Sector Programme Water and Sanitation in Burundi (PROSECEAU)

MANUAL AKASUGA

Agroecological Latrine

coopération allemande
DEUTSCHE ZUSAMMENARBEIT

UNITÉ · TRAVAIL · PROGRÈS

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sustainable sanitation alliance

FOREWORD

In 2013, the GIZ Water and Sanitation Sector Program (ProSecEau), in partnership with the University of Burundi and the Ministry of Public Health and AIDS Control, undertook a research-action study on the potential for valorization of human excrement through the internship of Mr. Leonard Nzeyimana.

The results led to the development of an agroecological latrine model specifically adapted to the rural and peri-urban context of Burundi with the aim of improving the quality of drinking water and the sanitary and socio-economic conditions of households.

The latrine is called Akasuga, which is the Kirundi abbreviation of „Akazu ka Surwumwe Gatanga Amase" and is translated into English as „fertilizer-producing latrine". This latrine has been approved by the relevant authorities in Burundi as a suitable sanitation facility and is now being actively promoted by the Ministry of Public Health and AIDS Control (MSLPS)[1] and the Ministry of Hydraulics, Energy and Mines (MHEM). From 2016 to 2021, GIZ ProSecEau and its partner directorates[1] at MSLPS and MHEM supported the installation of nearly 20.000 Akasuga latrines distributed mainly in the provinces of Rumonge, Bururi and Mwaro.

The use of the Akasuga latrine has attracted increasing interest from sector stakeholders in Burundi and the sub-region due to its low cost, ease of construction and environmental, health, agricultural and consequently economic benefits. In order to facilitate the transfer of knowledge and thus the replicability of the Akasuga concept to interested stakeholders, an Akasuga latrine manual was developed detailing the construction and use of this latrine and its by-products, as well as useful information for the implementation of activities and support measures.

Thus, this manual is particularly addressed to public technical services having in their attributions public health (hygiene and sanitation), water resources protection, environmental protection, waste management and agriculture, as well as to all stakeholders in the field of water, agriculture, environment, hygiene and sanitation.

ACKNOWLEDGEMENTS

GIZ_ProSecEau would like to express its gratitude to all those whose efforts made the development of the Akasuga latrine Manual and other related WASH sensitization tools possible, in particular: Leonard Nzeyimana (GIZ Technical Advisor on Hygiene and Sanitation and designer of the Akasuga latrine), Dr. Françoise Reman (GIZ Technical Assistant), Alexandra Dubois (GIZ Technical Advisor), Philippe De Roissart (GIZ Field Officer), Vanille Pieper and Dina Khalifa (GIZ Interns), and of course the Burundi Red Cross, Spanish Red Cross, Flanders Red Cross team, Development Media International (DMI) and Sparkassenstiftung für internationale Kooperation (SBFIC).

GIZ_ProSecEau could not have developed this manual without the continual support of the Ministry of Public Health and AIDS Control through the DPS-DSCE and the Ministry of Water, Energy and Mines through the AHAMR.

1 MSLPS : Health Promotion, Demand for Care, Community and Environmental Health Department (DPS-DSCE); MHEM: Water and Sanitation Agency in rural environments (AHAMR).

TABLE OF CONTENTS

TABLE OF CONTENTS (CONTINUED)

1 GENERAL INFORMATION ABOUT THE AKASUGA LATRINE

1.1 Context

As part of the reform of the water and sanitation sector beginning in 2007, the Government of Burundi adopted the National Water Policy (PNEau) in 2009 and the National Sanitation Policy (PNA) in 2013. The overall objective of the PNEau is to guarantee in a sustainable manner the coverage of water needs of all users through a harmonious development of national water resources . The PNA, for its part, has the aim „Access for all inhabitants of Burundi to a public sanitation service that is managed in a sustainable, efficient manner and respects the environment, human health, and fundamental human rights is improved".

The principles and strategic axes of the PNEau and the PNA have guided the interventions of the GIZ Water and Sanitation Sector Program (ProSecEau). Action Area 1 of ProSecEau, which aims to improve the quality of drinking water, by focusing on the protection of water resources on the one hand and on hygiene and basic sanitation on the other, is based on the following expected results from the strategic documents:

- The rural population uses functional and adequate sanitation facilities
- The rural population adopts appropriate hygiene practices
- The proportion of households practicing open defecation is reduced by half between 2013 and 2020 and the practice is eradicated by 2025
- Drinking water catchments are protected from human pollution sources

The choice of these specific indicators is explained by the fact that waterborne diseases are alarmingly prevalent among the population of Burundi and that human feces are the main source of transmission of these diseases. Human excrements contain pathogens responsible for many diseases such as diarrhea, cholera, typhoid and dysentery. Inappropriate hygiene practices, lack of adequate sanitation, and unsafe water supply contribute to the spread of these fecal-oral diseases that are transmitted through contaminated water, food, hands, and crops. Therefore, appropriate sanitation facilities, good hygiene practices, and safe management of human excrements can interrupt the transmission cycle and prevent health risks to people and the environment.

1.2 What is an Akasuga latrine?

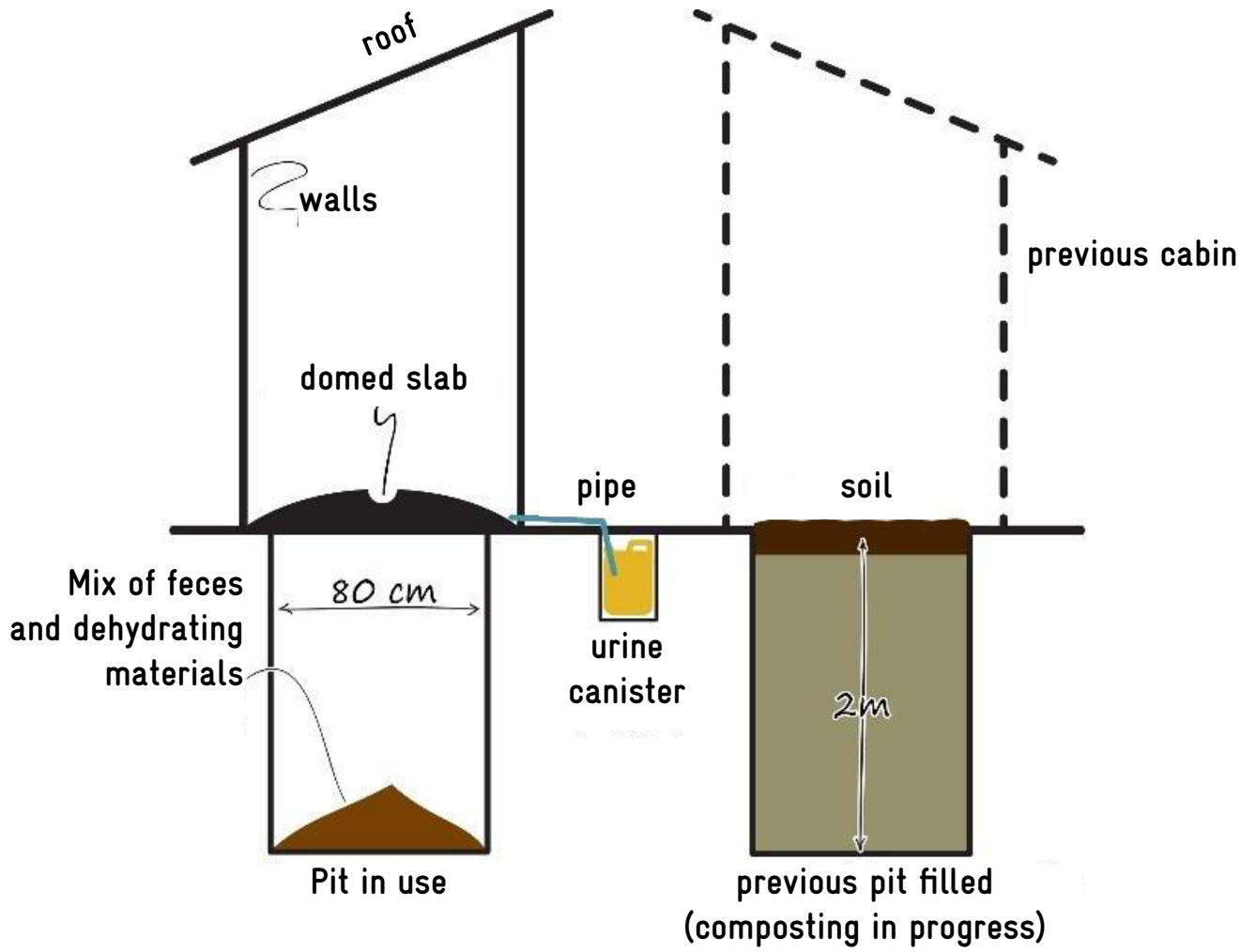
The name „AKASUGA" is the Kirundi abbreviation of „Akazu ka Surwumwe Gatanga Amase" which can be translated into English as „The house in which one hides to produce compost „. The Akasuga latrine is a model of agroecological latrine for family use, inspired by the ECOSAN model. It consists of a system for separating solid excrements (feces) from liquid excrements (urine). This separation has several advantages: it reduces odors, flies and the survival time of bacteria and viruses contained in feces; it also produces a good quality compost from dehydrated and biodegraded feces and urine to be used as liquid fertilizer once treated and diluted.

Example of an Akasuga agroecological latrine for family use

1.3 Components of the Akasuga latrine

The Akasuga latrine consists of the following structural elements:

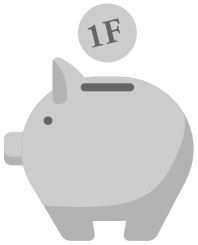
- Compost pit;
- The round, domed slab, made of unreinforced concrete with a covered defecation hole, a urine deviation system (concrete channel followed by a funnel) and two footrests;
- A superstructure or cabin that guarantees the user's privacy and includes 4 solid walls, a door and a waterproof roof;
- A urine deviation and collection system fixed on the domed slab. This system consists of a urine diverter (UD), a pipe connecting the end of the UD to the canister installed below in a hole dug inside or outside the cabin and used to collect urine;
- A nearby hand washing facility with clean water and soap (e.g. Tippy-Tap)



Cross section of the Akasuga latrine and its alternate pit system

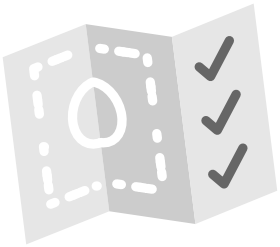
1.4 Advantages of the Akasuga latrine

The Akasuga agroecological latrine has many advantages that meet the specific needs of the Burundian population in rural and peri-urban areas.



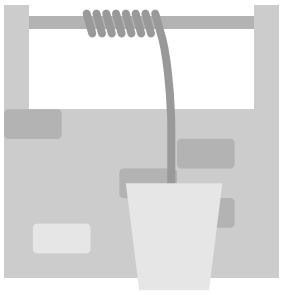
Low cost: the construction costs of the Akasuga latrine are low and are quite comparable to the construction costs of a traditional pit latrine. Construction materials are available locally, either in stores (cement, roofing liners, pipes, canisters, funnels) or in nature (gravel, sand, adobe bricks). Part of the construction can be done by the household, which results in lower labor costs. Finally, the domed design of the concrete slab has the advantage of not requiring rebars, which provides additional savings in construction materials.

Strong, durable and safe: one of the innovations of the Akasuga latrine is the particular shape of its concrete slab. The strength and capacity of the slab to support high loads is guaranteed by its domed shape, which distributes the weight over the entire surface of the arch through compression. Thus, despite the absence of rebars, the domed slab ensures the strength and safety of the latrine for its users. The brick walls and the waterproof roof also contribute to the durability of the infrastructure.



Simple to build: Apart from the construction of the domed slab, for which the services of a specialized mason is required, the Akasuga latrine can be built by the household itself by following the simple instructions given by the video tutorials, the Red Cross model households and volunteer educators, and the health promotion technicians and community health workers. ProSecEau has trained and certified 608 specialized masons in the 15 communes of the intervention zone (Province of Rumonge, Bururi and Mwaro), and has set up 5 sanitation stores for the sale of construction materials in the communes where these materials are not available.

Hygienic: the separation of liquid and solid excrements drastically reduces the odors that emanate from the chemical reaction caused by the mixing of urine and feces. The humidity in the feces is a favorable ground for the development of pathogens responsible for bad odors and waterborne diseases. The efficiency of this separation is increased by the addition of dry carbonaceous materials such as ash and sawdust that accelerate the dehydration process of the feces, and thus the elimination of pathogens and associated bad odors. This also reduces the number of flies attracted to the odor, which limits the transmission of fecal-oral diseases.



Production of good quality fertilizer: The unique feature of the Akasuga toilet is its ability to produce by-products for agronomic use. The urine deviation system allows the collection, storage and subsequent treatment of liquid and solid excrements separately. The treated and diluted urine is used as a liquid fertilizer rich in nitrogen. The dehydrated and biodegraded feces are transformed into compost acting both as a nutrient-rich fertilizer (nitrogen, phosphorus, potassium, etc.) and as a soil improver due to its high organic matter content. The production of by-products is thus a direct or indirect source of income and therefore can contribute to the improvement of the socio-economic situation of the household.

Protects drinking water sources: a low humidity level in the pit combined with the water tightness of the slab and a shallow pit eliminates any risk of pollution of groundwater by infiltration of contaminating liquids. Thus, the Akasuga latrine is particularly suitable for land where the water table level is high. However, if the water table is less than 2m deep, the pit must be bricked up and the level of the slab must be raised.

Comparison of the advantages of the ECOSAN and AKASUGA latrine

The advantages of the Akasuga latrine are quite similar to those of the Ecosan latrine except for the cost and technicality required for its construction. The Ecosan latrine costs about 10 times the price of an Akasuga latrine and requires the services of a specialized mason for the construction of the whole latrine (no self-construction possible). Thus, the Akasuga latrine is better suited to the rural and peri-urban regions of Burundi where the economic situation of households does not allow the financing of an Ecosan latrine from their own funds.

ECOSAN Latrines		AKASUGA Latrines	
Separation of urine and feces	✓	Separation of urine and feces	✓
No odors and no flies	✓	No odors and no flies	✓
Production of quality fertilizer	✓	Production of quality fertilizer	✓
Protection of groundwater	✓	Protection of groundwater	✓
Easy to build		Easy to build	✓
Low cost		Low cost	✓
Simple to use	✓	Simple to use	✓
Easy maintenance	✓	Easy maintenance	✓
Technology aimed to self-financing	✓	Technology aimed to self-financing	✓

2 CONSTRUCTION OF THE AKASUGA LATRINE

2.1 Steps and tasks distribution

The stages of construction of the Akasuga latrine are divided between the household, the mason and the Health Promotion Technician (HPT) or Community Health Worker (CHW) in charge of follow-up and quality control of the Akasuga built in their intervention zone. The construction steps are as follows:

Household tasks

1

To contact the HPT or CHW in your area in order to:

- Register
- Acquire the contact of the specialized mason(s) nearby
- Acquire specific information of the construction materials.

