



## **AIDG “ROCKET BOX” Stove**



## **Fabrication Manual**

1. Design Information .....	2
2. Cutaway Model .....	3
3. Fabrication .....	4
3.1 The Frame. ....	4
3.2 Frame Dimensions .....	6
3.3 Plancha .....	8
3.4 Láminas: dimensions .....	10
3.5 Lámina mounting .....	12
3.6 Combustion Chamber Assembly.....	14
3.6.1 Dimensiones.....	15
3.7 Insulation and Sealing.....	18
3.8 Firewood Support.....	21
4. Test the new stove .....	21

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B – Final Draft

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(Title photo: Don Polo and family, Nueva Alianza)

## 1. Design Information

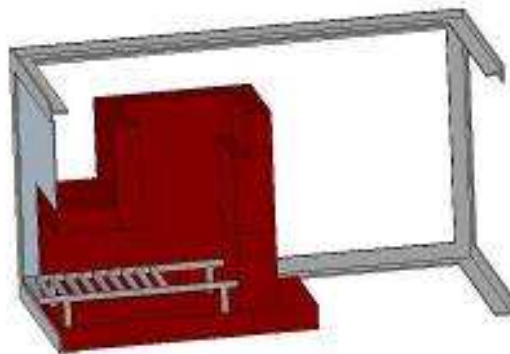
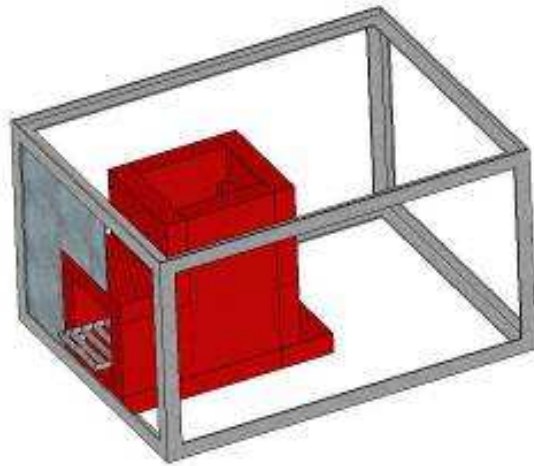
Technical Information can be found in:

1. **“Design Manual: Rocket Box Stove”** Ben Dana, November 2009

2. **“Design Principles for Wood Burning Cook Stoves”** Aprovecho Research Center, Partnership for Clean Indoor Air, Shell Foundation, June 2005

<http://www.bioenergylists.org/en/designprinciples>

## 2. Cutaway Model



## 3. Fabrication

### 3.1 *The Frame.*

The bulk of the frame is constructed of 3/4"x 1/8" angle iron, welded together (T iron for the top section below the plancha). A pre-measured template is used to cut the pieces to form the outer bracket. Cutting can be carried out with a hacksaw or a chop-saw. For the top and bottom sections, position the saw at 45° on the horizontal part of angle iron to make an angled cut, and carry on sawing straight down with an angled saw through the vertical part.



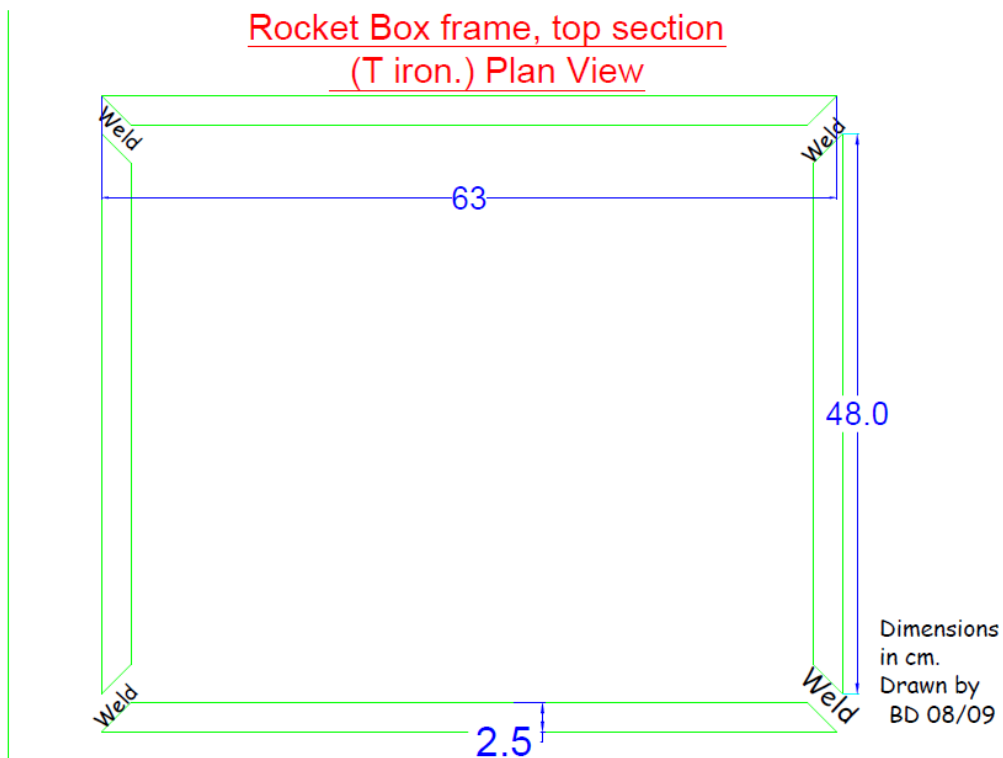
Two lengths of angle iron can now be positioned together at right-angles and welded. The 45° weld identifies the horizontal side. It's important to ensure the sides are perfectly square during welding.



