MEDECINS SANS FRONTIERES

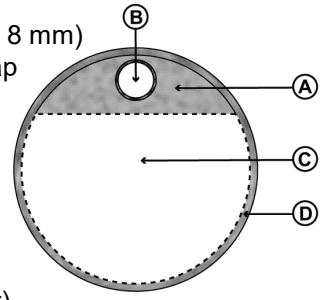
Temporary Volume Reducer: Soft Waste

This model of Temporary Volume Reducer should only be used for Soft Waste in a Health Structure during the emergency phase or for very small Health Structures that have a very low production of waste. Other medical waste such as sharps and organic waste should not be burned, thus other facilities should be available for them (see appropriate Manufacturing Sheets).

As the design of this Temporary Volume Reducer takes some time to manufacture, it might be that it is not the most feasible solution for the first days of an acute emergency. In such a situation, the reducer as used for Mass Vaccination Campaigns might be a better option, even for Soft Waste, but the openings in the grill should be smaller. It is also very important to have separate reducers for the Soft Waste and the Safety Boxes containing AD syringes (their residues should **NOT** be mixed in the same pit for safety reasons)!

Material needed

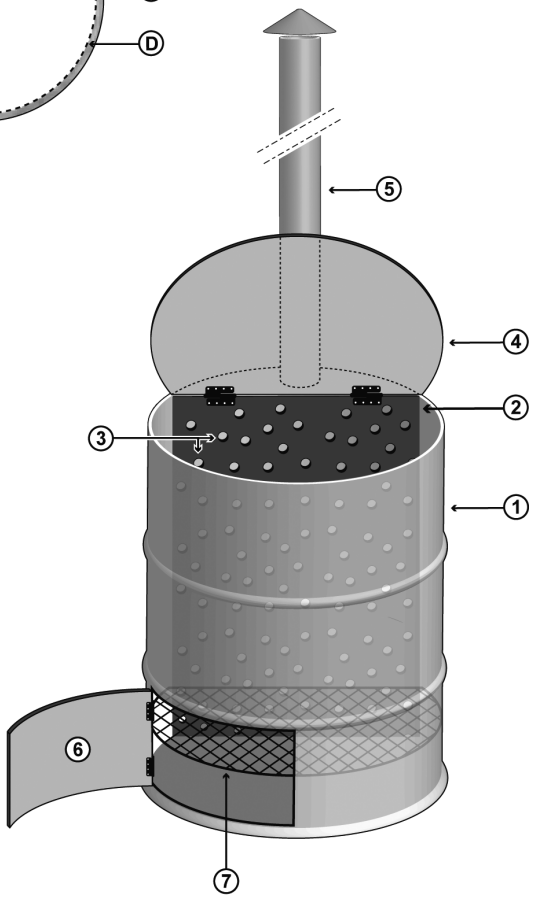
- Basic toolkit including:
  - (Electrical) hand drill with different sizes drilling bits / (drill standard)
  - Metal saws (preferably also an electrical jigsaw)
  - Marking tools (long ruler, pencil, centre-punch, pair of compasses, square)
  - Set of spanners and screwdriver
  - Universal pliers
  - Sandpaper
  - Hammer (& Chisel for metal cutting)
  - File (round and half round)
  - Measuring tape
  - Clamps
  - Bench vice
- Metal 200 l drum
- Metal plate
- Reinforcement rods (rebar of min. 8 mm)
- Metallic pipe (for chimney) with cap
- Nuts, washers and bolts
- 4 hinges
- Metal angle (L- profile)
- Metal flat strip



Principle

(drawing of a Temporary Volume Reducer)

A. Top of the drum (part not cut out)
B. Hole for the chimney
C. Combustion chamber (large)
D. Cut-out of the cover



1. Metal drum, 200 l
2. Perforated metal plate
3. Perforations in the metal plate for draught
4. Loading door
5. Chimney with head cap
6. Ash door (can be used to regulate the draught)
7. Metal grating (or heavy mesh)

II. 3.1. Step 1

Mark the centreline and the places where the chimney and grill will be positioned on the drum's top cover.

