

# Manual for Production of a Household Rocket Stove “Tikikil”



Ministry of Agriculture  
and Rural Development



Ministry of Mines and Energy



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## 1 Short description of the stove

The stove is basically a rocket stove but adopted to suit the conditions in most Ethiopian households and local production techniques; and hence named “Tikikil” meaning “Appropriate”. The design parameters consider households’ pot sizes, affordability, ease of production and use of locally available raw materials and skills. It is designed to accommodate pot sizes of 25 cm (and smaller) in diameter.

“Tikikil” is intended to replace the most inefficient but widely used traditional three-stone stove (Open Fire). GTZ SUN Energy has been involved in dissemination of improved stoves since the last ten years in Ethiopia. Recently, in collaboration with the Ministry of Mines and Energy, and Ministry of Agriculture and Rural Development, GTZ designed this household rocket stove for wider dissemination throughout the country.

The stove has two main parts which include the ceramic liner and the metal part. The metal part consists of the sheet metal cladding and the wood support. This manual is a guide for the production of the metal cladding and the wood support. Production of the ceramic liner is not included in this manual.

## 2 Components of the stove

### 2.1 Metal component of the stove

The crown (top part of the stove)

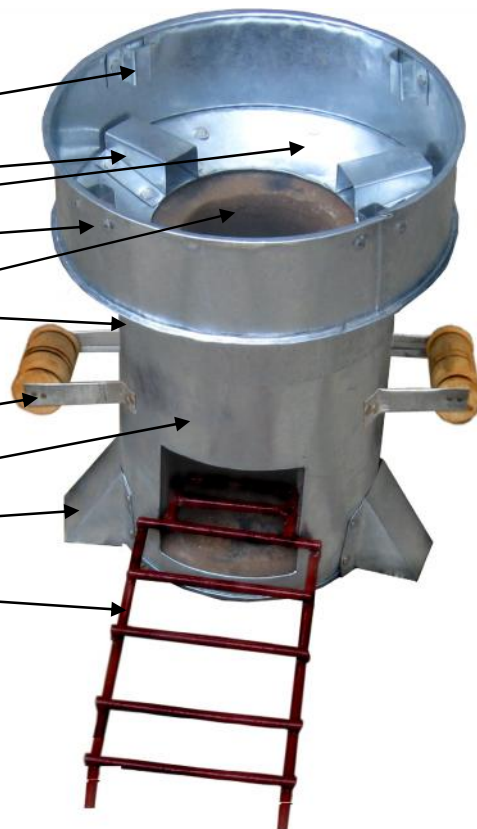
- four pot stabilizers
- three pot supports
- cone (top plate)
- pot skirt
- connector

The ceramic liner

The bottom part of the stove

- handles
- stove body (cylinder)
- legs
- wood support and shelf

Another variation of “Tikikil” has double skirts. The inner skirt is removable and used only when smaller pots are used. The bigger skirt is fixed to the stove body and accommodates a pot with 30 cm in diameter (see Annex 2).

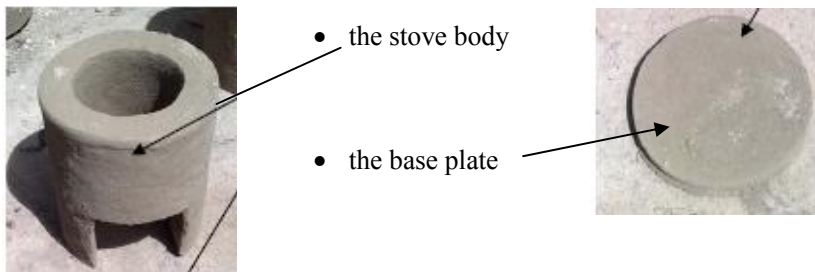


## 2.2 Ceramic liner

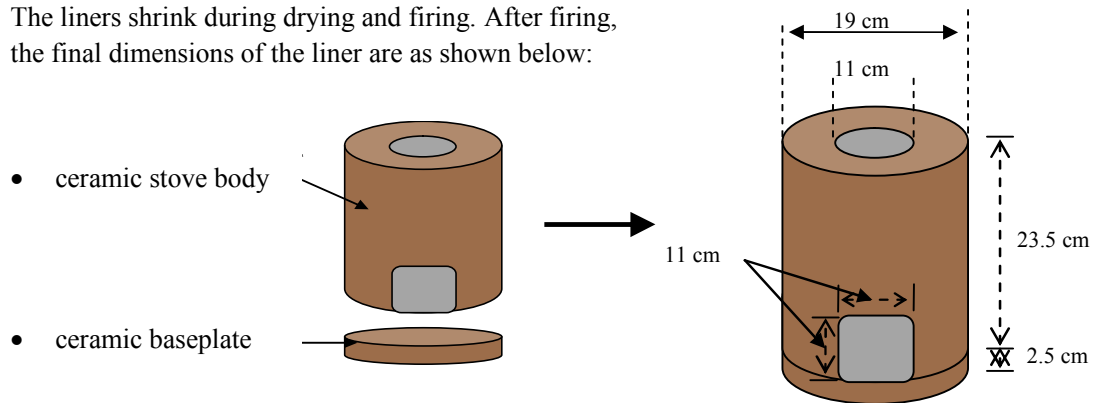
The ceramic liners are produced using molds. The molds need to consider for the shrinkage rate which varies for various clay types and mixes used.