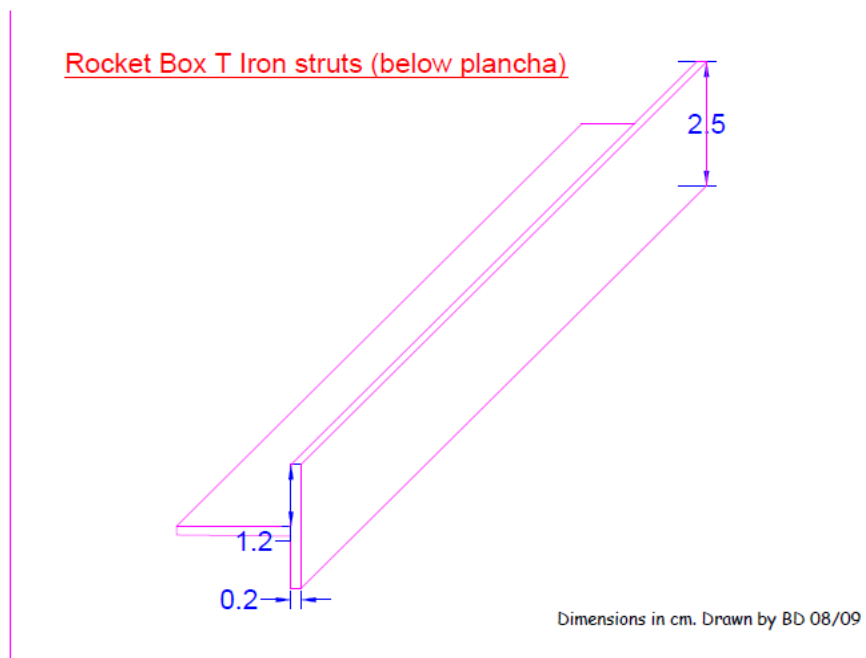
After welding, grind the corners with an angle grinder for neatness.



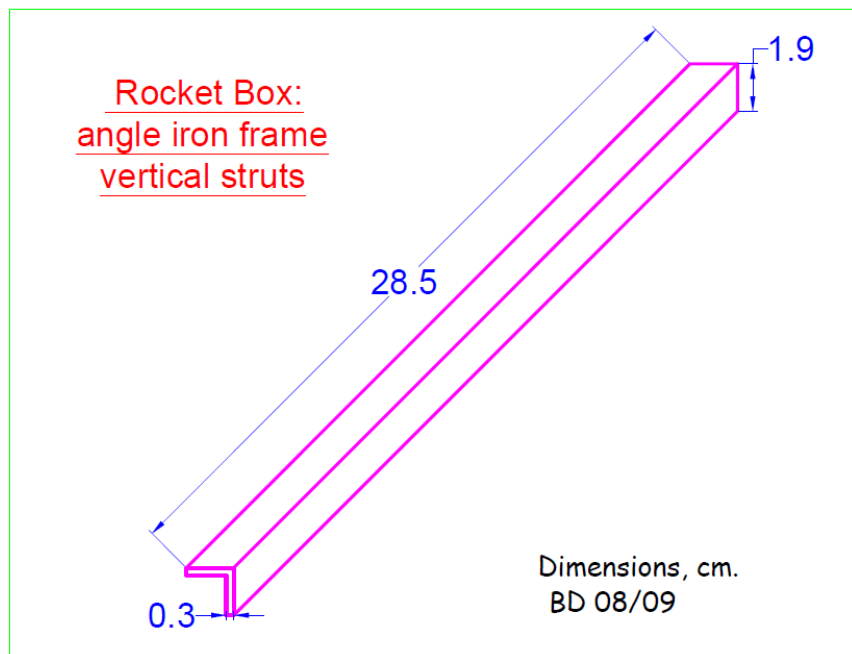
### 3.2 Frame Dimensions



The length and width of the body are determined by the size of the plancha that is being used.

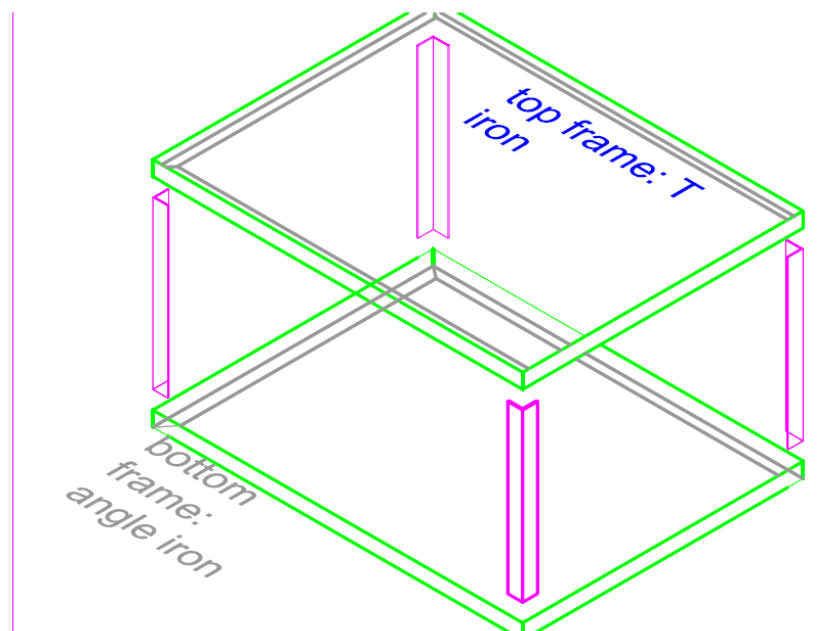


The top bracket, on which the plancha sits, is made of 2.5 cm x 2cm 'T' iron.



