Solar Neighbourhoods
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A Guide to Roof Assessment for SDHW Systems

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Notes on Flat Roofs

Flat roofs are great for solar, because collectors can be mounted on racks at the optimal slope and orientation, but they are also the most difficult to assess for structural quality. They also create the greatest challenge to properly secure as the wind loading will be much greater on racks compared to collectors installed flat to the roof of a sloped roof.

Flat roofs are not visible from ground and it is hard to determine if there is proper drainage or secure fastening opportunities so an actual roof inspection is usually required.

A flat roof which puddles during rainy periods will eventually leak through any bolt which is driven through it. There are proper penetration systems for bitumen roofs but they are expensive and not very user friendly, especially for the novice.

The best idea is to find a location on the roof at the highest point for mounting the collectors but if the pooling is severe, the owner should be told and ideally the roof should be repaired with a proper slope (and possibly insulation) before the collectors go on.

Notes on Sloped Roofs

Typical sloped-roof shingles, although warranted for 20-25 years usually show signs of wear after 10-15 year.

Roofing Material Evaluation

Some signs of wear and deterioration are: curled shingle corners (more than 1”), loss of pebbles on shingles, shingles missing, and major cracks showing. Generally these characteristics mean that the roof has less than 5 years left. It should be recommended to the owner that the roof be replaced prior to the collectors being installed if showing serious signs of wear.

Roofs with one area which looks like the shingles are curling up or have lost their colour or pebbles compared to another area on the same roof indicates that there are localized moisture problems in the attic (disconnected bathroom vent, lack of air movement in that area of the roof, etc.). It is probable that the roof sheathing and possibly the joists have been compromised. It would not be recommended to put the collectors over these areas. The homeowner should be notified.

Internal Structure

All houses have rafters except for those which use a "truss" system. Rafters can be made from anything from 2"x 4" to 2"x 12" (although this is a bit rare). Rafters are placed in most cases on a nominal 300, 400 or 400 mm spacing.

If the roof ridge appears to have sagged (the middle of the ridge is lower than the two ends) it is probable that, at some time, someone removed the "collar ties" which make up the triangle of the roof and base of the triangle which is in the attic (or could be the ceiling of the top floor in smaller houses). This is already a less than ideal situation and collectors should not be placed on this roof until the problem is remedied.

A deflected ridge indicates a major twisting of the joists and possibly a disconnection of the bottom of some joists from the top plate of the wall (house settling over time can also create this issue). If an inspection of the joists from inside shows that everything is attached properly, it is probable that the situation has existed for a long time and the roof is stable. Collectors can be installed, though it may be an ordeal for the installers as the roof will not be straight and level. Trusses were introduced in the late sixties and most tract homes began using them in the seventies. They are traditionally spaced at 24" centres and the plywood used on them is often only ½" – 5/8" thick (3/4" plywood or lumber is standard for older houses). It is important that all attachments on this type of roof are placed into the truss or a bracketed within the roof.

Guidelines on How to Measure Roof Structure Elements

To determine if an individual roof's structure can withhold the weight of a solar system it is necessary to:

1. Develop a span table showing the acceptable roof structures that the solar can be installed on (size and spacing of rafters and rafter span) and;

2. Inspect the roof to verify the size and spacing of rafters and the rafter span under the proposed location of the solar system.

The following provides some recommendations on how the roof rafter elements may be measured.

Sloped roofs (attic accessible)

1. Measure the rafter size and spacing from the attic.

2. Measure the rafter span by either:
a. Tape measure in the attic
b. Tape measure on roof
c. By using the measuring tool on google earth

Flat Roof or Sloped Roofs with no Attics (i.e. cathedral ceilings)

1. Measure the rafter size by either:

a. Drill a pilot hole in a closet to measure the spacing between the underside of the roof and top of ceiling - this will be the size of the rafters. Use a long (i.e. 12") drill bit. Patch the hole.

b. Remove a ceiling electrical outlet box (i.e. ceiling light fixture) and measure the size of the rafter it is attached to.

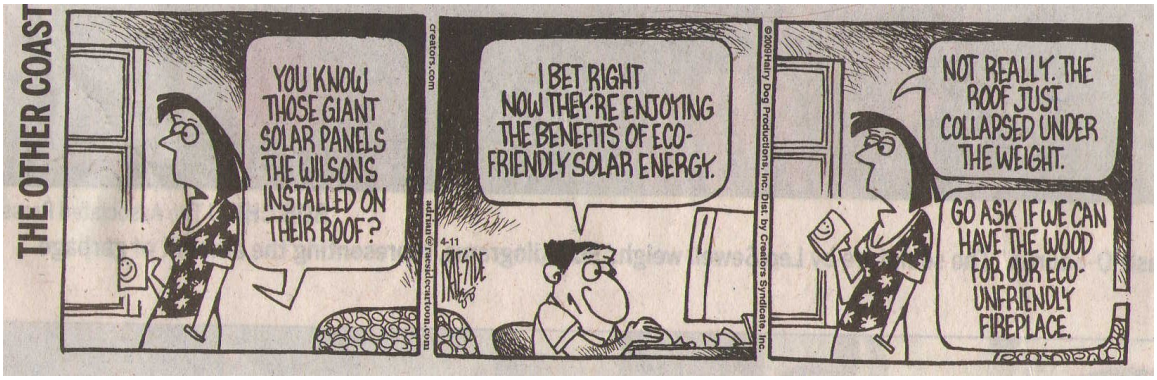
2. Measure the spacing of the rafters by use of a stud finder (on roof or from top floor)

3. Measure the rafter span by either

a. Tape measure on the roof

b. By using the measuring tool on google earth

Don't Make a Comic Strip Reality! Inspect your Roof for Suitability for Solar



add ons

If the roof has a closed or blind soffet (enclosed rafters not visible at roof edge), the nailing pattern along fascia board (board attached to ends of rafters) may indicate the rafter location at the bottom edge of the roof