

MNRE

Guidelines for installation of Solar Water Heating Systems in high rise buildings and multistoried flats

Solar water heating systems can be successfully installed on the terrace of apartment blocks in high rise buildings. However not, all apartment blocks are suitable for installing solar water heating systems. The important factors that may need to be considered while accessing the suitability of the solar water heating systems are as follows:

- i) Number of dwelling units or flats in the building.
 - ii) Number of bathrooms needed solar heated water
 - iii) Number of persons occupying the flats.
 - iv) Frequency of the requirement of hot water (whether on continuous basis or supply available at one time in the morning hours).
 - v) Whether hot water is required for any other purpose also (like washing, cleaning etc).
2. Depending upon the combination of above factors, solar water heating systems may be designed and sized to suit the requirement of the building. The building may be fitted with either a single system of adequate capacity meeting the hot water needs for all the apartments or different smaller systems supplying hot water to a group of flats. The thumb rule for calculating the requirement of hot water could be about 20 liters per person for only bathing and about 30 liters per person if used for bathing and washing. In general, it could be 100 liters per flat for two bed room, 200 liters per flat for 3 bed rooms in case individual systems are installed for each apartment. In case of a community system supplying hot water to various apartments, requirement may be increased to about 25% depending on number of apartments.

3. Both types of systems have advantages and some limitations as given below:

3.1 Single large system (Community type)

This type of system involves designing of a larger solar water heating system that provides hot water to the entire building. The system consists of a large storage tank and bank of solar collectors inter-connected through a pipe system. The hot water is supplied to the flats through a common pipe network.

The advantages of the system are:

- i) It is comparatively cheaper
- ii) It occupies less area on the terrace
- iii) It can take surges in the hot water demand
- iv) It is possible to have continuous hot water supply through a ring main system.
- v) Maintenance is simpler.

In this system the suppliers/ builders and developers, however, need to ensure the following:

- i) Equal hot water sharing among the inmates of the flat. Over sizing of system capacity could be one solution.
- ii) Maintenance and servicing of the system on long term basis, as the system is common to all apartments.

3.2 **Individual units:**

This type of system involves providing smaller units, of capacity just adequate for individual flats. Hot water pipe line is individually drawn for each flat. The advantage with this system is that each house will be independent with regard to hot water requirement and hence there would be no problem regarding sharing of hot water.

The shortcoming of this system is that individual system occupy more space on the terrace and hence may be not be possible to install systems for all owners in a building having large number of apartment blocks. Providing hot water at required temperature to lower flats may also be difficult due to longer pipelines.

4. **Possible options for installations**

The suitability of a common/individual type of solar water heating system may be decided based on the requirement and need of a particular building as each apartment will be unique and will have its own hot water consumption requirement. Community system may be preferred if hot water is to be provided to all the apartments and the building is of more than three storeys. Following options may be kept in mind while designing the systems for high rise buildings:

Individual Systems

- Installed at terrace for interested apartments, if it is less than 3 storied and space is available which is of common use to all apartments.
- Collector installed on south facing wall or in balcony of interested apartment and the storage tank installed in bathroom with water circulation in collector using a small pump of few watt capacity connected to a Different Temperature Controller (DTC). This is more possible for evacuated tube collector based system and in areas where frequent power cuts are not there. Shadow free space, however, needs to ensured during whole day particularly for lower apartments.

Community System

- Normal thermosyphon system with hot water pipe lines running to all apartment buildings having nor more than 7 storeys.
- System installed at terrace in closed loop arrangement alongwith ring main arrangement with motor installed at ground for circulation of hot water in

morning and to avoid wastage of water & ensuring hot water supply to lower flat also. Raised platforms may be used for installation of system if sufficient shadow free space is not available at terrace. This arrangement may be used for buildings with more than 7 storeys.

To ensure availability of required amount of solar heated water to all apartments, following options may be considered:

- a) System oversized by 25% as compared to individual systems
- b) System split into number of units with each unit supplying hot water to a separate wing of apartments.
- c) Each apartment provided with a separate storage tank (insulated) of designated capacity and installed inside at top of the bathroom. Hot water from the system allowed to drain for an hour in the morning to fill everybody's tank in bathroom & then stopped.
- d) Auxiliary hot water tanks of smaller capacities installed in middle floors with electronic control to heat water if required so that supply is quicker to lower apartments.
- e) Complete system/different units of the system have control panel connected with solenoid valves & water meters installed in line with each pipeline going to the apartment. This will allow the set amount of hot water to flow in a particular apartment. Operation of flow of hot water could be controlled by Automatic timer or a Manual valve.

In addition to above, following points maybe kept in mind while designing the systems :

- i) Shadow free installation area to the extent of 3 to 4 sq. meter per 100 lpd system should be available. Usually the space available for installation is on the terrace or on top of the terrace canopy/ cold water tank, wherein a platform may be required to be fabricated for installation.
- ii) Solar collector integration with building elements like pergola of south facing surface/ parapet wall or façade of south face side may be innovatively used if installation is planned during design stage of the building.
- iii) Non return vales may be installed at entry points in the bathrooms for hot and cold water pipes. This will avoid mixing of hot & cold water, if the mixing level is kept in the center.
- iv) Hot water distribution should be telescopic and diameter of distribution on pipe lines may be chosen keeping the number of apartment in mind so as to avoid unnecessary heat losses during usage.

- v) PPR pipes with required insulation may be used with the system to avoid corrosion and scaling effects. Pipes may be concealed if systems are being planned at the design & construction stage of apartments.
- vi) To avoid excess usage of hot water by any apartment, electronic control panel connected with solenoid valves installed in hot water pipelines going to the apartments may be installed.
- vii) It needs to be ensured that all the Apartments get required amount of hot water at specified temperature even during non-sun shine hours. Automatic electric heating of water in the main storage tank or in the additional smaller tank in bathrooms, therefore needs to be ensured.
- viii) To ensure hot water availability immediately on opening the tap during cloudy days even, an instant geyzer of 5 liter capacity may be installed in hot water supply live to each apartment. The geezer will be set at a particular temperature and will be on only if water at set temperature is available. In such a case electric heaters in storage tank of solar water heating systems will not be required.
- ix) Responsibility of maintenance and servicing of the system needs to be ensured throughout of its life.
- x) To avoid damage to the water proofing of the terrace and accumulation of waste material, solar collectors may be installed on a fabricated structure.

5. List of few manufactures/suppliers/consultants involved in installation of systems in multi-storey flats.

- i) M/s Emmvee Solar , Bangalore
- ii) M/s Tata BP Solar, Bangalore
- iii) Ms. Rashmi Solar, Bangalore
- iv) M/s Anu Solar, Bangalore
- v) M/s Bipin Enterprizes, Pune
- vi) M/s Kotak Urja, Bangalore
- vii) M/s Hykon India Ltd (P) Ltd, Trichur, Kerala
- viii) M/s Hitech Geysers, Bangalore
- ix) Ms. Atam Kumar, Noida, U.P.
- x) M/s Arsh Electronics, Delhi
