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Monthly Mean Daily Utilizability of South India

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Abstract

The level of solar irradiance is the principle input parameter of any solar apparatus or solar system. Flat-plate solar collectors are solar systems, which have been widely used for water heating by utilizing the level of solar irradiance. For optimum system design, it is necessary to examine the long-term performance of flat plate solar collectors. Utilizability is one of the design methods in designing hot water system by using solar irradiance. Utilizability is the fraction of long-term average radiation which is above the specified critical radiation level that can be collected by an idealized collector for which FR(ta) = 1. Utilizability correlations proposed by Klein (1978) and Collares-Pereira and Rabl (1979) have been based on data pertaining to US locations that are temperate regions. Generalized k curves developed by Liu and Jordan (1960) have been suspected for tropical locations (Saunier et al., 1987). It is necessary to find the applicability of Klein?s utilizability correlations for tropical locations. In South India, long-term data (five years) for four locations are concentrated to find the data based utilizability correlation and Klein?s correlation. The standard deviation and relative standard deviation are noted between data and Klein?s utilizability correlation. The results indicate that relative standard deviation between data and Klein?s utilizability correlation is less than 7% an average for all the months. Henceforth Klein?s utilizability correlation is advisable to find the monthly mean daily utilizability when data based correlations are not available for the locations in South India.