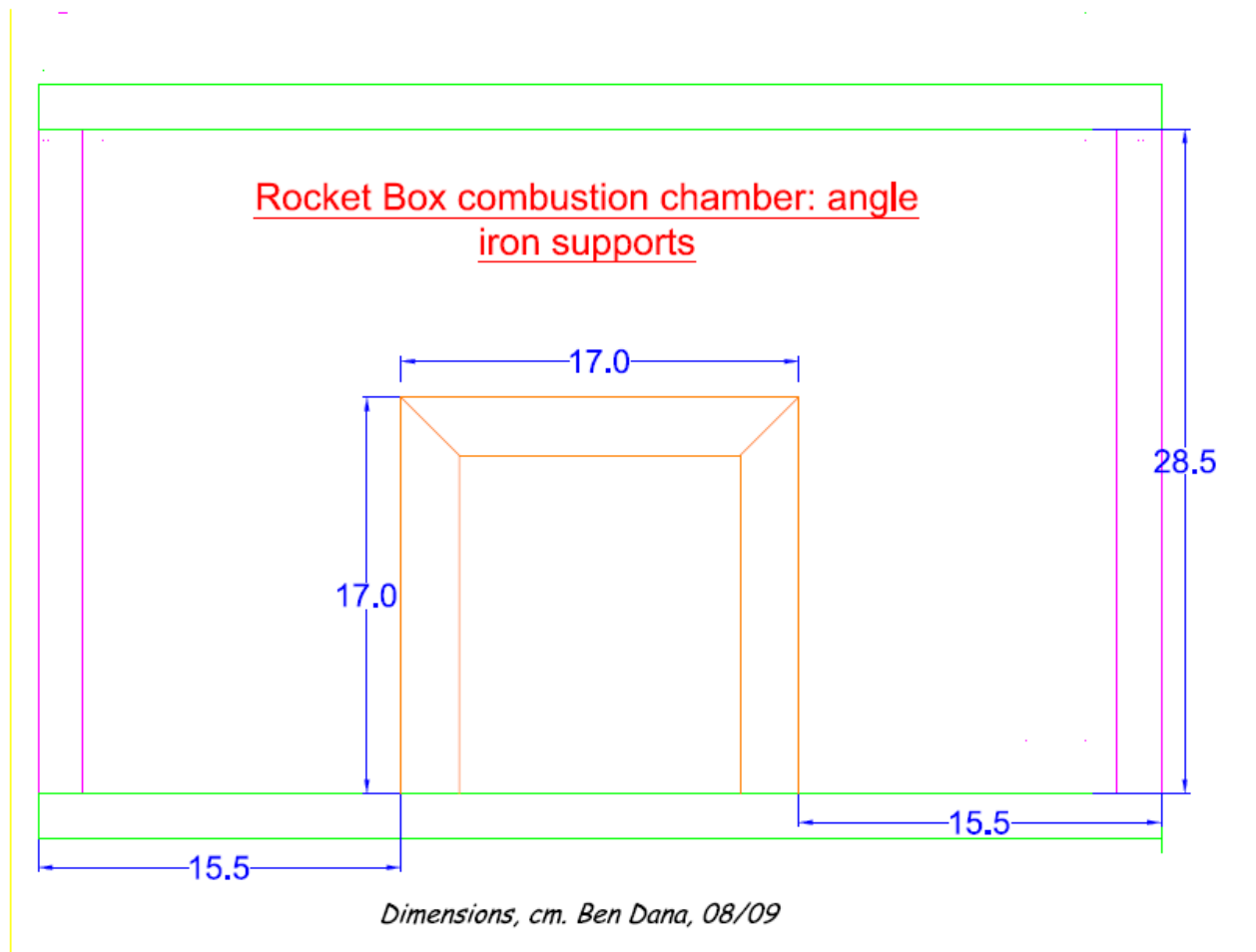
The height of the body is determined by the height of the combustion chamber plus the height needed between the plancha and the insulating material to maintain a constant cross-sectional gas flow area: see “**Design Manual: Rocket Box Stove**”, Ben Dana (6.2.2).

Stove Body: Frame 3 D View



The angle iron that frames the combustion chamber are cut at 45° and welded into the shape shown in

*Combustion chamber angle iron frame.* It is sized so that the bricks rest against it. This provides extra support that prevents the bricks from falling inwards.

