TLUD Champion Gasifier Cookstove

(Top-Lit UpDraft)

Construction Plans

(without stove structure)

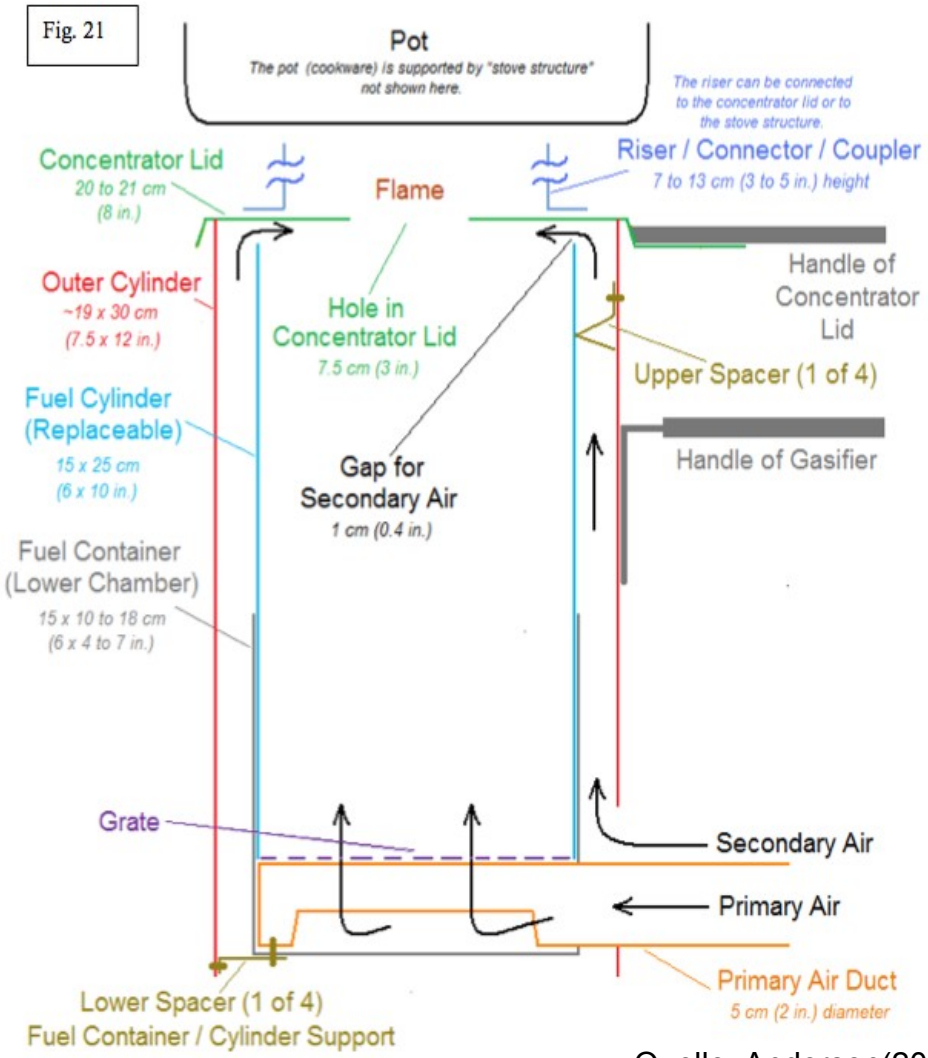
Microgasification

→ Combination of clean cooking and biochar production (for Terra Preta) at the same time

Dry biomass in transfered into gas (which is burned directly) and charcoal via gasification-pyrolysis

