

Contents

An Alternative TrickleDown Absorber	3
Recommended tools:	5
Materials:.....	6
Absorber Cutting List:.....	7
Assembling The Frame:	8
Cutting the Roofing to size:	8
Assembling The Trickle Tube:.....	16
Cutting and Installing the Acrylic Felt:.....	17
Applying the Mylar Inner Glazing:.....	19
Mounting the Trickle Tube Assembly:.....	22
Photos of completed absorber:.....	23
An Alternative Collector Frame:.....	25
The Materials and Tools Needed:	26
Cutting the Steel Rail to Length:.....	28
Assembling the Collector Frame:	31
Attaching the SunTuff Outer Glaze:	34
Making and Installing the Drain:	36
References:.....	38

Cost Estimate Table: 38

Notes on material selection: 39

Material Suppliers and Part Numbers: 40

 McMaster-Carr 40

 Home Depot - <http://contractorservices.homedepot.com/> 40

 Dick Blick Art Supplies - <http://www.dickblick.com/> 40

 Artist & Craftsman Supply – <http://www.artistcraftsman.com/> 40

 Tuff-R Insulation 40

An Alternative TrickleDown Absorber

By: Richard Heiliger

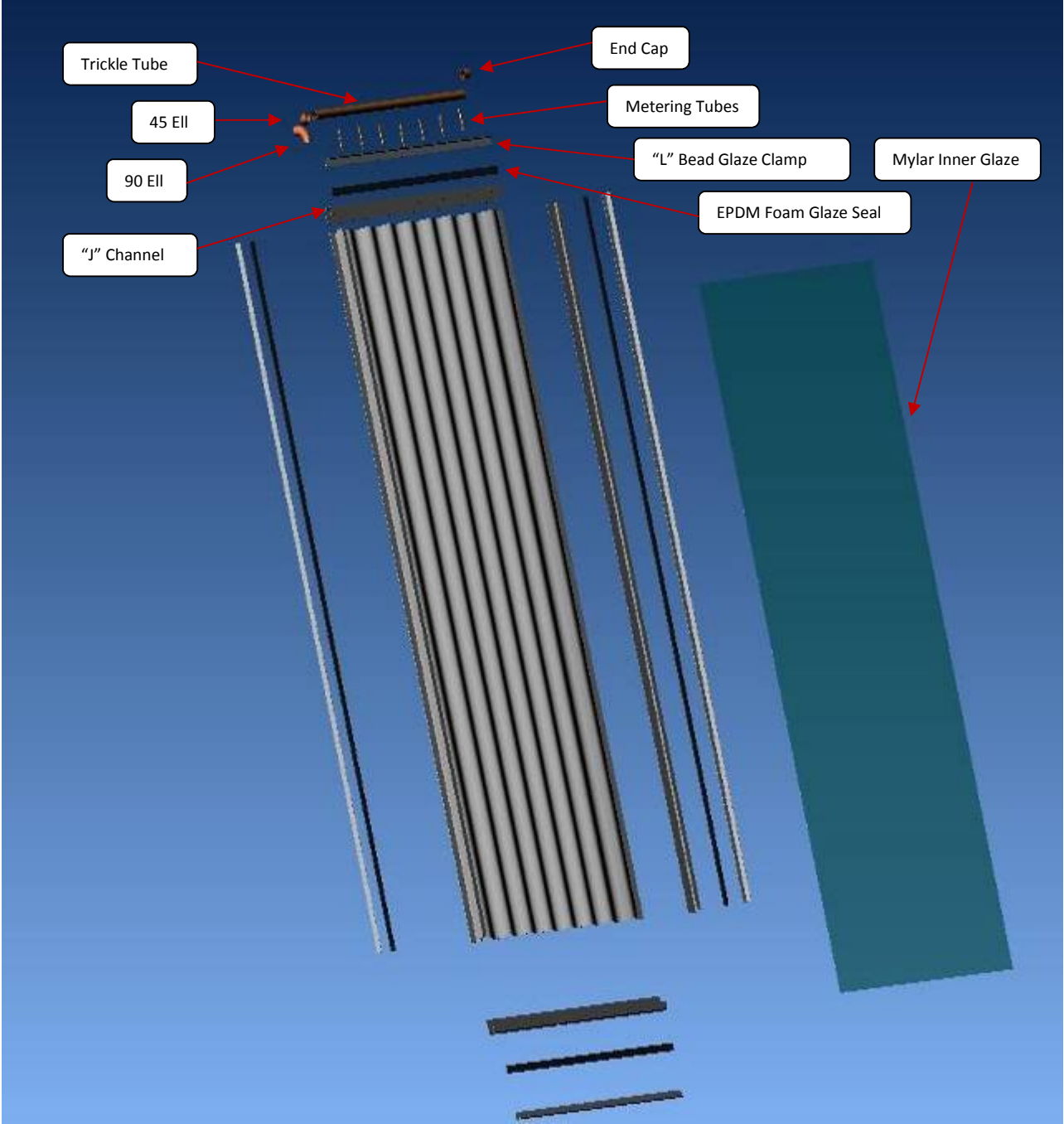
In this section I will describe an alternative to the “Trickle Down Mat” (TDM), that John Canivan uses in his Trickle Collectors. Material selection was based on surviving high stagnation temperatures, and likely increasing the longevity of the unit. The costs are higher than the TDM and it must be site built, as the shipping costs would be very high. Since John sells his TDM premade and shippable in a small mailing tube, it offers the builder considerable time and money.

