



0.1 The clogging process during water infiltration into a ground

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1 INTRODUCTION

Rainwater infiltration is one of the techniques in stormwater management, which offers important possibilities in term of development, often less costly in comparison with traditional solutions and allows good protection against the risk of flooding. Infiltration systems are usually not designed with any concern for pollution retention. It should be pointed that during liquid flow through the porous medium, suspended solids accumulate on the surface and in the interior of the filtering medium and thus contribute to the occurrence of the clogging phenomenon, which enhances flow resistance and consequently reduces porosity and filtration rate.

Consequences of silting-up enforce using solution designed to keep good enough filtration ability of ground. In recent years in order to protection from deep clogging more often are used nonwoven geotextiles. These fabrics are easily installed, relatively low costly and environmentally acceptable.

This work presents laboratory experiments carried out and the results obtained, indicating usefulness of nonwoven geotextiles as the material for removing, by microfiltration, suspension solids in the range of 0,02-1000 μm . Pollutions in precipitation are characterized by these range of size. Research connected with determining precipitation contaminants size were carried out by authors and published in (Burszta-Adamiak et al., 2004).

These studies were carried out within the Grand KBN 3 PO4G 051 25 “*Application of the laser diffraction particle size analyzer to monitoring the surface waters*”.

The particle retention behavior of geotextiles has been studied in the laboratory. Test setup for this purpose consisted of two polypropylene rectangularly prisms with dimensions: 0,27m width, 0,36 length and 0,25 height, respectively. Its bottom and sides have been covered with nonwoven geotextiles of brand TS 10 and TS 20 and thickness 1mm and 1,2mm, respectively. Experimental stand was poured mineral(soil)-water suspension once a day for 30 days period. Suspensions were prepared with clay and kaolin owing to size of particles, which were reflected size of precipitation pollutions.

When studies were finished samples of sediment silted-up on the surface and inside of geotextiles and samples of soil under the geotextiles have been collected.

In order to thoroughly analyze the structure of sediments scanning electron microscope has been used. Microscopic analyses after measurement period showed two kind of sediment formation: on the surface in contact with the suspension and on inside the geotextiles structure.

Losses of ground porosity on individual depths of porous medium were analyzed in samples after measurement period.

CONCLUSIONS

The main conclusions obtained are summarized below:

1. Share of particles which were kept and let through the geotextiles is determined by thickness and size of textile pores.
2. Geotextiles can act as the layer separating the filtration deposit from the layer of sediment accumulated on the surface and inside of geotextiles in case when geotextiles parameters (mention above) are matched to the size of particles contained in precipitation.
3. Further research is required to evaluate these effects for wider range of nonwoven geotextiles products and for better understanding and prediction of retention capacity and clogging mechanisms of porous medium and geotextiles.

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