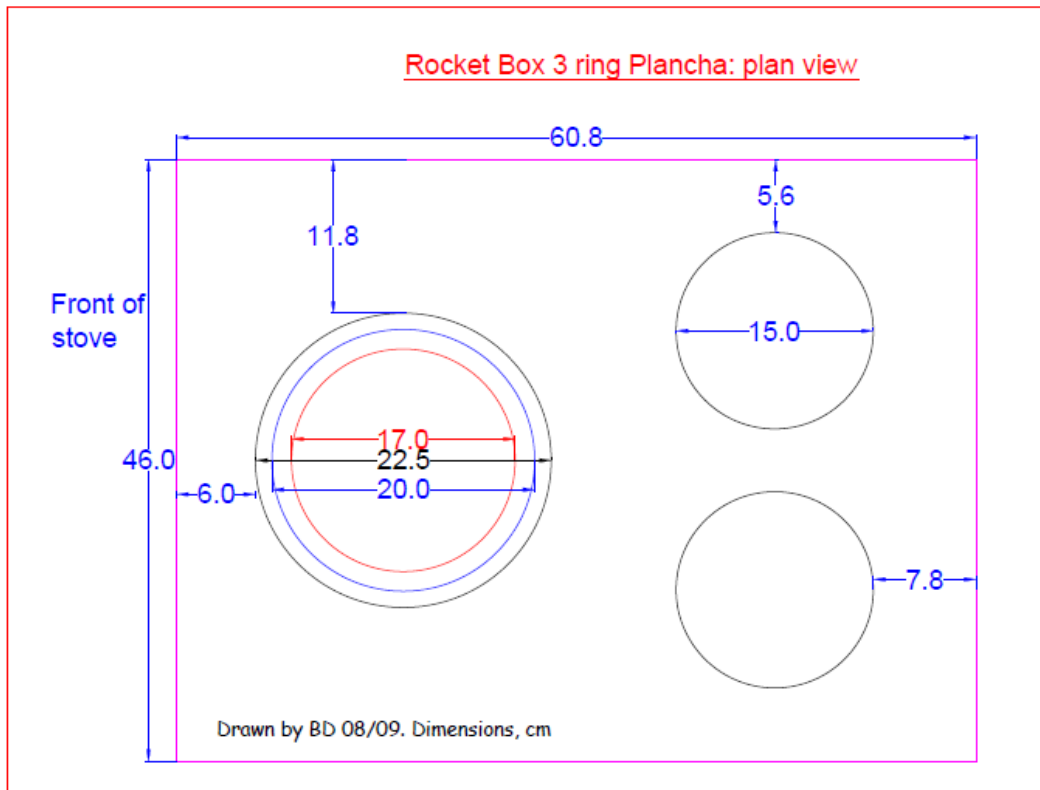


### **3.3 Plancha**

The plancha used in this design is a standard 18" x 24" model that can be found commonly in hardware stores in Guatemala. It sometimes has two pot rings, sometimes three. The dimensions and locations of the rings are determined by the maker of the plancha and are independent of the design of the Rocket Box. The plancha is 0.5cm thick and is made of sheet steel. The larger pot ring features three individual rings allowing the right size to be removed for a particular pot.