HPT/CHW tasks

- To register the household requesting the latrine for follow-up
- To provide the contact of the nearby specialized mason(s) from the masons list
- To inform the household about the specifications of the construction materials needed
- To advise on the latrine location and slab construction location
- To provide information of the superstructure (size, material, etc.)

Household tasks

2

To choose the location for the latrine and slab construction

3

To collect the construction materials that may be found in nature (sand, gravel, etc.)

4

To buy the remaining construction materials (cement, pipes, roofing liners, etc.)

Household tasks

5

To schedule an appointment with the specialized mason provided by the HPT/CHW

6

If necessary; to choose a suitable location, and collect/buy the compatible materials with the support of the specialized mason

Mason tasks

To check the compatibility of

- The latrine location
- The chosen location for slab construction
- Collected and bought construction materials

If necessary; to help the household choose a suitable location and collect/buy compatible materials

Household tasks

7

To support the mason (additional workforce) during the slab construction

Mason tasks

- To build the domed slab and urine diverter
- Supporting the household in sizing the compost pit and superstructure
- Instructing the household to water the built slab daily for 2 weeks to ensure the hardening of the concrete

Household tasks

8

Water the slab twice daily for 2 weeks to ensure the hardening of the slab

HPT/CHW tasks

9

Inspecting the slab, the location and dimensions of the pit and superstructure before allowing construction to proceed

Household tasks

10

Digging the compost pit

Household tasks

Mason tasks

11

Moving the Akasuga slab and placing it over the compost pit

If necessary, ask the mason for support

If necessary, support the household in moving and placing the slab over the compost pit

12

Building the superstructure

If necessary, ask the mason for support

If necessary, support the household building the superstructure

HPT/CHW tasks

13

- Inspecting the final Akasuga latrine before allowing its use
- Providing the household with information on use and maintenance of the Akasuga latrine and its by-products (supported by the municipal agent in charge of agriculture)

2.2 Equipment and Materials

a) Equipment of the specialized mason

A set of tools and materials are needed to build an Akasuga slab, which constitutes the mason's equipment. They must be properly maintained, handled and stored before, during, and after the construction work. It is important to find an appropriate and secure storage place to avoid fast deterioration and potential theft.

Circular cast mold

The casting mold is used to give the round shape to the slab. It consists of two metallic strips connected by two nuts to form a circular ring.

The total length of the ring corresponds to the circumference **(C)** of the slab, which has a diameter of 1.10m.

C = 1.10m x 3.14 = 3.454m

The length of a strip **(L)** corresponds to half of **(C)**, to which 4cm is added to allow the two strips to be joined by overlapping their ends while maintaining the measurement **(C)** circumference of the slab.

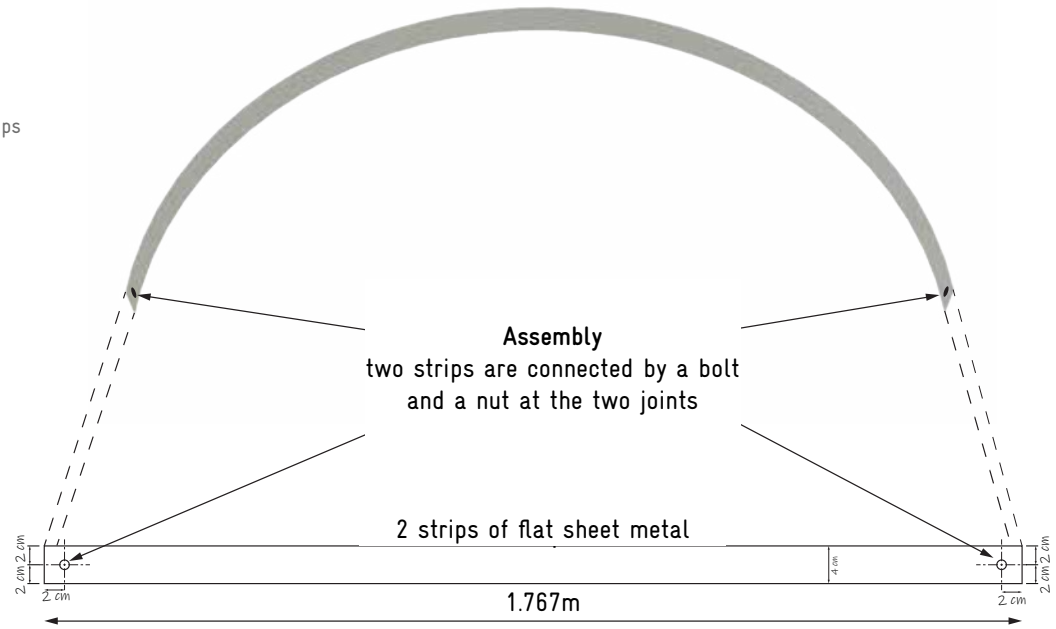
L = (3.454m/2) +0.04m = 1.767m

The thickness of the slab being 4cm, the width of the two metal strips measures 4cm.

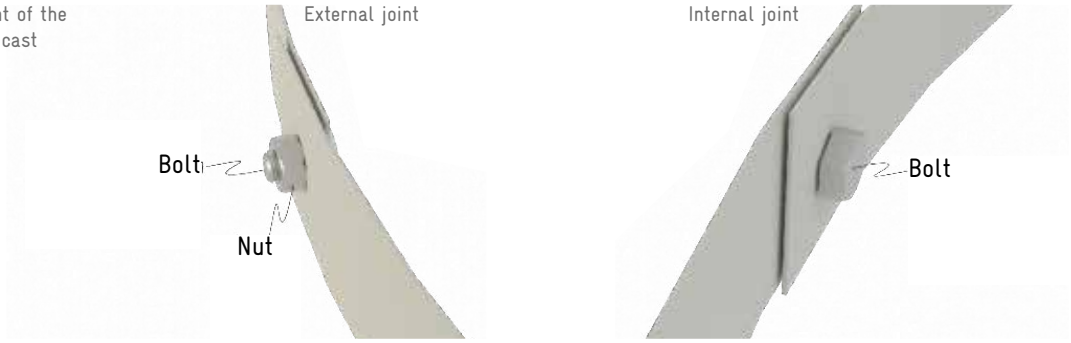
l = 0.04m

The cast mold should be constructed by a craftsman, the measurements and assembly instructions are given in the following technical drawings:

Measurements of the metallic strips with assembly instructions



External and internal joint of the metal strips forming the cast

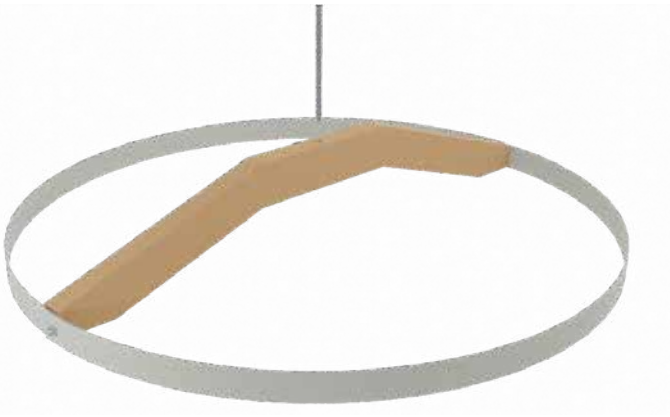


Jig

The jig is a wooden tool used to level the surface of the mold on which the concrete slab will rest. Once the cement is poured onto the mold, the jig will be used again to level the surface of the concrete slab to ensure a uniform thickness of the slab (4cm).

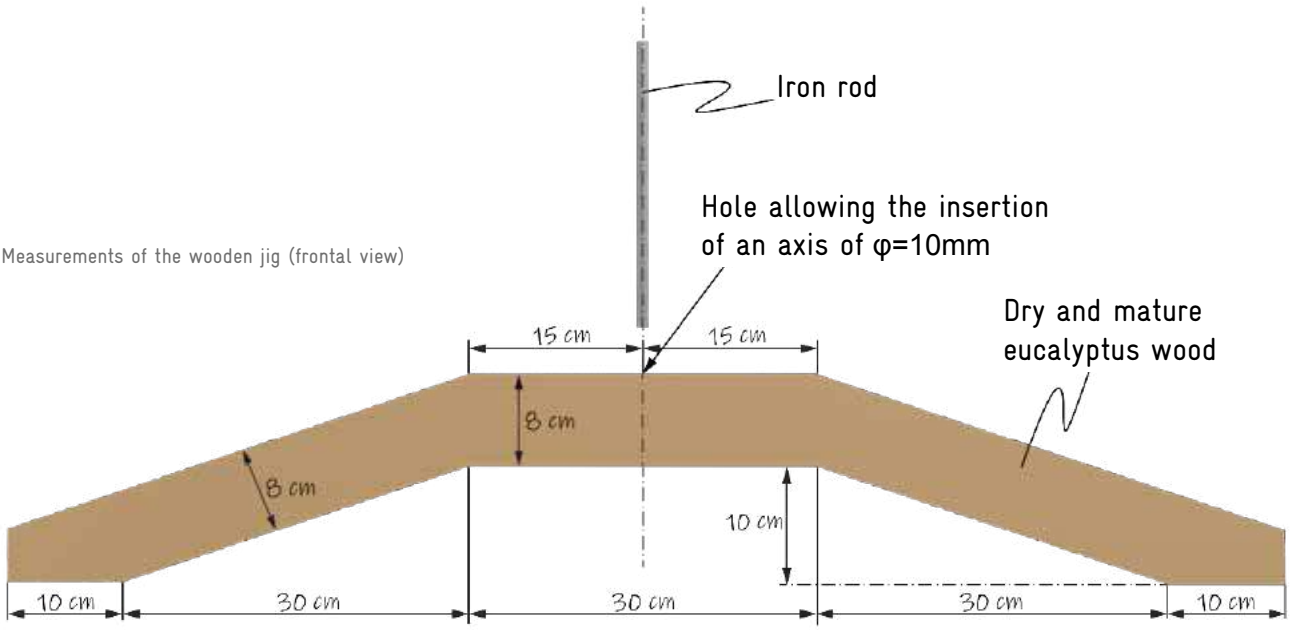
The jig has a central hole of 10mm diameter for the insertion of a metallic axis (iron rod), allowing the jig to rotate.

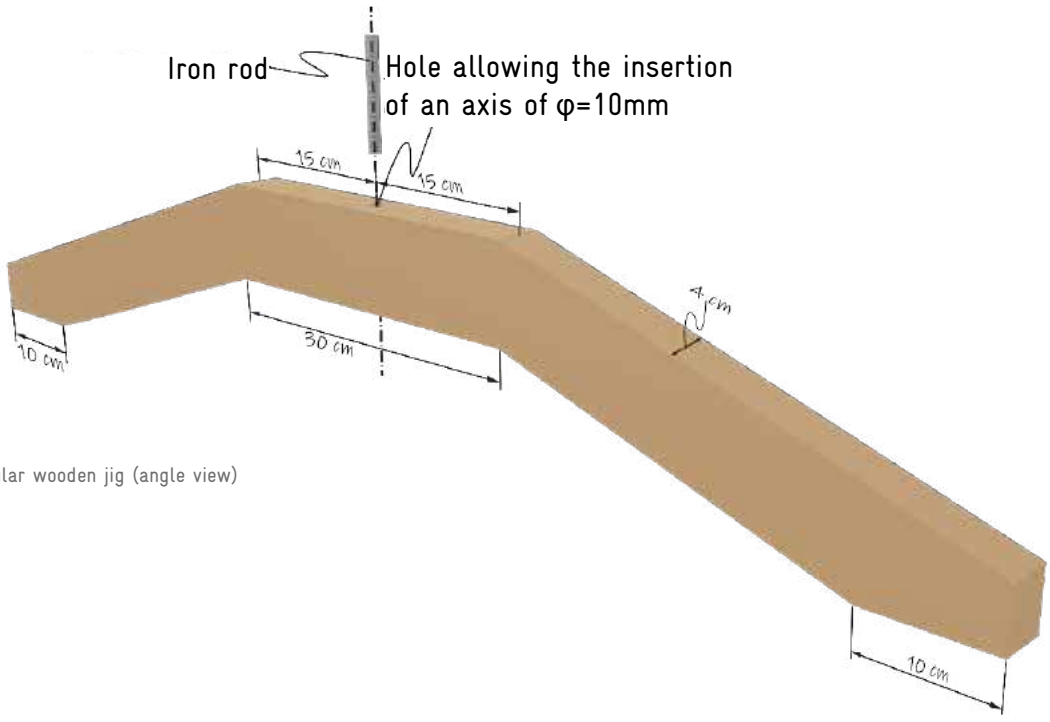
The jig should be built by a craftsman, the position of the jig in comparison with the circular cast mold construction measurements are shown in the following technical drawings:



position of the jig compared to the circular cast mold

Measurements of the wooden jig (frontal view)



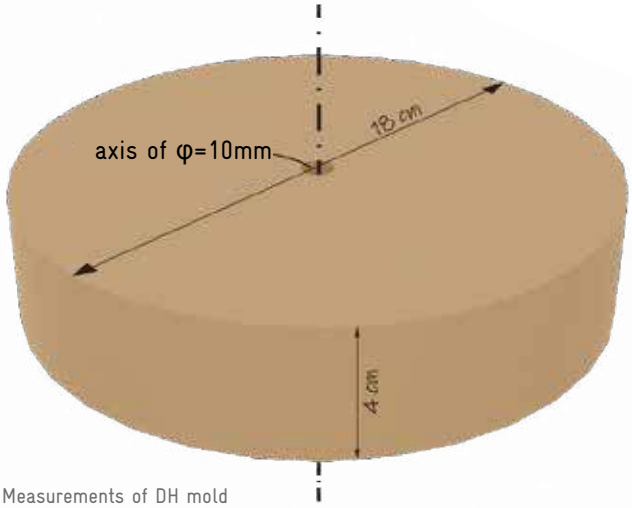


Measurements of the circular wooden jig (angle view)

Defecation hole mold

The defecation hole (DH) mold is a wooden piece used to shape the defecation hole. The DH mold is 18cm in diameter and at least 4cm wide (thickness of the slab).

The DH mold has a central hole of 10mm diameter to insert the metallic axis (iron rod), allowing the jig to rotate.