The centreline should ideally be aligned with the welding seam of the drum's cylinder.

The positioning of the chimney should be on the side of the welding seam.

The positioning of the grill should be perpendicular to the centreline, and the future iron reinforcement bars spaced out by about 50 mm from each other. The lines for the future grill can be continued vertically until the bottom of the drum's cylinder.

II. 3.2. Step 2

Position 2 hinges on the grill line closest to the chimney and drill its holes through.

Once cut out, this part of the top cover will become the loading door.

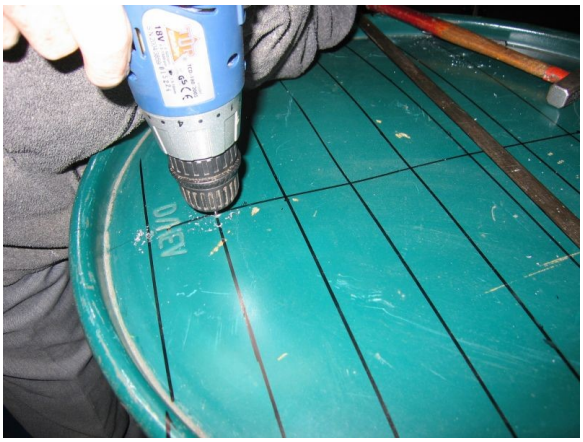
The diameter of the holes depends on the size of the holes in the hinges and the available bolts.

It is recommended to insert bolts already once the holes on one side of the hinge are drilled, to make sure that the holes on the other side of the hinge are made at the correct spots. Once all the holes drilled, the bolts can be removed.

II. 3.3. Step 3

Drill 2 holes along the centreline on the edge of the future loading door, opposite to the chimney positioning.

The diameter of the holes depends on the size of the bolts available.



II. 3.4. Step 4

Mark two concentric circles on the chimney position of the drum cover, and divide the space in between the inner and outer circles in small trapezoids, starting from the centre.

The outer circle diameter should be equal to the outer diameter of the chimney pipe.

A template (in paper) can help to divide the future opening into equal trapezoid parts. At every 90°, the base of the trapezoid can be double in width (see the example of the template further on in this manufacturing sheet).

II. 3.5. Step 5

Drill a hole in each of the 4 big trapezoid part about 20 mm inwards of the outer circle, and also a small hole just on the inside of the inner circle.

The diameter of the 4 holes inside the outer circle depends on the size of the available bolts (e.g. 6 mm).

The diameter of the hole inside the inner circle depends on the size of the saw blade.

II. 3.6. Step 6

Cut out the inner circle completely and continue to cut radial from the opening towards the outer circle according to the trapezoid pattern drawn before.

Before starting to cut the trapezoid parts, the sharp edges of the opening should be removed with some sand paper or a file in order to avoid injuries during further manufacturing.

The big trapezoid parts at 90° intervals can be cut a little beyond the outer circle.

II. 3.7. Step 7

Hammer the small trapezoid parts inwards and fold the 4 big trapezoid parts by means of universal pliers outwards until they stand vertically.

The inward trapezoid parts will help to centre the chimney pipe that will be fixed to the outward trapezoid parts.

Once the outward trapezoid parts are upright, their sharp edges should be removed.

It is recommended to try if the chimney fits before cutting out the loading door, as this reduces the strength of the drum's top cover.

II. 3.8. Step 8

Drill 2 holes along the hinges line on the edges of the top cover.

The diameter of the holes depends on the size of the saw blade that will be used to cut out the loading door.

II. 3.9. Step 9

Insert the saw blade in one of the holes and start cutting out the loading door.

If an electrical jigsaw is used as indicated in the picture, put a small block with the height of the drum rim underneath it, as this will ease considerably the cutting of the metal plate.

