TECHNICAL SPECIFICATIONS FOR THE INDOOR SOLAR COLLECTORS TEST FACILITY

Indoor test stand for the performance test for solar thermal collectors should be according EN12975:2006. All necessary equipment for performance tests (inclusive: sensors, data acquisition, software etc.) must be included according the specification in EN12975:2006. The test equipment have to be delivered as a turn key solution which enables the user to make performance test for solar thermal collectors after the installation without the need of any additional equipment.

Lamp field

Lamp type: metal halide lamps, dimming: 70 – 100 %, intensity: 900 - 1100 W/m², spectral quality: in accordance with EN12975:2006, homogeneity: depending on test area, test area: 2.4m x 2.4m (homogeneity +/- 15 %), 2.0m x 2.4m (homogeneity +/- 10%) 1.0m x 2.0m (homogeneity +/- 5%) collimation: according EN 12975:2006. Automatic positioning of the single lamps to realize different test areas with optimized homogeneity and intensity. Automatic height and angle adjustment of the complete lamp field to realize performance tests between 0 – 90°. Artificial cold sky to prevent the collector from long wave infrared irradiation from the hot lamps. Temperature sensors to monitor the temperature of the artificial cold sky inlet and outlet. Low iron, anti-reflex solar glass have to be used. Cleaning (also between the glass panes) has to be possible.

Collector support frame

Test area: 3.2m x 2.4m. Automatic positioning and angle adjustment to realize measurements under the lamp field between 0 – 90°. Double portal axis scanner to measure the light and wind distribution over the complete test area with adjustable spatial resolution. Inclusive installed wind speed sensor and pyranometer. Speed adjustable ventilation unit for artificial wind over the test surface (wind speed 2 – 4 m/s). Height adjustment of the ventilation unit for different collector thickness (maximum 0.30 m).

Hydraulic circuit

Conditioning of hydraulic circuit according the specification in the standard. All hoses must be guided in a energy chain to the test area for comfortable installation of test collectors. Temperature range:10 – 110°C, temperature control: ±0.1°C, heating / cooling power: 6 kW / 4 kW, mass flow (min. / max.): 100 to 600 kg/h, max. deviation flow rate: ±1%.

Description of sensors and components

Temperature: PT100 class A (collector in / out); flow rate: Coriolis (Krohne Optimass or comparable); air flow speed sensor: accuracy 0-10 m/s (+/- 0.1 m/s + 2%); irradiation: pyranometer secondary standard (Kipp&Zonen CMP11 or comparable); data acquisition: multiplexer (Agilent 34980A or comparable); computer: desktop PC latest version; software: LabView Professional with LabView VI for automatic collector tests according EN 12975:2006.

Central control and user interface

Control software with a graphical user interface installed on a touch screen. The graphical user interface must have at least the following functions: changing and logging the lamp field position (vertical position, angle); switching the lamps on and off and dimming; changing and logging of the individual lamp positions; switching the artificial sky's ventilation unit on and off; logging the air temperature in the ventilation system of the artificial sky; changing and logging the position of the collector test surface (horizontal position and angle); continuously adjustable regulation of the ventilation units (wind speed); scanning of the irradiation and visualization of the scan results (irradiation, wind speed); possibility to save the above parameters in a configuration file to facilitate the documentation and reproduction of test conditions; automatic repositioning of the test surface after scanning for intensity distribution based on the thickness of the collector.