Open source design by Paal Wendelbo

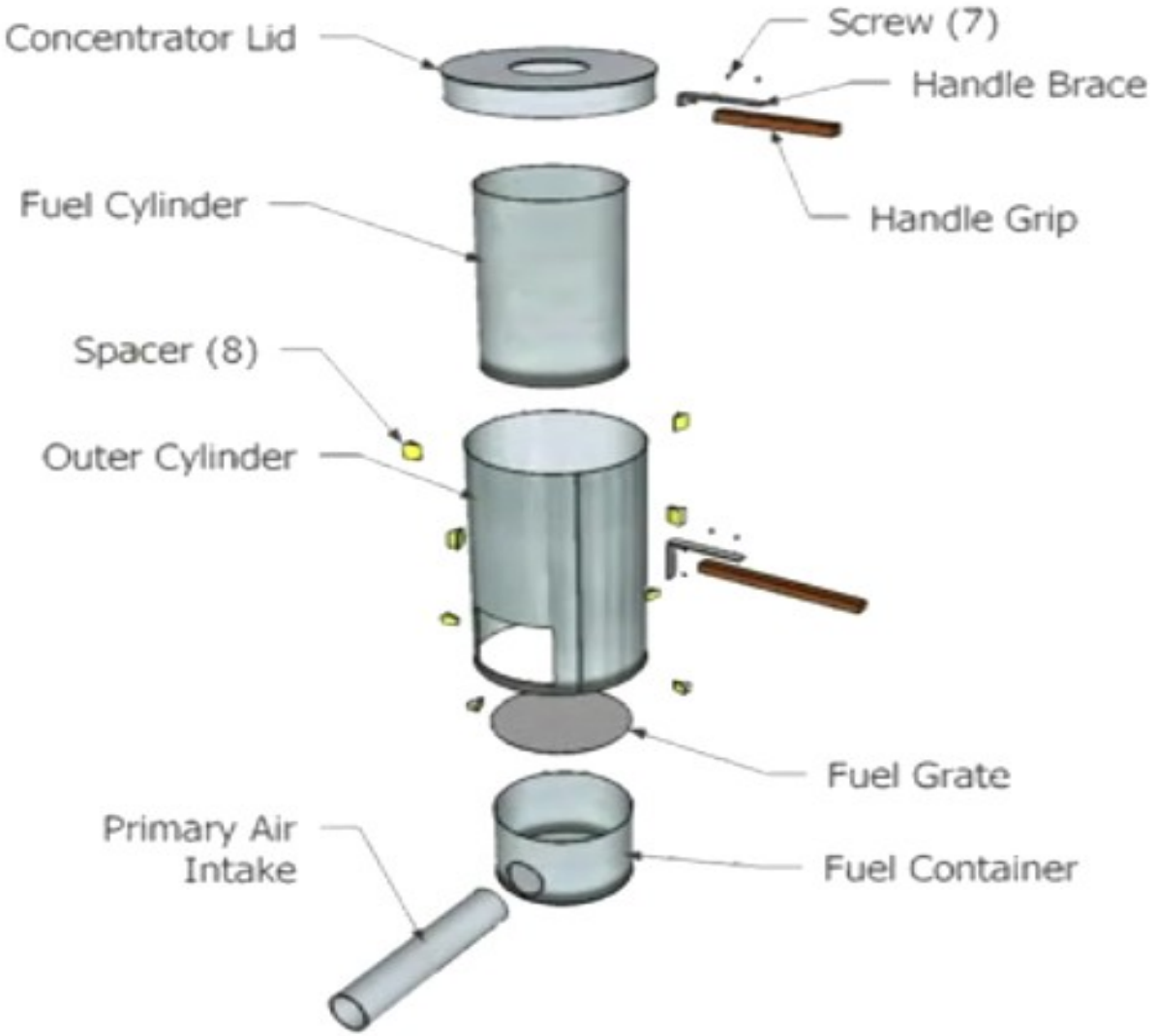
Design by Paul S. Anderson



Quelle: Anderson(2009)

