

SUPPLEMENTAL INFORMATION ON COLLECTOR DESIGN

TO HELP YOU CUSTOM DESIGN YOUR OWN

Air Channel Dimensions

Baffle dimension is determined by figuring the number of square inches of your stovepipe. Do this by measuring the radius of the circle---for 6" stovepipe the radius would be 3". Multiply the radius times 3.14 to get the total square inches of the stovepipe circle. For a 6" stovepipe, $3 \times 3.14 = 9.42$ square inches. To create just the right space inside the collector air chamber, and to size the baffles, the dimensions of the air space as seen from the side should equal 9.42 square inches.

Mounting Glass

If you choose to install the collector by assembling it horizontally on sawhorses, you may want to install the tempered glass using the wooden wedge mentioned, approximately 6" long tapered to about a $\frac{1}{4}$ inch thickness on one end. One person should slide the wedge under glass edge to lift slightly. Second person uses caulk gun to lay bead of the high temp caulk about 1/2" wide exactly under edge of glass, and follows the person with wedge all the way around the collector, taking care not to shift glass out of alignment.

[Figure 8]

For the horizontal assembly, allow caulk to dry flat at least overnight before lifting collector into place and securing to angle brackets or other framework to either set up collector panel at an angle* facing south, or, possibly secure collector to south wall of home. Line up stovepipes with previously prepared holes into crawl space, and connect stovepipe to carry heated air to coldest end of the house, or farthest distance possible from the collector. Remember to connect fan to the collector so it will pull air through the collector and push it into the crawlspace.

[Figures 1, 5]

Radiant Barrier

There are other brands of thin radiant barrier insulation for skirting the trailer, besides Prodex and Radiant Barrier. They vary in insulative value and in cost. We have some information on these.

Collector *Angle

There is a formula for the angle which maximizes solar gain in the winter and minimizes the overheating of collector in the summer.

The idea when tilting a collector is to have it point directly at the sun during the time of year that you want the most heat output. Space-heating collectors can be mounted vertically with minimal losses in wintertime heat gain.

Most of the collectors built in the San Luis Valley (Alamosa, Colorado, area) are mounted vertically against existing walls and are used primarily for space heating. For this, the vertical mount has some definite advantages. It is self-shading during summer, requires little additional insulation on the back, collects solar energy reflected off snow and ground, is close to point of

use, is easier to build, the glazing stays cleaner, it does not alter the building's appearance as much.

However, if for some reason you cannot mount vertically against an existing wall, you may want to build a mounting separately or on your roof, or in your yard, and you will wonder about tilt angle.

Collectors designed for space heating only should be aimed more directly at the low winter sun or at an angle from the horizontal equal to the latitude plus 15 degrees. They will still collect a lot of heat during the summer but will have peak performance during the heating season. However, sometimes it is desirable to increase the tilt angle to lessen the heat gained in the summer and avoid having to vent or cover the collector at that time. A variance of up to 15 degrees from the optimal tilt angles will make very little difference in overall performance.

If your existing roof is close to the correct angle, it is usually more cost-effective to mount the collector directly on it rather than build up the roof to accommodate the collector. When dealing with collector tilt, as well as with orientation, "good" is often better than "best" when structural, aesthetic and cost advantages are all considered.

In summary, if all the cost factors are considered, vertical mounts are usually superior to tilted ones in terms of Btu's delivered for dollars spent, in space-heating applications, and they are especially attractive if you are considering building a small system. However, if you decide to tilt, you now have some how-to- calculate information here.

Blower Sizing

The 130 CFM blower we recommend in this packet will work perfectly for the collector described in this packet, $24.6 \text{ square feet} \times 5 = 123.0 \text{ CFM}$. Other size blowers are of course available. We recommend calculating 5 CFM per square foot of collector for our altitude. This is just right for heating a subfloor area to transform a home's floor into a radiant heating surface.