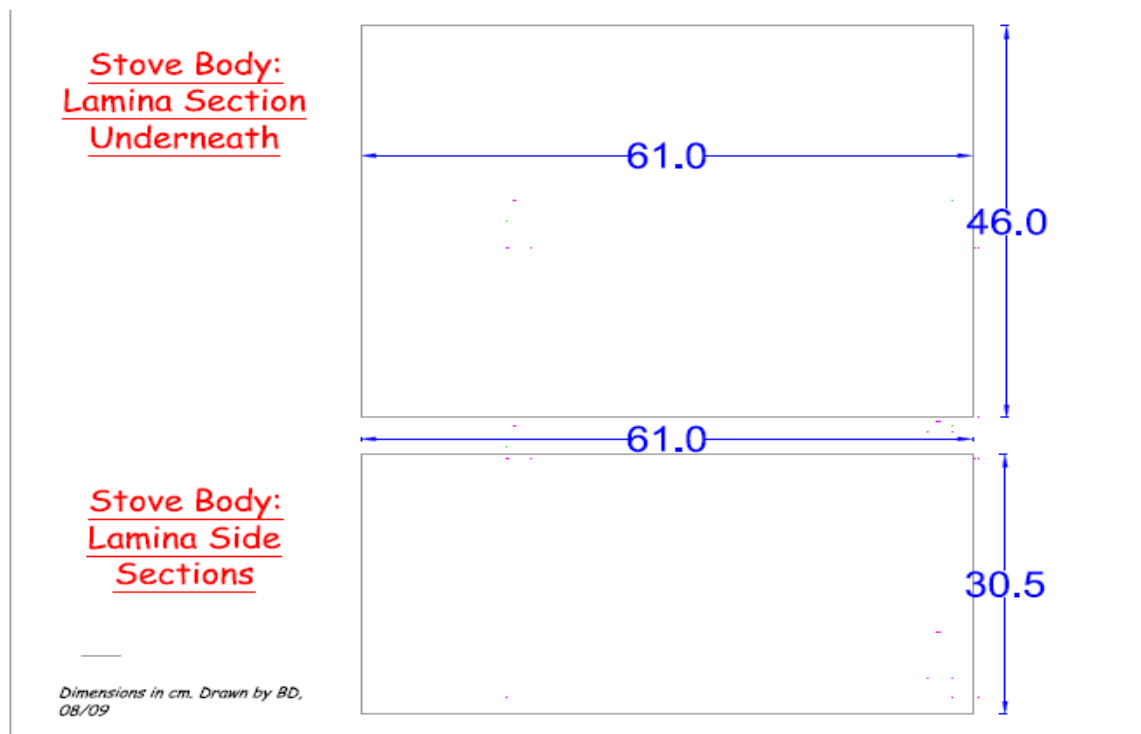
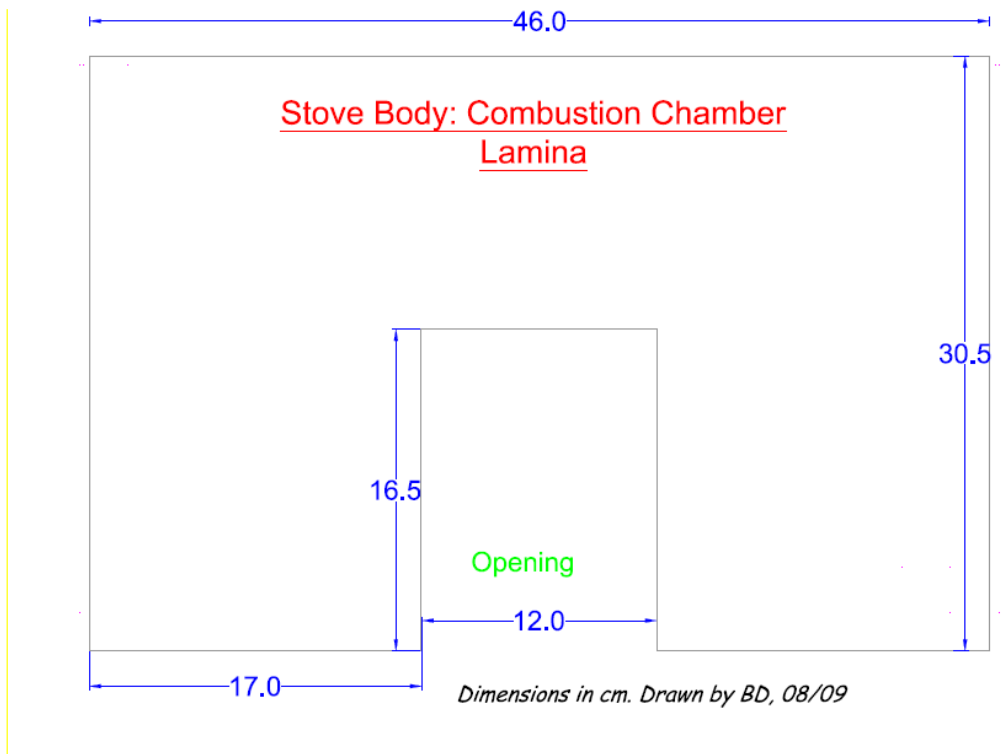




The plancha comes welded with angle iron braces on the underside, to prevent warping in the heat.

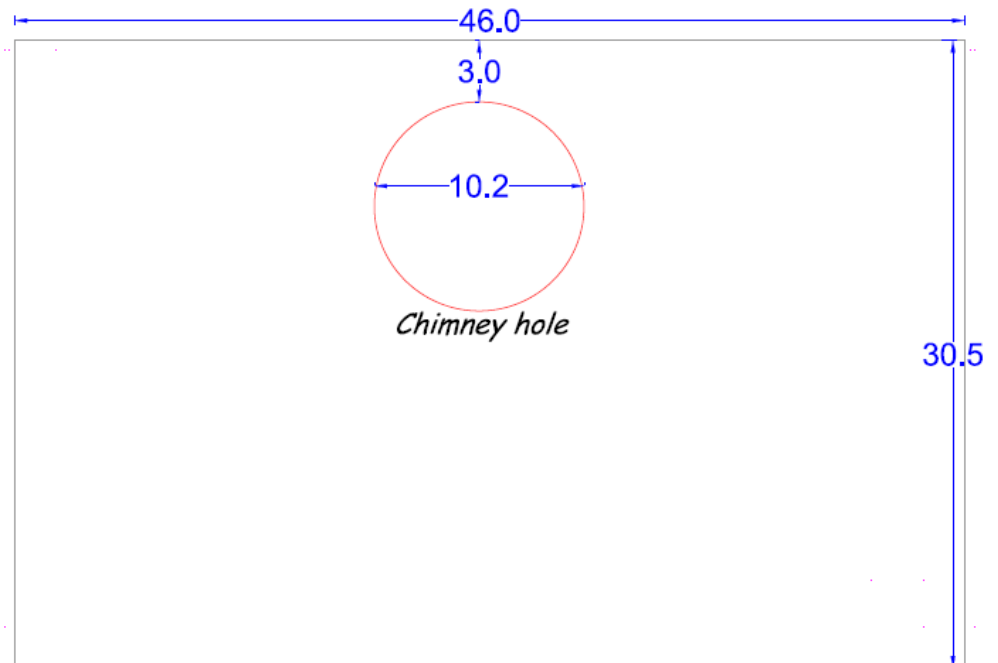
### **3.4 Láminas: dimensions**

The stove body is 24 gauge galvanized sheet steel. The lamina sections are cut with tin-snips to fit snugly inside the angle iron frame. As shown in the drawing *Stove Body Combustion Chamber Lámina*, the front section has an opening which aligns with the combustion chamber.