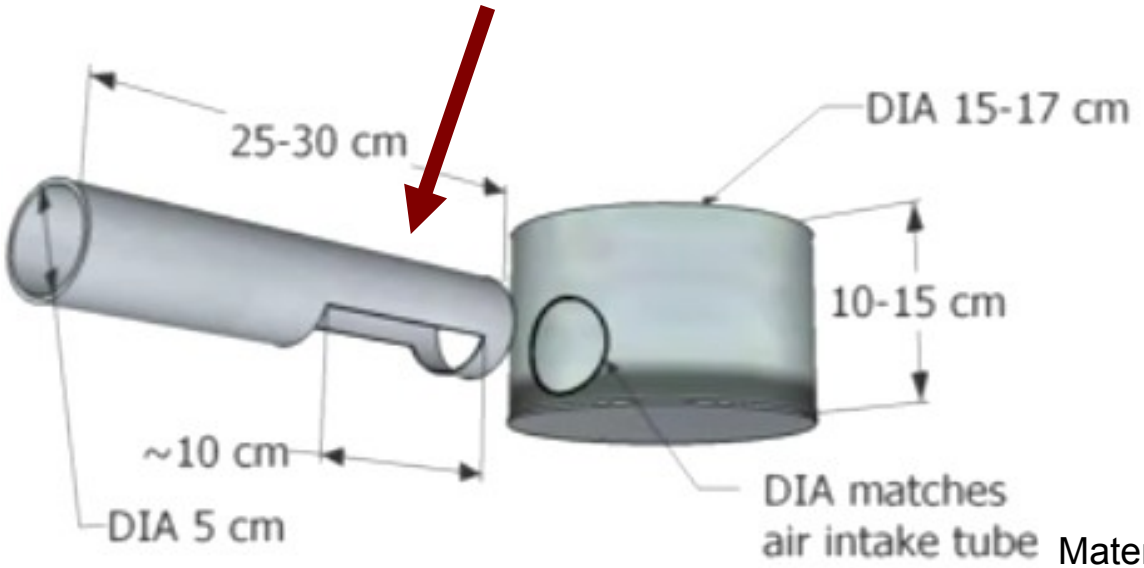
All pictures are taken from youtube of S. Anderson with permission

http://www.youtube.com/watch?v=_HPQjvq8Cdw&feature=related



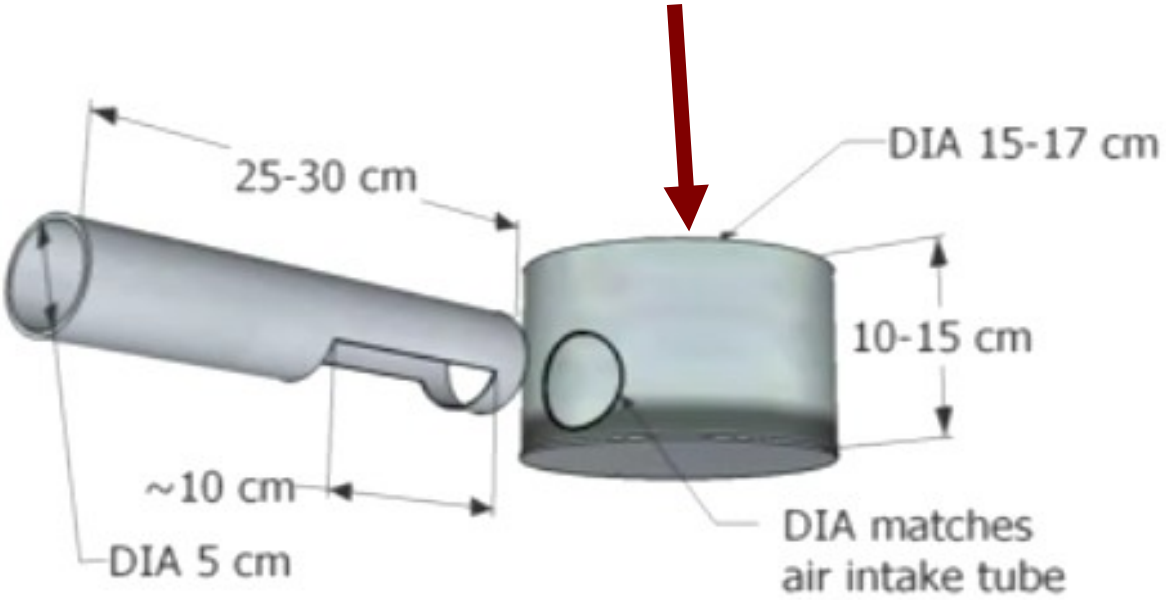
Ingenieure ohne Grenzen

Primary Air Intake



Material	Steel sheet metal
Diameter	approx. 2" resp. 5 cm
Length	20-30 cm (to reach completely through the fuel chamber and stick out up to 5" resp. 12,5 cm)
Form	Cylindrical or rectangular with similar cross sectional area
Forming	Bottom half is cut away to allow air flow up into the chamber

