

Compound-wall receiver for DSG in parabolic troughs

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The behavior of a steel receiver along two-phase flow at low pressure (~ 7 bar) has been described by Almanza *et al*, 1997 and Jiménez *et al* 1999. Under two-phase flow there was a bending of steel receiver for about 6.5 cm in the center of sections of 2.9 m long of the steel receiver. Such receiver is 14.5 m divided in 5 sections of 2.9 m and where it is held up by six posts; it is of 2.54 cm in diameter and when a flow of water of 1 to 2 l/min started to go in the concentrator was focused, then the bending was carried out due to the production of two-phase flow. It was a temperature difference between the top and bottom of the absorber up to 60°C.

According with a mathematical model described by Valdés *et al* 1998, and Almanza *et al* 1999 for low pressure, the difference of temperature between the top and bottom will be between 13.8 and 21.7°C for a compound-wall receiver. It was built a section of such compound-wall receiver with a external steel receiver of 3.81 cm diameter and an internal copper pipe receiver of 3.5 cm diameter. Two sections of steel receiver were soldered before and after such compound-wall absorber.

A flow mass water of about 1 liter min^{-1} was permitted to go in when the compound-wall receiver was mounted on the parabolic trough concentrator. Under such circumstances when the parabolic trough was focused and the water started to go in, the deflection on the steel receiver was of the order of 6.5 cm, while the deflection of the compound-wall receiver was only about 1 cm; such deflections were always upward around noon when the concentrator is about in horizontal position on direction E-W.

References

Almanza R, Lentz A, and Jiménez G, (1997). Receiver behavior in direct steam generation with parabolic troughs, Solar Energy Vol. 61 No. 4 pp 275-278.

Jiménez G, Lentz A, Almanza R, Valdés A and Soria A, (1999). Thermal gradient variations on a steel receiver of a parabolic trough concentrator when a two-phase flow starts for DSG, Solar Energy (in press).

Valdés A, Almanza R, Soria A. and Mazari M. (1998). Mathematical model for direct steam generation in parabolic trough collectors with compound-wall receiver, Proceedings of the 1998 Annual Conference American Solar Energy Society pp 271-275.

Almanza R, Lentz A, Santiago L. and Valdés A. (1999). Some experiences on electricity production at low powers with DSG using parabolic troughs, Journal de Phisique IV, Vol. 9, France pp 229-232.