

Godrej Refrigerator Manufacturing

General Information

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General Information on the company using solar thermal energy

Description of the company : Godrej & Boyce Mfg. Co. Ltd., is the holding company of the Godrej Group, started with the manufacture of high quality locks in 1897. Presently, they have 15 diverse business divisions offering consumer, office, and industrial products and services of the highest quality to every corner of India and across the globe. This plant is situated in Mohali and is manufacturing refrigerators of different capacities.

Type of Industry : Metal Manufacturing Unit

Location of the company and the solar plant : The solar system is installed at the location of:
M/s Godrej & Boyce Manufacturing Company Ltd
Plot No. A-40, Phase 8A
Industrial Area, Mohali
Chandigarh 160059

Heat demanding processes : The heat demand required for the plant on an average is for 8 hours. The heat generated by the solar system is used for performing certain quality assurance tests like Pull down test, Ice Making test, Compressor overload test and Voltage stability test at 440°C.

Conventional heat supply : 12 Infrared Light bulbs each of 250 watts were used for maintaining the ambient temperature of Quality Assurance room at 440 C. The system is used for heating 4 such rooms.

Conventional fuel used : No Fuel; Electricity was used for generating the required heat.

Motivation to use solar thermal energy : To decrease the cost in manufacturing process.

Description of the solar thermal system

Type of solar plant : It's an FPC based Industrial Solar Water Heating System with a storage tank of capacity 5000 litre. The system is generating the hot water which is used for generating heat for performing Quality tests on the manufactured products.

Year of installation : The SWHS was commissioned in January 2014.

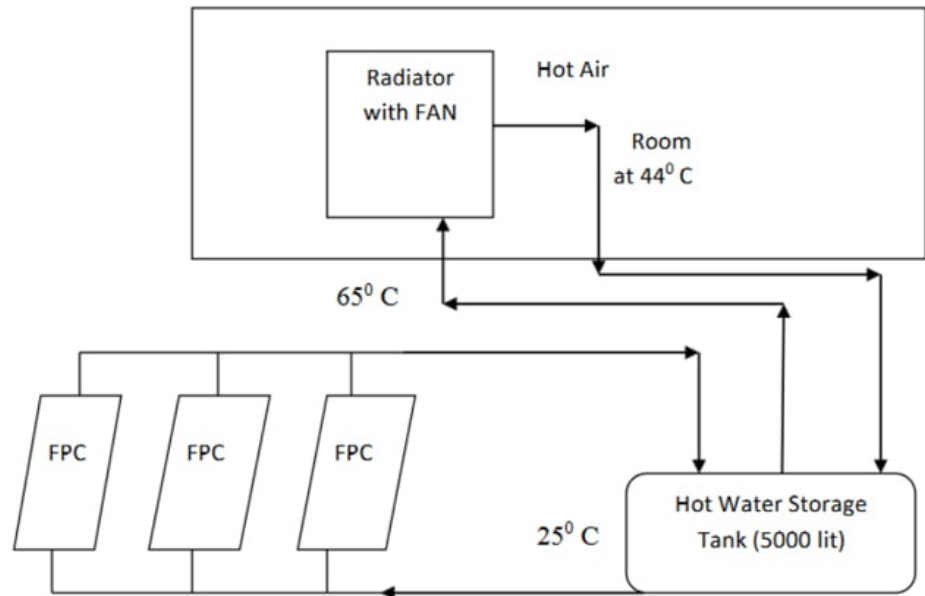
Solar collector field : The SWH System has 36 FPC collectors with a total collector area of 72 m² (@ 2 m² per collector).

Water storage : Collector arrays are connected to a water storage tanks with a volume of 5000 litre.

Hydraulics : The system is a closed loop system with a radiator.

Operation of the system : Water from the storage tank of 5000 litre capacity is recirculated using pump of 0.5 horse power (HP) capacity into the Flat Plate collectors where it gets heated and attains a temperature of 650 C. This water is then allowed to pass through a radiator with a fan attached to it which supplies hot air into the room. The required temperature in the room is 440 C. At this temperature several load tests are performed on the manufactured product (refrigerator).

Hydraulic scheme :



Supplier/ manufacturer of the solar system :

The solar system was designed, delivered and commissioned by:
M/s Akson Solar
42/1, Sahajanand Society
Gandhi Bhawan, Kothrud
Pune-411038
Tel: 020-25398771
Email: info@aksonsolar.com

Data recorded :

The plant is not maintaining any log books/ data.

Energy balance and economy

Heat demand :

The heat requirement in one room is on an average of 24 kWh per day (250 Watt X 12 X 8 hours) and 8760 kWh per year (considering 365 days of plant operation per year). Since there are 4 such rooms the total heat requirement is 96kWh per day and 35 MWh annually.

Solar radiation-on site :

The site receives an average annual solar insolation of 5.44 kWh/m²/day which means 1985 kWh/m²/year on horizontal surface. On collectors with an inclination of 30° the irradiation is about 1.13 * 1985 kWh/(m²*year) = 2,243 kWh/(m²*year).

Location: Longitude: 76.69 E & Latitude: 30.78 N

Source: NASA Surface meteorology and Meteorom

Useful solar energy delivery :

The solar radiation on the collector surface is 72 m² * 2243 kWh/(m²*year) = 160 MWh/year. Assuming a system efficiency of about 20%, the useful solar energy is about 160 MWh/year * 0.2 = 32 MWh/year, which corresponds to 88 kWh/day. The useful solar energy delivered by the SWHS per m² of collector is: 1.22 kWh/m²/day.

Electricity saved by solar energy :

The unit is saving around 88 units of power per day after implementation of this project. Assuming per unit of power is costing Rs 6 and the plant is running for 365 days, the net savings of the unit is Rs 192,720 per year.

Emissions saved :

Around 31.36 tonne of CO₂ are saved over a year period.

(Considering 32MWh of grid electricity substituted and taking Grid emission factor of 0.98 t CO₂/MWh for India, refer here)

Economy

Investment costs : The project is commissioned with an overall investment of Rs.11 lakhs, corresponding to Rs 15,277 per m² of collector area.

Subsidies : No subsidy is taken from Government or MNRE.

Economics of the solar system : The simple payback period is around 5.5 years without MNRE grant.

Experiences

Operation experience : Operation of the system is good.

Statement of the owner : Owner is satisfied about the operation and savings due to implementation of Solar Water Heating System.

Statement of the supplier/manufacturer : Supplier expressed his satisfaction about the operation of the system.