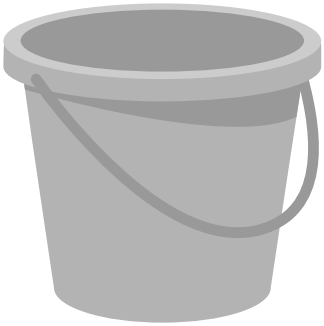


Measurements of DH mold

Other necessary tools

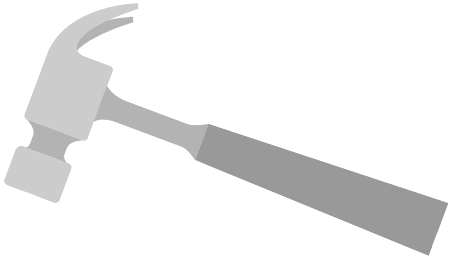
Bucket

A Bucket with a volume of 10L, (Non-returnable bucket used as a packaging for oil) which is used to measure the quantities of sand, gravel, cement and water.



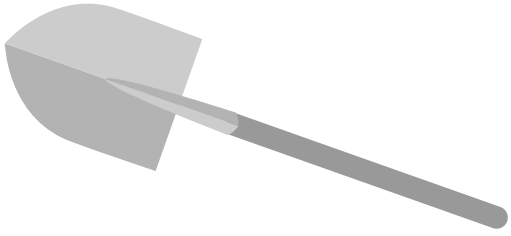
Hammer

A carpentry hammer with a metal handle (brand SOMAFIX model SFDC500) which is used to wedge the metallic mold, to hammer the jig when leveling the thickness of the slab and to drive the nails during the construction of the roof (if this step is carried out by the mason).



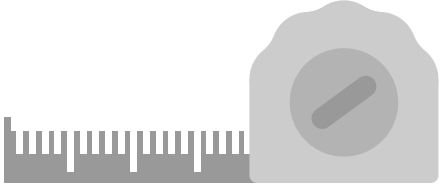
Shovel

A pickup shovel which is used to prepare (level) the construction ground for the slab, to mix and collect the concrete mix and to dig the pit (if this step in done by the mason).



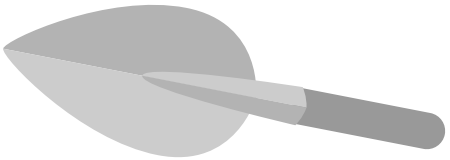
Measuring tape

A 3m (10ft) measuring tape used to take measurements.



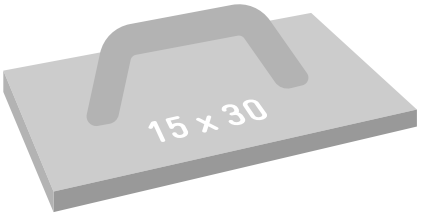
Trowel

A trowel with a steel blade and a wooden handle, which is used to mix and apply the concrete and mortar.



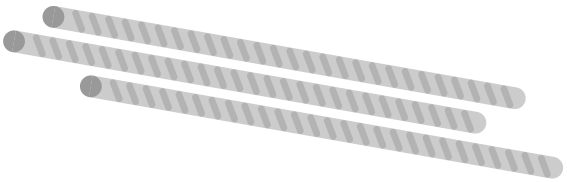
Smoothing trowel

A wooden trowel measuring 15x30cm, which is used to spread concrete and mortar.



Iron rod

A 50cm long, 8mm diameter iron rod, which allows the jig (and DH mould) to pivot on the central axis.



b) Construction materials to be collected by the household

The particularly low cost of Akasuga latrine is partly because some of the construction materials can be collected from nature. The quantity and quality specifications for these materials are described in this chapter.

Sand and gravel

The quality of sand and gravel is important to ensure the strength and durability of the concrete, and therefore the slab itself. It is then important to ensure that the sand and gravel do not contain any organic matter (soil, leaves, grass, etc.) or foreign bodies such as pieces of plastic, as these will weaken the slab after its hardening. To build a good quality slab, it is recommended to choose clean and sifted (uniform grains) sand and gravel. River sand and gravel are preferred.

- Collect 3 buckets of 10-liters, overfilled with clean sand (no soil), coarse sand (2mm grain size) rather than fine sand;
- Collect 4 buckets of 10-liters, overfilled with sifted and washed gravel to get a homogeneous size of gravel varying between 2 and 3cm

Water

The water to be used in concrete preparation must be clean. Avoid using water that contains soap, salt or oil. These products reduce the quality of the concrete and consequently make the slab fragile and non-durable.

- Provide 10-liters of water (equivalent to a bucket) to prepare the concrete required to build the slab;
- Provide additional 10 liters of water to wash hands and materials used during the construction steps;
- Provide approximately 40 liters of water (2 canisters) over a period of 2 weeks to water the slab once it is built. This ensures proper hardening of concrete, as well as the strength and durability of the slab. The slab should be watered twice daily for two weeks. Use around 1.5 liters of water per watering (3 liters per day).

Adobe Brick

To build the walls of the superstructure, obtain around 3000 adobe bricks (clay that does not contain organic matter), of 25 x 12 x 12cm dimensions or about 3000 fired bricks of 12 x 5 x 5cm dimensions (the latter must be purchased).

Stones

- Get 2 steres (3.5 m^3) of stones for the foundation of the walls of the superstructure and for the beam ring of the pit if necessary.

c) Construction materials to be purchased by the household

Cement

Choose a cement of 32.5 MPa strength. Verify that the cement is in powder form and that it does not contain lumps. If you find lumps in the cement, it is unusable. The cement must be conserved in a cool place away from humidity.

- Provide half a bag of cement (25kg or 1 bucket of 10-liters filled to the top) to build the slab in form of a dome, and its urine diverter.

Cement of 32.5 MPa resistance

Roofing or Sheeting liners

These are plastic or nylon sheets used to cover the mold in the ground and the slab before pouring the concrete. The roofing or sheeting liners are also used to cover the roof.

- Count 1 piece of 1.20 x 1m to cover the mold on the ground. Note that it is possible to replace this roofing liner with plastic bags that are clean and without holes, or nylon bags for food packaging or even fabric;
- Count 1 piece of 2 x 3m for the roofing. The roofing liners can be replaced by nylon bags used for food packaging.

Funnel

A plastic funnel to be inserted in the urine diverter to direct urine into the pipe.

- Provide 1 plastic funnel (type n°2) which measures 17cm in diameter at one end of the cone and 2cm in diameter at the other end.

Plastic canister

Plastic canisters for urine collection and storage. A minimum of 2 canisters are needed in order to interchange them.

- Provide at least 2 yellow canisters of 20-liters (vegetable oil canisters) with screw caps.

Pipe

Soft plastic pipe

- Provide a polyethylene pipe of 2m length and 1/1“ of diameter (1.3 cm)

Poles and nails

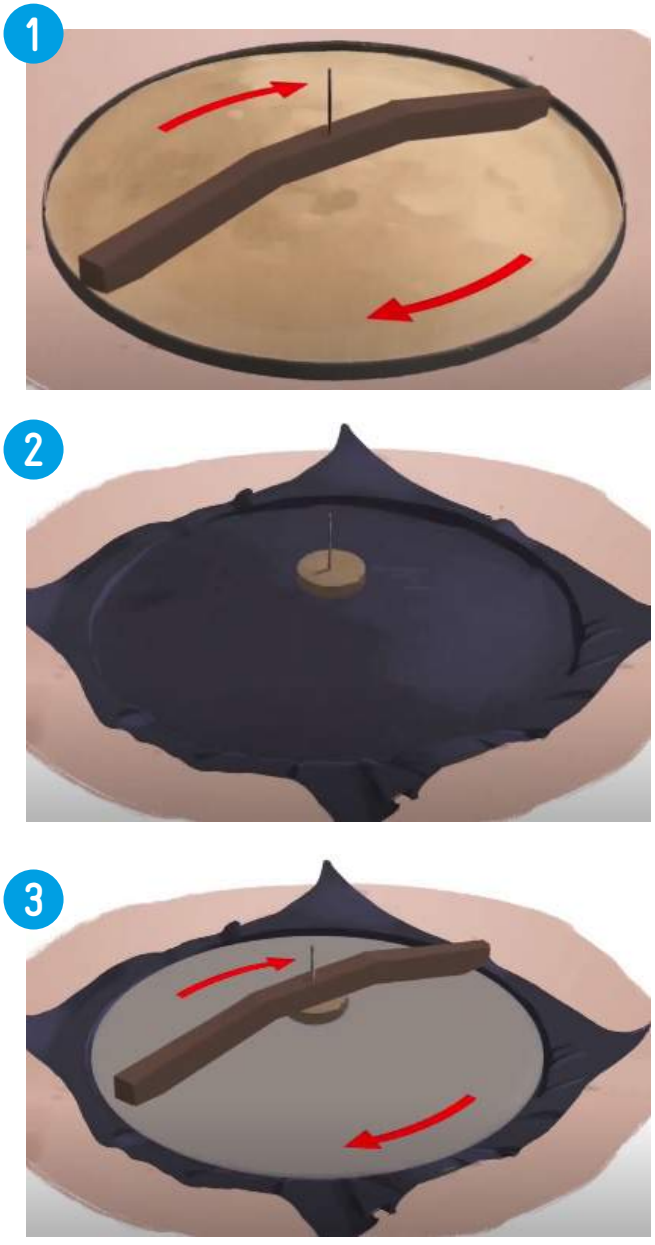
The poles and nails will be used to build the roof structure of the Akasuga latrine.

- Provide 2 to 8 wooden poles (depending on the chosen roof type) of 6 cm diameter and 8 m of length;
- Provide around 0.5 kg of 8 cm nails.

2.3 Construction of the slab

The slab is the most expensive part of the Akasuga latrine, it is wise to make it as solid and durable as possible. The beneficiary household will need to hire a specialized mason (trained and certified) to build the slab. Nevertheless, the process of construction should be known to the household, so they can support the mason and make sure the quantity and quality of used materials are respected, as well as the work is well done by the mason.

The construction steps of a domed and unreinforced concrete slab are described in the pictures below:



Steps of (1) mold preparation in the ground, (2) mold covering and (3) pouring of concrete and leveling the slab

What is special about the Akasuga slab?

The domed slab is made out of unreinforced concrete, which means that it does not require rebars, which significantly reduces the cost. The strength and ability of the slab to support heavy weights are ensured thanks to its dome shape that allows the distribution of weight over the entire arch by compression effect.

The dome shape of the slab allows it to be moved by simply rolling it, which presents an advantage in comparison to a square-shaped slab that would need to be carried.

a) Mold preparation on the ground

Before making the mold, the mason must check that the ground is flat, the location is in the shade with minimum traffic (choose an isolated place).

Once the ground preparation is completed, the mason places his metallic circular cast mold on the ground and the puts his jig inside the mold with its axis (iron rod) inserted in the center. The mason stabilizes the cast mold with enforced wedges in the ground all around the mold.

After that, the mason, with the help of a member of the household, collects a pile of sand or fine soil to place inside the metallic cast mold. The mason shapes the pile of sand or soil into a dome shape with the help of the jig that he turns on its axis. He will make sure the sand or soil dome is well compacted by tapping it as he goes along, wetting it slightly if necessary.

Once the sand or soil mold is shaped, the mason removes the jig from the centerline (the centerline remains in position), and carefully places the roofing liner (or the replacement material) on the dome, passing it through the central axis. Make sure that the roofing liner has no folds.

The mason then places the defecation hole mold over the sand or soil, on top of the roofing liner, inserting it through the centerline.

Preparation steps of the mold

b) Concrete preparation

The mason chooses a clean, hard, and shaded surface to prepare the concrete.

The constituents of the concrete intended to build the domed slab for the Akasuga are mixed in the following proportions:

1 part[2] cement;

2 part sand;

3 parts gravel;

water (around 2/3 of a part).

The mix of the first three constituents is firstly done dry (using a shovel) by two people (the mason and a member of the household) placed on either side of the pile. It is necessary to do at least three turnarounds until the mixture is uniform and the cement is well distributed.

Before adding water to the mixture, the mason digs a crater at the top of the pile with a shovel. He pours a little water into this crater, and let the mixture absorbs the water for a few minutes. He then mixes by pushing the edges of the crater inwards with the back of the shovel and turns over several shovelfuls to wet the mixture in the center. This mixing will be repeated as many times as necessary until a soft paste consistency is obtained. The concrete must be manageable but in no case liquid (it must not sink), at the risk of weakening the strength of the slab.

The mason should test the quality of the concrete by creating ridges with the shovel. If he fails to make visible ridges, the mix tis too dry. If the ridges do not hold their shape, the mix contains too much water.

2 1 part = 1 overfilled bucket of 10-litres

Steps of concrete preparation: dry mixing, wetting, mixing and consistency testing

c) Pouring the concrete

Before pouring the concrete, the mason should make sure that the metallic ring of the cast is correctly stabilized with the wooden wedges attached to the exterior of the metallic cast mold, so that it does not deform.

The mason lays the concrete using a trowel on the cast on the ground covered with the roofing liner. He starts by compacting the concrete at the base (at the edges) of the slab using a smoothing trowel, to form a 10cm wide abutment. The mason lightly waters and taps the metallic ring to obtain a smooth and even edge of the slab after demolding.

Then, the concrete is progressively laid and compacted from the base to the top until it reaches the mold of the defecation hole. The surface of the concrete must reach the height of the metal cast

mold and the top of the DH mold, to ensure a uniform thickness of 4cm over the entire slab.

The mason then places the jig on the central metallic axis and gradually rotates it and compacts the concrete to level the surface of the slab by hammering the jig with the hammer. The thickness of the slab must be the same everywhere.

The empty spaces between the jig and the surface of the slab (especially the gaps between the concrete aggregates) must be carefully filled with concrete until an even surface is obtained, taking care to keep a certain roughness to limit the risks of slipping. The mason then compacts the concrete with the smoothing trowel to eliminate air bubbles.

Steps of concrete pouring and forming the slab mold into a dome shape

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2.4 Addition of the urine diverter (UD)

The role of the urine diverter is conveying urine to the collection canister (20-liters plastic canister). It includes the following elements:

- The urine diverter (UD) on the slab;
- A plastic canister that allows storage of collected urine (to be installed after fixing the slab)
- A flexible pipe connecting the UD and the canister (to be installed after fixing the slab).