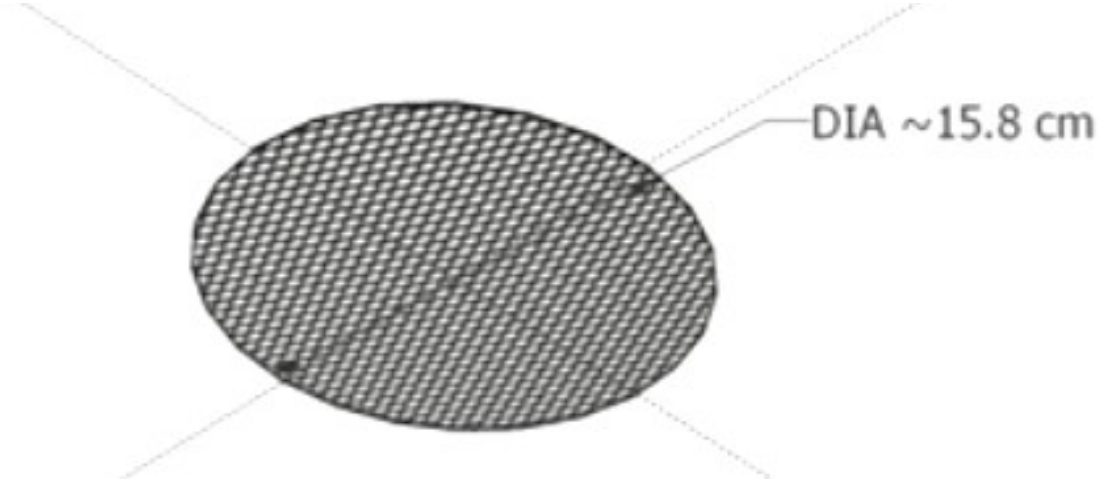
Fuel Container



Material	Steel sheet metal
Diameter	Approx. 6" to 6,5" resp. 15-17 cm
Height	At least 4" resp. 10 cm
Form	Cylindrical with sealed bottom and open top
Forming	Hole corresponding to air intake tube