This is a step by step pictorial of the tools, materials, and assembly of a trickle down absorber frame made from galvanized steel roofing, drywall “J” end cap and “L” bead corners. The assembly is pop riveted together and sealed with “Gutter Seal”, commonly used in sealing gutters for the home. Acrylic felt is adhered to the galvanized steel roofing to distribute the water evenly over the surface. An inner glazing of Mylar applied to this frame prevents water vapor from condensing on the outer “Sun Tuff” glazing, resulting in heat loss and degradation of the polycarbonate “Sun Tuff”.

Most anyone with some basic DIY experience should be able to construct this absorber with a minimal learning curve. I would recommend that the experience of one unit be completed prior to going into mass production. Minimize the total number of errors? If you are not familiar with sheet metal fabrication, buy a good pair of gloves to minimize the use of the first aid kit.

Following the steps in the sequence outlined is the most efficient way to assemble the unit.

Exploded Cad Rendering of Absorber.



Recommended tools:



- Drill
- 1/8" bit
- 1/4" bit
- Power Screw Driver
- Hex bit for sheet metal screws
- Machinists Square
- Sharpie Marker
- Tape Measure
- Sheet Metal Shear
- Hack Saw and or Tubing Cutter
- Pop Rivet Gun
- Propane Torch
- Solder, Flux, Pipe cleaner for copper pipe
- Caulking Gun
- Long Straight Edge
- Scissors and/or Rotary Cutter

Materials:



- 1 - 26"x96" Corrugated Galvanized Roofing
- 2 - 10' Drywall "J" Channel
- 2 - 10' x 1/2" Drywall "L" Corner Bead
- 1 - 10'x1/2" Copper Pipe
- 1 - 1/2"x45 Copper Pipe Ell
- 1 - 1/2"x90 Copper Ell
- 1 - 1/2" Copper End Cap
- 1 - 12" 1/8" Brass Tube
- 1 - 100cnt Box 1/8" Pop Rivets
- 1 - 100cnt Box #8 Sheet Metal Screws
- 20' 1/2" Double Sided Neoprene Foam Tape
- 9' x 40" 3mil Mylar or Polyester Film
- 7 - 1/8" x 1/4" Rubber Grommets
- 4 - Nailing Mounts for 1/2" Copper Pipe

Absorber Cutting List:

Part	Material	Length	Width	Quantity
Roofing Panel	Galvanized Roofing	96	23 1/2	1
Side "J" Channels	Drywall "J" Chanel	96	N.A.	2
End "J" Channels	Drywall "J" Chanel	23.5	N.A.	2
Side "L" Bead	Drywall "L" Corner Bead	96	N.A.	2
End "L" Bead	Drywall "L" Corner Bead	23 1/2	N.A.	2
Water Dispersion	Acrylic Felt	96	24	1
Mylar Seal	EPDM Foam Tape	As Needed	N.A.	N.A.
Inner Glaze	Mylar	10 feet	N.A.	1
Trickle Tube	1/2" Copper Pipe	23		1
Trickle Feed Tube	1/2" Copper Pipe	93		1
Metering Tube	1/8" Copper Tube	1 1/2		7

Assembling The Frame:

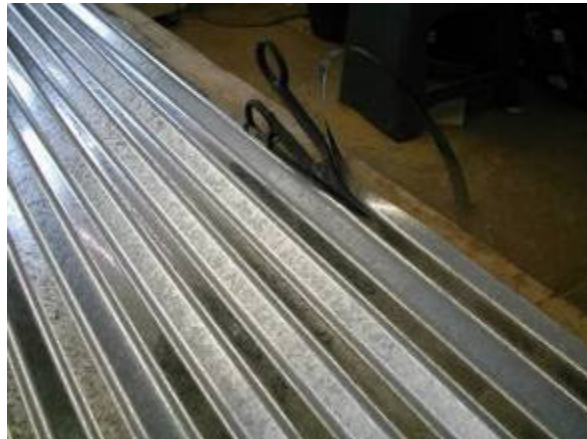


Cutting the Roofing to size:

Since the roofing is 26 ½" wide and the inside dimensions of the frame it needs to fit into is 24", the roofing needs to be cut narrower.

Using a machinists square mark a line to cut 1 ½" in from each edge. Removing an equal amount of material from each side will keep the corrugations centered in the collector.

Use a sheet metal sheer to cut off the 1 ½" from each side. This leaves a 23 ½" wide sheet. A clearance of ¼" on either side to allowing the unit to drop easily into the main frame of the collector.



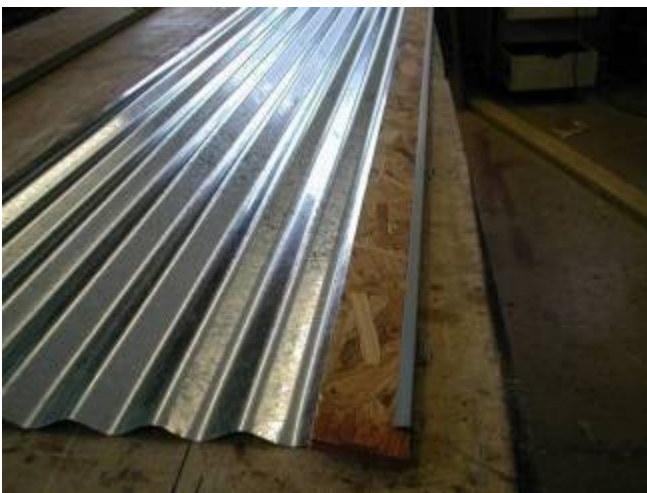
Cut a wedge off the bottom. I cut a triangle off the bottom to match the slope of the drain gutter it will be inserted into. Using a ¼" per foot slope, that would mean marking ½" up what will become the high side of absorber. Mark down to the opposite corner. This ensures the absorber will seat down into the bottom of the gutter.