The urine diverter (UD) is the key element of the urine deviation system. A channel is placed in front of the defecation hole, limited with a small wall, allowing the Akasuga user to direct the urine towards the plastic funnel inserted in the wall at the end of the channel. It is built from the same concrete mix as the slab. As with the slab, the beneficiary household needs to hire a mason (trained and certified) to lay out and construct the UD. Nevertheless, the steps of construction of the UD must be known to the beneficiary who will be able to provide labor support to the mason and ensure that the quantities and quality of the materials used are respected as well as the proper execution of the work by the mason.

a) Outlining the UD

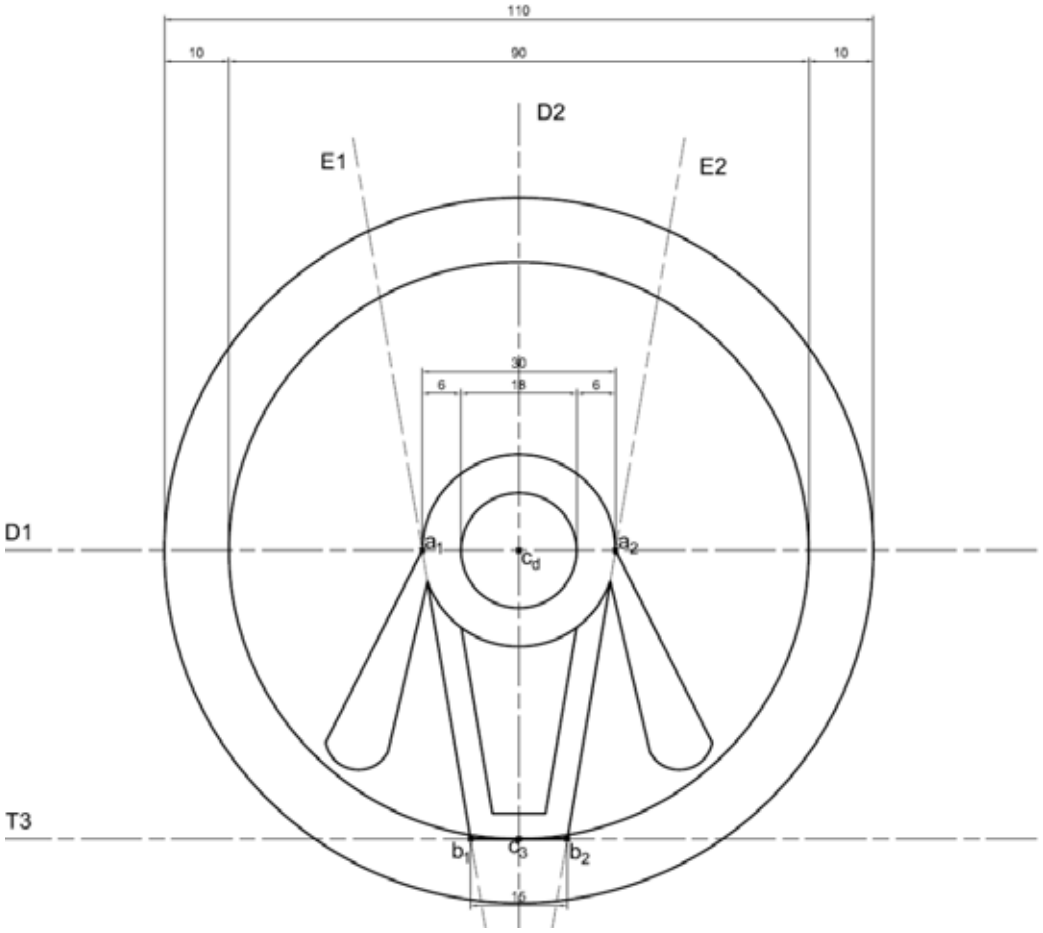
UD outlining takes place directly after the construction of the slab, when the concrete is still fresh, in order to allow the drawing of the UD guidelines. The UD is outlined as follows:

1. Draw a line $\mathbf{D}_1$ passing through the point $\mathbf{c}_d$ (center of the slab or DH) and intersecting the outer circle of the slab base crown at the points $\mathbf{a}_1$ and $\mathbf{a}_2$;
2. Draw a line $\mathbf{D}_2$, perpendicular to $\mathbf{D}_1$, intersecting $\mathbf{D}_1$ at point $\mathbf{c}_d$;
3. Draw a tangent $\mathbf{T}_1$ to the outer circle of the crown of the slab, perpendicular to $\mathbf{D}_2$ and intersecting $\mathbf{D}_2$ at point $\mathbf{c}_1$;
4. Draw a tangent $\mathbf{T}_3$ at the inner circle of the slab base crown or abutment and perpendicular to $\mathbf{D}_2$ at $\mathbf{c}_3$;
5. Mark, on the line $\mathbf{D}_2$ a point $\mathbf{c}_2$, middle of the line segment [$\mathbf{c}_1$ $\mathbf{c}_3$];
6. Draw a line $\mathbf{T}_2$ perpendicular to $\mathbf{D}_2$ intersecting $\mathbf{D}_2$ at point $\mathbf{c}_2$;
7. Mark, on the line $\mathbf{T}_3$, two points $\mathbf{b}_1$ and $\mathbf{b}_2$ equidistant from the point $\mathbf{c}_3$ such as [$\mathbf{c}_3\mathbf{b}_1$] =[$\mathbf{c}_3$ $\mathbf{b}_2$] =7.5cm;
8. Draw two lines $\mathbf{E}_1$ et $\mathbf{E}_2$ passing respectively through the points $\mathbf{a}_1$, $\mathbf{b}_1$ and $\mathbf{a}_2$, $\mathbf{b}_2$. $\mathbf{E}_1$ intersecting $\mathbf{T}_1$ at $\mathbf{f}_1$, $\mathbf{T}_2$ at $\mathbf{f}_2$ et $\mathbf{T}_3$ at $\mathbf{b}_1$; $\mathbf{E}_2$ intersecting $\mathbf{T}_1$ at $\mathbf{g}_1$, $\mathbf{T}_2$ at $\mathbf{g}_2$ and $\mathbf{T}_3$ at $\mathbf{b}_2$;
9. We then have a trapezoid ($\mathbf{a}_1$, $\mathbf{a}_2$, $\mathbf{b}_2$, $\mathbf{b}_1$) of a large base ($\mathbf{a}_1\mathbf{a}_2$) and small base ($\mathbf{b}_1\mathbf{b}_2$);
10. Mark, on the line $\mathbf{T}_1$ and from the points $\mathbf{f}_1$ et $\mathbf{g}_1$ moving towards the interior of the trapezoid, points $\mathbf{h}_1$ et $\mathbf{h}_2$ such as [$\mathbf{f}_1\mathbf{h}_1$] = [$\mathbf{g}_1\mathbf{h}_2$] = 4cm;

11. Mark, on the line $\mathbf{T}_3$ and from the points $\mathbf{b}_1$ et $\mathbf{b}_2$ moving towards the interior of the trapezoid, points $\mathbf{i}_1$ et $\mathbf{i}_2$ such as $[\mathbf{i}_1\mathbf{b}_1] = [\mathbf{i}_2\mathbf{b}_2] = 4$cm;
12. The two small parallelograms ($\mathbf{f}_1\mathbf{h}_1$ $\mathbf{i}_1\mathbf{b}_1$) and ($\mathbf{h}_2\mathbf{g}_1$ $\mathbf{b}_2\mathbf{i}_2$) correspond to the surface that will be occupied by the UD wall. The cast boards will be placed on the lines ($\mathbf{f}_1\mathbf{b}_1$), ($\mathbf{h}_1\mathbf{i}_1$), ($\mathbf{g}_1\mathbf{b}_2$), ($\mathbf{h}_2\mathbf{i}_2$) while keeping 4cm between the boards placed two by two. The 4 cm corresponds to the thickness of the wall.
13. The inner edges of the two footrests are obtained by counting 10cm from the points $\mathbf{f}_2$ and $\mathbf{g}_2$ of the line $\mathbf{T}_2$. The external edges are obtained on the same line by counting 10 cm from the lower edges, which corresponds to the maximum width of the footrest.
14. Connect the points marking the inner edges of the footrests to the point of intersection of the wall and the outer circle of the crown, to obtain the line of the inner edges of the 2 footrests.

Construction plan of the Akasuga latrine slab

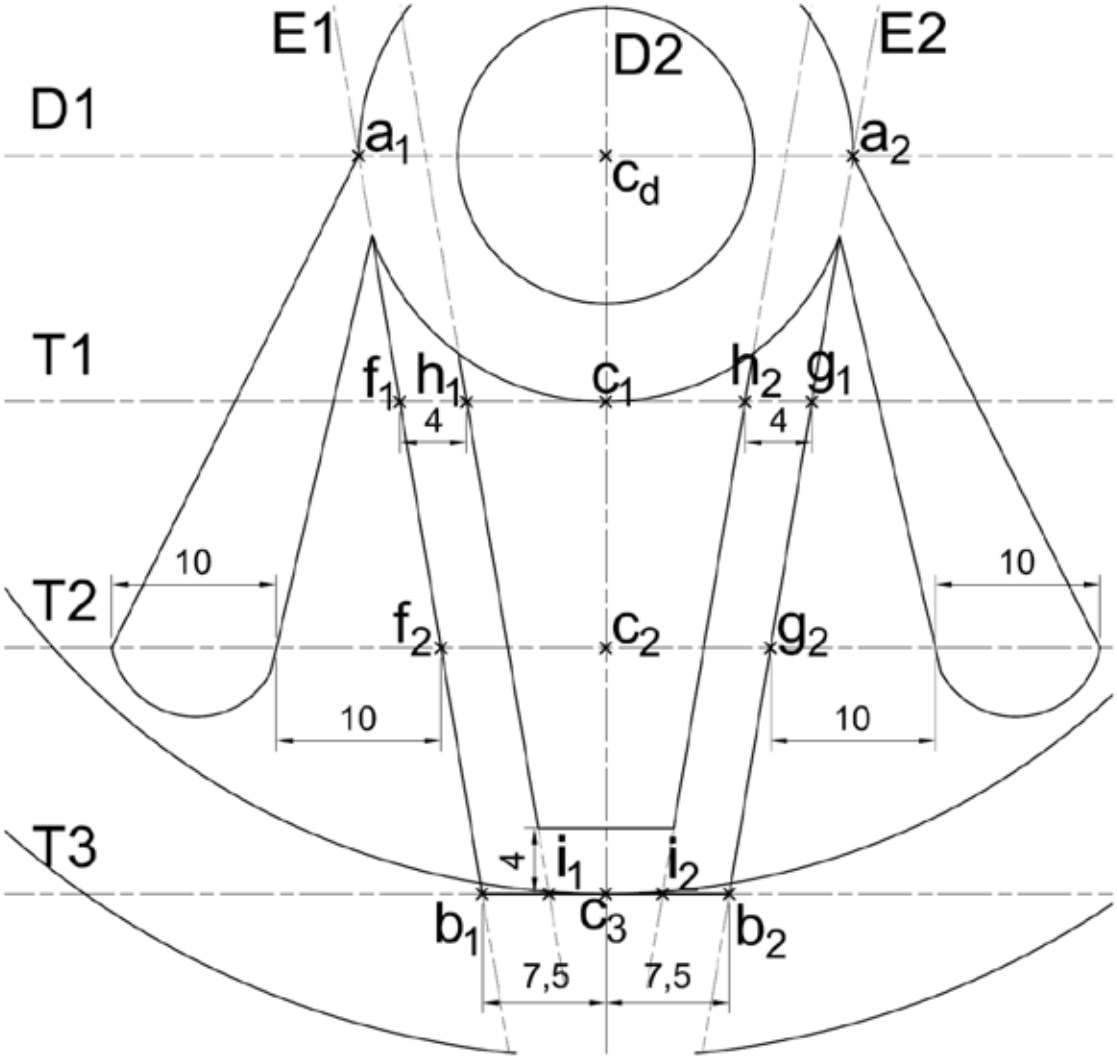
The measurements are in cm



technical drawings of the layout of the urine deviation system

Details of the urine deviation system and footrests

The measurements are in cm



technical drawings of the layout of the urine deviation system

Steps of UD outlining

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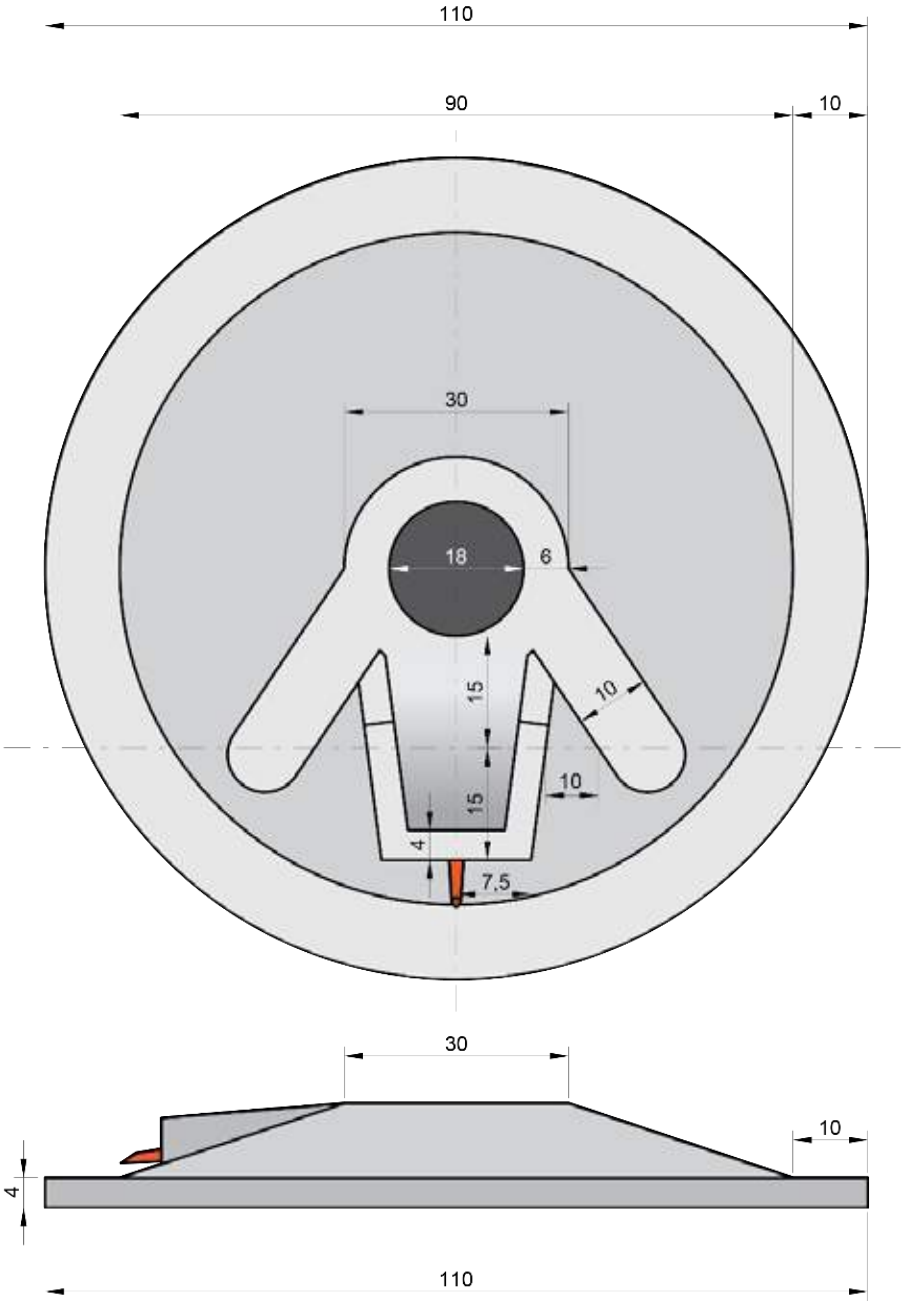
b) Construction of the UD

The UD must be built the day after the slab is poured, after several hours of drying.

