

## Product Sheet Alphasoil®-06

### Mode of operation

**Alphasoil®-06** is a natural and environmental careful product for soil stabilization and soil 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 **Alphasoil®-06** we can accelerate this process. The soil is durable improved in its behavior regarding to load-carrying capacity and tightness.

**Alphasoil®-06** 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.

**Alphasoil®-06** reduces the capillary discharge by breaking the adhesive 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). As a result, a higher compressibility of the soil and a subsequent increase in compaction is already achieve during installation.

The reduction of the permeability, by locking the capillaries, leads to a strongly increased resistance of the treated soil against water influences, which in turn influence the swelling or shrinkage behavior. The strongly reduced water-absorption of the treated soil 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 **Alphasoil®-06** the following parameters of the soil are changed:

- Improvement of the load-carrying capacity to 3 to 5 times 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-value (Permeability).
- Strongly reduced swelling and shrinking behaviour.
- Reduction of the frost susceptibility.  
Resistance against water erosion and thus reduction of fine particle scouring.
- Agglomeration of the fine fractions.

## Environmental compatibility

**Alphasoil®-06** is ecologically impeccable and the application for the environment completely harmless.

By the solidification of the soil, treated with **Alphasoil®-06**, a durable connection of the soil particles results.

A leachate of the active substances does not occur. With that, a leakage water is output, which can be pass into a surface water without subsequent treatment. The environment stays completely unstressed.

## Application

In principle, all soil types for the use of **Alphasoil®-06** are suitable. This applies to all semi-cohesive or cohesive soils, like cohesive soils with a larger content of fine fractions such as clay and silt. In addition, all other non-cohesive soil types (crushed stone, gravel, sand) can be make usable for durable soil stabilization with **Alphasoil®-06**, by attaching the missing fine fraction like clay content soil. By to heavy clay soils, which usually exhibit a very high swelling and shrinkage potential, there is the possibility to temper the clay fraction by addition of non-cohesive materials.

### Best part of the soil parameters for the application of **Alphasoil®-06**

- The fine fraction of pure clay content ( $< 0.002 \text{ mm } \emptyset$ ) of the soil, must be a minimum of  $>15\%$  and maximum of  $\approx 28$  to  $30\%$ . The grain size distribution should be around 1/3 clay and silt ( $< 0.063 \text{ mm } \emptyset$ ), 1/3 sand ( $0.063 \text{ mm} - 2 \text{ mm } \emptyset$ ) and 1/3 gravel ( $2 - 20 \text{ mm } \emptyset$ , maximal –  $25 \text{ mm } \emptyset$ ).
- The residual moisture of the soil should lay a little bit near above of the Proctor-optimum, which is determine by a Proctor-test. The addition of Alphasoil®-06 ensures optimum tightness and load-bearing capacity after compaction.
- The frame value of the Proctor value of the treated soil (pd) should be  $> 1850 \text{ kg/m}^3$ .
- The moisture is due to the yield point/flow limit (wt) in the range 20-60%.
- The plasticity index (Ip) is in the range of 5 - 30%.
- (less)  $< 5\%$  organic admixtures (humus, roots, leaves, etc.).
- Soil salt content should no more than 2%. If the salt content is  $> 2\%$ , the result of Alphasoil®-06 stabilization getting worse in proportional ratio to the salinity.

To determine these parameters, the following analyses are required:

1. Particle size distribution: identification by screening or sedimentation analysis (Hydrometer) Measuring range: <math><0.002\text{ mm}</math> to  $\approx 50\text{ mm}$  after **DIN 18123** or **DIN EN ISO 17892-4**
2. Classification of soil according to **DIN 18196** or **SUCS** (soil classification unique system)
3. Determination of the natural moisture content (NMC) after **DIN 18121** or **DIN ISO 11465**
4. Proctor valuation: Determination of the moisture content (**OMC**) of the to be used soil-material after **DIN 18127** or **DIN EN ISO 13286-2**
5. Capillarity test: produce two specimens (press core), once treated with Alphasoil® -06, even once without Alphasoil®-06. Re-drying at about half the Proctor- Value (let it dry it about 2 days or use a blow dryer) - then 48 hours in a water bath (water immersion test) with an evaluation.
6. Determination of organic additives (humus, roots, leaves) by glowing loss after **DIN 18128**.

## Necessary equipment

- Grader with Ripper.
- Special Stone-Crusher-Miller or Recycler to bring in **Alphasoil®-06** adequately.
- Displaced-Rubber-Tyred-Road-Roller (or Pad-Drum-Roller/Sheep-Foot-Roller) from 15 tons upwards, for the rough compacting of cohesive soils and kneading-in the catalyst to the soil colloids. Without vibration or oscillation.
- Plain-Roller/Smooth-Roller for the fine compacting with  $\approx 15$  tons upwards on the front-roller, without vibration or oscillation.

If various equipment is difficult to be organized, it also can be used equipment from conventional road construction. This can reduce the equipment expenditure substantially and helps thereby to save costs. This does have on the quality of workmanship and/or on the effect of **Alphasoil®-06**, a big influence.

## Processing

The processing can take place either in the central mixing process (mixed in plant) or in the local mixing process (mix on site). For smaller projects, the local mixing process (mix on site) comes practically always in use.

## Central Mixing Process (Mixed in Plant)

In an external mixing plant, mix the soil homogeneously with **Alphasoil®-06** and deliver ready-to-install material to the construction site, apply and compact adequately by using suitable rollers (rubber-wheel-roller or pad-foot-roller).

## Local Mixing Process (Mixed on Site)

Application of cohesive material (e.g., clay or loam) if not sufficiently present in the soil. Mill **Alphasoil®-06**, mix homogeneously and compact adequately by using suitable rollers (rubber-wheel-roller or pad-foot-roller).

**Very important is: Good and Persistent Compaction!**

## Result Checking

Bearing Load 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 successful verification of the results a highly bearing, resistant and durable subgrade has been produced, which should/can subsequently be protected by a suitable wearing course.

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