A 10.2cm hole is cut into the section of lámina at the back of the stove for the 4" chimney pipe. The centre of the hole is 8.1cm from the top edge of the lamina.

### Stove Body: Lamina section at the back of the stove.



*Dimensions in cm. Drawn by BD, 08/09*

### **3.5 Lámina mounting**

The chimney elbow is mounted in position before riveting the rear lamina to the frame. Pass the elbow through the hole. Make 1cm cuts along the edge that is inside the frame. Fold the cuts with pliers, and hammer these sections flat against the frame. Fasten in place with two rivets.

The laminas are fixed to the frame with (3mm x 15mm rivets.) The process is as follows:

1. Drill holes with a 1/8 bit in the frame structure: six equally spaced holes in each vertical iron (three on each side), three in each iron across the front and back pieces, and four along the length. The holes should be near the inner edge of the frame
2. Put the lamina in position. Use clamps to hold it in place. Mark the position of the holes on the lamina through the holes in the angle iron frames. It is better to remove the laminas now, so that they can be drilled in a more comfortable position.



3. Put the lamina back in position and rivet in place. If you need to remove a rivet, it can be drilled through.



### **3.6 Combustion Chamber Assembly**

The combustion chamber is assembled from what is known in Guatemala as baldosa tiles ("fire-bricks"). These can be cut with a hack-saw, angle grinder or a jigsaw for larger baldosas.



Combustion Chamber: side view



Combustion Chamber: rear view



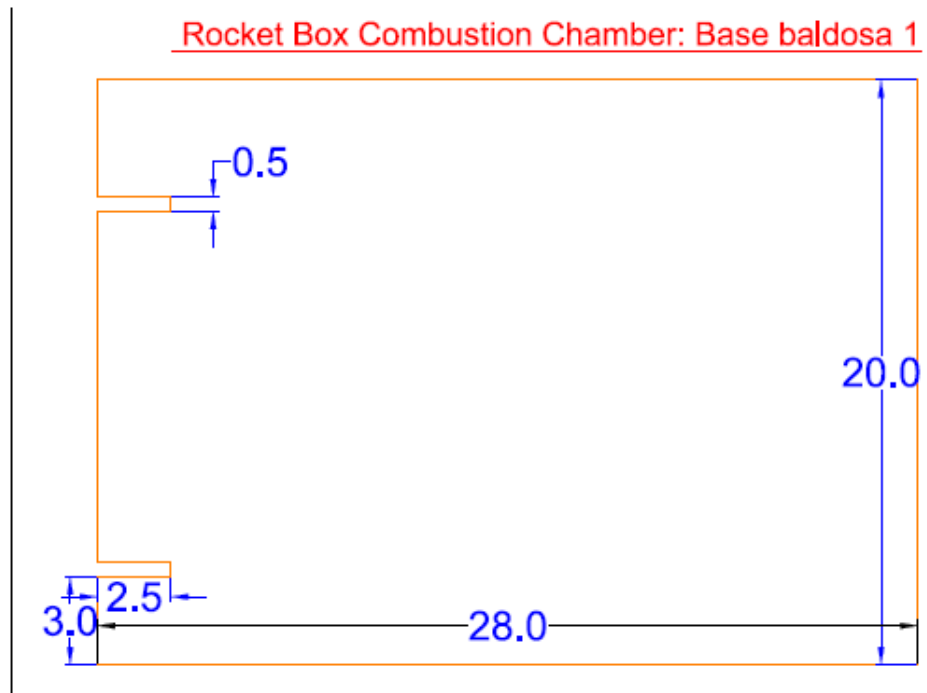
Combustion Chamber: front view (without front lamina)