1. Place the cast molds along the lines ($\mathbf{a}_1$, $\mathbf{b}_1$), ($\mathbf{a}_2$, $\mathbf{b}_2$), ($\mathbf{h}_1$, $\mathbf{i}_1$), ($\mathbf{h}_2$, $\mathbf{i}_2$) and fill them with concrete, building up both walls bordering the urine diversion channel. The walls are 4 cm thick and 4 cm high at the back (towards the defecation hole) and 12 cm high at the front (towards the base of the slab) which corresponds to the large diameter of the funnel.
2. Place the funnel at the end of the channel between the ends of the two walls, position the funnel so that its tube is at the level of the abutment along the central axis of the channel (line $\mathbf{D}_2$). Ensure the funnel's inclination allows the urine flow easily by testing with water.
3. Place the cast mold to build the third wall (at the end of the channel) into which the funnel will fit. Surround the conical section of the funnel, making sure to release the tube outside to allow it to be connected to the plastic pipe.
4. Fill the inside of the channel with mortar (5 parts sand + 1 part cement + a little bit of water) until it reaches the funnel hole so that it creates a slope that will allow quick urine drainage, without stagnation at the end of the channel. Test again with water, if there are areas in the channel where water stagnates, fill them with concrete and/or rework the slope. Make sure to smooth the surface to facilitate cleaning and avoid the emission of bad odors.
5. Place the cast mold for the footrests following the lines defined during the outlining. Fill the inside of the molds with concrete to create a horizontal and flat surface so that the feet will rest flat when using the Akasuga latrine. Thus, the height of the footrests increases as you go down to the base of the slab. The height of the footrests starts at 0cm at the top of the slab, then increases until they reach 6cm.

Technical drawings for the UD construction (plan and cross section view)



Steps of UD construction

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2.5 Demolding and hardening of the slab

Demolding: the mason removes the mold from the defecation hole immediately after the slab is built. The circular metallic mold must be removed 24 hours after the slab construction.

Demolding: removing the DH and the metallic casing mold

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Slab hardening: it is the beneficiary's task to take care of the concrete hardening phase. This step is essential to ensure the strength and durability of the slab. It corresponds to the phenomenon of concrete crystalization, the ''Crystalized '' water and cement mixture encloses the rest of the concrete constituents (sand and gravel) to produce a compact material. For the crystallization (or hydration), the cement needs a quantity of water equals to 25% of its weight. The process of slab hardening takes two weeks, during which time the slab must be watered twice a day: in the morning before 7 am and in the evening after 5 pm. During this period the slab should not be moved under any circumstances, to not risk fragilizing or even breaking it. Use around 1.5 liters of water in each watering. Firstly, soak the entire surface of the slab, then pour the rest of the water inside the defecation hole. The water will slowly seep between the roofing liners covering the mold in the ground and the inner surface of the slab, and it will gradually rise into the concrete through capillarity.

Steps of concrete hardening

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2.6 Slab strength and durability test

The household must ensure the strength of its slab. The strength test is preformed at the end of the hardening period of the slab, i.e. 14 days after its construction. To do the test, the household lifts the slab using the lever principle, which allows to lift heavy objects with little effort:

1. Dig a small hole under the edge of the slab;
2. Insert at the end of a rigid stick which will serve as a lever arm;
3. Place on the ground, under the stick, as close as possible to the slab, a second stick or a large flat stone that will act as a pivot;
4. Press with the foot on the other end (in the air) of the lever stick. The weight of the body will counterbalance, and the lever arm will rotate on its axis and lift the slab;
5. Once the foot is almost on the ground, a second person will grab the slab and tip it sideways so that the slab rests vertically;
6. Remove the roofing liner from the inner wall of the slab;
7. Roll the slab to the location of the strength test

Lifting and moving the slab

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- The slab is then placed on top of the 4 wedges placed diagonally under the slab abutment (flat base); or placed directly on the pit;
- 4 to 5 people get on the slab and preform rotational movements together while remaining in the same alignment. If the slab does not crack, it is considered strong and durable.

Strength and durability test of the Akasuga slab

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2.7 Digging the pit

WHEN?

It is recommended to dig the pit 1 to 3 days (maximum) before placing the slab, to avoid the risk of collapse of the edges of the pit caused by rain, and the risk of falling into it.

WHERE?

Choose a suitable location to build the Akasuga latrine. If possible, the latrine should be located at least 10 meters away from houses, to avoid health risks and allowing easy access for users.

Preferably, place the latrine downstream from a water source (at a distance of at least 20 meters), if the latrine is upstream, ensure that it is at least 150 meters away, to avoid potential contamination of the water source.

From a topographical point of view, choose a flat surface to facilitate the construction and avoid problems of erosion due to runoff, and avoid as much as possible to build the latrine in low-laying areas.

HOW?

1. Once the location is chosen, draw a circle on the ground with a diameter of 80 cm using a 40 cm thin rope attached to a peg planted in the ground;
2. Dig a cylindrical pit inside the drawn circle. The pit has a diameter of 80 cm and depth of 2 meters;
3. The pit should be evenly sized throughout its depth: 80 cm in diameter from top to bottom. To ensure this, use the cross technique: tie two 80 cm sticks in the middle with a rope to form a cross. Insert the cross in the pit as you dig, hanging it by the rope: if the cross gets stuck, it means that the diameter of the pit has shrunk, if there is too much space between the ends of the cross and the edges of the pit, it means the pit has widened;
4. Place the soil from the pit around the hole to raise the edges to prevent runoff in the pit. In case of semi-solid soil (susceptible to erosion), build a ring beam with a circular row of stones or fired bricks on which the slab will rest. In case of sandy soil, build a deeper concrete ring beam (depth to be determined according to the nature of the soil).

Steps of digging the pit

Beam ring for construction in unstable areas

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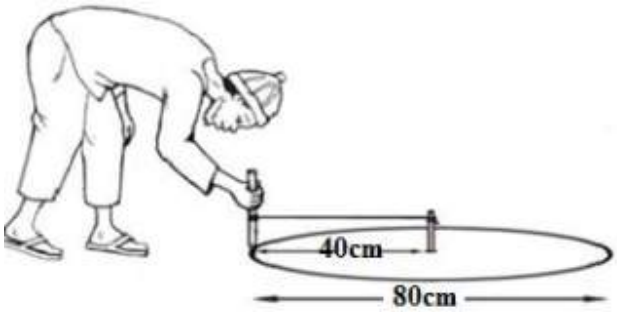

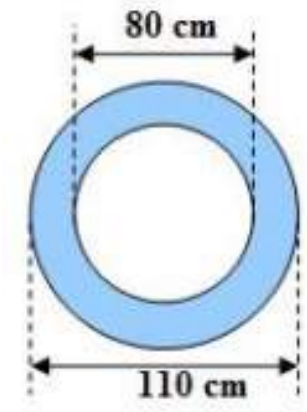

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If the soil is unstable, build a beam ring with stones and mortar, all around the marked circle (outside the circle), then dig the pit inside of the beam ring. The depth of the beam ring to be built (the number of rows of foundation stones) will depend on the depth of the unstable soil layer of the land on which the Akasuga latrine is built.

2.8 Slab placement

1 to 3 days after digging the pit, the household can proceed to place the slab on top of the pit. To do that, the household must lift the slab using the lever technique (see 2.6) and move it to the pit by rolling it sideways.

Laying the slab on the pit must be very carefully done. Make sure that the slab is well centered over the pit and that it is not wobbly (stabilize the slab if necessary). The abutment of the slab should rest on 15 cm support on the ground or be perfectly aligned with the circular wall of base, in case of a soft ground.

The orientation of the slab and its UD must take in count the position of the door, the slope of the roof, and the desired place of the urine collection canister.

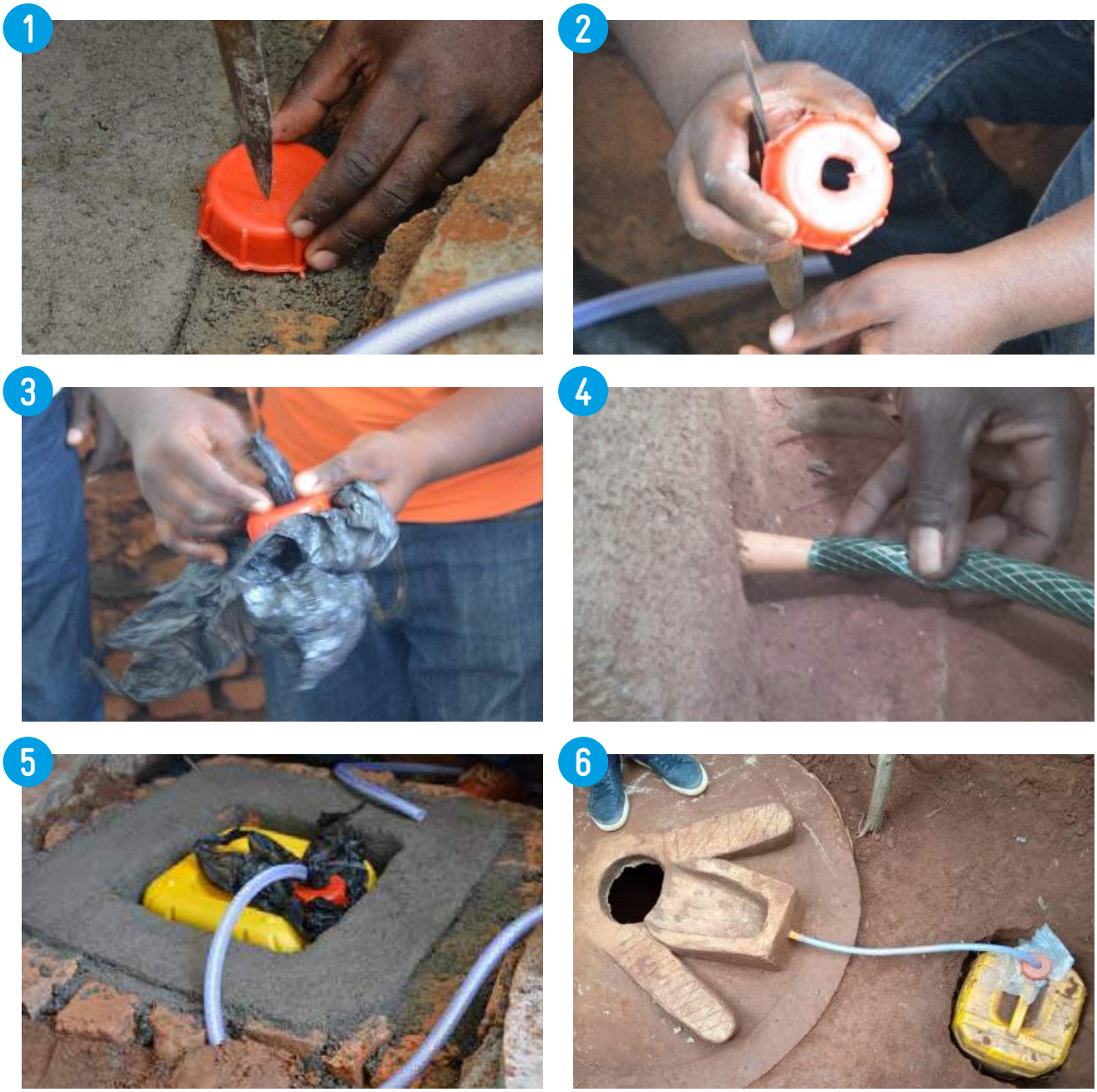
Steps of placing the slab over the pit

2.9 Installation of urine canister and connecting the UD

Once the slab is placed over the pit, the household proceeds to install the urine canister and connect it to the urine diverter (UD) on the slab. This step can also be done after the construction of the superstructure walls. To do that:

1. Choose a place for the urine canister, which must face the UD. Delineate the outline of the superstructure to decide if the urine canister will be inside or outside of the superstructure. It is recommended to build the superstructure with large enough area (2 m long and 2 m wide) to allow the hole of the urine canister to be dug inside the superstructure, so that the urine canister is protected from the weather and possible theft. If the location of the urine canister is outside the superstructure, do not place it near the door or at the back of the superstructure where rainfall drains from the roof slope.
2. Dig a small pit to place the urine canister. The hole should be slightly deeper than the height of the urine canister (40cm) to allow urine to flow by gravity. The opening of the canister should be placed below the end of the funnel. To ensure the longevity of the hole and increase the stability of the urine canister, the walls of the hole can be bricked up. If the urine canister is placed outside the superstructure, the hole should be covered with a board or a piece of waterproof sheet metal (without holes).
3. Unscrew the cap of the urine canister. In the center of the cap, make a hole with a diameter that allow the insertion of the pipe (1/2“ or 3cm). Slide a plastic bag through the hole in the cap. The plastic will be used to seal the gaps of the cap-pipe connection to ensure a tight seal.
4. Connect an end of the pipe with the funnel tube and insert the other end of the pipe into the hole in the cap (in which the plastic bag is inserted). Make sure that the plastic surrounds the pipe circumference completely.
5. Screw the cap back onto the opening of the canister which is in its dedicated location (the hole) by pulling the rest of the plastic bag out through the edges of the cap so as to seal the gaps created by the screwing system of the cap.
6. Attach the middle of the pipe to the ground with a forked stick to create a syphon system that will prevent the bad odors of the nitrogen contained in the urine stored in the canister from rising. A small volume of urine will remain trapped in the U-shaped curve of the siphon, creating a barrier to the odorous nitrogen gas.
7. Test with water to ensure proper flow of fluids from the UD to the urine canister. If the water is having trouble flowing, check that the pipe is not clogged, and that the canister is correctly placed: the level of the canister opening should be below the level of the end of the funnel.

Installation steps of the urine canister and connecting it to the UD



2.10 Construction of the superstructure

The superstructure can be built by the household alone and/or by the mason (e.g. the specialized mason who built the Akasuga slab). The superstructure includes the following elements:

- The foundation
- The walls (including the door)
- The roof

a) Construction of the foundation

The foundation is the base of the superstructure, which ensures the load-bearing capacity of the walls and allows the stabilization of the whole structure by controlling the settlements due to the loads (weight of the walls and the roof) and to the water infiltrations on the ground. The construction of the foundation is done in the as follows:

1. Mark out the outline of the superstructure (the outline was defined before the urine canister was installed and connected to the UD). The recommended dimensions for the superstructure area are 2m length x 2m width (to accommodate the urine canister inside).
2. Dig a trench about 40cm deep until you reach solid ground.
3. Collect 1 stere (1.75 m^3) of stones and place them in the ground, filling the trench to the surface.
4. Stabilize the stones with clay mortar (identical to that used in the construction of the adobe bricks) of soft and elastic consistency.

