NANO ALPS®

Nanotechnology in construction

Nanoalps® - The patented original

Improved technology in harmony with nature

Nanoalps® - The patented original

Nanoalps® - The new generation of nanotechnology in the construction business

Nanotechnology is the research of processes in order to develop and use nanomaterials that have a structure that is 1,000 times smaller than the diameter of human hair. Thus, the use of the tiniest material structure is possible.

Mr. Georg Niederkofler, the CEO of the well-known construction company Alpenbau in Terenten was inspired by this technology when he started to test the binding abilities of the material. Here the earth from a molehill was bound with polymer and cement. The possibility to bind previously unusable materials fascinated him so much that he became heavily involved in the research of nanotechnology.

Nanoalps® is a Research and Development Company in applied geotechnics and consulting that can utilise decades of experience of the construction company Alpenbau.

Nanoalps® is a silicium polymer additive and finds its primary use as an additive for building materials which interact with hydraulic binding agents in the nano range. It drastically expands and improves the usability of the existing building materials and at the same time reduces construction costs. With the use of Nanoalps® polymer additives binding with salt water is even possible.

3 different systems, usable in various sectors of the building industry, have been patented and already implemented to the satisfaction of a lot of customers.

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Mittel zur Bodenverfestigung

Product for ground consolidation

Produit pour consolidation du sol

Patent

- European patent – nr. EP2256098 B1
- Patent issued April 27th 2011
- „Nanoalps“ brand registration nr. 009148271 carried out on 15-11-2010

Quality

Continuous cooperation with universities and independent certification authorities guarantee the constant and verifiable quality of our products and services.

Eingetragen / Registered 15/11/2010

No 009148271

HABM – HARMONISIERUNGSAMT FÜR DEN BINNENMARKT
MARKEN, MUSTER UND MODELLE

EINTRAGUNGSURKUNDE

OHIM – OFFICE FOR HARMONIZATION IN THE INTERNAL MARKET
TRADE MARKS AND DESIGNS

CERTIFICATE OF REGISTRATION

NANOALPS

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Nanotechnology - Improved technology in harmony with nature

The products of the brand Nanoalps® are environmentally-friendly and non-toxic.
Material and construction costs are reduced thanks to the usability of on-site material. At the same time, natural resources are protected and pollution is reduced. Depending on the different demands, the recipe is put together individually, according to local requirements. All three systems have the following characteristics:

- Good resistance to frost and longer durability
- Higher resistance to pressure and elasticity
- Process of hydration of binding materials is possible also with organic grounds like earth, silt or clay

Nanoalps® – SYSTEM SOIL

- Improvement and stabilization of grounds
- Increase in lifetime durability and resistance to frost
- Reduction in material and construction costs

Nanoalps® – SYSTEM DRAIN

- Increase in water absorbance ability
- Higher and faster development of elasticity and compressive strength
- Cost reduction by avoiding complicated drainage systems

Nanoalps® – SYSTEM SAFE

- Minimization of dry splitting through reduction in swellability
- High chemical and biological stability
- Cost reduction through thinner layers (in comparison to clay layers) whilst maintaining a high level of impermeability

Nanoalps® System SOIL - The innovative ground stabilization

Nanoalps® System SOIL is an environmentally-friendly and non-toxic polymer additive that transforms even unsuitable and earth of inferior quality into valuable construction material. The water soluble material consolidates and stabilizes the earth in combination with hydraulic binders.

Characteristics:

- Consolidation, stabilization and toughening of roadways and base courses, whether in the new construction business or the restoration of roads
- Inerting and immobilization of contaminated grounds
- Binding with fresh and salt water and even with organic grounds (earth, silt, clay) possible
- Reduction in material-, transportation- and construction costs up to 30% possible, due to usability of on-site material and avoiding the transporting away of material
- Improvement in the elasticity and compressive strength of construction materials
- Higher resistance to frost
- Reduction in the water absorbance capacity
- Stabilization of road embankments
- Drastic reduction in construction time through faster binding and building process
- After 24 hours the road is often already passable
- Usable also without asphalt if needed
- Also applicable at low temperatures

Application areas:

Nanoalps® System SOIL is also usable with contaminated earth in combination with hydraulic binders and thereby immobilizes harmful substances.

- Base layer for national roads, state roads and highways
- Carparks, cycle tracks and foot paths
- Forest roads, country paths and skiing areas
- Foundations and access roads to construction sites
- Nature protected areas and protected landscapes
- Construction of hard shoulders by avoiding slip circles
- Storage areas and container platforms
- Harbours and airports
- Dams, dykes and water reservoirs

Service

The aggregates used are examined by specialists from the Nanoalps® laboratories. Depending on the individual requirements, the optimal mixture is created and produced. The successful application and use is guaranteed by suitability tests, field tests and post-implementation checks.

After several years without Nanoalps®

After several years with Nanoalps®

Technical Data:

Flexibility:	Tensile splitting strength from 0.5 -2.0 mPa adjustable
Strength:	Uni-axial compressive strength from 1.0 N/mm² – 10.0 N/mm² adjustable
Resistance to frost:	Depends upon the requirements and material available
Compressive strength:	100 MN/m² EV2 – 250 MN/m² EV2 adjustable

Microscopical exposures show a more compact structure by using Nanoalps® System SOIL

Without Nanoalps® System SOIL

With Nanoalps® System SOIL

Processing

With Nanoalps® System SOIL layers can be diminished and costs reduced (new building and restoration)

By using Nanoalps® System SOIL layers can be reduced and costs saved (new building and restoration).

Build-up with Nanoalps® System SOIL

A: 3 cm asphalt fine layer
B: 6 cm asphalt binder layer
C: 25-30 cm base and frost protection layer with Nanoalps® System SOIL
D: Natural ground

Without the improving characteristics of the polymer additive, more material and layers are necessary.

Traditional build-up

A: 3 cm asphalt fine layer
B: 6 cm asphalt binder layer
C: 10 cm asphalt base layer
D: 8 cm stabilizing layer
E: 40-70 cm base and frost layer
F: Natural ground

SYSTEM DRAIN

Nanoalps® System DRAIN - The drainable natural layer

Nanoalps® System DRAIN enables the construction of water permeable surface pavements and base layers. The non-toxic, environmentally-friendly and water soluble Nanoalps® System Drain gets mixed with natural stony aggregates of a defined diameter, a modest amount of hydraulic binding agents and water.

Characteristics:

- Increase in the water absorption capacity
- Surface water penetrates quickly into the lowest layers
- Improved and quicker development of resistance from the 4th day
- Reduction in costs by avoiding complicated drainage systems
- Maintaining natural aspect by keeping the natural colour
- Diverse surface colours possible

Application areas:

Infrastructures, where drainage is necessary:

- Road surfaces for light traffic
- Carparks, cycle tracks and footpaths
- Sports facilities, landscaping e.g. garden centres, golf courses and compost works
- Substructures for roads, sports facilities, riding facilities
- Steep areas for embankment fortification

Service

The aggregates used are examined by specialists from the Nanoalps® laboratories. Depending on the individual requirements, the optimal mixture is created and produced. The successful application and use is guaranteed by suitability tests, field tests and post-implementation checks.

Technical data:

Strength:	Uni-axial compressive strength from 1.0 N/mm² – 20.0 N/mm² adjustable
Flexibility:	Tensile splitting strength from 0.5 - 2.0 mPa adjustable
Resistance to frost:	Depends upon the requirements and material available
Water absorption rate:	According to requirements, usually 10^{-4} m/s

Nanoalps® System DRAIN offers a high level of water permeability

By using Nanoalps® System DRAIN the water seeps into the lower layers and allows for a dry surface.

Without the drainable polymer additive water remains on the surface and can cause dangerous aquaplaning.

Nanoalps® System SAFE - The mineral sealant

Nanoalps® System SAFE is an environmentally-friendly, non-toxic polymer additive which creates water-impermeable layers, seals and also rehabilitates contaminated grounds. It is used with clay mineral binding agents as well as reduced grain-size minerals and recycled raw materials.

Characteristics:

- Improved elasticity and high levels of waterproofing
- Minimisation of dry-splitting through a reduction in the swellability
- High level of chemical and biological stability
- Good processability
- Cost-savings through a reduction in the required layer depth

Application areas:

Nanoalps® System SAFE can be used in all areas where a high level of impermeability and waterproofing is required, e.g.:

- Landfill sites
- River and sea dykes
- Dams and embankments
- Water reservoirs and water-storage facilities
- Near to rivers and protected water and nature areas

Service

The aggregates used are examined by specialists from the Nanoalps® laboratories. Depending on the individual requirements, the optimal mixture is created and produced. The successful application and use is guaranteed by suitability tests, field tests and post-implementation checks.

Load-tests show an improvement in material stability

Without the use of the polymer the material remains brittle and long tears appear.

With Nanoalps® System SAFE the load is spread out more evenly, so that the wearing-down of material is minimised.

Technical data:

Nanoalps® System SAFE - strengthening of the mineral course layer at a high rate of sealing

Strength:	Uni-axial compressive strength of 1.0 N/mm² - 5.0 N/mm² adjustable
Resistance to frost:	Depends on requirements and material
Rate of water permeability:	k-values of up to 10^{-11} m/s

Nanoalps® System SAFE enables a reduction in layer depth and construction costs whilst improving the rate of impermeability

Through the use of Nanoalps® System SAFE a higher level of impermeability is achieved and the depth of the mineral layer can be reduced to a large extent.

Build-up with Nanoalps® System SAFE

A: Recultivation layer
B: Geomembrane 400 g/m²
C: 30 cm drainage layer
D: PEHD foil 1,000 g/m²
E: 20 cm mineral layer using Nanoalps® System SAFE
F: 20-40 cm gasdrainage and compensation level

Without the sealing characteristics of the polymer additive the layer would otherwise have to be drastically increased and this results in a lower level of chemical stability.

Traditional build-up

A: Recultivation layer
B: Geomembrane 400 g/m²
C: 30 cm drainage layer
D: PEHD foil 1,000 g/m²
E: 100 cm mineral layer
F: 20-40 cm gasdrainage and compensation level

Nanoalps® - Application instructions

Nanoalps® SYSTEM SOIL Application instructions - new building

Nanoalps® System SOIL in new building projects is installed by the Mixed-in-Place procedure

1. Initial situation: Unmachined road

2. Removal of earth and production of plane

3. Application of binding agent through binding agent spreader

4. Stabilization of on-site existing earth with mixture of Nanoalps® System SOIL

5. Compression of machined and improved road

6. If necessary application of asphalt

Nanoalps® SYSTEM SOIL Application instructions - restoration

Nanoalps® System SOIL in restoration projects is installed by the Mixed-in-Place procedure

1. Removal of asphalt layer with asphalt milling machine

2. Creation and levelling of plane

3. Application of binding agent through binding agent spreader

4. Stabilization of on-site existing earth with mixture of Nanoalps® System SOIL

5. Compression of machined and improved road

6. If necessary application of asphalt

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Nanoalps® SYSTEM DRAIN — Application instructions

Nanoalps® System DRAIN is installed by the Mixed-in-Plant procedure

1. Initial situation: Unmachined road

2. Production of mixture Nanoalps® System DRAIN with mixing machine

3. Laying of mixture with road finisher

4. Compression and rolling of laid mixture

5. Final base layer

6. Demonstration of water permeability of final bound surface

Nanoalps® SYSTEM SAFE — Application instructions

Nanoalps® System SAFE is installed by the Mixed-in-Plant procedure

1. Landfill: Initial situation

2. Production of material with the addition of Nanoalps® System SAFE in the mixing plant

3. Laying of mixture with special machinery

4. Compression of ground

5. Final landfill covering

6. Landfill: Final situation

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