

## Study of Lamination Quality of Semi-Flexible Solar Modules with Special Textile Materials

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**Abstract :** The army, police and fire brigade commonly use dedicated equipment based on special textile materials. The properties of these textiles should ensure human life and health protection. Equally important is the ability to use electronic equipment and this requires access to the source of electricity. Photovoltaic cells integrated with such textiles can be solution for this problem in the most of outdoor circumstances. One idea may be to laminate the cells to textile without changing their properties. The main goal of this work was analyzed lamination quality of special designed semi-flexible solar module with special textile materials as a backsheet. In the first step of investigation, the quality of lamination was determined using device equipped with dynamometer. In this work, the crystalline silicon solar cells 50 x 50 mm and thin chemical tempered glass - 62 x 62 mm and 0.8 mm thick - were used. The obtained results showed the correlation between breaking force and type of textile weave and fiber. The breaking force was in the ranges: 4.5-5.5 N, 15-20 N and 30-33 N depending on the type of wave and fiber type. To verify these observations the microscopic and FTIR analysis of fibers was performed. The studies showed the special textile can be used as a backsheet of semi-flexible solar modules. This work presents a new composition of solar module with special textile layer which, to our best knowledge, has not been published so far. Moreover, the work presents original investigations on adhesion of EVA (ethylene-vinyl acetate) polymer to textile with respect to fiber structure of laminated substrate. This work is realized for the GEKON project (No. GEKON2/O4/268473/23/2016) sponsored by The National Centre for Research and Development and The National Fund for Environmental Protection and Water Management.

**Keywords :** flexible solar modules, lamination process, solar cells, textile for photovoltaics

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