

## SUMMARY OF THE DOCTORAL DISSERTATION

Name and surname of the author of the dissertation:  
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Degree, name and surname of the dissertation promoter:  
**prof. dr hab. inż. Zygmunt Meyer**

The subject of the doctoral dissertation:  
**Verification of a mathematical model for the design of a geosynthetic dewatering tube based on experimental tests in field conditions**

Thesis of doctoral dissertation:  
**It is possible to estimate, with sufficient accuracy for practical purposes, the relationship between filling pressure in a synthetic tube, its shape and circumferential stresses in the synthetic shell.**

This work aims to analyse and verify current design methods, which allow to determine the shape and circumferential stresses in the geosynthetic shell of a geosynthetic tube. This purpose was achieved by performing experimental studies, which consisted in measuring the shape and elongation of the shell of geosynthetic tubes of various sizes. Measurements were made at specific filling stages. These results were used to elaborate the necessary relationships and dependencies enabling the verification of the chosen method.

Based on the obtained relationship between stress and discharge pressure (for each tube) the author of the work has verified one of the commonly used design methods in practice. The method selected for verification has certain simplifications, which are probably the reason for deviations between calculation results and reality. This fact is important, for example, when specifying the strength parameters of the geosynthetic shell.

The author's proprietary verified calculation algorithm has been proposed, which, partly bases on the method proposed in the literature and partly on the actual results of measurements. It allows to obtain greater accuracy of calculations with regard to practical experience.

The verified stresses in the geosynthetic shell differ from those calculated in the common method. According to the verification, the stresses are determined according

to the following rule: the larger the circumference of the tube, the higher the stresses in the shell by the small increase in height. This gives a completely new view of the required tensile strength of the geosynthetic shell.

To enable further optimization of the obtained stress results in the shell, continued research is proposed. It consists in testing for different diameters and within the same diameter for different thicknesses of a shell, to determine the impact on the results of calculations.

Michał Pilch



1 października 2018 roku