

Q.1 Solar Flat Plate Collector

1. Flat plate collector is simplest in design and it is most important part of any solar thermal energy system.

2. In this collector both direct and diffuse radiation are absorbed and converted into useful heat.

(a) Components of Flat Plate Collector

- (i) Absorber plate,
- (ii) Transparent cover,
- (iii) Insulation, and
- (iv) Box.

(i) Absorber Plate * \Rightarrow Absorber plate is used to grasp and absorb solar radiation.

2. The plate is useful metallic (Copper, aluminum or steel), sometimes plastics have been used in some low temperature applications.

(ii) Transparent covers \Rightarrow There are

one or more sheets made of glass for trapping the heat received by the absorber plate.

2. It helps in reducing the convective and radiative heat losses.

(iii) Insulation \Rightarrow It minimizes the heat losses by conduction.

(iv) Box \Rightarrow It contains the above components and keep them into desired position.

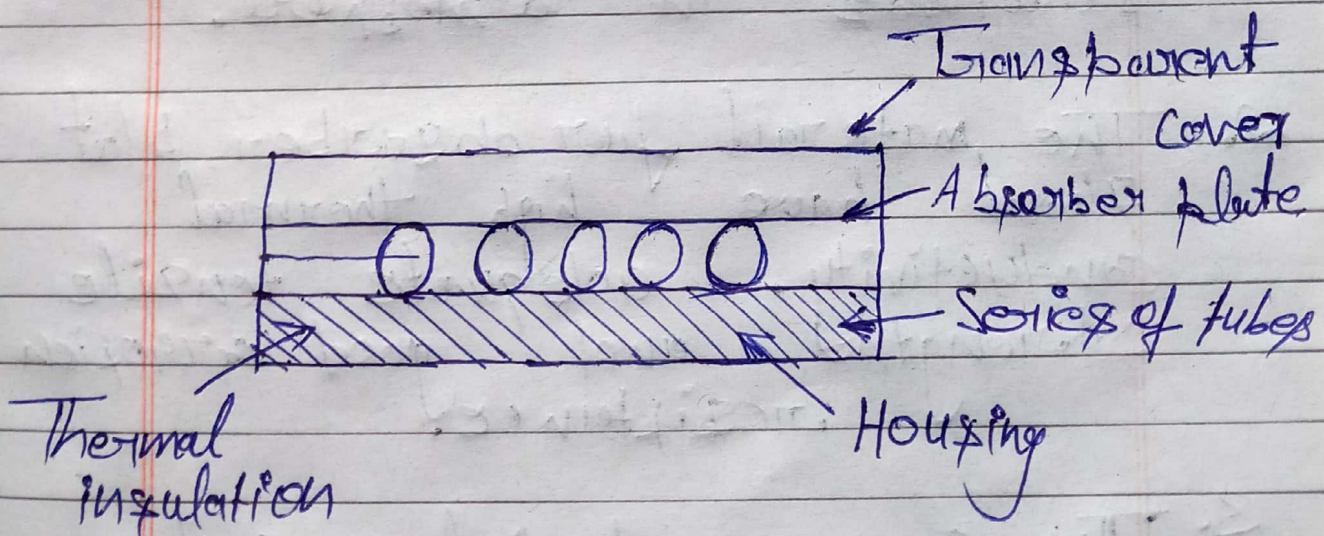


Fig. 2.12.1 Schematic diagram of a flat plate solar collector.

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Solar materials used for flat plate collectors.

1. The properties of the materials used for collectors can be classified as:

(a) Thermophysical properties such as thermal conductivity, heat capacity etc.

(b) Physical properties like density, tensile strength, melting point etc., and environmental properties like moisture penetration, corrosion resistance and degradation due to pollutants in atmosphere.

2. The material for absorber plate should have high thermal conductivity, adequate tensile strength and good corrosion resistance.

3. The common material used for absorber plate is copper because of high conductivity and resistance to corrosion.