Ingenieure ohne Grenzen

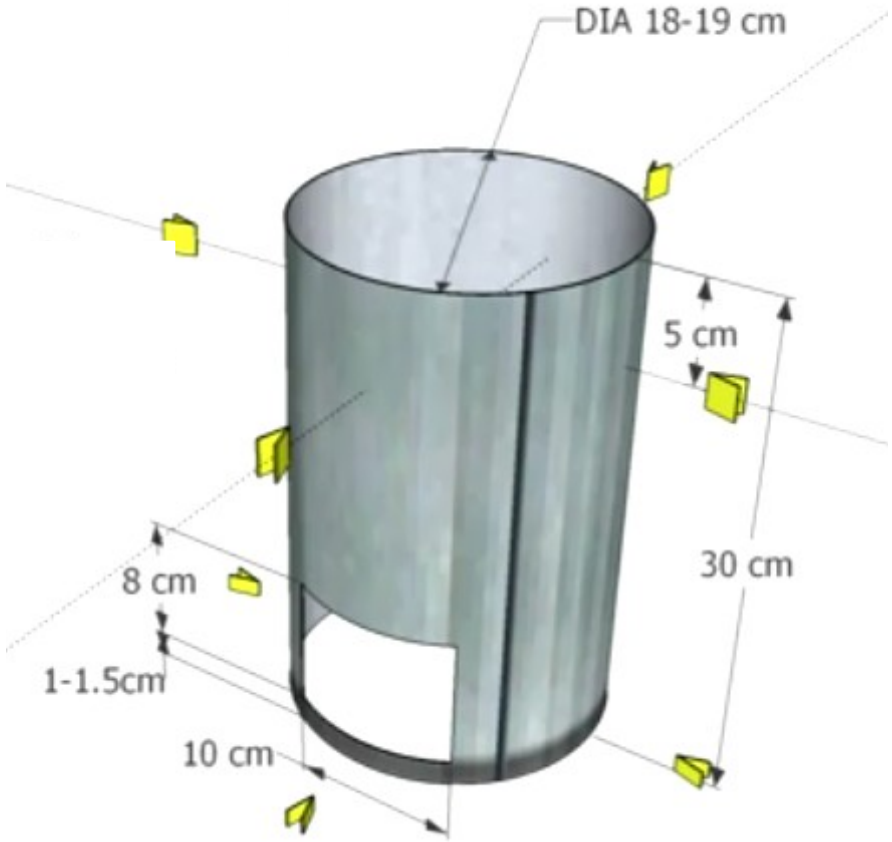
Fuel Grate



Material	Expanded steel with small mesh (1/8" resp. 3 mm spaces) or heavily perforated discs of sheet metal (for Refugee version)
Diameter	Closley match with Fuel Container for pressure fit (approx. 6" to 6,5" resp. 15-17 cm)
Forming	Hole sizes and frequency must allow sufficinet air flow without allowing fuel to fall through