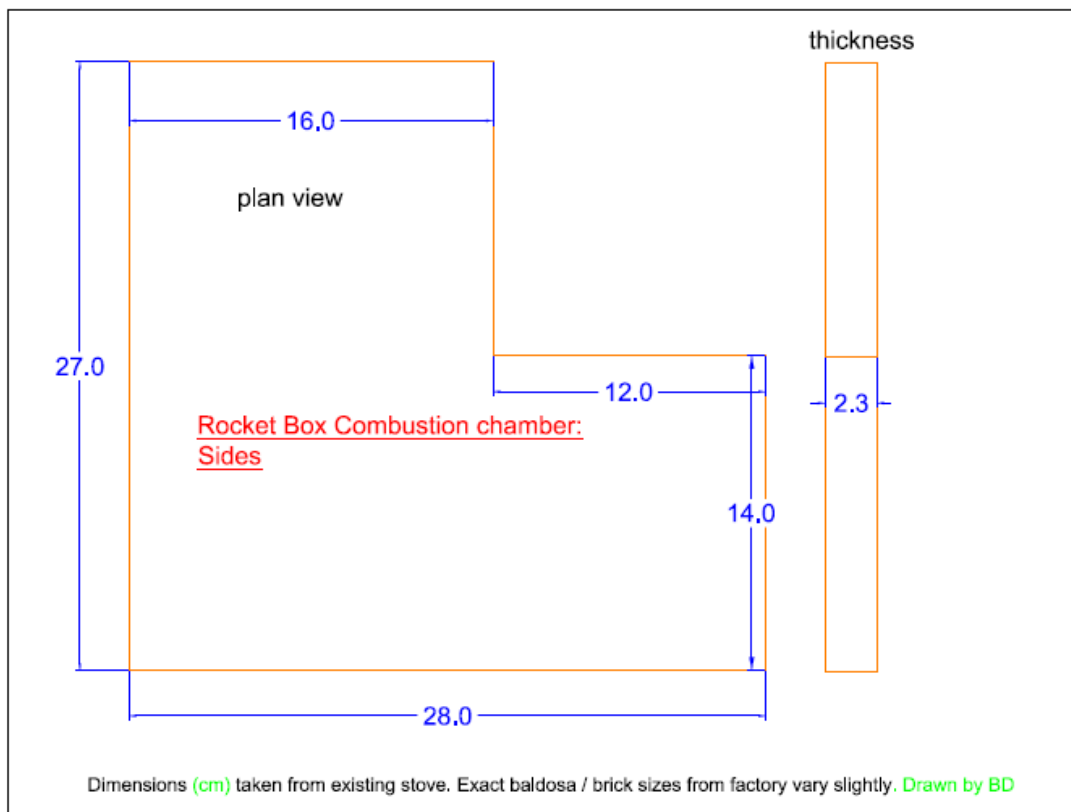
### 3.6.1 Dimensiones

The length, width and height of the combustion chamber is determined by the size of commonly available baldosas.

The base is made from is cut from 1' x 20cm x 28cm baldosa tile (*'Base baldosa 1'*). The front side is notched to slot into the angle iron. The side walls sit on top of this.

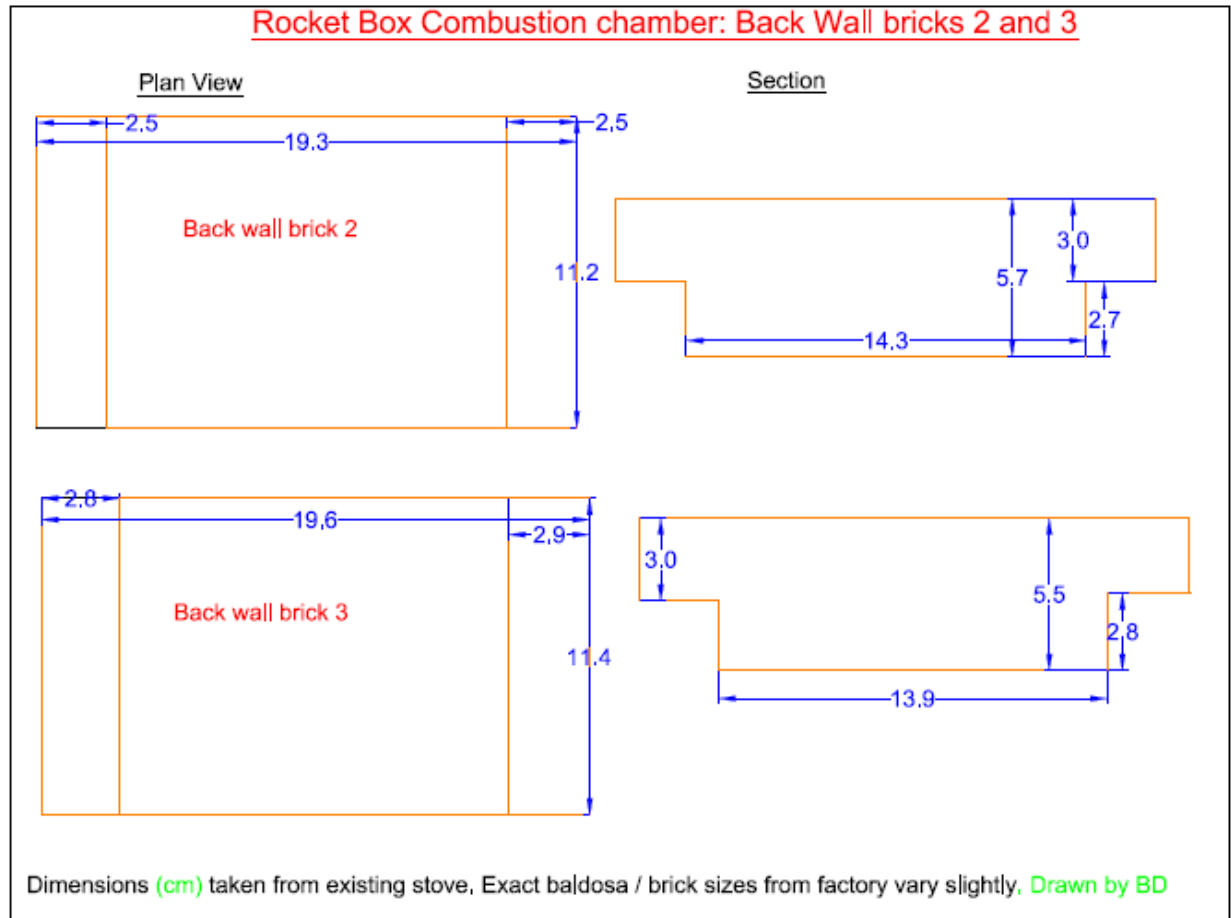


The side walls are cut from 1 "x 27cm x 28cm baldosa.