The ceramic liner consists of two separate pieces:



The liners shrink during drying and firing. After firing, the final dimensions of the liner are as shown below:

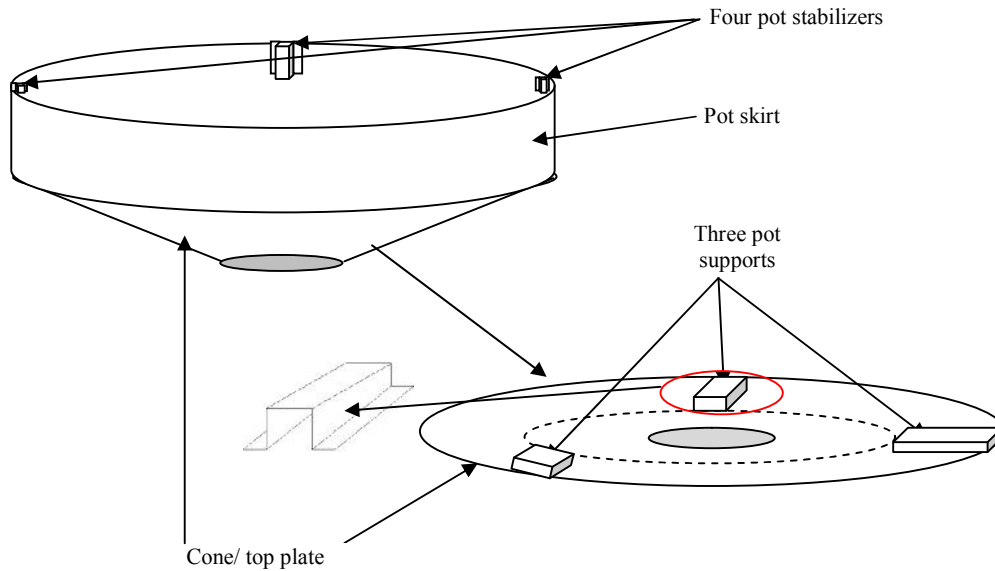


## 3 Producing the metal components of the stove body

### 3.1 The Crown of the stove

The crown or the top part of the stove consists of the cone (top plate), the skirt, the three pot supports, the four pot stabilizers and the connector.

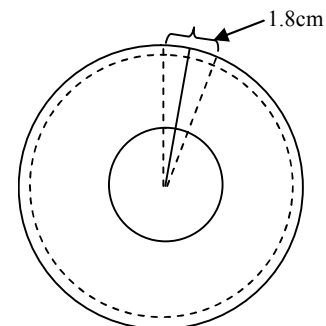
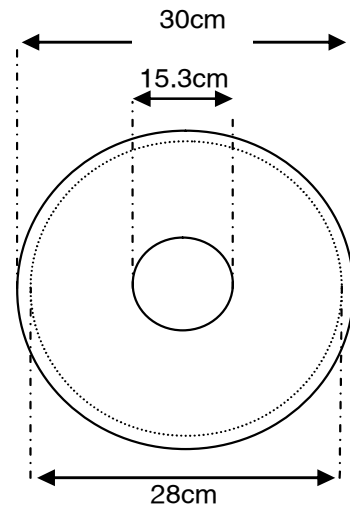




### 3.1.1 Producing the cone/ top plate

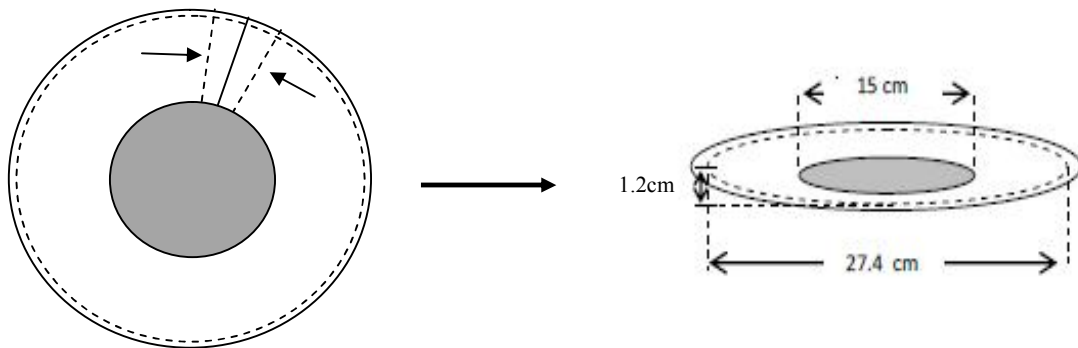
Use a sheet metal of thickness not less than 0.6mm to make the cone.

- Scrip three circles on a sheet metal as indicated in the picture.
  - An outer circle of 30cm in diameter,
  - The middle circle – 28 cm in diameter and
  - The inner circle – 15.3 cm in diameter
- After marking the three circles, cut the sheet metal along the outer circle. DO NOT CUT THE INNER CIRCLE at this stage.
- Draw a straight line from the center of the inner circle to the edge of the out circle. Mark the point where the straight line intersects with the outer line.
- Mark two points at 9mm from either side of the point where the line from the center meets the out circle. The two points must now be 1.8 cm apart.
- From each of these two points draw dotted lines to the center of the inner circle.



