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# The SPF Test Facility for Solar Combisystems and Storage Tanks.

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**An Extract from a Report of IEA SHC - Task 26**  
**Solar Combisystems**  
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# The SPF Test Facility for Solar Combisystems and Storage Tanks

by

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An extract from a technical report of Subtask B  
(Test facilities for combisystems and tanks)



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## 1 General information on test facilities for solar combisystems and tanks

Several test institutes have built facilities to test solar combisystems and storage tanks of solar combisystems according to the newly developed AC/DC and CCT methods. All these facilities are restricted to systems operating with liquid fluids as heat transfer media. Before the start of Task 26 similar test facilities had been built and set in operation at TNO, The Netherlands; SERC, Sweden [1]; ITW, Germany. The design of the newly built test facilities was inspired by these earlier examples.

Unlike the CTSS method the AC/DC and the CCT methods require an accurate emulation of the collector gain and the building load. The most important difference between the AC/DC method and the CCT method is that, with the CCT method, the building load is calculated by a dynamic (online) simulation of the building whereas with the AC/DC method the emulation of the space heating load is based on a load file. An overview of how the different components are installed, operated and tested with the different test methods is given in table 1.

*Table 1: Overview of components used in different test methods*

	CTSS	AC/DC	CCT
Solar collector	standard charge (1)	online emulation	online emulation
Solar loop piping	not installed, may be tested separately	optionally installed for testing	installed for testing
Solar loop pump and controller	not installed, may be tested separately	installed for testing	installed for testing
Auxiliary heater and auxiliary heater controller	not installed, not tested	not installed, not tested (2)	installed for testing
Space heating controller, valve and pump	not installed, may be tested separately	not installed, not tested	installed for testing
Space heating load	standard discharge (1)	load file	online emulation

(1) Collector gain and the space heating load do not need to be precise. Charging and discharging takes place at constant power and flow rates or according to a file.

(2) Under special circumstances the auxiliary heater and its controller may be installed and tested: The operation of the auxiliary heater may not be dependent of the space heating controller.

## 2 The test facility at SPF, Rapperswil, Switzerland

The test facility at SPF, Rapperswil, Switzerland is a result of the work carried out within IEA SHC Task 26. Before the starting date of the task, there was only a very simple, manually operated test facility for testing solar storage tanks. Its conversion into a fully automatic test rig was carried out during most of the duration of the task.

The SPF indoor test facility is designed to be used for tests according to the CCT method. The ambient outdoor temperature and the building indoor temperatures are provided by small boxes in which the system's sensors are located. The collector array and the building

are emulated using heating and cooling circuits. To date the test facility can accommodate systems using either a gas- or an oil-fired boiler as an auxiliary heater. Alternatively the auxiliary heater may be emulated by a heating circuit. The mains water supply is temperature- and flow-controlled.



*Figure 1: Floor installation area. A 25 cm grid drawn on the floor gives an indication of the space requirement from that photograph alone.*

The system components are to be set onto the designated floor area or may be attached to dummy inner walls. The installation area is designed in such a way that the components to be tested are separated from those of the test facility. Before each draw-off there is a rinse phase during which the mains water temperature and flow rate are adjusted. During rinsing, however, the flow stream bypasses the tank. Additional information about the test facility is given in [2].

### 3 References

- [1] Bales, Chris: Thermal Store Testing, Evaluation of Test Methods, Chalmers University of Technology, Department of Building Services Engineering, Göteborg, Sweden, 2002.
- [2] Vogelsanger, Peter: The Concise Cycle Test Method – a Twelve Day System Test, A Report from IEA SHC Task 26 Combisystems, 2002.