To remove a bit of the bend in the corrugation next to the edge, Use a piece of hardwood on edge, and slide board along and hammer the bend a bit more flat. This will allow the “J” channel, attached in the next step to sit square.



Flush a length of “J” channel with one end of the roofing, mark and cut to length. Do one for each side of the roofing.



Slide the “J” channel along with a length of ½” thick wood strip over the lip of the roofing. Shown top side up in this photo. The top side of the roofing will have a valley in the very middle. Flip this over on the table to allow drilling from the bottom side. Place the wide flange of the “J” channel toward what will be the bottom of the absorber.



Mark 1 ½" in from each end on the "J" channel then mark on 6" intervals down the rest of the channel. Set the machinist square at ½" and mark the position of the holes for the pop rivets. I prefer to mark than to guess. Showing the bottom side of the absorber, with the wide flange of the "J" channel being marked.

Drill 1/8" holes for the pop rivets at the positions just marked. Be sure the wood strip is in position and that you drill thru both the "J" channel and the roofing. I use a couple clamps to hold the roofing and wood strip completely seated into the bottom of the "J" channel.



Before completely removing the wood strip, put a pop rivet in each end hole, and one in the middle. Then complete putting in all the other pop rivets. Be sure to get the rivet thru both the "J" channel and the roofing before clinching the rivet. Repeat for opposite side.



What the absorber should look like at the completion of the previous steps.

Beginning to lay out the hole positions for the trickle tube. I found it simplest to drill the holes in the trickle tube and the same time as the holes in the "J" channel that forms the top of the absorber frame.



Cut off 22" of $\frac{1}{2}$ " copper pipe for the trickle tube. Lay it across the top of the roofing. Set the 45° and 90° copper ells in position as shown. Put a mark on the trickle tube at the bottom of each valley of the roofing. This is where the metering tubes will be soldered in. Mark and cut off the trickle tube just past where the last metering tube will be. Allow enough for the cap.



Cut a 23 ½" long piece of "J" channel from the remaining length cut off for the side channels. Position at the end of roofing, flush to the outside edges, of the side channels on both sides. Again, put a mark on the "J" channel at the bottom of each of the 7 middle valleys of the corrugated roofing.



Write "ELBOW" on the elbow end of both the "J" channel and trickle tube so that they can be properly oriented in this step.

Slip the trickle tube into the channel as shown. Align the marks on the channel and trickle tube. They will be drilled as a matched pair. This way there will be no problems aligning the metering tubes to the holes in the channel that caps the top of the absorber.



Clamp the tube and channel on the edge of a table as shown. This keeps the trickle tube and channel aligned while drilling the holes.



Drill all holes 1/8" thru both channel and trickle tube. Be sure to only drill thru only one side of the trickle tube.

Remove the trickle tube from the channel. Re-drill the 1/8" holes in the channel to 1/4". The outside diameter of the grommets that will go into these holes is 1/4". The grommets seal the metering tubes into the channel. The grommets also prevent wearing holes in the metering tubes, and provide isolation between the steel and copper, preventing galvanic corrosion.



You can now put the top channel in place. From the bottom drill 1/8" holes in each end and pop rivet thru both overlapping channels and the roofing. Put additional rivets thru the channel and the roofing where the valleys in the roofing meet the channel, as shown in photo. This photo is of the bottom of the absorber.

Make another channel for the bottom of the absorber with 1/4" holes drilled the same as for the top, but add two more holes. One on each end, near the ends, to allow drainage of the very outside of the absorber, near the side channels.

Make another channel for the bottom of the absorber with 1/4" holes drilled the same as for the top, but add two more



This is what the inside of the absorber should look like at the completion of the above steps. Both ends will look the same.

With the caulking gun put a heavy bead of "Gutter Seal" along the joints between the "J" channel and the roofing. Both sides and top and bottom. Put an extra heavy lump in all corners as this is the only likely leak point. Using a half inch acid brush wipe the beads of Gutter Seal well into all the seams. The sealant sets quickly. So, do one side at a time, wiping right after applying the sealant.



Gutter Seal has a very strong odor and would recommend it being applied outside or in a very well ventilated room with no open flame or pilot lights for furnace or water heater being lit. Try to leave the holes in the top and bottom channels as open as possible.



Insert the grommets into the holes in the top channel while the Gutter Seal is still a bit soft. Run a 1/8" rod thru the grommets to make sure the holes are free of Gutter Seal.

Now let this assembly sit for a few hours while the Gutter Seal sets up. Overnight is what I recommend.

Assembling The Trickle Tube:



Cut seven Metering tubes 1 1/2" long from the 1/8" brass tube. Insert a 1/4" rod into the trickle tube, to act as a stop when inserting the Metering tubes. Slide a Metering tube into each of the seven holes drilled in the Trickle Tube. If they are a bit tight, a very light tap with a hammer will seat them down against the 1/4" rod. Leave the rod in while soldering the metering tubes to insure they do not slip further into the Trickle Tube.

I soldered the metering tubes then soldered the 45° and 90° Ells onto the Trickle Tube, making sure that they were at the correct angles. Then, soldered the cap on the other end. Try to leave an extra bead of solder around the metering tubes. There is not much surface area for the solder to grab onto. I would recommend brazing the metering tubes into the copper pipe for a stronger joint.



Completed Trickle Tube with feed tube added to the left side. Since most of the feed and trickle tube are exposed to the sun, they are painted flat black. A little preheating of the feed water.

Run a 3/32 bit thru the metering tubes after soldering to ensure no solder is blocking the tube. This also removes any burrs that formed when you cut them to length.