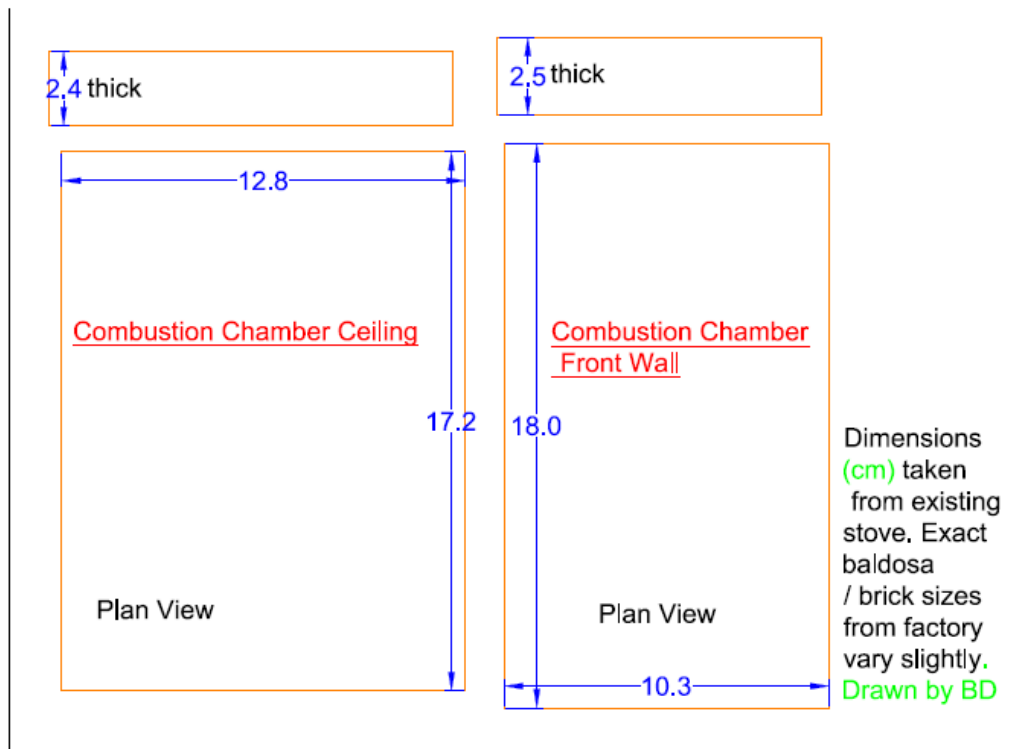


### Rocket Box Combustion chamber: Back Wall bricks 2 and 3



The back wall bricks are notched. This wall is cut from 2" x 19cm x 19cm bricks. A top brick sits on bricks 2 and 3. It is 3cm high with the other sections the same. Cutting a forward slope into the section of the back wall may help the heat to disperse to the back cook rings.

The ceiling sits on top of the horizontal part of the combustion chamber. The front piece lines the chimney. They are cut from 1" x 19cm x 27cm brick.



### 3.7 Insulation and Sealing

The Pumice stone is separated into large and small stones. The stove body is filled with pumice stones; with larger stones on the bottom and smaller stones on the top. This prevents filtration of smoke hot gases through the top layer of insulation near the plancha, with more air in between the smaller pieces.





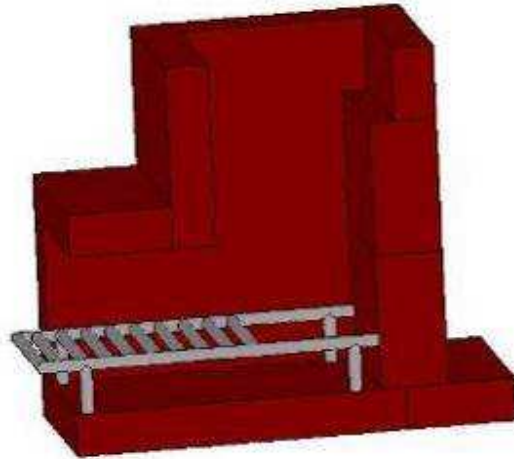
A small chamber to allow space for the smoke to flow out is made in front of the chimney using baldosas.



The plancha is positioned on top of the structure. The gaps along-side the plancha can be sealed with clay/mud (to prevent smoke and improve insulation,)



### **3.8 Firewood Support**



The firewood is held off the floor of the combustion chamber by a grill made by welding 3/8" rebar. The height of the grill is equal to 1/3 of the height of the combustion chamber. This allows sufficient air to pass through to create an effective draft. The innermost part of the grill is open to allow air to flow unobstructed and any hot coals that fall down to continue to feed the fire. In this way air can enter the stove and heat up on the embers before the wood catches fire. Hot air can light the stove with more force. A high temperature flame will completely burn the fuel, reducing smoke (the signal of inefficiency.)

### **4. Test the new stove**





#### **4.1. Guidelines for Users**

1. **Selection of firewood:** Small pieces of wood should be used in the Rocket Box Stove; either bought that way or cut (max. 30cm x 5cm x 5cm.).
2. **Lighting the fire.** To start the fire, put small pieces of wood vertically in the stove. This way, the fire can be started easily and hot embers can be created
3. **Maintaining the fire.** Once the fire has been lighted and there are burning embers, insert wood horizontally through the door of the combustion chamber. Push the wood forward every 15 minutes.