METHODS OF MOUNTING SOLAR COLLECTORS

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Annotation
When using solar collectors, it is necessary to pay special attention to their maintenance and service. The article shows how to install solar collectors on buildings. By properly installing the collectors, it was possible to increase the energy efficiency and extend the service life.

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Solar collectors are heat generating generators, and their correct and perfect installation and use in the standard composition allows it to work for more than 20 years.

The difference between the solar collector and other heating techniques is the permanent effect of the weather. There are several specific requirements for fixing it: they must be long-lasting, statically stable, lightning-proof, not affecting the structure of the building in its location, architectural design.
It is possible to install solar collectors of different appearance and structure on different roofs and sides of the building. Since the roofs in cottage houses are sloped, the collector is fastened parallel to the slope. The assembly can be fixed on the roof or on the structure in the attic. Before installing the collector on sloping roofs, it is necessary to determine the area where it will be placed. Correct choice of installation and fixing places of its supporting structures ensures its reliability.

When choosing a place to install the collector, shadows should not fall on the collector between the southeast and southwest, and the growth of trees in 20 years should also be taken into account. Depending on the type of roof, its costs are calculated differently and its technical and economic calculation is carried out. After the assembly is completed, all places where the supports are placed on the roof are hermetically sealed.

In high-rise residential buildings and industrial buildings, collectors are often installed on flat roofs. In this case, the collector is directed to the south and installed at the optimal slope, which is considered its achievement. At the first stage of the design, the installation possibilities are studied, the installation area is evaluated taking into account the distance from the roof edge and ensuring the reliability of the installation.

Figure 2. Effect of trees on collectors placed in the building.
The collector is attached to the support structures on a fixed or movable support. A moving support means that the collector moves a small distance under the influence of the wind. In addition, it is possible to move due to bending.

To prevent the collector from shadowing each other, it is necessary to place them at a certain distance. For this, it is necessary to determine the angle of the sun rising from the horizon. The shortest day of the year is December 21 at 1200 and is selected depending on the latitude of the region, for example, 11.50 in Germany, 16.20 in Ukraine. In addition, it is necessary to take into account the morning and evening shade in the area. The distance between the rows of collectors is calculated by the following expression:

$$\frac{Z}{h} = \frac{\sin(180^0 - (\alpha + \beta))}{\sin \beta}$$

here $Z$- distance between collector rows;

$h$- the length of the collector;

$\alpha$- angle of inclination of the collector;

$\beta$- the angle of the sun rising above the horizon.

The quality of the collector's work depends on its location. When placing the collector, it is necessary to ensure the correct slope angle. Sun rays falling on the collector should form a right angle as much as possible. In addition, the collector should be oriented in the direction towards the equator. Improper orientation will significantly reduce its efficiency (up to 25%). By installing collectors based on the above recommendations and calculations, we will be able to increase their efficiency.

References