Construction steps of the superstructure foundation

b) Construction of the walls

To build the walls of the superstructure, it is possible to use adobe bricks or fired bricks.

1. Provide about 650 adobe bricks of current dimensions 24 x 12 x x12cm, or about 3000 fired bricks of current dimensions 12 x 5 x 5cm.
2. Assemble the 4 sides of the walls on the foundation by joining the bricks together with clay mortar. Use a spirit level, plumb bob or a similar tool to ensure that the walls are straight.
3. The height of the front side is 2.5m, while the height of the back side is 2m. This difference in height creates the slope of the roof. The side walls have a height of 2m creating two triangles of ventilation and light entry on both sides of the cabin under the roof.
4. On the front of the superstructure, make an opening at least 80cm wide and 2m high for the door, which shall be made either of wood, corrugated metal or fabric suspended by a rope.

5. If the urine collection canister is placed outside the superstructure, leave a small opening at the bottom of the wall facing the UD to allow the pipe to pass through to the canister.

Construction steps of the superstructure walls

c) Construction of the roof

The number of poles (6cm in diameter and 8m long) to be used for the frame varies according to the type of roof. Use 2 poles for a metal roof, 4 to 5 poles for a plastic liner covered with thatch, and 8 poles for a tiled roof.

For a roofing liner + thatch:

1. Cut the poles to the size of the roof and arrange them in the direction of the slope. Place them parallel to each other and space them out at regular intervals.
2. Obtain reeds, or palm branches or other similar wood branches. Arrange the branches (or reeds) perpendicular to the poles to create a grid pattern over the entire surface of the frame. The spacing between the branches should not exceed 10cm. Attach the branches to the poles with nails or sisal rope.
3. Place the roofing liner over the grid formed by the poles and branches (or reeds), that will ensure the roof's impermeability.
4. Protect the roofing liner from the weather and the sun with thatch (mulch of any kind) to be replaced regularly.

Examples of a roofing liner and thatch

For a metal roof:

1. Cut the poles to the dimensions of the roof and arrange them in a grid that will serve as a support for the sheet metal: 2 ends of the poles in the direction of the slope and 3 ends of poles in the perpendicular direction.
2. Fixate the poles together with 8cm nails.
3. Fixate the sheet metal to the poles with 8cm nails.

Construction steps of a metal roof

For a tiled roof:

1. Cut the poles to the size of the roof and arrange them in the direction of the slope. Place them parallel to each other and space them out at regular intervals.
2. Obtain reeds, or palm branches or other similar wood branches. Arrange the branches (or reeds) perpendicular to the poles to create a grid pattern over the entire surface of the framework. The spacing between branches should not exceed 10cm. Attach the branches to the poles with nails or sisal rope.
3. Place the tiles above the grid formed by the poles and branches (or reeds).

Example of an Akasuga latrine with a tiled roof

3 USE AND MAINTENANCE OF THE AKASUGA LATRINE

3.1 Use of the Akasuga latrine

The proper use of the Akasuga refers to respecting of the following rules:

- Before starting to use the latrine, place a layer of dry leaf litter covered with a layer of topsoil at the bottom of the pit to introduce the biodegrading microorganisms that are naturally found in the topsoil.
- Position yourself well on the slab so that the urine is directed into the urine diverter and then to the collection canister (through the pipe) and the feces fall into the compost pit without soiling the walls of the compost pit.
- Do not urinate in the defecation hole and in general do not put any liquids into the compost pit (water of the anal washing, water for cleaning the latrine, runoff water, etc.), because this adds moisture to the content of the pit which interferes with the process of feces decomposition and develops bad odors. This also increases the risk of percolation of contaminated liquids from the pit into the aquifer, resulting in a high risk of drinking water pollution.
- Use biodegradable materials (toilet paper, tree leaves, notebook paper, etc.) for anal cleansing.
- After each defecation, add one or two handfuls of ash to cover the fresh feces and be careful not to pour ash into the urine diverter, which would clog the urine collection pipe. The ash accelerates the dehydration of the feces and thus reduces flies and bad odors from the pit. It also improves the agronomic quality of the compost. The ash can be replaced by wood chips or as a last resort by fine soil.
- Provide a container (jar, bucket or bag) to store the ash in and place it in shade inside the superstructure.
- After using the latrine, always close the defecation hole with an appropriate cover (with a handle).
- If you only need to urinate, leave the lid on the defecation hole, and aim at the urine diverter channel properly.
- Add two shovelfuls of topsoil every two months to introduce new biodegrading microorganisms. Also add dry leaves and sawdust to create a porous structure that will promote aeration in the compost. The mixture of feces + ashes + soil + dry leaves will accelerate the composting.

Illustrations of the main rules for using the Akasuga latrine

3.2 Maintenance of the Akasuga latrine

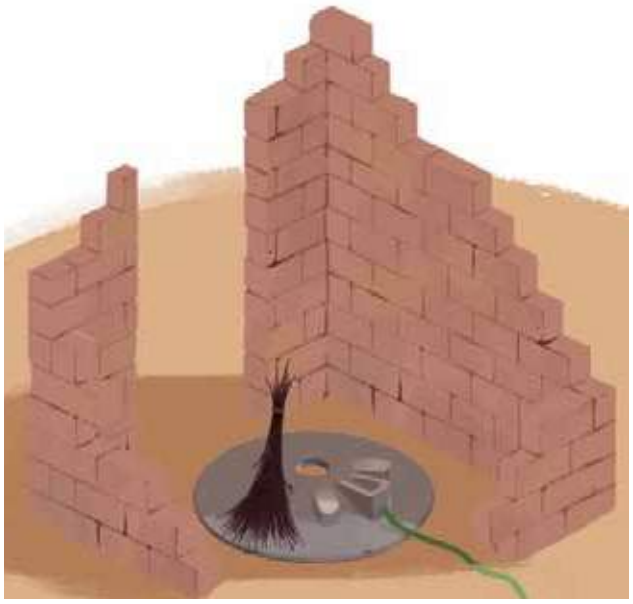
To maintain the Akasuga latrine, the following rules must be observed:

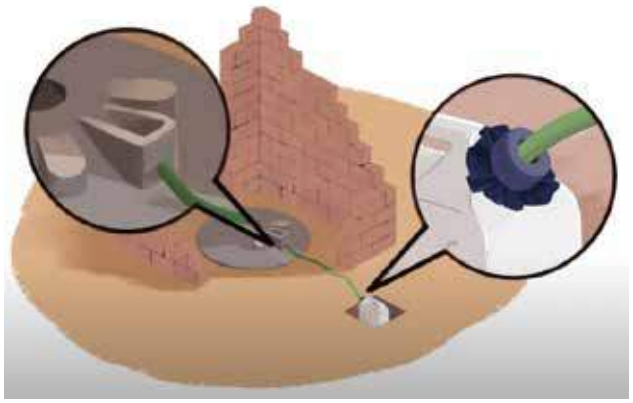
- The ash must always be available and stored inside the superstructure.
- Regularly dig and maintain the drainage channels around the outer walls to prevent standing water around the cabin and to prevent run-off water from entering the pit.
- Regularly check the condition of the roof and walls to ensure that the cabin is watertight.
- Change the urine collection canister when it's full, and regularly check the connection of the pipe with the cap of the canister (it must be well sealed using the piece of plastic bag).
- Clean the inside of the latrine whenever necessary and ensure that there is always a broom in the cabin. This broom should be used only for cleaning the latrine.
- After sweeping the cabin, ensure that the urine deviation pipe is not clogged.
- If the urine deviation pipe is clogged, disconnect it from the canister and the end of the funnel and determine the nature of the clog. If it is a weak material, place the pipe upright and run water through it, plug the end of the pipe with your thumb and move it up and down to dislodge the clogging material with the pressure. If the stopper is stronger, use a long iron or a long thin strong stick; to insert into the pipe. Don't forget to wash your hands after handling the urine pipe.
- If you use water to clean the slab, be sure to cover the defecation hole and handle the water carefully so that it does not get into the pit.
- If water has reached the pit or baby feces (containing a lot of liquid) have been dumped in the pit, pour several handfuls of ash to absorb the excess liquids.

Attention !!!

- Never throw non-biodegradable garbage into the pit: metal or plastic boxes, rags, glass or plastic bottles, plastic bags, batteries, etc. This type of garbage does not degrade in the compost and will reduce its quality.
- Avoid throwing biodegradable household garbage in the pit: fruit and vegetables peelings, hard shells, food scraps, etc. this type of food may increase the humidity and the odors which attracts flies and vermin, and reduce the compost speed.

Illustrations and photo of the main maintenance rules of the Akasuga latrine

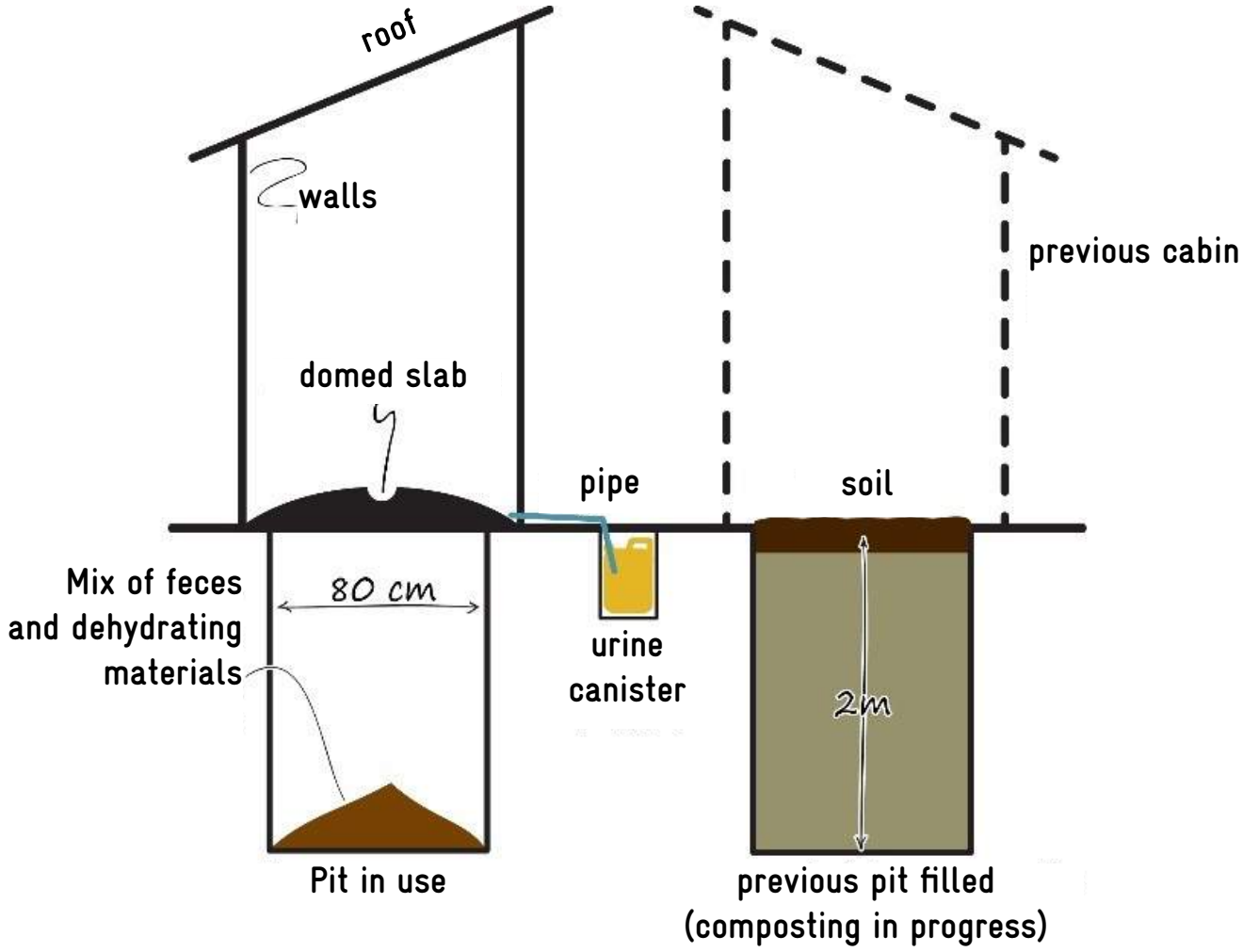




3.3 What to do when the pit is full?

1. Dig a new pit a few days before the pit in use is completely filled, and build the superstructure around it (possibly using the material from the first superstructure).
2. When the pit is full, remove the slab (using the lever technique) and the urine collection canister.
3. Move the slab by rolling it to the newly dug pit (inside the new superstructure).
4. Cover the contents of the old pit with a 10cm layer of topsoil. If the old superstructure has been removed, protect the top of the composting pit with wooden boards, sticks or branches during the resting period necessary for processing the compost.
5. In order to give the contents of the pit time to convert into safe (pathogen free) and good quality compost, it is necessary to let the pit rest for at least one year before emptying it and using the contents in the field.
6. Once the pit is emptied, it can be used again once the second pit is full.

Diagram illustrating the system of two alternating pits



Two Akasuga latrine superstructures facing each other

Full pit covered with earth and ash

4 TREATMENT AND USE OF BY-PRODUCTS OF THE AKASUGA LATRINE

4.1 Urine treatment

1. Once the canister is full, unscrew its cap which is connected to the pipe, remove the full canister and replace it with an empty canister. Screw the cap with the pipe to the empty canister and use the cap from the empty canister to seal the full one.
2. Write the date on the full canister and store it for 30 days in a dark place to allow the urine to change from an acidic to a basic pH, to stabilize the nitrogen and to ensure the elimination of potential pathogens (fecal cross-contamination, sick person, etc.).
3. Ensure that urine collection canisters are properly sealed during storage to avoid odor and evaporation of nitrogen, which would result in a decrease in the agronomic quality of the by-product.