Now, cut along the middle solid straight line all the way through to the edge of the inner circle. Continue cutting along the edge of the inner circle and remove it.

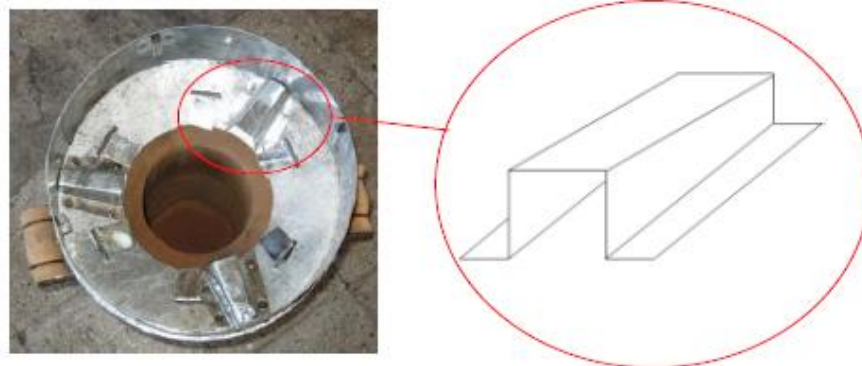
To make the cone, move the edges of the plate until the two dotted line overlap and then rivet them together. When completed the top plate should form a cone with dimensions as shown below.



The 2 cm difference between the outer line and the dotted line is to seam the cone and the skirt together. The skirt, the three pot rests and the connector of the crown and the body part are all attached to the cone.

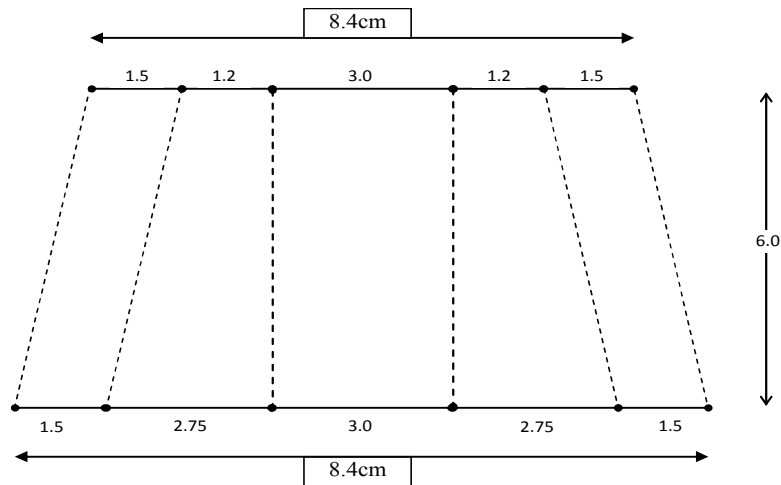
### 3.1.2 Making the pot supports

The three pot supports can be made from a 0.6 mm sheet metal. The height of the pot supports is greater in the front than they are at the back. The pot supports must be riveted on the cone keeping equal distance between them.

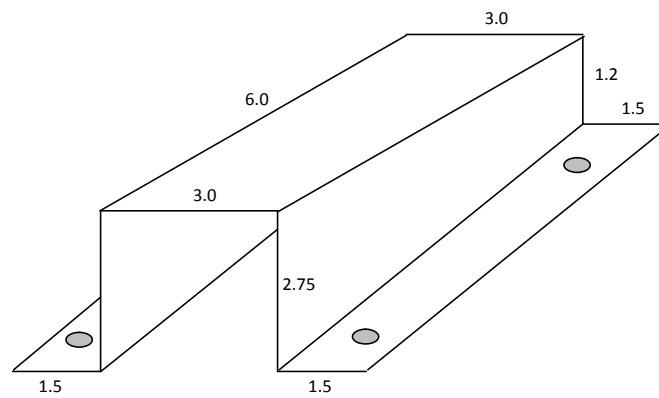


The pot supports can be made by cutting a sheet metal and folding it as indicated below:

Mark the dimensions shown below on a sheet metal and cut the piece along the solid lines.



Now, fold the cut piece along the dotted lines into the shape show below:

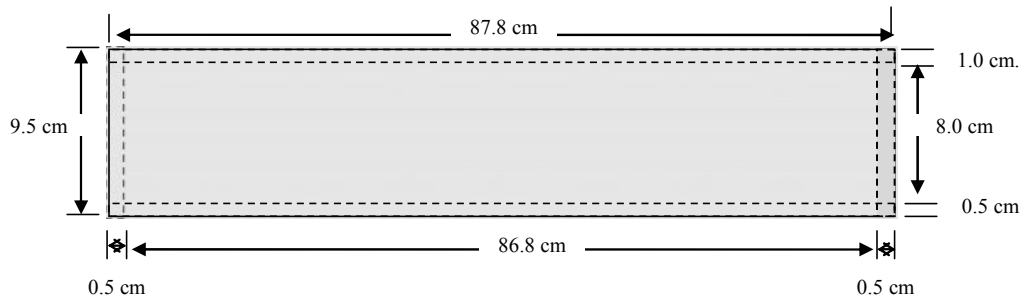


The small gray circles represent the holes that need for the placement of the rivets to attach the pot supports to the cone/ top plate.

