노출환경에 의한 지반합성보강재의 내후성 평가

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Evaluation of Weatherability of Geosynthetic Reinforcements under Exposure Condition

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1. Introduction

The longer construction period, woven geotextiles are exposed under the sunlight and ultra violet ray with not good storage condition. The tensile performance should be decreased due to the weakness and degradation by these phenomena. This is related to determine the difference of tensile strength retention before and after exposure. Besides this, the installation conditions of woven geotextiles in the field could be the serious cause of the breakage and failure of woven geotextiles by the decrease of tensile strength during construction. In this study, polyester and polypropylene woven geotextiles were used to compare the tensile performance change before and after exposure through the index and field tests.

2. Experimental

Polyester and polypropylene woven geotextiles which have the design strength of 5, 8, 12 ton/m were used as following; polypropylene woven geotextiles - GT-1: 5 ton/m, GT-2 : 8 ton/m, GT-3 : 12 ton/m and polyester woven geotextiles - GT-4: 5 ton/m, GT-5 : 8 ton/m, GT-6 : 12 ton/m. Decrease of tensile strength before and after exposure was calculated to compare the degree of weatherability of woven geotextiles as same as the outdoor exposure test. Tensile strength was determined in accordance with ASTM D 5034.

3. Results and Discussion

The waste slag is used as filled materials for the soft ground reinforcement by using the woven geotextiles. It is seen that the pH value of this slag material is high alkaline state. For polyester woven geotextiles, the temperature is higher, the degradation is more serious. But for this field exposure, the highest temperature is about 36℃ and there was no significant degradation phenomena of polyester woven geotextiles was not occurred. If the installer did in the bad working condition e.g., driving without caution, installation of woven geotextiles without caution etc., the serious damages would be occurred. *Figure 1* shows the percentage change of tensile strength of woven geotextiles by field exposure test at MD. Polyester and polypropylene woven geotextiles showed the decrease of tensile strength with

exposure and polypropylene woven geotextiles showed the lower weatherability than polyester woven geotextiles. *Figure 2* shows the repaired part of polyester woven geotextiles after failure and the failure line was made along the sewn direction. This means the exposure condition may be the cause of the stress concentration along this direction and the failure would be accelerated.

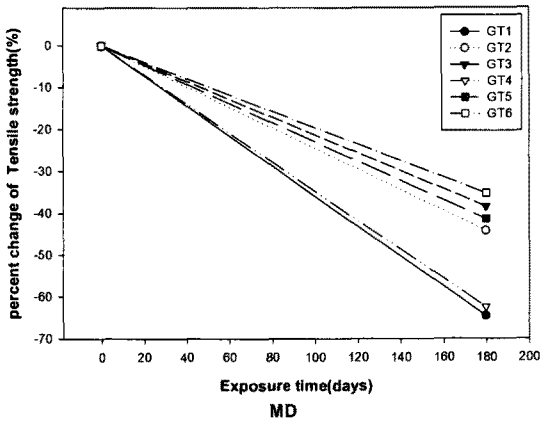

Figure 1. Percentage change of tensile strength of woven geotextiles by field exposure test at MD

Figure 2. Photographs of repaired part of woven geotextiles after failure

4. Conclusion

It is seen that the long-term design strength of woven geotextiles should be strongly influenced by the reduction factor and this is the important key to prevent the failure of woven geotextiles and their related structure.

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Reference

Koerner, R. M., "Designing with Geosynthetics", 5th Edition, Elsevier, New York, 2005.