Some oil might be needed to ease the cutting.

Before continuing, insert a good amount of sawdust to absorb the liquid that might be inside. To avoid contamination of the environment, it's strongly recommended to encapsulate the soiled sawdust afterwards. Wear thick rubber gloves when performing this work, as the liquid might be harmful.

II. 3.10. Step 10

Remove all sharp edges from the drum and the cut-out to avoid injuries during further manufacturing and operation.

The sharp edges of the drum rim can be hammered inwards.

The sharp edges of the straight part of the drum and the cut-out can be removed with sandpaper or a file. In case the latter is used, make sure to have removed all the oil before, as it will damage the file.

II. 3.11. Step 11

Drill small holes in a flat metal strip according to the holes already been made along the centreline of the loading door.

This flat metal strip will not only serve as a handle, but also avoid that the loading door, once installed, will pivot inwards the drum.

II. 3.12. Step 12

Bend the flat metal strip into a flat Z-shape.

This is needed for the handle to pass the rim of the drum.

II. 3.13. Step 13

Cut the flat metal Z-shaped strip to length.

The part of the handle that passes outside of the rim should have about a hand's length to ease the opening of the loading door.

II. 3.14. Step 14

Fit the hinges and Z-shaped handle to the loading door by means of bolts and nuts.

II. 3.15. Step 15

Fix the loading door with its hinges to the drum by means of bolts and nuts.

II. 3.16. Step 16

Mark on the side of the drum the opening of the ash door.

The opening should be made on the lower side of the drum, opposite of the chimney position.

The dimensions of the opening depend on the positioning of the future grill.

II. 3.17. Step 17

Drill holes at the 4 corners of the marked area.

The diameter of the 4 corner holes depends on the size of the saw blade that will be used to cut out the opening.

II. 3.18. Step 18

Position 2 hinges on one side of the ash door and drill its holes through into the marked area and the drum cylinder.

The diameter of the holes depends on the size of the holes in the hinges and the available bolts.

It is recommended to insert bolts already once the holes on one side of the hinge are drilled, to make sure that the holes on the other side of the hinge are made at the correct spots. Once all the holes drilled, the bolts can be removed.

II. 3.19. Step 19

Drill 2 holes, 50 mm separated from each other, in between but on the opposite side of the hinges' holes, with 1 falling within and the other outside the marked area.

These 2 additional holes will serve to attach a "locking" mechanism for the ash door.

The diameter of the holes depends on the size of the available bolts.

II. 3.20. Step 20

Insert the saw blade in one of the 4 corner holes of the marked area and start cutting out the whole opening.

Some oil might be needed to ease the cutting.

Keep the metal cut-out, as it will be used as the ash door afterwards.

II. 3.21. Step 21

Remove the sharp edges of the drum and the cut-out plate by using sand paper or a file.

This is to avoid potential injuries during future manufacturing and operation.

In case a file is used, make sure to have removed all the oil before, as the file will be damaged by the oil.

II. 3.22. Step 22

Cut a piece of metal angle to length and remove all sharp edges.

The piece should be about 70 mm in length.

This metal angle piece will serve as “locking” mechanism for the ash door.

II. 3.23. Step 23

Drill 2 holes in the metal angle piece with a distance from each other of 50 mm and remove all sharp edges.

The diameter of the holes has to be at least the same as those already drilled in the drum.

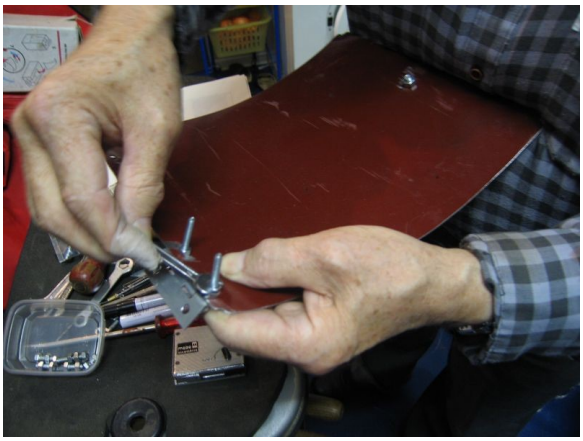
II. 3.24. Step 24

Cut from the edge towards the hole (at the drum side when it will be mounted) of the metal angle piece, and enlarge this slot a little by means of a round file.