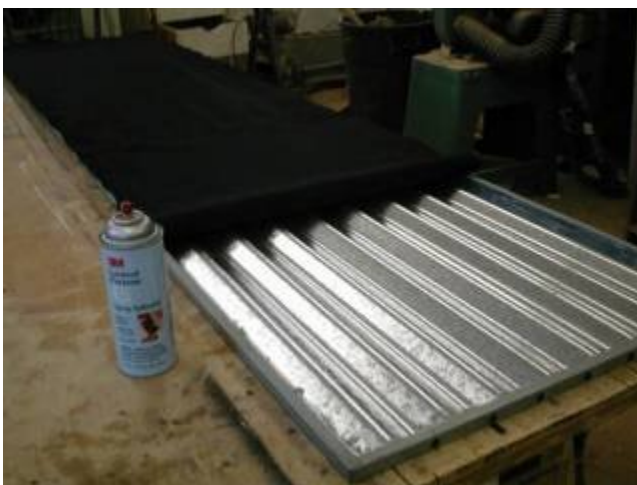
Also, do a pressure test to ensure no leaks, prior to installation.

Cutting and Installing the Acrylic Felt:



Lay out the felt on a table to cut it to size. The felt comes 36" wide. Cut off a length a little over eight feet.

Cut this piece 24" wide. Keep the 12" you just cut off. You can use two 12" wide pieces in one of the next absorbers you build. Use an 8' long scrap of straight board as a straight edge. Use a circular fabric cutter to zip along the edge of the board to make a nice even cut.



Lay the felt out evenly over the absorber frame. Fold back one end about two feet. Spray the exposed two feet of roofing with a good brand of spray glue. Then roll the felt back into the wet glue. Starting in the center wipe the felt into the glue and into the valleys of the roofing, then move out one row of corrugations and press it down. Repeat till at the edge. Tuck any little extra

felt down under the lip of the "J" channel.



Now fold back the other three fourths of the felt back over the two feet you just glued down. It is easier to glue the felt down a couple feet at a time. It also seems to work better if the glue is still wet when the felt is pressed onto it. Spray the next two feet. Fold the felt down onto the wet glue. Again, starting in the center, press the felt down into the glue with the flat of your hand, working your way from center to the outside. Repeat until you reach the other end of the absorber.

When you reach the end trim off the excess. Tuck the end under the “J” channel.



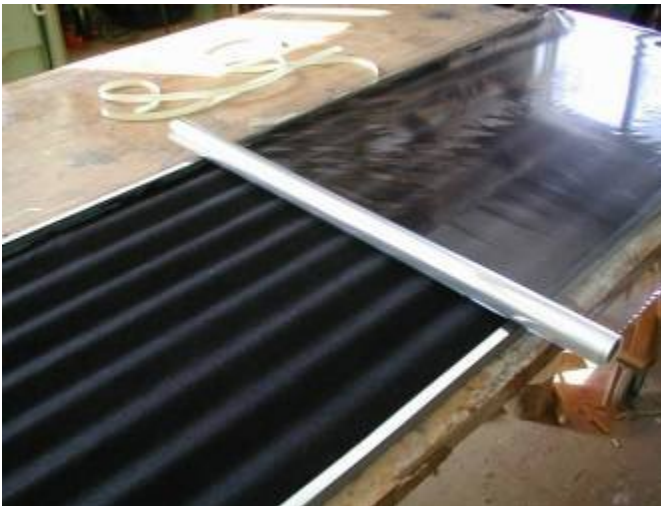
This is what the absorber should look like after gluing the felt onto the galvanized roofing.

Applying the Mylar Inner Glazing:



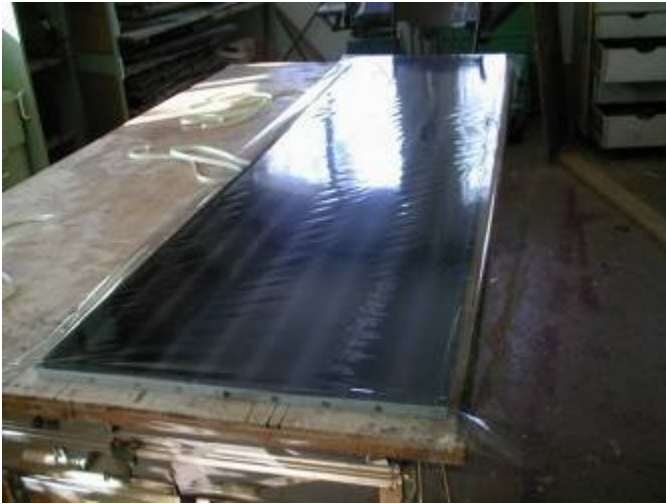
Stick the 1/8" thick, 1/2" wide double sided neoprene tape to the top of the "J" channel, around the entire perimeter of the absorber. Be sure to very slightly overlap at the corners to ensure a complete vapor proof seal between the frame and the Mylar.

Remove the paper backing from the foam tape on half of the absorber. Roll out the Mylar from the opposite end to just before where you removed the paper backing from the tape. Straighten the Mylar and make sure it is straight with the frame. Carefully roll the Mylar onto the sticky tape all the way to and past the end of the frame. With a scissors cut off the roll of Mylar a foot or two past the end. Do not use a knife, it will allow the Mylar to tear.



the frame.

Using the roll of Mylar, roll the other end of the Mylar back onto the roll. Roll back until you are back to where the Mylar is already stuck down. Remove the paper backing from the other end of the frame. Then roll the Mylar back onto the sticky tape to the other end. This will leave you with a nearly wrinkle free film of Mylar on



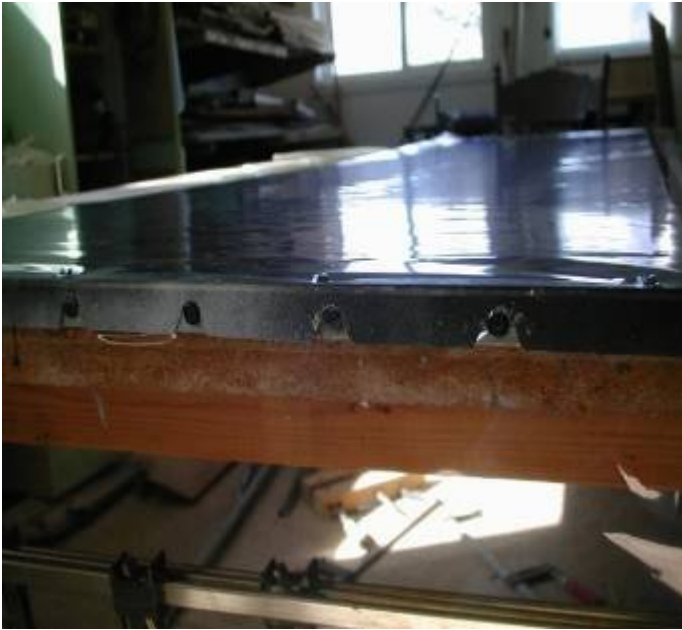
This is what the absorber should look like at this point.

Mylar is pretty strong, but minor holes or tears will allow it to tear very easily. Be very careful not to puncture or tear the Mylar. Any hole will eventually propagate across the entire sheet. If you do put a hole in it you must start over with a new sheet. The double sticky tape will likely need replacing as well.

Cut two 23 ½" lengths of the "L" bead. Mark the centers of the holes for the Metering tubes. The "L" bead has a ½" lip and a ¾" lip. The ½" lip is to be the top. Measure up about 3/8" from what will become the bottom of the "L" bead. Drill a 1/8" pilot hole and drill it out to 3/8", to fit around the grommets for the metering tubes.



Cut another 23 ½" length of "L" bead for the bottom of the absorber, and drill the 3/8 holes to allow the drain holes in the bottom of the frame to show thru, and allow the water to drain. Check to make sure that the drain holes have not become clogged with Gutter Seal.



I cut "V" shapes in the lip of the "L" bead to make it a bit easier to screw the bead onto the frame. I used the #8 x 1/2" sheet metal screws and a power screwdriver to put in the screws. Be extremely careful not to let the driver and screw to slip. Remember a slip and a hole means starting over. I use a two handed grip with fingers wrapped around the screw and driver bit. Also, only put screws in where the roofing panel has dips. Putting a screw thru where the roofing panel meets the channel will result in a hole and a leak. Apply the "L" bead to the bottom of the absorber as well.

Use two lengths of the "L" bead to secure the outside edges of the Mylar to the frame. Mark out 6" increments along the "L" bead. Make sure the "L" bead is pushed up against the edge of the channel. I put a screw one inch from each end, then one in the middle. Put in the rest of the screws on the 6" interval.



Mounting the Trickle Tube Assembly:



I used nail up type clips for ½" copper tube to mount the Trickle Tube assembly to the absorber frame. Remove the nails and drill out the nail holes to fit #8 sheet metal screws.

Slide the Metering tubes into the grommets. You can see the Metering tube in the upper right of this photo.

Note that by using this method the trickle tube may be easily remove for cleaning any debris from the metering tubes.



Remove one of the screws holding the "L" bead and screw one of the clips in place of the screw removed. Choose a length of screw that will just barely go thru the "J" channel and not thru the bottom of the absorber frame. Using too long a screw will result in a leak. I used 3 clips, one at top and bottom. The other centered on the frame.

Photos of completed absorber:

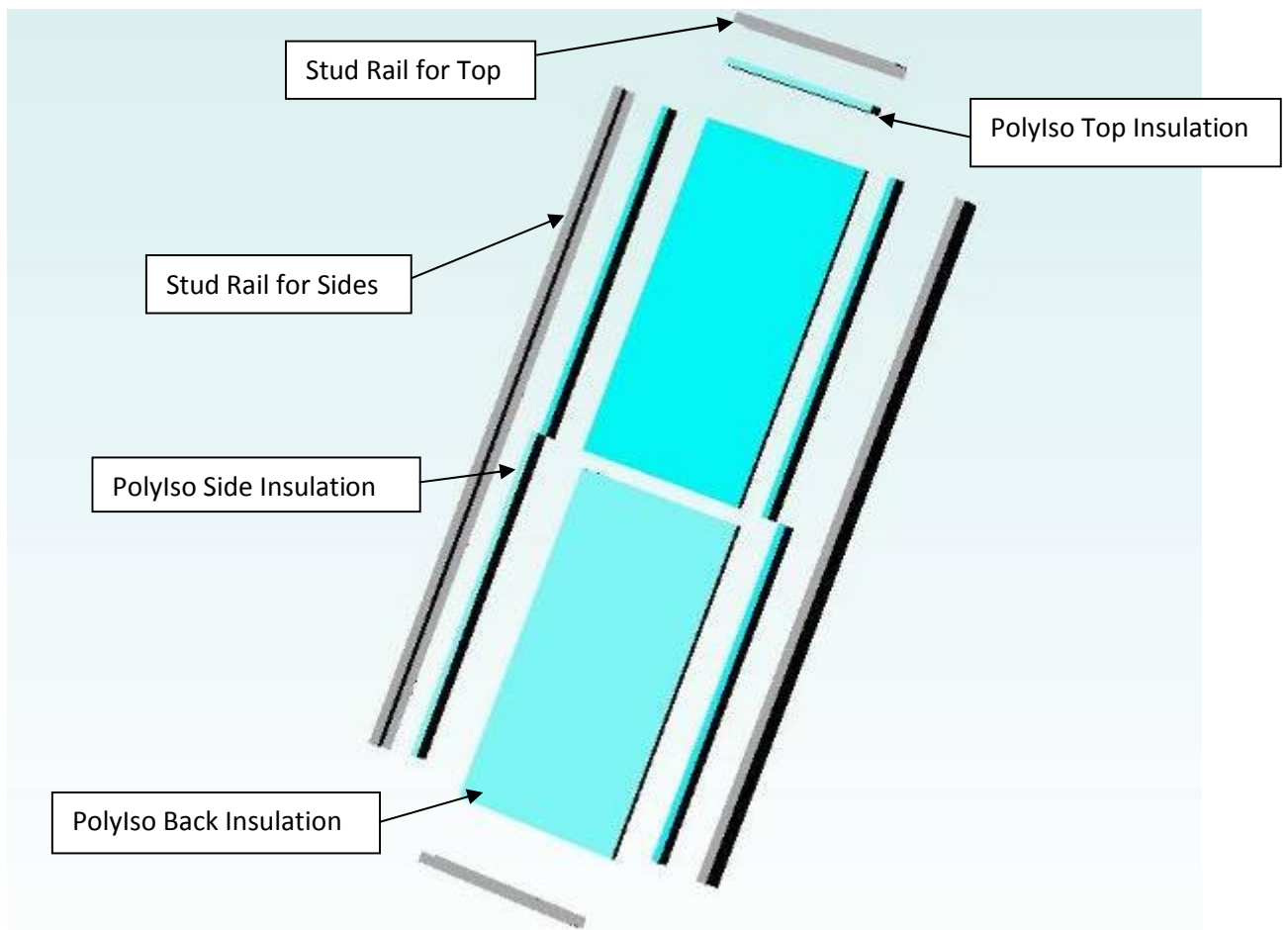




An Alternative Collector Frame:

This collector external frame is made from galvanized Steel Stud Rail. It uses no wood framing components other than a thin strip to act as a side seal for the Sun-Tuff outer glaze. A stiff foam weather strip may be substituted for the wood strip.

Exploded view of the components used to assemble the frame. See Cutting List for proper dimensions



The Materials and Tools Needed:

Tools:

Circular saw
Power Screw Driver
Square
Sheet Metal Shear and/or Aviation Snips
Tape Measure
Sharpie Marker

Materials:

Steel Stud Rail
Angle Brackets
Sheet Metal Screws
Tuff-R Insulation Board
2" ABS Pipe



Cutting List:

Cut the Top, Bottom, and Sides from the 10' lengths of Steel Stud Rail.

Cut the PolyIso Parts from 4' x 8' sheets of Tuff-R.

You will need three sheets of Tuff-R to make two collectors.

From each Tuff-R sheet cut off three 26" x 48" panels for the Back Insulation.

Cut the remaining 18" x 48" piece into six 2.5" x 48" pieces for the Side and Top Insulation.

Cut one of the back panels to 46" in length for the Lower Back Insulation.

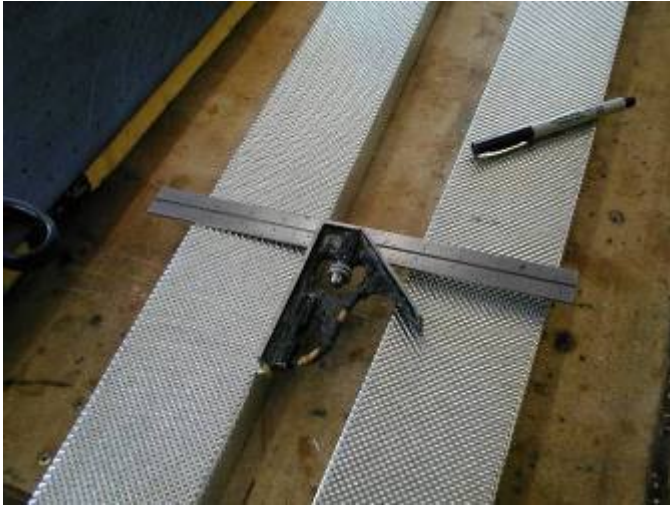
Cut two of the 2.5" pieces to 46" in length for the Upper Side Insulation.

Cut one of the 2.5" pieces to 24" in length for the Top Insulation.

Part	Material	Length	Width	Quantity
Top and Bottom Rail	3 5/8" Steel Stud Rail	26"	NA	2
Side Rail	3 5/8" Steel Stud Rail	94"	NA	2
Top Insulation	1" Tuff-R PolyIso	24"	2.5"	1
Upper Back Insulation	1" Tuff-R PolyIso	48"	26"	2
Lower Back Insulation	1" Tuff-R PolyIso	46"	26"	2
Upper Side Insulation	1" Tuff-R PolyIso	46"	2.5"	2
Lower Side Insulation	1" Tuff-R PolyIso	48"	2.5"	2

Using these dimensions will result in a frame that is 26" wide and 94" long. If you made the Absorber 96" long it will protrude out the slot in the bottom by about 4". When making the Absorbers allow for the required 1/4" per foot slope the drain gutter must have. For example, the Absorber that will be next to the drain will be the full 96". The next one will be 95 1/2" long, the next 95", the next 94 1/2". In this design I do not recommend more than 4 collectors being drained by a single gutter.

Cutting the Steel Rail to Length:



Measure up 26" on both lengths of stud rail. Mark square lines to cut on across top and sides.



Measure up the length of the Tuff-R 26" and clamp a straight edge in place to guide the saw. Cut off three 26" x 48" pieces from the 48" x 96" sheet of Tuff-R.