The standard calculation for airflow for a 50 degree temperature rise at 7,500 feet above sea level is: 3.5 to 4 CFM per square foot of collector. However, a slightly higher velocity airflow is more efficient at "scrubbing" heat off the back of the absorber plate. (The greater the heat difference between the absorber and the air, the greater the rate of heat transfer.)

This packet calls for an AC blower, but if for some reason you are working with DC current, you should know you can inadvertently hook up the motor on a DC blower so that it rotates in the wrong direction. The system will seem to be working, but working very poorly. Several "experts" have made this mistake and been confused for days before switching the wires to the motor.

If you build a collector larger than the example in this packet, you will need glass supports made of Paintlock or Galvalume where the sheets of glass come together. As to the glass supports, if they are shortwise on the collector, single u-shaped supports as in the diagram is fine. If the

glass is 76", then the extra stiffness provided by pushing one support into the other to form a more rugged square-shaped support would be desirable, but not necessary. One pop-rivet at each end is good for them.

[Figure 10]

Absorber Plate

If you plan to build a larger collector and need to join two sheets of absorber plate, see attached diagram. Put silicone in the joining strip, push it on, crimp it with pliers, and put 3 or 4 screws through it from the side. This will serve to stiffen the whole plate.

[Figure 11]

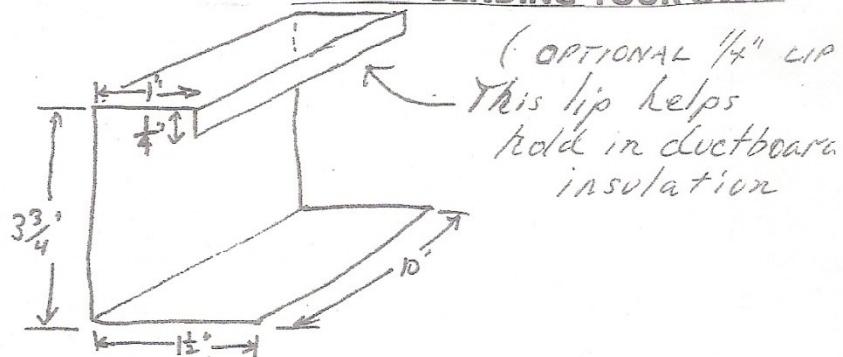
Or you may wish to build two collectors side by side and pull air from both with one single larger blower, sized using the formula above.

For the absorber plate c-channel supports use 3/4" hex head self-drilling screws as for sheet metal ducting. 1/2" would be nice because they wouldn't protrude through the OSB, but they don't have threads all the way also, so we prefer the 3/4". For the absorber supports, you need 1-5/8" to get through the ductboard and the OSB. We use sheetrock screws for this.

FIGURE 9 CROSS SECTIONS OF CHANNEL TRACK IF BENDING YOUR OWN

Perimeter Track:

24 gauge
"Paint-lock"



Baffle Track:

24 Gauge
"Paint-lock"

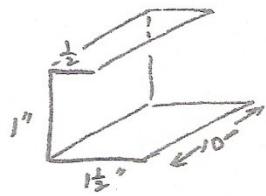


FIGURE 10 CROSS SECTIONS OF GLASS SUPPORTS IF BENDING YOUR OWN

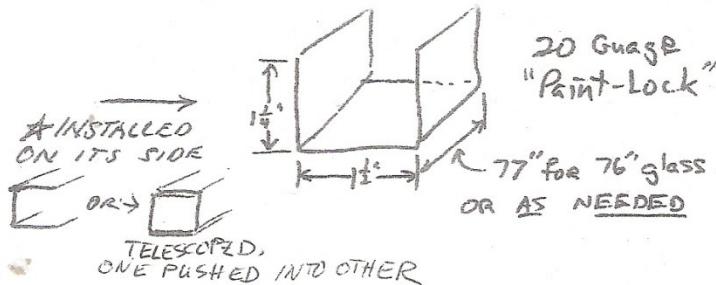


FIGURE 11 ABSORBER JOINTS IF JOINING TWO ABSORBER PLATES