II. 3.25. Step 25

Fit the hinges and "locking" mechanism (metal angle piece) to the ash door by means of bolts and nuts.

The bolt of the "locking" mechanism will have to be fixed with a double nut, one on the inside and the other on the outside of the drum, so that the mechanism can turn freely.



II. 3.26. Step 26

Fix the ash door with its hinges to the drum by means of bolts and nuts, and install a bolt in the remaining hole of the drum.

The bolt on the drum will be the attach point of the "locking" mechanism. It will have to be fixed with a double nut, one on the inside and the other on the outside of the drum, so that the bolt head is free from the drum and therefore will hold the "locking" mechanism. A 3rd nut should be fitted to the bolt head with a washer in between to improve the "locking" mechanism.

Once fitted, check the functioning of the ash door and its "locking" mechanism.

II. 3.27. Step 27

Drill 2 opposite holes about 50 mm underneath the top rim along the hinge line and all the holes at about half the height of the ash door according to the indicated grill lines.

The holes are needed to insert iron reinforcement bars that will act as a support for the vertical baffle and also for the grill.

It might be needed to pre-drill with a small diameter and increase the size afterwards with a bigger drilling bit and a round file.

All sharps edges should be removed in order to avoid injuries.

II. 3.28. Step 28

Measure the lengths in between 2 holes on opposite sides of the drum.

The easiest way to do this is to measure the marked grill lines on the loading door.

Obviously, the longest length will be in between the opposite holes located along the diameter of the drum, where the other lengths will get shorter towards the outside of the circle.

II. 3.29. Step 29

Put markings on the iron reinforcement bar according to the measured lengths to which 100 mm should be added, cut them to length and remove all sharps edges.

The iron reinforcement bars should be long enough to be able to bend 1 side (so they won't fall out easily, but not too long either to avoid that they would stick out of the drum too much, causing potential injuries.

II. 3.30. Step 30

Bend all the iron reinforcement bars at one side.

The iron bars should be bent at about 50 mm from 1 extremity.

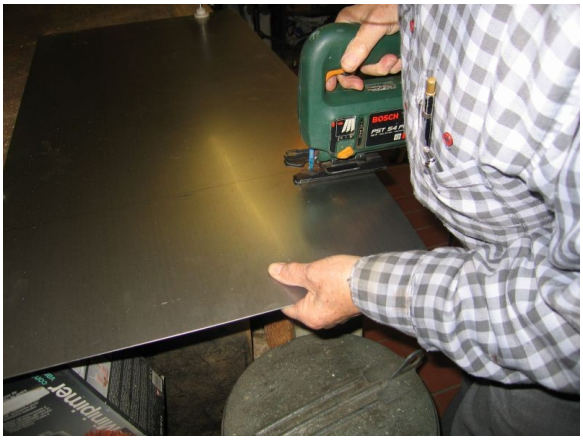
II. 3.31. Step 31

Measure the inside width and height at the level of the loading door's hinge line.

II. 3.32. Step 32

Cut a metal plate to the right measures.

This metal plate will become the vertical baffle in between the hearth and the chimney part.



II. 3.33. Step 33

Insert the cut metal plate into position and mark the places at its 4 corners where it will be fixed to the drum.

The metal plate will be fixed vertically with 2 (re-) bars, 1 at the level of the loading door's hinges and the other at the bottom by the deepest grill bar.

II. 3.34. Step 34

Drill the 4 holes in the metal plate at the marked places where it will be fixed to the drum.

