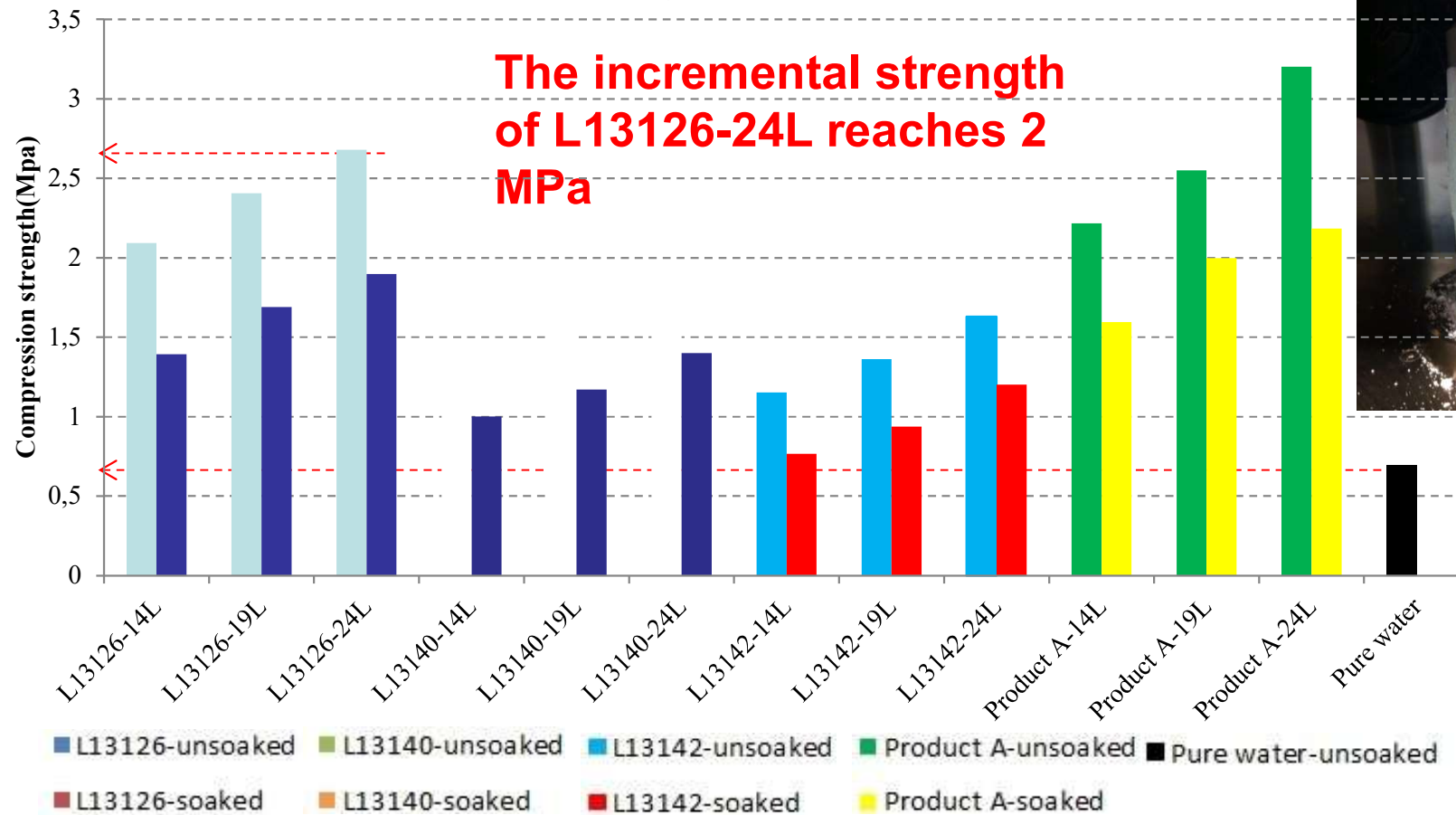


## Unsoaked case



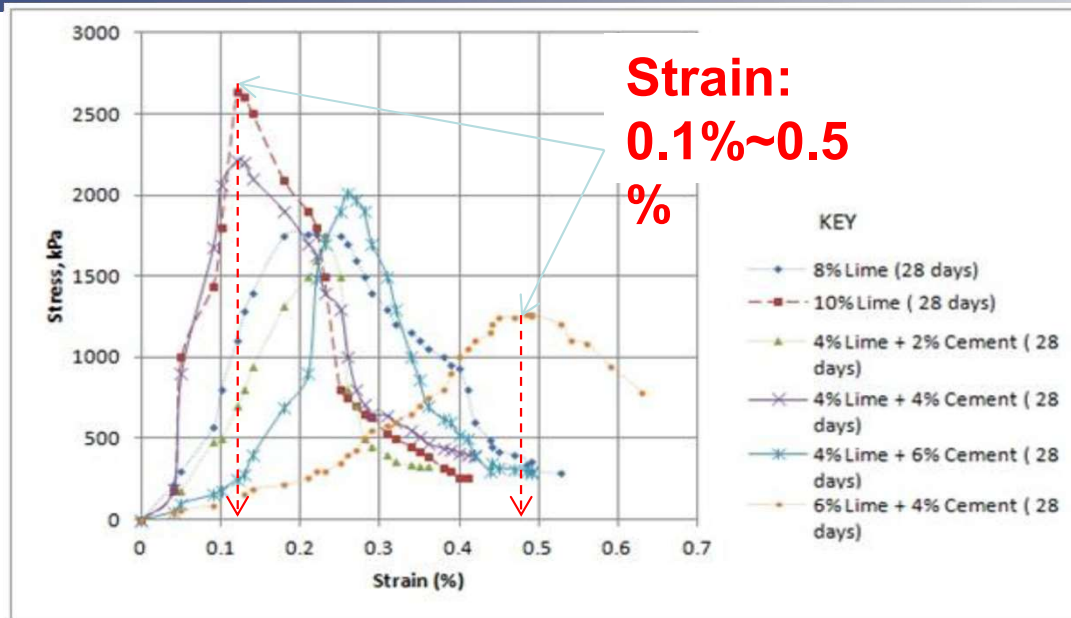
# COMPRESSION TEST RESULTS FOR LUCOSOIL SAMPLES

## 28 days test results



**Strength of Lucosoil stabilized soil: L13126>L13140>L13142**

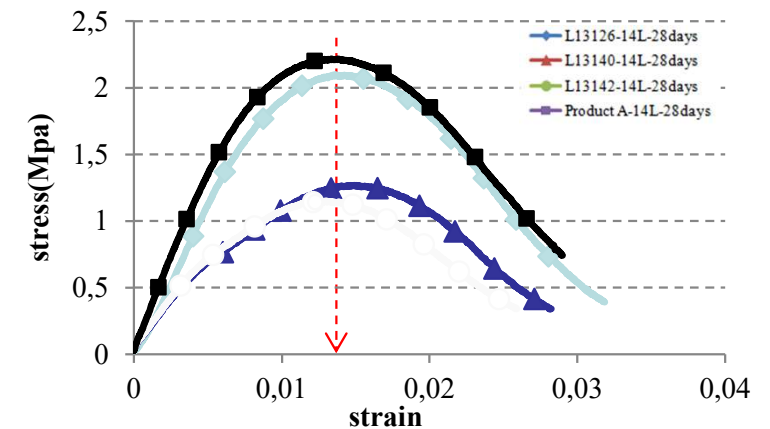
# COMPRESSION TEST RESULTS



**Cement & lime stabilized UCS tests**

**Comparing to cement & lime,  
Lucosoil stabilized soil  
shows higher ductility**

## Lucosoil UCS tests



**Strain:  
1.4%**

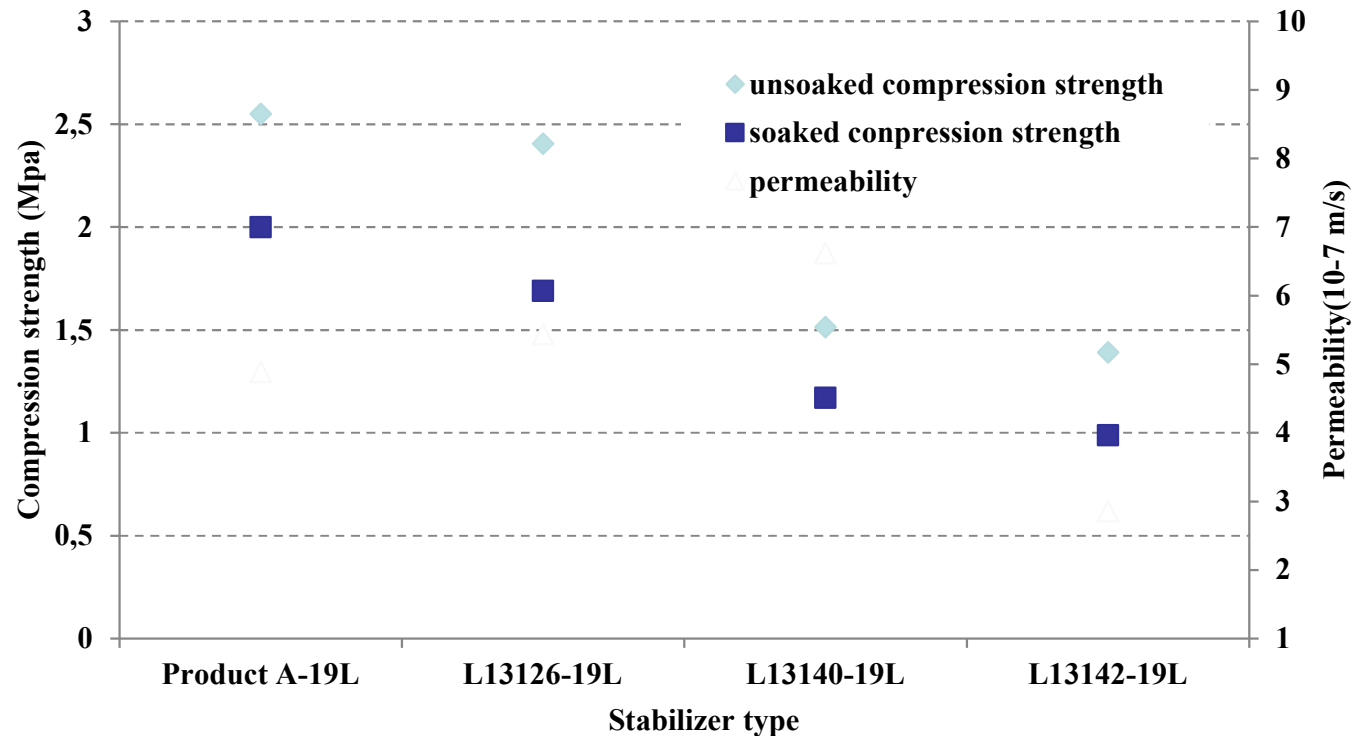


# PERMEABILITY TEST



**Fill the tube with water and leave the test device for one day in order to forming steady flow, then start the test**

# PERMEABILITY TEST RESULT



**The soaked and unsoaked UCS value decreased follow the sequence of L13126, L13140, L13142, the permeability increased with the compression strength decreasing.**

- Soil stabilized by Lucosoil L13126 show higher compression strength;
- The 28 days incremental compression strength of soil samples stabilized by using 19L/m<sup>3</sup> Lucosoil L13126 can reach to 2Mpa;
- The compression strength of soil stabilized by Lucosoil L13126 shows similar compression strength as the one stabilized by the reference product A;



- The compression strength growth of the Lucosoil stabilized soil correlates with the moisture loss rate in the sample.
- After 14 days, most stabilized soil samples reach the maximum compression strength;
- There is no further strength increase when sample loses its moisture completely;
- By comparing to the cement & lime stabilized soil, the Lucosoil stabilized soil sample shows higher ductility;

- The potential of using Lucosoil to stabilize the furnace slag as the road base material;
- The possibility of using Lucosoil combined with cement or lime to stabilize the recycled industrial waste as the road base material;
- Slope stabilization by using Lucosoil;
- .....