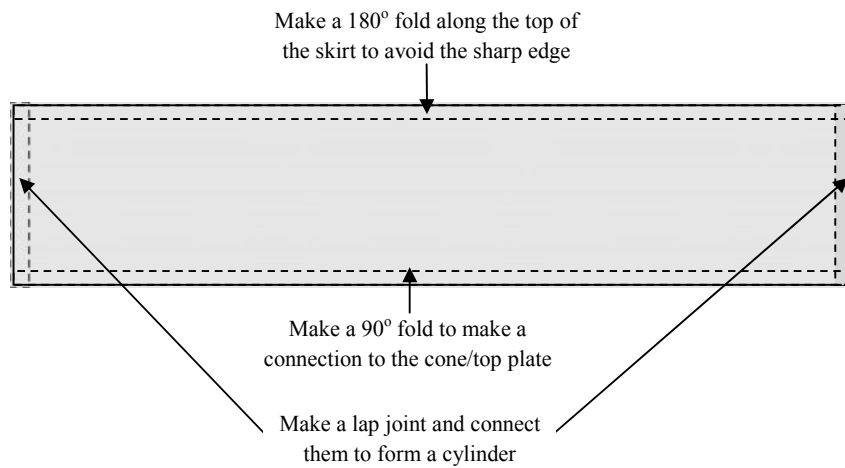
### 3.1.3 Making the pot skirt

The pot skirt can be made from a sheet metal of 0.6 mm thickness. It can be cut out and rolled from one longer piece of sheet metal or by connecting two shorter pieces together according to the dimensions outlined below. Cut the sheet metal to the dimensions below:





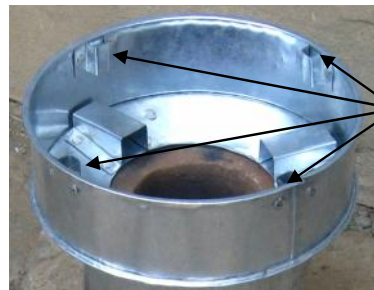
Then, make the folds as indicated below and role the sheet to make a cylinder.



### 3.1.4 Constructing the pot stabilizers

Make four pot stabilizers from a sheet metal of 0.6 mm thickness.

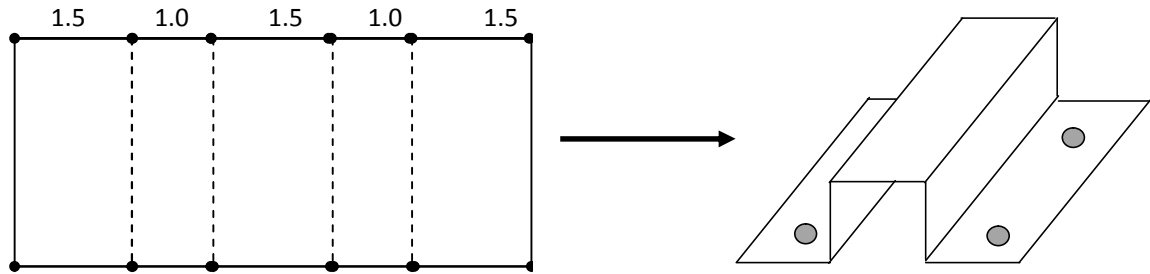
Cut four pieces of sheet metals and fold them according to the dimensions shown below to make the stabilizers.



Four pot stabilizers



Cut the four pieces and fold them:

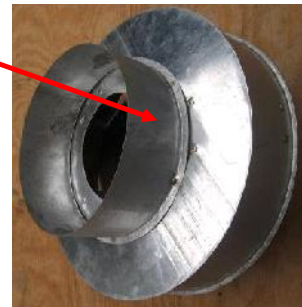


The gray holes on the folded stabiliser are for the placement of the rivets that will be used to attach them to the pot skirt.

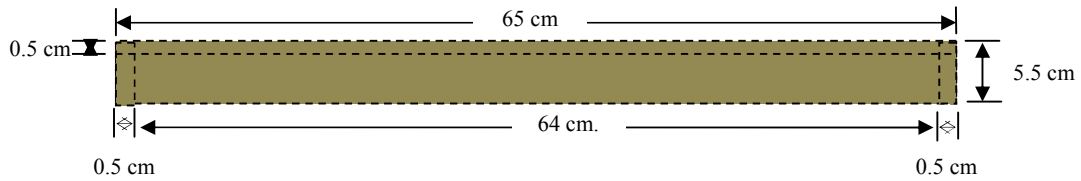
### 3.1.5 Constructing the crown and stove body connector

The connector is used to connect the crown and the bottom part of the stove body.

This can be made using a strip of sheet metal (0.6mm thickness)..



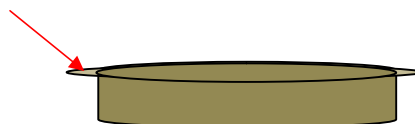
Cut following dimensions,



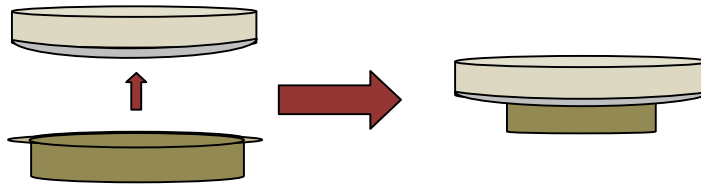
Then roll the strip of sheet metal to form a cylinder:



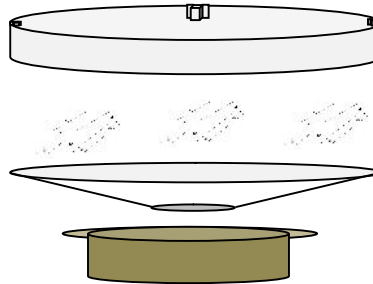
After rolling, make a 5 mm chamfer around the top edge of the connector:



After chamfering the edge of the connector use rivets to connect it to the cone.



Order of assembly of the crown:



### 3.2 Constructing the bottom part of the stove body

#### 3.2.1 Making the metal stove body

The metal stove body is composed of the cylinder and the base plate which closes the bottom of the cylinder.

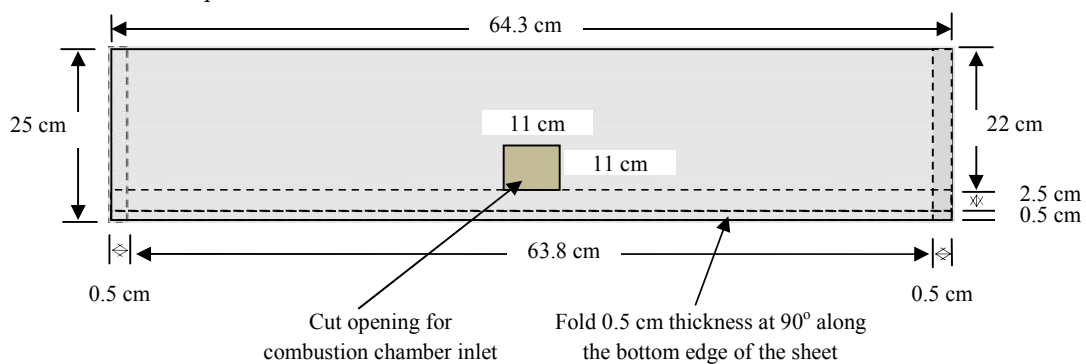
##### Making the cylinder:

The cylindrical metal component of the stove is used to clad the ceramic liner. It can be made from a cut sheet metal as per the dimensions shown below. Roll the cut piece to form a cylinder.

Before rolling the sheet metal, a fuel inlet opening of size 11 cm x 11 cm must be cut out.

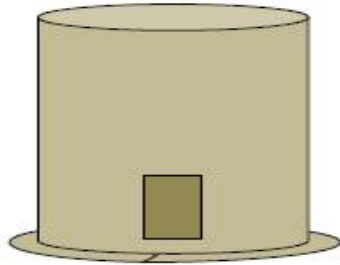


Cut the sheet metal piece as follows:

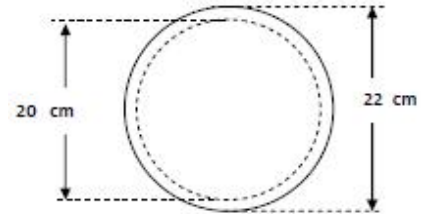


The cylindrical metal component should look like this after completion.

**Make the base plate:**



From a piece of sheet metal cut a 22 cm diameter circle. Then, scrip a smaller circle of 20 cm in diameter. This leaves 1.0 cm at the edge of the outer circle for connecting the piece to the body cylinder.



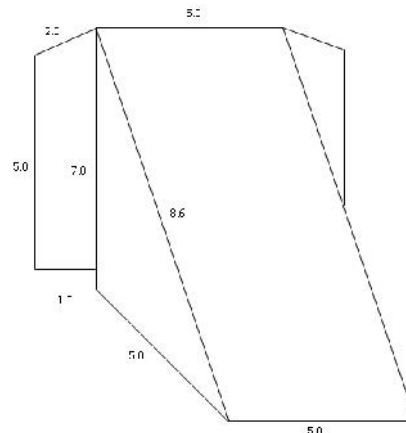
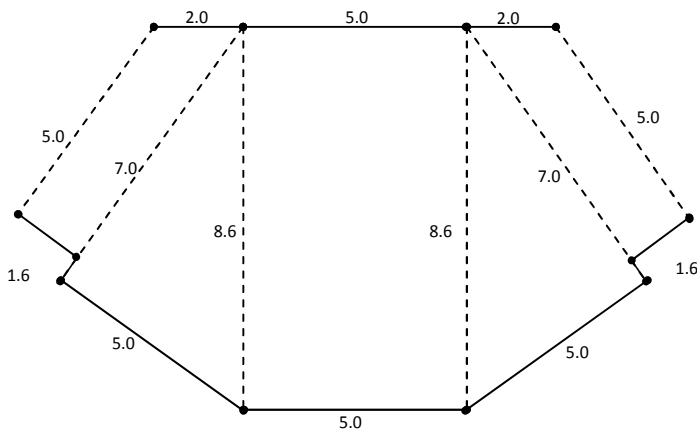
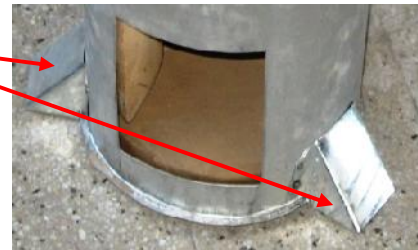
When completed the metal stove body stove body.