It might be needed to pre-drill with a small diameter and increase the size afterwards with a bigger drilling bit.

II. 3.35. Step 35

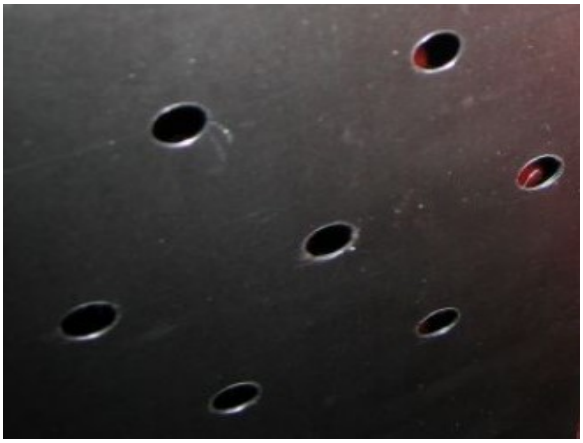
Cut slits just beyond the holes in the 4 corners of the metal plate and bend these small parts over 90°.

In order to have a straight fold, it is recommended to fix the plate with a little block and clamps at the exact spot where it should be folded.

II. 3.36. Step 36

Drill holes with a diameter of about 10 mm over the whole surface of the metal plate.

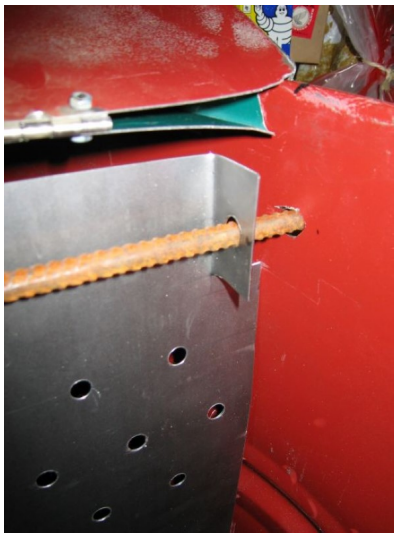
The holes can be separated about 50 mm from each other, with 2 following lines offset from each other (see picture). In this manner, the plate keeps its strength.



II. 3.37. Step 37

Insert the baffle into the drum and fix it with the upper and lower bars.

For a thick plate, it could also be welded to the drum. In this case, steps 33 until 35 can be skipped.



II. 3.38. Step 38

Insert the remaining bars for the grill into the drum according to their length.

II. 3.39. Step 39

Push the chimney in the hole, and drill via the small holes of the outward trapezoid parts into the pipe when the latter is in a vertical position.

Position the chimney pipe in such a way that its bottom falls just beyond the bottom of the inward trapezoid parts.

The diameter of the drilled holes should correspond to the size of the available bolts.

II. 3.40. Step 40

Fix the chimney pipe to the outward trapezoid parts by means of bolts and nuts.

The bolts can be introduced in the chimney pipe from the outside and tightened with nuts inside via the loading door.

For thick walled pipe, the chimney could also be welded to the drum.

II. 3.41. Step 41

Position the cap on the chimney pipe, and fix it with bolts.

In case a prefabricated cap can't be found, it can easily be made from a thin metal sheet. Once a circle has been cut out of the sheet, a triangular section from its centre should be removed as well. By connecting the 2 edges of the semi-circular cut out with bolts, a cone (cap) will appear. This cap should be connected to the chimney pipe by means of brackets and bolts.

II. 3.42. Step 42

Install the Temporary Volume Reducer on an appropriate spot within the protected waste zone.

Don't loose the grill (reinforcement bars) during the transport.

During the rainy season, it will be necessary to position the Temporary Volume Reducer under some kind of high roof, made out of non-combustible materials.

Reminder: *This Temporary Volume Reducer should not be used to burn sharps or hazardous waste.*

Example of a template for a 125 mm chimney pipe: