

Dust Binding On Fine-Grain Surfaces

In industrial areas there are numerous areas as for example deposits of coal and mineral ore, areas of dredged-up sand, areas of opencast mining and rubbish tips of ashes and slags, which get into environmental problems due to dust emissions.

Similar dust endangered areas can be found in arid or semiarid regions (semi-dry deserts and deserts) of the earth or in large dune-landscapes.

As these areas distinguish themselves in most cases by a missing vegetation cover, the consequence is, depending on the wind speed, a more or less strong dust pollution, which leads, most of all in densely populated areas to interference of the people.

Successful measures against wind erosion on such areas are continuous raining, fixation, greening or overearthing or covering e. g. with coarse-grained material or the installation of erosion protective mats.

1. Technical possibilities of surface fixations

At this point the possibilities and limits of a surface fixation with soil stabilizers on a polymer basis (**TERRAVEST**) with or without the use of erosion protective fibres shall be explained:

Soil stabilizers on polymer basis are liquid, highly unsaturated, pure hydrocarbons which become a fixed material when they get into contact with oxygen. Within this process a netting of long-chained hydrocarbons develops, which is connected by oxygen bridge bonds. The soil stabilizer fixes the soil particles depending on the soil graining to a depth of 15 mm. The fixed soil layer remains completely permeable. The netting, constructed by the soil stabilizers gets destroyed by UV-radiation due to its molecular structure and becomes carbon dioxide and water. The durability of such a fixation is therefore limited for a certain time.

Soil stabilizers on polymer basis are used as a concentrate or as an emulsion.

The application of soil stabilizers is mostly bound to the use of a tank with a powerful stirring mechanism and pump-system. Very suitable are the so-called hydroseeders, which are mostly used for hydroseedings. A further application method is the use of already installed raining-systems if a well-balanced mixing of water and soil stabilizers is ensured. If there is not stirring mechanism available for the application of soil stabilizers, soil stabilizer-emulsions which are easy to mix with water can be applied.

Normally, for fixations, soil stabilizers are applied only with water or altogether with mulch materials, wood fibres or cellulose material, whereby the extra materials work as arm for the fixing layer. During these works attention should be paid that the fixing mixture does not become too viscous. The fixing mixture must be easy sprayable.

For most of the fixations, hydroseeders are used. They have the advantage of mobility, as they are installed on vehicles or are pulled by vehicles. If extension tubes and manual spray jets are used, also difficult accessible surfaces or areas with missing weight-bearing

capacities can be reached. Distances up to 300 m between the stirring tank and application location can be bridged this way.

At the end of the application a cleaning of the machinery used by intensive washing with water is absolutely necessary in order to avoid a sticking of the machines and the possibly used spraying systems.

2. Necessary quantities and durability

The duration of such fixations is limited and depends on the necessary quantity chosen per unit. For the choice of the necessary quantity and therefore the duration of the fixation the steepness of the landscape, the soil corning as well as the erosion power caused by wind speed have to be paid attention to.

Due to the supplement of suitable components (erosion protective fibres) made of vegetable fibres or vegetable macro molecule structures the effectiveness and the duration of a fixation can be increased.

Important to know is that the finished fixed layer does not stand any mechanical stress e. g. stepping or driving on it. To guarantee a long-time duration, the treated area has to be protected from such stress.

Generally you can say that an optimal fixation with high necessary quantities may achieve a duration of one year.

An exact dosage of all erosion protective materials can only be defined after the knowledge of the locational problems and the requested duration of the fixation.

If an effective fixation for several years is requested, a multiple repetition of the application has to be considered.

3. Fixation in combination with a greening

Due to ecological reasons, for long-time effective dust binding, an installation of a vegetation cover following the **TERRAVEST-System** is recommended. One prerequisite is, that the material in question is cultivable, that the water supply of the plants is secured by sufficient rainfall and sufficient water storage capacity of the material and that a greening does not block an eventual future use of the material (e. g. coal in heating power stations).

As greenings on extreme locations during the summer months are not very successful due to climate reasons, it may happen that before a greening which should favourably be done in autumn, a short-time effective fixation has to be done as a temporary solution.