

## **EXPERIMENTAL INVESTIGATIONS OF ALUMINIUM THERMOSYPHONS FOR PHOTOVOLTAIC-THERMAL MODULE**

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### **Abstract**

The paper presents approach to the design of aluminium profile thermosyphons (APT) for building façade integrated photovoltaic thermal solar collector of photovoltaic thermal module (PVT). The profiles for aluminium grooved heat pipes use as APT's shells. In this case, APTs perform a complex role: they simultaneously serve as an absorbing surface, as highly thermal conductive device and as a cooling system for photovoltaic cells. Maximum heat transport capacity and thermal resistance of APTs intended for use in PVT collectors are showed. Researches were conducted for the APTs with outer diameters of 8,1 mm, 10 mm and 14 mm; tilt angles changed within the range  $5^{\circ}$ ... $90^{\circ}$  and the temperatures changed from  $20^{\circ}\text{C}$  up to  $80^{\circ}\text{C}$ . Also, in the work presents the results of research which showed that the efficiency of PVT based on APTs with parameter  $X = (0.02...0.06) \text{ K}\cdot\text{m}^2/\text{W}$  is  $0.35...0.60$ . Besides, the PVT can further produce electricity up to  $135 \text{ W}/\text{m}^2$  and maximum heat output up to  $457 \text{ W}/\text{m}^2$  at the incident solar radiation of  $900 \text{ W}/\text{m}^2$ . Experimental test was carried out on the mock-up of facade PVT collector with dimension  $1,340 \times 500 \text{ mm}$ . Such design of the PVT collector could be easily integrated into building constructions.