**3.2.2 Making the three legs of the stove**

The three legs will be attached on the cylinder and increase the stability of the stove.

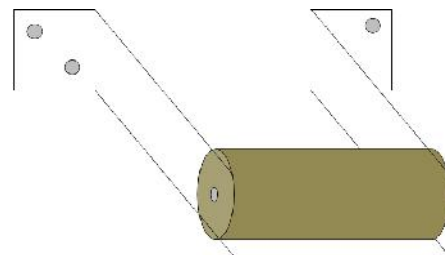
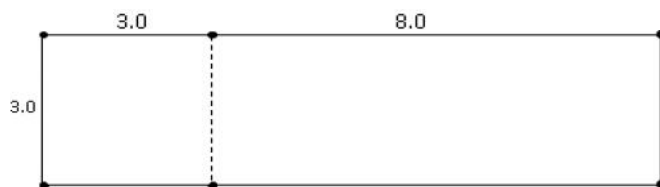
To make the leg, cut a sheet metal of 0.6 mm thickness and fold it as shown below. Make three of them.



### 3.2.3 Making the handle supports

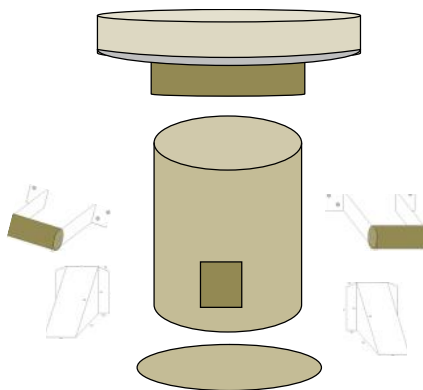
The stove handles should be made from non-conductive materials to protect the cook from burns. A piece of wood can be machined into aesthetically appealing and comfortable grip. It can then be supported by two pieces of sheet metals that are riveted to the cylindrical stove body.

Cut the pieces as per the dimensions indicated below. Trim the edges of the metal piece to avoid sharp points.



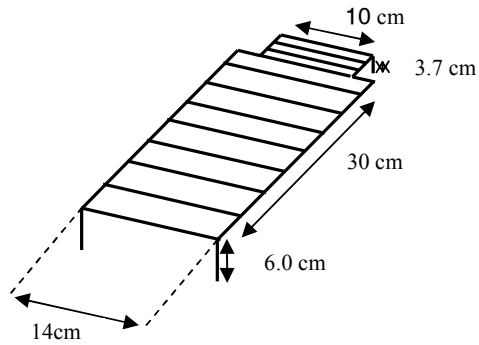
### 4 Order of assembly of stove parts

1. Connect pot supports to the cone/ top plate
2. Attach pot stabilizers to the pot skirt
3. Connect the skirt to the cone/top plate
4. Attach the connector to the cone (this forms the crown)
5. Close the bottom of the stove body with the circular palte
6. Attach the legs to the stove body/metal cylinder
7. Attach the handles to the stove body
8. Connect the crown of the stove to the stove body



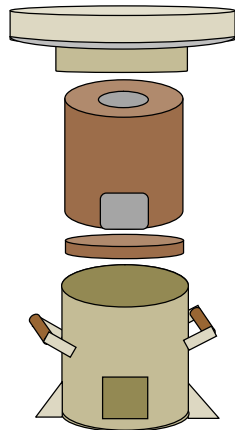
## 5 Constructing wood support and shelf

Use 6 mm round metal bar to make the wood support and shelf. Cut the pieces, fold them and weld them according to the dimensions given below.



## 6 Inserting the ceramic liner into the metal caldding

1. If the crown is attached to the stove body, detach it.
2. Insert the ceramic disk into the bottom floor of the stove body,
3. Put the ceramic cylinder into the stove body. It should rest on top of the ceramic plate. Make sure that its opening overlaps to that of the stove body.
4. Finally, put on the crown

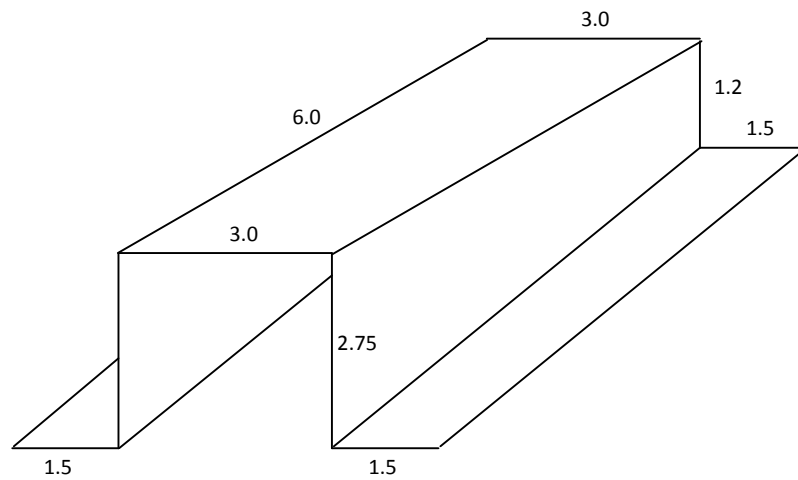
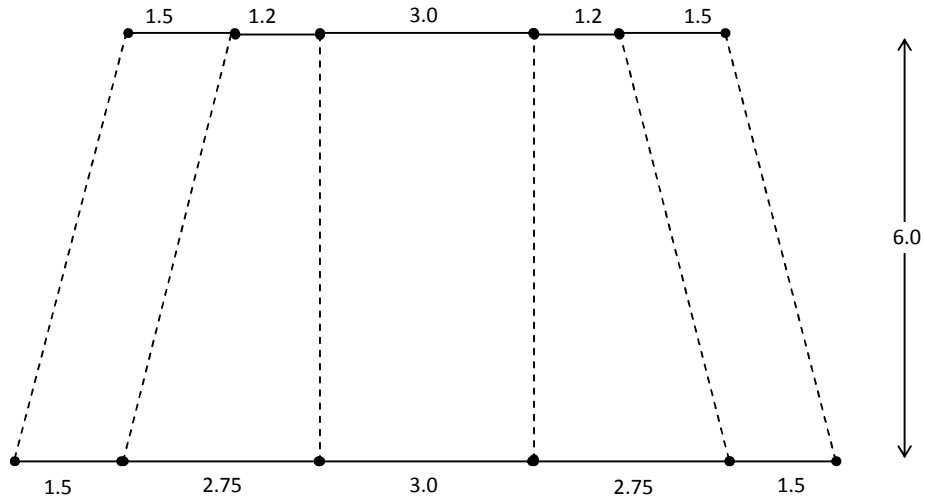