Ingenieure ohne Grenzen

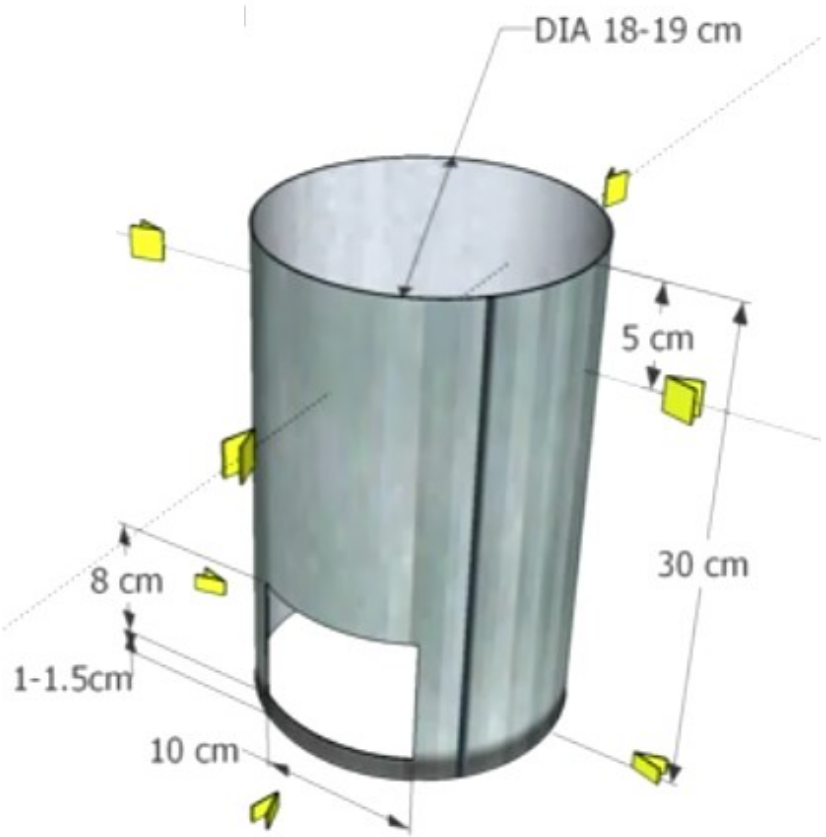
Outer Cylinder

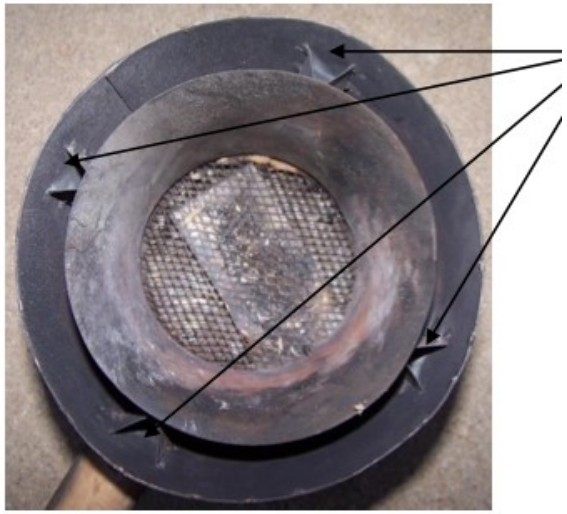


Material	Steel sheet metal
Diameter	Approx. 1" to 1.5" resp. 2.5 to 3.5 cm larger then inner cylinder
Length	20-30 cm (to reach completely through the fuel chamber and stick out up to 5" resp. 12,5 cm)
Form	Cylindrical
Forming	Cylinder rolled and bonded; Rectangular hole for primary air tube and functions as secondary air inlet; size 3" x 4" resp. 8 x 10 cm)

Ingenieure ohne Grenzen

Spacers

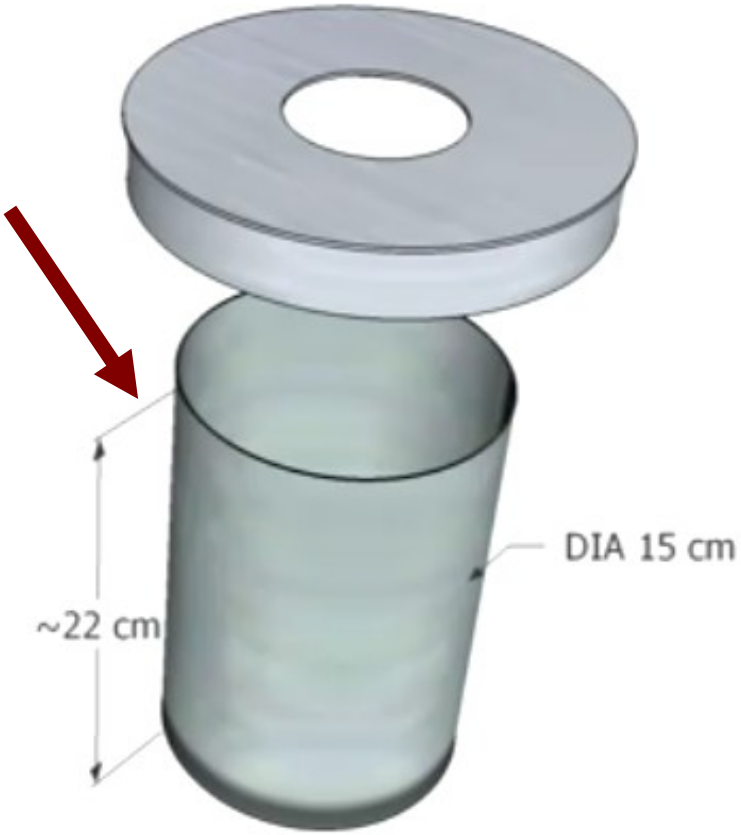




Material	Steel sheet metal
Size	Approx. 1 to 2 cm
Form	Triangle; attached to the inside walls of the outer cylinder at points, spacers for the lower portion of the inner fuel chamber can be incorporated into the support requiered to elevate that chamber relative to the outer cylinder
Function	To secure the inner fuel cylinder in a central position inside the outer cylinder

Quelle: Anderson(2009)