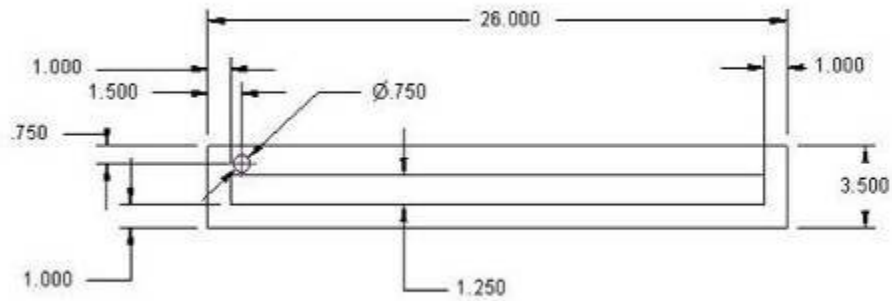
You will end up with three 26" x 48" pieces and six 2.5" x 48" pieces of Tuff-R.

This allows three sheets of Tuff-R to make two collectors.

Cut these pieces to the lengths show above in the cutting list.



Bottom Stud Rail Cutout:

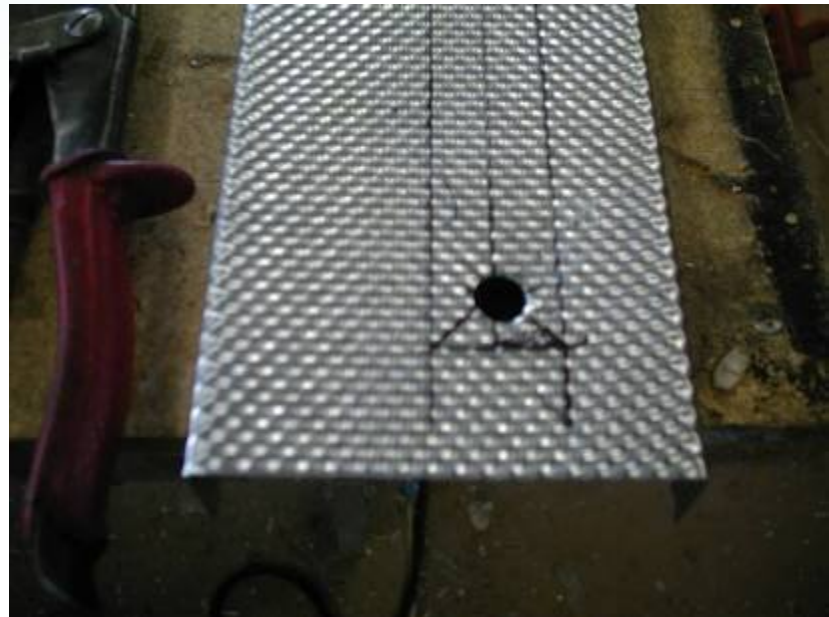


Cut a slot in the Bottom Steel Stud Rail for the end of the Absorber to protrude thru. 1 ¼" high, 1" up from bottom, 1" in from each end.

Cut a hole for the Trickle Feed Tube to come thru. ¾" in diameter, ¾" down from top and 1 ½" in from side.



Layout the dimensions above on one of the 26" pieces of stud rail. Mark a center line and cut down to the opposite end with aviation snips or a jig saw. Nip the 45 degree angles out to the corners on each end.





I used a welder's sheet metal clamp to start to fold the slot.



Then hammer the fold down flat. This covers the sharp edge, preventing punctures in the Mylar inner glaze on the Absorber.

Assembling the Collector Frame:



I put a small bead of Tub Surround adhesive on the joint between the two back insulation sections. Mainly to prevent air drafts from creeping thru. Use an adhesive that says it is compatible with foam board. Some adhesives will melt the Tuff-R insulation.

Slide the stud rail and back Tuff-R insulation into place. Put a pop rivet into the top corners. Then push the 2½" side insulation into place in the stud rail sides. Then press the single piece of 24" long top insulation



. Friction is enough to hold the insulation in place. The Absorber will hold it all in place after you install it.



Use sheet metal screws to attach the angle brackets to all four corners of the frame. The bottom two brackets will need to be trimmed a bit so as to not lap over the slot for the Absorber to protrude thru.

A demo of how strong and ridged the collector frame is. About 18" of the 94" long frame is clamped to the table at one corner. The remainder is hanging, cantilevered off the end of the table.





A series of pictures showing the absorber inserted into the frame. Tilt the Absorber and slide the bottom thru the slot, guiding the trickle feed tube as you go. Not shown but need is a large grommet in the hole for the trickle feed tube.



Attaching the SunTuff Outer Glaze:



Cut the SunTuff foam end seals to 26" and lightly glue them into place on each end of the Collector frame.



Rip two ½" thick strips of wood from 2 x 2 stock. Rip a 60 degree angle on one edge to match the SunTuff corrugations. Lightly glue them in place.



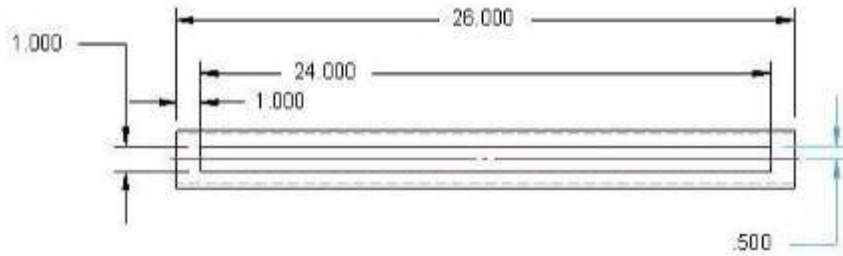
Set the SunTuff Gazing on and screw down with roof panel screws, made for metal.