**Annex 1:** Templates for stove components

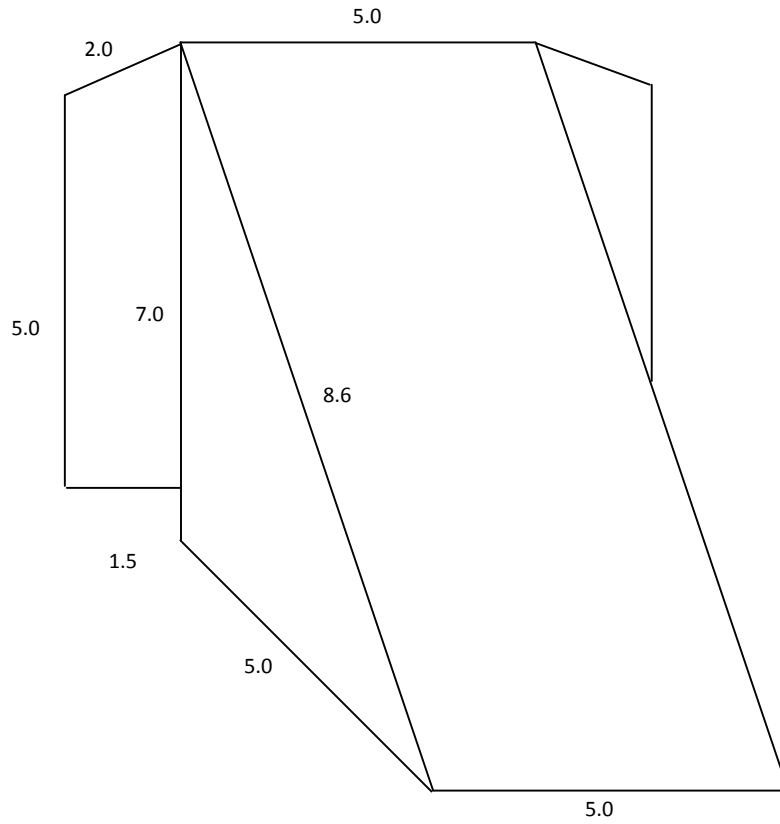
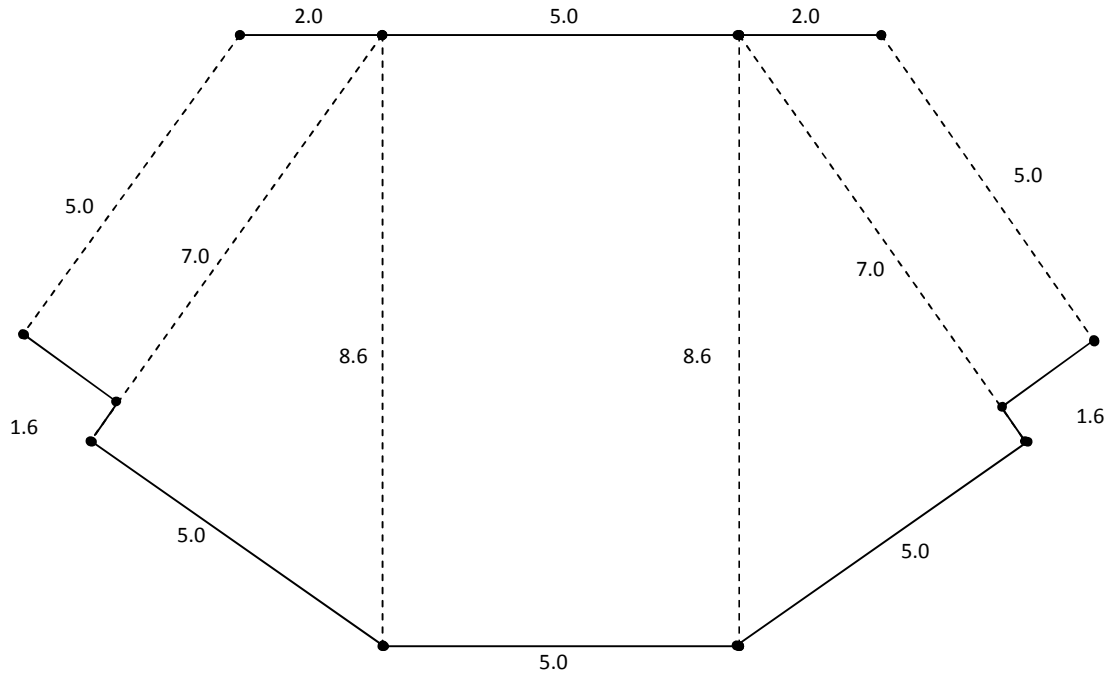
Templates for the pot support, stove leg, pot stabilizer, and the handle can be printed to scale and directly used to trace and cut metal pieces. All measurements are in centimetres.

(From the menu bar select **File** and open the **Print** Dialogue box. Then select **A4** from the **Scale to paper size** combo box.)

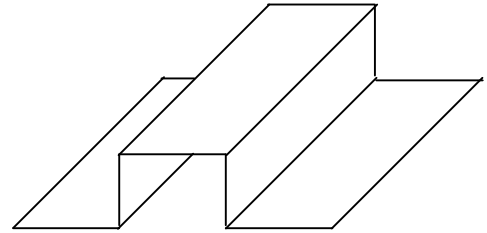
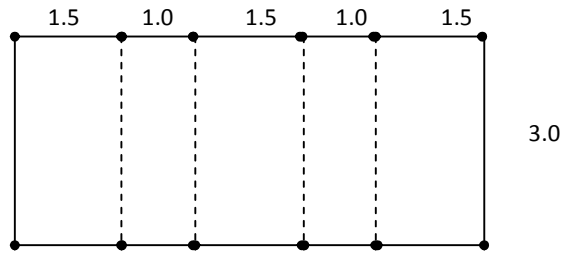
1. Pot support



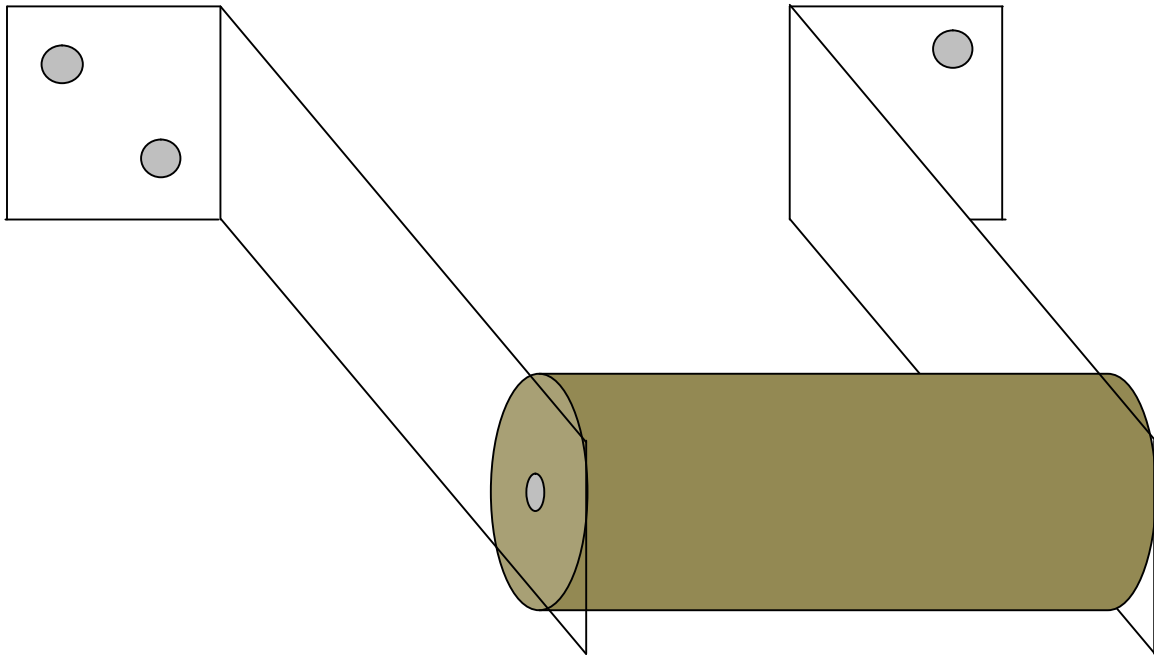
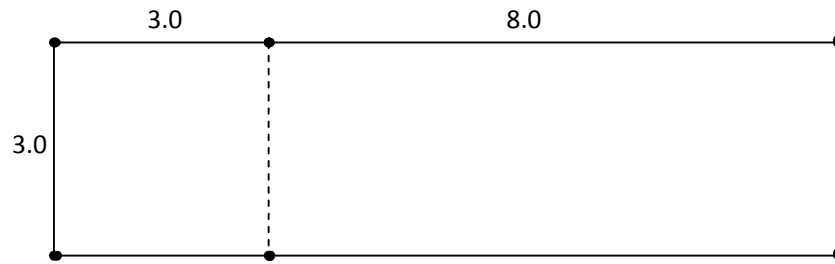
2. Stove leg



3. Pot stabilizer



4. Stove handle





**Annex 2:** - “Tikikil” with double skirts