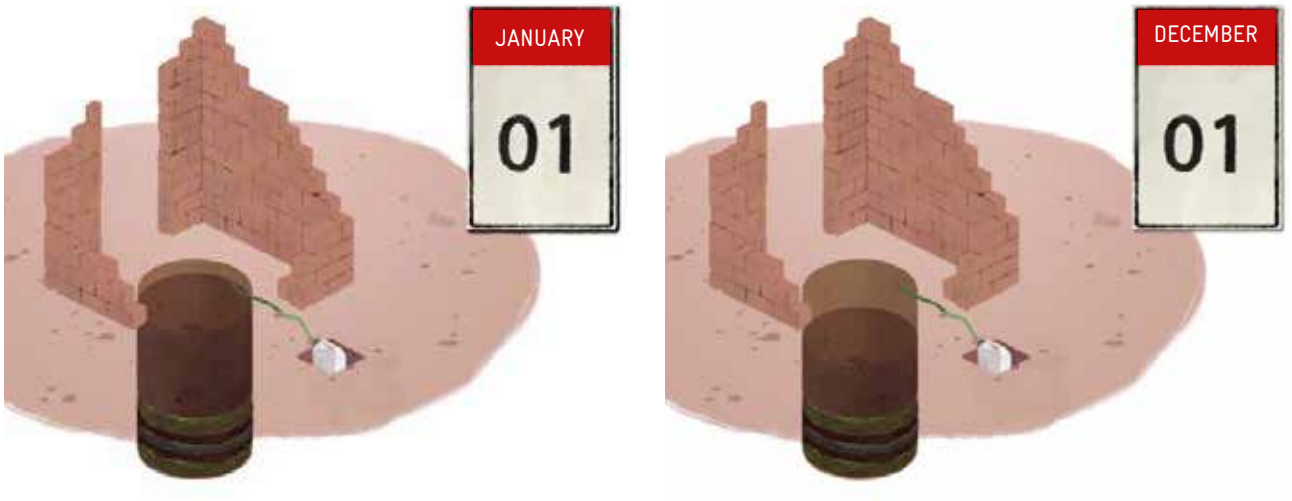
Date marking on full urine collection canisters

Storage of urine for treatment

4.2 Feces treatment

1. The feces are collected in the compost pit and the dehydrating materials such as ash, soil, dry leaves and sawdust are added to the feces as they are collected. Once the pit is full and the slab has been moved to the newly dug pit, the contents of the full pit are covered with a 10cm layer of soil.
2. This mixture should be kept at rest for at least one year under aerobic conditions (created by the porous structure given by the dehydrating materials). This will allow a complete composting which will guarantee a mineralization of the composted materials and a total elimination of the pathogenic germs (by biological competition of the microorganisms). The composting time is equivalent to the time required to use the second Akasuga pit: when the second pit is about to be full, empty the contents of the first pit.
3. During the composting process, the contents of the pit will lose volume due to progressive dehydration, compaction and transformation of the organic matter by biodegradation. At the final state of the compost, the level of the pit will have decreased by about 40cm.

Decrease in the level of the pit due to the composting process



Compost produced from feces

4.3 Use of liquid fertilizer from urine treatment

1. Dilute the urine in the following proportions: 1 part urine to 2 parts water.
2. Make a furrow around the plant or dig a small hole near the plant (in the rhizosphere).
3. Apply the diluted urine-based liquid fertilizer in the furrow or hole, avoiding the foliage (for health reasons).
4. Then close the furrow or hole with soil.

Dosage and frequency of application by type of plant

Plant Family	Plant type	Dilution	Dosage	Frequency
Tuberous plants	Sweet potatoes, cassava, colocase	1 part urine to 2 parts water	0.5 liter of liquid fertilizer per foot	1 application per month. Stop applying 2 weeks before harvest (residual period).
Plants with leaves	Vegetables	1 part urine to 2 parts water	0.5 liter of liquid fertilizer per foot	1 application every 2 weeks. Stop applying 1 week before harvest
Grasses	Corn, sorghum, wheat	1 part urine to 2 parts water	0.5 liter of liquid fertilizer per foot	2 applications : • 1 during weeding 2-3 weeks after planting (at the growth stage called bolting). • 1 during ridging 1 1/2 months after (at the growth stage called heading).
Fruit trees and other perennial crops	Banana trees, avocado trees, mango trees	1 part urine to 2 parts water	10 liter of liquid fertilizer per plant	1 application every 3 months
Legumes	Beans	1 part urine to 3 parts water	0.5 liter of liquid fertilizer per foot	1 application during weeding

Flyer distributed to the population on the use of urine-based liquid fertilizer

HOW TO USE URINE-BASED FERTILIZER TO FERTILIZE CROPS

URINE TREATMENT

1. Once the canister is filled with urine, unscrew the connector cap and replace with an empty canister

2. Close the full canister tightly, write the date on it and store it for 1 month in the dark to eliminate germs

USE OF LIQUID FERTILISER

1. Dilute the urine with water: 1 part urine to 2 parts water

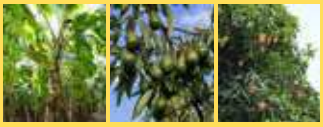
2. Make a furrow or poke a hole next to the plants and pour the diluted urine in, avoiding the foliage

3. Close the furrow or holes with soil

DOSING OF LIQUID FERTILISER

For root vegetables (sweet potato, cassava, colocassus), leafy plants (vegetables) and cereals (maize, sorghum, wheat): apply 1/2 litre of the mixture per plant twice, at the time of weeding and one month later

For legumes (beans), dilute 1 part urine to 3 parts water and apply 1/2 litre per plant once during weeding



For fruit trees (banana, avocado, mango, etc.) and other perennial crops, apply 10 litres per plant every 3 months

Demonstration of the use of liquid fertilizer from treated urine

4.4 Use of compost from feces treatment

1. Carry out a proper tilling and cleaning of the soil. Wait approximately two weeks before sowing or planting.
2. Lay out the furrows or dig pellets according to the spacing instructions required for each type of crop (ask your local agronomist or technician for advice).
3. Apply the compost in the furrows or pellets (target the action of the compost and save the quantities) in such a way that the fertilizer is easily useable by the fertilized crop's root.

- **In terms of dosage:** count about one pinch of compost per pellet.
- **In terms of application frequency:** a single application is enough for the entire growth cycle of the plant.

The compost from feces treatment can also be used to amend soils if they are severely depleted. Mix the compost with the soil to a depth of 10cm. For the dosage, count about 10kg per m^2 of field.

Use of compost from Akasuga by-products for crop fertilization

Flyer distributed to the population on the use of feces-based compost

HOW TO USE AKASUGA COMPOST TO FERTILISE CROPS

FAECES TREATMENT

1. The Akasuga pit contains faeces mixed with ash added after each defecation, soil and dry leaves

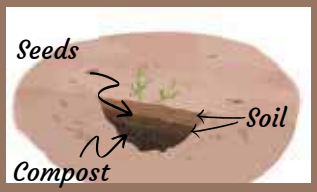
2. Once the pit is filled, leave it to rest for at least 1 year to eliminate all pathogens: build a second Akasuga (same slab) to use during this period

USE OF THE COMPOST

1. Plough the land deeply (30cm), 2 weeks before sowing

2. Poke little holes for sowing or transplanting

3. Apply a handful of compost per hole



4. Cover the compost with a little soil before placing the seed or seedling to avoid direct contact with the compost, then close the hole completely with soil

5. Compost can also be used to amend impoverished soils: mix the compost with the soil to a depth of 10cm. Count about 10kg of compost per m^2 of field.

Sector Programme Water and Sanitation - ProSecEau

5 PRACTICAL INFORMATION FOR IMPLEMENTATION

5.1 Cost of the Akasuga latrine construction

The cost of an Akasuga can vary from about 60.000 FBu for a basic Akasuga latrine to 400.000 FBu for an improved Akasuga latrine.

The basic Akasuga latrine is the most commonly built among the (mainly rural) populations of Pro-SecEau's intervention area (Rumonge, Bururi and Mwaro provinces). This is because the construction technique is simple (a large part of the latrine can be built by the household), the materials are easily accessible, and the construction costs are particularly low. Here are the technical specifications of the basic Akasuga latrine model:

- The pit and superstructure are built by the household (or unskilled labor)
- The slab is built by a specialized mason
- The roof is made of branches: thatched roof
- Walls are made of unbaked clay bricks produced by the household
- The pit is not bricked up
- Branches (for the roof), sand and gravel (for the slab) are collected from nature.

Materials to build the Akasuga latrine

Costs of a basic Akasuga latrine

Material Description	Unit	Quantity	Unit Price (FBu)	Total Price (FBu)
Cement (only for the slab)	bag	0.5	30.000	15.000
Funnel	piece	1	1.500	1.500
Pipe	meter	1.5	2.500	3.750
Canisters	piece	2	5.000	10.000
Roofing liners	meter	4	2.000	8.000
Poles	piece	2	5.000 *(UP varies by region and wood availability)*	10.000
Nails (8cm) for the roof	kg	0.5	8.000	4.000
Skilled labor for the construction of the domed slab	Worker/Day	2	5.000	10.000
TOTAL				**61.200**

The improved Akasuga latrine tends to be built in urban and peri-urban areas (e.g. Rumonge commune) as well as in areas where the soil is unstable, and the groundwater table is shallow (costal regions). The technical specifications of the improved Akasuga latrine model are as follows:

- The pit and superstructure (walls and roof) are built by a qualified mason
- The slab is built by a specialized mason
- The pit is built with fired bricks and cement
- The walls are made of fired bricks
- The roof is made of sheet metal or tiles
- The door is made of wood
- The sand and gravel (for the slab) are collected from nature

Costs of an improved Akasuga latrine

Material Description	Unit	Quantity	Unit Price (FBu)	Total Price (FBu)
Cement (for the slab and the masonry pit)	bag	1.5	30.000	45.000
Fired bricks	piece	3000	60	180.000
Funnel	piece	1	1.500	1.500
Pipe	meter	1.5	2.500	3.750
Canisters	piece	4	5.000	20.000
Sheet BG 32 *Tiles*	piece *piece*	3 *100*	25.000 *200*	75.000 *20.000*
Poles	piece	3	5.000 *(UP varies by region and wood availability)*	15.000
Nails (8 cm) for the roof	kg	1	8.000	8.000
Wooden door (200 x 70 cm)	piece	1	20.000	20.000
Defecation hole cover with handle	piece	1	4.000	4.000
Skilled labor for the construction of the domed slab	Worker/Day	2	5.000	10.000
Skilled labor for the construction of the masonry pit and the superstructure (walls and roof)	Worker/Day	3	5.000	15.000
TOTAL *Alternative (tiled roof)*				**397.250** ***342.250***

5.2 Cost of training and equipment for a specialized mason

One of the prerequisites for the implementation of Akasuga latrines in Burundi is the training of masons specialized in the construction of urine-separating dome slabs. These trainings will allow households wishing to obtain an Akasuga latrine to be able to call upon a specialized mason in their locality to support them in the construction of the Akasuga slab and eventually the rest of the latrine. The costs of training and equipping the specialized masons are detailed below. Technical drawings for the equipment are provided in chapter 2.2 of this manual.

Cost of equipment to be provided to the mason to be trained

Material Description	Unit	Quantity per trained mason	Unit Price (FBu)	Total Price (FBu)
Equipment to be made in a woodworking shop				
Jig	piece	3	11.500	34.500
Trowel	piece	1	2.000	2.000
DH circular mold	piece	1	3.000	3.000
Equipment to be manufactured in a welding shop				
Metallic mold	piece	1	12.000	12.000
Material to buy in hardware store				
Shovel	piece	2	6.000	12.000
Hammer	piece	1	15.000	15.000
Smoothing Trowel	piece	1	3.000	3.000
Rebars (length 12m)	piece	0.25	12.000	3.000
Measuring tape	piece	1	3.000	3.000
TOTAL per trained mason				**87.500**

Costs of the 3-day training (5 participating masons + 1 mason trainer)

Material Description	Unit	Quantity per training workshop	Unit Price (FBu)	Total Price (FBu)
Fees and mission expenses				
Participants' travel expenses	Worker/ Day	15	10.000	150.000.
Fees and expenses of the mason trainer	Worker/ Day	3	60.000	180.000
Construction material (1 Akasuga demonstration slab + 1 slab per mason to be trained)				
Cement	bag	3	30.000	90.000
Funnel	piece	6	3.000	18.000
Pipe	meter	9	2.500	22.500
Canisters	piece	6	5.000	30.000
Transport of material and equipment	Flat rate	1	80.000 *(depends on the distance*	80.000
TOTAL				**570.500**

Example of a certificate granted to a mason trained and certified by ProSecEau

5.3 Establishment of sanitation stores

One of the main obstacles to the construction of Akasuga latrines in rural areas of Burundi is the unavailability of construction materials such as cement, funnels, roofing liners, etc. In order to overcome this problem, ProSecEau has decided to invest in the establishment of sanitation stores in the communes of its intervention zone where access to construction materials is particularly difficult: Muhuta, Vyanda, Mugamba, Nyabihanga and Ndava. The objective of these sanitation stores is to market to the local population the materials necessary for the construction of Akasuga latrines throughout the project and beyond.

The establishment of a sanitation store requires technical, material, and financial support to start the sale of materials and to allow the store to become autonomous.

a) Material and financial Support

The start-up costs associated with the implementation of each sanitation store are detailed below.

Costs associated with the initial capital required to set up a sanitation store

Materials and financial support provided by the project	Total Price (FBu)
Rental costs of the store decreasing over 6 months (150.000 FBu per month the first month)	600.000
Store equipment: shelves, pallets, table, chair, stationery/registers, pens, invoice holder, stamp, ink, scale, scissors, saw, broom	946.300
Decreasing compensation for the manager over 6 months (150.000 FBu per month for the first month)	600.000
Start-up stock (materials needed to build 200 Akasuga latrines: 100 bags of cement, 133 kg of roofing liners, 400 canisters, 200 funnels, 8 rolls of 25m of pipe)	6.473.000
TOTAL AMOUNT per store	**8.619.300**

b) Technical support

The creation of a sanitation store generates recurring expenses that require an evaluation of the means necessary to cover these expenses in the long term. The development and use of an operating account allows for an overview and therefore better control over the store's expenses and revenues, with a view to reaching the break-even point that will allow revenues to be sufficient to cover all the expenses necessary for the proper functioning of the store. Training of store managers on the use and update of this operating account is essential.