Evenly space about 6 screws down each side. I recommend putting a screw in each dip in the SunTuff across the top and bottom to make a good seal.

Making and Installing the Drain:

Layout for the Gutter Drain.



Cut a 26" length of 2" ABS pipe.

I made the pictured jig to rout the slot in the pipe. It is just two 26" long pieces of plywood tacked together. Cut a slot with a jig saw to match the above pattern dimensions.



Use a bit with a top pilot bearing. The slot cut with a jig saw can then be the same size and the slot required.



Completed Drain Tube for one Collector.

Gutter Drain tube slide up onto end of Absorber that protrudes out the bottom of the Collector frame.



References:

Cost Estimate Table:

Steel Absorber Cost				
Material	Purchase Quantity	Quantity Cost	Required/Absorber	Cost/Absorber
Galvanized Roofing	1	\$8.79	1	\$8.79
Drywall J Channel	1	\$1.59	2	\$3.18
Drywall L Bead	1	\$1.75	2	\$3.50
1/2" Copper Pipe	1	\$9.19	1	\$9.19
1/2" Copper 90	1	\$0.45	1	\$0.45
1/2" Copper 45	1	\$0.45	1	\$0.45
1/2" Copper Cap	1	\$0.40	1	\$0.40
1/8" Brass Tube	15	\$16.70	1	\$1.11
1/8" Pop Rivets	100	\$4.26	50	\$2.13
#8 Sheet Metal Screws	200	\$4.67	40	\$0.93
Double Sided Foam Tape	75	\$10.30	25	\$3.43
3mil Mylar	50	\$33.02	9	\$5.94
1/8" x 1/4" Grommets	200	\$5.62	7	\$0.20
Copper Pipe Clips	10	\$3.65	3	\$1.10
			Total Cost/Absorber	\$40.81
Steel Collector Frame Costs				
Material	Purchase Quantity	Quantity Cost	Required/Frame	Cost/Frame
Steel Stud Rail	1	\$2.81	2	\$5.62
Angle Brackets	1	\$0.72	4	\$2.88
Tuff-R Insulation	1	\$22.54	1.33	\$29.98
#8 Sheet Metal Screws	200	\$4.67	32	\$0.75
1/8" Pop Rivets	100	\$4.26	8	\$0.34
SunTuff Roof Panels	1	\$17.98	1	\$17.98
Glaze End Seal	5	\$6.99	2	\$2.80
Glaze Side Seal	1	\$1.75	0.5	\$0.88
Roof Panel Screws	50	\$3.98	20	\$1.59
2" ABS Drain Pipe	1	\$4.73	0.25	\$1.18
			Total Cost/Frame	\$63.99
			Total Cost/Collector	\$104.80

Notes on material selection:

All the metal parts should have a life expectancy in excess of 30 years.

The EPDM foam tape has a temperature rating of 170°. Since it is protected by the “L” bead it will perform well in this application. The grommets are of the same material. EPDM is used as roofing and subjected to very high temperatures and harsh conditions in that application.

The Mylar (Polyester) film was chosen for its temperature rating in excess of 300° and zero water absorption. In the 3 mil thickness it is very strong. One can use thinner material if you are very careful installing and handling the absorber during installation.

The Acrylic felt has a temperature rating above 250°. Its main purpose is to disperse the water evenly over the entire surface of the absorber. I tested many materials and the Acrylic felt was the very best.

Tuff-R insulation is a product made by Celotex, and marketed by Dow. Other manufacturers of Polyisocyanurate insulation are Atlas, and Firestone. Do not substitute Styrofoam insulation, it will melt at the high temperatures in a stagnant collector, I know this from firsthand experience.

SunTuff polycarbonate glazing should be used. Any glazing used must have a UV protective rating of 100%. The Mylar used for the inner glaze is not UV tolerant and must be protected. Multiwall Polycarbonate may be substituted at additional cost with little added benefit. Do not use PVC roofing panels. They will not tolerate the UV or the high temperatures in the collector.

I tested all of the material in my oven at 250° for half an hour, before using them in the absorber.

Material Suppliers and Part Numbers:

McMaster-Carr - <http://www.mcmaster.com/>

Metering Tubes - ALLOY 260, ROUND TUBE, 1/8" OD, 1' LENGTH – Part Number 8859K19

Grommets - PUSH-IN BUNA-N RUBBER GROMMET, 1/8" ID, 11/32" OD – Part Number 9307K35

Double Side Tape - EPDM/SBR Foam Tape .125" Thick, 1/2" Wide X 25 Yards– Part Number 75315A32

Home Depot - <http://contractorservices.homedepot.com/>

Galvanized Corrugated Roof Panel – 26" x 96"

Drywall "J" Channel – 10 foot

Drywall "L" Bead – 8 foot

Pop Rivets – 1/8" Dia. 1/8 max thickness capacity

Gutter Sealant – 10 oz. Tube

Sheet Metal Screws - #8 x 1/2"

SunTuff Glazing – 26 x 96 panels

End Seals – 5 packs of 36" strips

Side Seals – 2 x 2 lumber or manufactured side seals

Steel Stud Rail – 3 5/8 x 10'

Roof Panel Screws – 50 and 250 count packages

2" ABS pipe

Dick Blick Art Supplies - <http://www.dickblick.com/>

Black Acrylic Felt – 36" by the yard – Order Number - 63201-2036

Artist & Craftsman Supply – <http://www.artistcraftsman.com/>

Mylar Inner Glaze - .003 mil Clear Polyester Drafting Film, 40"x50' – Order Number - W015246

Tuff-R Insulation

I had a difficult time finding a supplier in my local area. Check with local lumber yards. Lowes may carry it in some locations. Substitute manufacturers are – Atlas and Firestone.

