

## Product Sheet TERRA-3000®

### Mode of operation

**TERRA-3000®** is a natural and environmental careful product for ground stabilization and solidification. Each soil possesses the natural characteristic that it petrified again. It needs very long time and high pressure for this process. By bringing in **TERRA-3000®** we can accelerate this process. The soil is durably improved in its behavior regarding load-carrying capacity and tightness.

**TERRA-3000®** affects the pore and micropore range of the soils boundary surface-actively. It breaks the detention water film open around the fine and purifying particles and works in the soil electrical-physically (ionic-exchange). It comes to a not reversible agglomeration of the fine and purifying parts of the treated soil.

**TERRA-3000®** reduces the capillary discharge by breaking the detention water film open and the irreversible agglomeration of the fine and purifying parts completely substantially. It sets thereby soil-own cohesive forces free (increase of the coherence). Thus with the installation a higher compactibility of the soil and a later compression increase are already reached.

The reduction of the permeability, by locking the capillaries, leads to a strongly increased resistance of the treated soil against water influences, which affect again the pouring and/or shrinking behavior. The strongly reduced water-absorption of the treated soil is prevented a softening of the earth subgrade level. Because of the decreased capillarity the frost resistance is increased.

### Characteristics

By a treatment of the soil with **TERRA-3000®** the following parameters of the soil are changed:

- Improvement of the load-carrying capacity to the 3 - to 5-fold without soil exchange. Increase of the density of the soil.
- Reduction of the soil water absorption by changing the capillarity.
- Improvement of the key-field-worth.
- Strongly reduced pouring and shrinking behavior.
- Reduction of the frost susceptibility.
- Resistance against water erosion and thus decrease to rinse out the fine particles.
- Agglomeration of the fine and purifying parts.

## Environmental compatibility

**TERRA-3000®** is ecologically perfectly and their application for the environment completely harmless.

From the solidification of the soil with **TERRA-3000®** a durable connection with the treated soil particles results.

A leachate of the active substances does not take. Thus a leakage water is reached, which can be introduced without subsequent treatment into a surface water. The environment stays completely unladen.

## Application

In principle all soil types for the use of **TERRA-3000®** are suitable. This applies to all semikohäsiven or cohesive soils, thus cohesive soils with a larger content of fine and purifying particles such as clay/tone and silt. In addition, all other non-cohesive soil types (crushed stone, gravel, sand) can be made usable for durable ground stabilization with **TERRA-3000®**, by attaching the missing fine parliamentary groups at clay/tone and silt. By to heavy clay soils, which usually exhibit a very high pouring and decrease potential, there is the possibility to temper the clay/tone by addition of non-cohesive materials.

Best part of the soil parameters for the application of **TERRA-3000®**:

- ▶ The fine fraction (less than 0.002 mm) of the soil should be a minimum of >15%. The grading curve should be around 1/3 loam (<0.063 mm), 1/3 sand (0.063 mm to 2 mm) and 1/3 gravel (2-50mm).
- ▶ The residual moisture of the soil should be in the vicinity of the Proctor-optimum. The optimal conditions are 10% - 14% moisture, which is determined by a proctor-test. By the addition of **TERRA-3000®** after densification, optimum densities can be achieved.
- ▶ The frame of the Proctor value of the treated soil (pd) should be >1850 kg/m<sup>3</sup>.
- ▶ The moisture is due to the flow limit (wt) in the range 20-60%.
- ▶ The plasticity index (Ip) is in the range of 5 - 30%.
- ▶ (less) <4% of organic impurities (humus, roots)

To determine these parameters, the following analyzes are required:

1. Particle size distribution: identification by screening or sedimentation analysis (Aräometer) or laser analysis - Measuring range: <math><0.002\text{ mm}</math> to 50 mm
2. Classification of soil according to DIN 18196 or SUCS (soil classification unique system)
3. Determination of the natural moisture content (NMC)
4. Capillarity test: produce two specimens (press cores), once treated with TERRA-3000®, even once without TERRA-3000®. Re-drying at about half the Proctor- Value - then 48 hours in a water bath (water immersion test) with an evaluation.
5. Determination of organic additives (humus, roots) by glowing loss.

### Necessary equipment

- Grader with Ripper
- Special Stone-milling-cutter for soil and to bringing in of **TERRA-3000®**
- “Sheep-foot-roller” for the rough compression of cohesive soils
- “Rubber-wheel-roller” or “plain-roller“ for the fine compression more than 10 ton on the front-roller without vibration or oszilation!

If various equipment is difficult to be organized, we also can use machines from conventional road construction. This can reduce the equipment expenditure substantially and helps thereby costs to save. This does not have however on the quality of workmanship and/or on the effect of **TERRA-3000®** influence.

## Processing

The processing can take place either in the central mixing process or in the local mixing process. With smaller projects the local mixing process is practically always used.

### Central Mixing Process

(mixed in plant)

In an external plant the soil is mixed homogeneous with **TERRA-3000®**.

Material ready to be installed to the building site on supply and lay on.  
Consolidate

### Local Mixing Process

(mixed in place)

Lay on from cohesive soil (e.g. clay/tone or silt), if in the soil not sufficiently available.

Mill into and mix homogeneous.

**Compacting with suitable roller (Paddrum- or rubber-wheel-roller)**

**Important: good compression!**

## Result-Checking

Bearing Capacity Measurement:

1. with "a slight drop-weight" EV-d ((dynamic load plate test)

or

2. "Static load compression test" EV-2

3. depending on the needs assessment of the kf-value (permeability, liquid permeability)

After a successfully checking of the results, a highly resistant and durable surface is produced, which must be protected by a suitable wearing layer!