Experimental studies on seasonal heat storage based on stable supercooling of a sodium acetate water mixture

Laboratory tests of a 230 l seasonal heat storage module with a sodium acetate water mixture have been carried out. The aim of the tests is to elucidate how best to design a seasonal heat storage based on the salt water mixture, which supercools in a stable way. The module can be a part of a seasonal heat storage, that will be suitable for solar heating systems which can fully cover the yearly heat demand of Danish low energy buildings. The tested module has approximately the dimensions 2020 mm x 1285 mm x 80 mm. The module material is steel and the wall thickness is 2 mm. Different methods to transfer heat to and from the module have been tested. Further, a solidification start method, based on a strong cooling of a small part of the salt water mixture in the module by boiling CO2 in a small brass tank in good thermal contact to the outer side of the module wall, has been tested. Tests of the long term durability of small scale seasonal heat storage modules with different heights have been carried out in order to elucidate the maximum height of a module resulting in a stable heat storage. Based on the studies, recommendations for the design of a seasonal heat storage based on modules with a sodium acetate water mixture will be given.

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