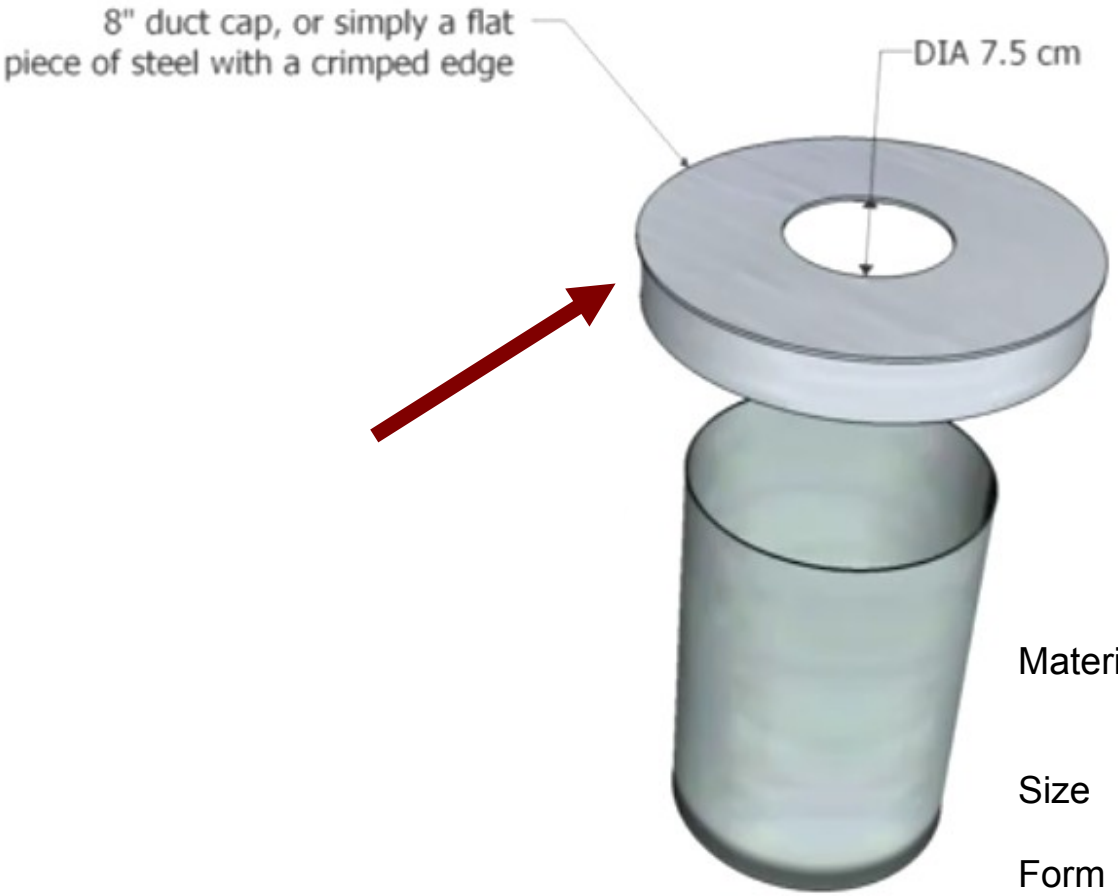
Fuel Cylinder



Material	Steel sheet metal, rolled and bonded
Height	Fuel chamber + fuel cylinder
Form	cylindrical
Position	When concentrator lid is in place, resting on outer cylinder, the top of the fuel cylinder should be approx. 0.4" resp. 10 mm below the lid
Note	This cyclinder should be the last component made, as its size may vary due to any modifications of other parts.

Ingenieure ohne Grenzen

Concentrator Lid



Material	Non-crimped duct cap (refugee version), flat steel
Size	Approx. 8" resp. 20 cm
Form	cylindric
Forming	Form „lip“ or collar edge of 1" to 2" resp. 2,5 to 5 cm
Note	To minimize the impact of wind

Handle

Material	Non-heat-conductive material (e.g. wood)
Note	To be radially joined onto the lid´s collar

Riser

Material	Steel sheet metal, rolled and bonded
Height	4" to 5 " resp. 115 to 125 cm
Form	cylindrical
Note	Need to be taller for cooking at elevatins above 3300 feet resp. 1000 meters

Assembly

1. Insert the assembled lower half of the fuel chamber into the outer cylinder, and fix it into place using the spacers and attachments.

2. Attach the handle.

3. Insert the upper part of the fuel chamber. Use a set-screw to prevent it from slipping from its position when the char and ashes are removed by tipping upside down.

4. Verify that the concentrator lid is correctly and completely assembled in relation to the stove structure with which the gasifier will be used.

Operation

- Fill Fuel Cylinder and Container with chunky (approx. 0,5 x 1 x 2 cm), dry biomass; watercontent should be 6 to max. 15%
- Mix some biomass aside (!!!) with kerosene/paraffin, citronella oil, flammable alcohol, diesel fuel or other “reasonable” flammable liquids as „starter material“ and then add on top for top-lightning
- Ignite and add concentrator lid and riser immediately (within 20 sec.)
- Operation: pyrolysis front is moving downwards
- End of pyrolysis process: flame turn from yellow to blue and maybe smoke is released
- To end pyrolysis: stop air flow by closing air inlet and/or dump the hot char into „snuffer can“ (simple can or clay pot) or let charcoal also burn to ash for more heat supply if wanted

Hobbyist and Artisan Version

Quelle: Anderson(2009)

Refugee Version

Fig. 15


Fig. 16

Quelle: Anderson(2009)

Recycling-TLUD

Built, tested and used for biochar production
in CaSa-project* by Ingenieure ohne Grenzen e.V.

Construction design after McLaughlin (2010)

Ingenieure ohne Grenzen

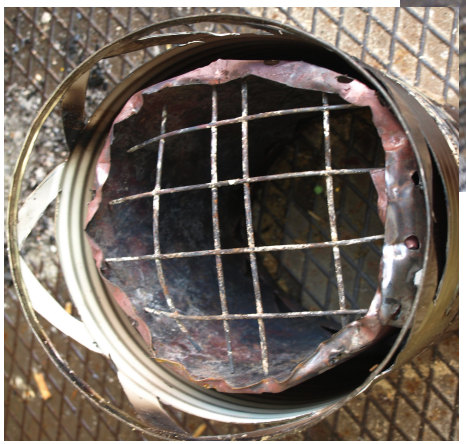
*CaSa = Carbonization and Sanitation; Berlin chapter; Pictures by Ingenieure ohne Grenzen e.V.

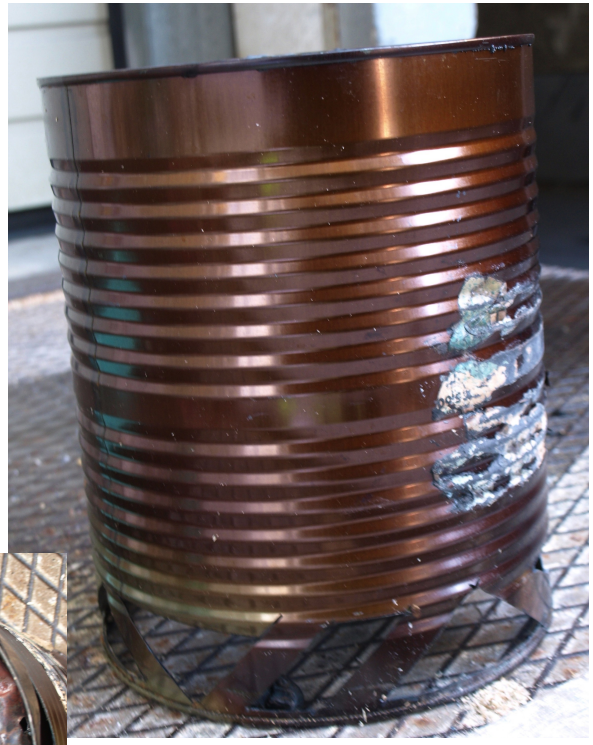
TChar = TBase + TTop

TBase: Charcoal stove
TTop: TLUD

Quelle: Anderson(2011)

TLUD (found in a backyard, Berlin, Kreuzberg)





Ingenieure ohne Grenzen

Literature

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