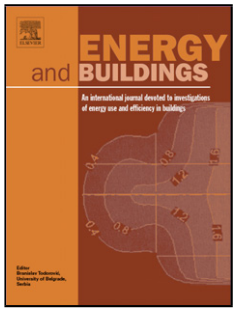


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# Experimental study of an active slab with PCM coupled to a solar air collector for heating purposes

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## Highlights

- Active slab coupled to a solar air collector is used as storage unit & heat supplier.
- The system is based on the storage of solar energy through melting process of PCM.
- Active slab registered significant energy savings compared to conventional system.
- Experiments show the potential of the solar energy to cover the heating demand.
- Strategies of the control system are important to optimize & improve the performance.

## Abstract

Solar energy has been widely introduced in the building market to provide electricity, heating and domestic hot water for a sustainable development. However, the low-density and the mismatch between energy supply and demand make appropriate its combination with thermal energy storage (TES) systems. The integration of these technologies (solar thermal and TES) in the building design is a key aspect to reduce energy consumption. Latent heat storage using phase change materials (PCM) presents an advantage in comparison to conventional sensible heat storage systems due to the required volume. In this context, an innovative system that integrates PCM inside the structural horizontal building component is presented in this paper. The slab consisted of a prefabricated concrete element with 14 channels filled with macro-encapsulated PCM which is used as a storage unit and a heating supply. In order to melt the PCM the system is coupled to a solar air collector. The prototype is tested in an experimental facility located in Puigverd de Lleida (Spain) where its thermal performance is