Example of an operating account for one of the sanitation stores

Number of Latrines per month	**100**
Margin on sale of merchandise	**10%**

EXPENSES

Nº	Description	Unit	Quantity per month	Quantity per year	Unit Price (Fbu)	Total Price (Fbu)	Annual Depreciation (Fbu)	Annual Costs (Fbu)
1	**Purchase of merchandise**							
	Cement	bag	50	600	27.000			16.200.000
	Canister	piece	200	2.400	5.000			12.000.000
	Roofing liner	kg (6m)	67	800	7.000	5.600.000		5.600.000
	Funnel	piece	100	1.200	1.000	1.200.000		1.200.000
	Pipe	roll (50m)	4	48	80.000	3.840.000		3.840.000
	Total							***38.840.000***
2	**Investment**							
	Table	piece		1	100.000	100.000	30	3.333
	Cahir	piece		1	20.000	20.000	10	2.000
	Shelf	piece		1	150.000	150.000	10	15.000
	Pallet	piece		1	150.000	150.000	10	15.000
	Scale	piece		1	50.000	50.000	10	5.000
	Scissors	piece		2	1.000	2.000	5	400
	Stamp	piece		1	5.000	5.000	3	1.667
	Seal	piece		1	30.000	30.000	3	10.000
	Broom	piece		2	1.000	2.000	1	2.000
	Total							***54.400***
3	**Consumables**							
	Office furniture (accounting ledgers, invoices, pens, ink)	lump sum		1	70.000			***70.000***
4	**Operation**							
	Rent	month		12	150.000	1.800.000		1.800.000
	Manager's salary	month		12	150.000	1.800.000		1.800.000
	Marchandise transport fees	year		1		-		-
	Reparation fees	year		1	50.000	50.000		50.000
	Water and electricity bills	month		12		-		-
	Municipal Tax	year		1	50.000	50.000		50.000
	Total					3.700.000		***3.700.000***
							ANNUAL EXPENSES	**42.664.400**

REVENUES

Nº	Description	Unit	Quantity per month	Quantity per year	Unit Price (Fbu)	Total Price (Fbu)	Annual Depreciation (Fbu)	Annual Costs (Fbu)
1	**Sale of goods**							
	Cement	bag	50	600	**29.700**			17.820.000
	Canister	piece	200	2.400	**5.500**			13.200.000
	Roofing liner	kg (6m)	67	800	**7.700**	6.160.000		6.160.000
	4m roofing liner				***5.133***			
	Funnel	piece	100	1.200	**1.100**	1.320.000		1.320.000
	Pipe	roll (50m)	4	48	**88.000**	4.224.000		4.224.000
	2m pipe				***3.520***			
	Total							***42.724.000***
							ANNUAL REVENUES	**42.724.000**
							OPERATING RESULTS	**59.600**

* Figures to be updated regularly

Sales price of merchandise

Terminologies

The EXPENSES are all the expenses incurred by the operation of the sanitation store, i.e., all recurring expenses such as the purchase of merchandise to be sold, the rent for the store, the payment of allowances to the manager, transportation costs, etc. The expenses also include the depreciation of the material, so that the sanitation store lasts long-term: the material acquired within the framework of the project must be able to be renewed when it is too worn. For this purpose, it is necessary to calculate how much money should be set aside each year to be able to renew the equipment. This calculation is made on the basis of the estimated life span of the equipment.

The REVENUES refers to the necessary resources. They come mainly from the sale of materials: bags of cement, canisters, funnels, etc. Be careful not to overestimate revenues and not to include (start-up) grants or one-time donations in the revenues so as not to distort long-term estimations.

The OPERATING RESULTS is the difference between all annual expenses and all annual revenues. The break-even point is reached when the operating result is greater than 0. The positive balance represents the store‘s profit.

Use of the operating account

The number of latrine constructions per month and the margin to be applied on the merchandise to be sold are the two variables that allow to control the annual expenses and revenues and thus impact the operating result. The number of latrines built per month will determine the amount of materials to be purchased per year. The percentage margin to be applied to the merchandise will determine the selling price of each item. The selling prices of the merchandise items are shown in bold (and red) at the bottom of the operating account table, at the revenue level.

Vary these two numbers until you reach an operating income equal to or greater than 0. The number of latrine constructions does not depend on the store but on its customers. Determining this variable will require an estimate of the number of latrine constructions in the commune where the store is located. The markup to be applied to the merchandise for sale typically varies between 7 and 20%.

Update of the operating account

In terms of store expenses, it is to be expected that the unit prices of the various sales items, consumables and operating expenses will vary over time (from one year to another or from one season to another). It is important to update the operating account regularly, at least every 6 months, or whenever there is a significant change in the price of a commodity such as cement, gasoline, water or electricity. In the annual operating account table for the sanitation store, the figures to be updated regularly are shown in grey.

5.4 Construction of Akasuga latrines in Catchement Protection Perimeters (CPP)

The Catchment Protection Perimeter (CPP) are zones in which relatively important constraints are imposed to protect the environment close to the catchment, and thus to secure the aquifers in order to preserve the quality of water intended for consumption. The main function of the CPP is to delimit the sector in which any point or accidental pollution is likely to reach the catchment quickly, either by surface runoff or by underground migration of polluting substances.

In order to preserve the quality of drinking water, the residents of the CPP must comply with a certain number of obligations and prohibitions. The Akasuga agro-ecological latrine, thanks to its system of separation of liquid and solid excrements and its shallow pit, limits the risks of pollution of aquifers by percolation of liquids contained in conventional latrine pits. The use of an agro-ecological latrine also makes it possible to recover solid and liquid excrements by transforming them into compost and/or organic liquid fertilizer, thus offering an alternative to chemical fertilizers, pesticides and other phytosanitary products whose spreading is regulated in the CPP.

In order to ensure compliance with the rules to be applied in the CPPs aimed at preserving the quality of the catchment water, the project decided to impose the use of Akasuga latrines on all households residing in the CPPs. The latter are thus forced to comply with the numerous prohibitions dictated by the CPP regulations (no chemical fertilizers and pesticides, no livestock breeding, no cemeteries, no conventional latrines, etc.) and to invest in agro-ecological latrines. In order to encourage CPP households to comply with this obligation, the project offers material and technical support to all households residing in the CPP.

Project and household contribution for Akasuga latrines in CPP

Project contribution		Household contribution
Material support	Technical support	
• ½ bag of cement • 1 funnel • 1 canister for the tippy-tap • 2 canisters for urine collection • 1 roofing liners for the roof of the superstructure • 2 days of service of a specialized mason equipped with 1 trowel, 1 smoothing trowel, 1 jig, 1 metallic mold, 1 DH mold, 1 metal axis, 1 hammer and 2 shovels	• Household awareness on WASH themes • Awareness of the benefits of the Akasuga latrine • Self-construction of the Akasuga latrine training (pit and superstructure) and the tippy-tap • Training in the use of the Akasuga latrine and its agronomic by-products • Close monitoring of the construction and proper use of the Akasuga latrine	• Collection of local materials: sand, gravel and bricks • Digging the pit and self-construction of the superstructure and the tippy-tap hand washing device • Application of good hygiene practices • Proper use and regular maintenance of Akasuga latrines • The correct use of the agronomic by-products resulting from the use of the Akasuga latrine

5.5 Awareness raising and promotion of the Akasuga latrine

a) Model Household Approach / Neighboring Household

In the 4 communes of the concentration zone (3 in Rumonge and 1 in Bururi), the „model household/ neighboring household" approach has been implemented. This is an outreach approach based on the concepts of social commitment and replication at the community level. Households considered as „models" in their community are selected and supported by the project from a technical and material point of view. In return, they commit to encouraging hygiene and sanitation behavior change in 10 „neighboring" households. This behavior change also includes the construction of Akasuga latrines. Neighboring households wishing to build an Akasuga latrine receive technical and material support from the project.

Project Contribution to Model and Neighboring Households

Project contribution to the "model household"		Project contribution to the "neighboring household"	
Material support	Technical support	Material support	Technical support
• ½ bag of cement • 1 funnel • 1 canister for the tippy-tap • 2 canisters for urine collection • 1 canister for drinking water storage • 1 roofing liner for the roof of the superstructure • 2 days of service of a specialized mason equipped with 1 trowel, 1 smoothing trowel, 1 jig, 1 metallic mold, 1 DH mold, 1 metal axis, 1 hammer and 2 shovels	• Training of households on WASH topics, including the self-construction of the Tippy-Tap and the Akasuga latrine (pit and superstructure) as well as the use of the latrine and its by-products • Close monitoring of the construction and proper use of the Akasuga latrine	• 1 canister for the storage of drinking water • 2 days of service of a specialized mason equipped with 1 trowel, 1 smoothing trowel, 1 jig, 1 metallic mold, 1 DH mold, 1 metal axis, 1 hammer and 1 shovel	• Close monitoring of the construction and proper use of the Akasuga latrine

b) Mass Media Approach

In the 11 communes of the extension zone (2 in Rumonge, 6 in Bururi and 4 in Mwaro), the so-called „Mass Media" approach has been implemented. This approach relies on the use of mass media tools to spread the project's messages quickly, on a large scale and at low cost. Households are encouraged to change their hygiene and sanitation behavior and build Akasuga latrines through radio spots and videos transmitted via cell phones and mobile cinemas. Households wishing to self-finance the construction of an Akasuga latrine receive technical and material support from the project.

Project contribution to beneficiary households in the Extension Zone

Material support	Technical support
• 1 SD card containing tutorial videos on self-construction (pit and superstructure) and use of the Akasuga latrine and its by-products • 1 canister for the tippy-tap • 1 canister for storing drinking water • 2 days of service of a specialized mason equipped with 1 trowel, 1 smoothing trowel, 1 jig, 1 metallic mold, 1 DH mold, 1 metal axis, 1 hammer and 2 shovels	• Close monitoring of the construction and proper use of the Akasuga latrine

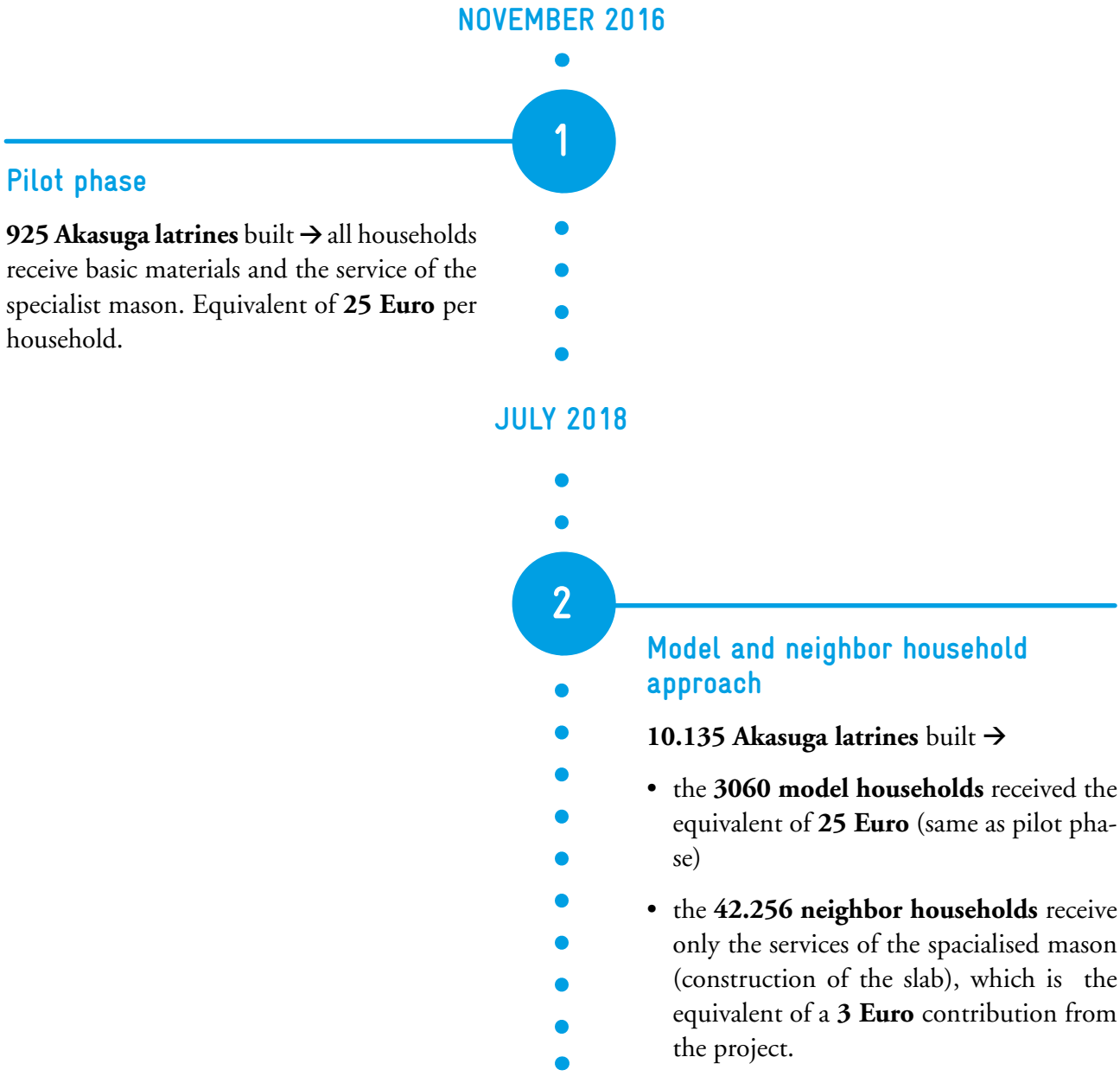
Screenshots of Mass Media videos of the Akasuga latrine and the Tippy-Tap

5.6 Self-financing of Akasuga latrines

a) Material contributions and reduced funding

Since the introduction of the Akasuga latrines in its intervention area, ProSecEau has opted for a financing strategy that aims at total self-financing by households. During the successive phases of the project, ProSecEau implemented approaches involving reducing material and financial contributions from the project, allowing the technology to be introduced and the supply and demand to be created at the beginning, and then gradually creating a climate conducive to the self-financing of Akasuga latrines by households. The financial contribution aspect of the different phases and approaches are described in the diagram below:

Material and financial contributions throughout the implementation of the Akasuga project



AUGUST 2018

3

Mass Media Approach

7.141 Akasuga latrines built → households willing to build an Akasuga benefit from the services of a specialised mason (construction of the slab), i.e. the equivalent of a **3 Euro** contribution from the project + support in accessing microcredits.

DECEMBER 2020

4

Total self-financing

households wishing to build an Akasuga must self-finance the entire latrine → number of self-financed latrines will be estimated through the decentralized services of the DPS-DSCE (CPPS-TPS-ASC)

2021 and beyond

b) Microcredits

From July 2019 to October 2020, ProSecEau in partnership with SBFIC (Sparkassenstiftung für internationale Kooperation) implemented a project to facilitate access to microcredits for the construction of Akasuga latrines by members of savings groups. The implementation of the project was articulated around 6 major activity blocks targeting 3 groups of actors: local authorities, Microfinance Institutions (MFIs) and savings groups (VSLAs). The project implementation steps are detailed in the diagram below:

Implementation steps of the Akasuga latrine construction microcredit facilitation project

JULY 2019

Introduce the project to the local administrative authorities of the three provinces of intervention to actively involve them in the activities

Approach the MFIs operating in the project area and the convince them to join the project

JULY TO OCTOBER 2019

Identify the existing VSLA (formal and informal) in the communes of intervention

AUGUST 2019

Develop with the MFIs the financial product ''Akasuga" specific to the microcredits granted for the construction of Akasuga latrines

NOVEMBER TO DECEMBER 2019

Training the VSLA on:

- Akasuga latrine advantages
- Construction of the Akasuga latrine
- Financial aspects related to the construction of an Akasuga
- Financial education (how to manage family income by promoting savings)

JANUARY TO SEPTEMBER 2020

Monitor and support the MFIs in the implementation their financial product ''Akasuga" to their new clientele (the project's VSLA)

Accompany and train the VSLA members to:

- Open an account in an MFI
- Fund their account to prove their ability to repay
- Apply for a microcredit

The financial product „Akasuga“ developed by the project‘s MFI partners has the characteristics described in the product sheet below. It was finally decided after several months of testing by the MFIs, to combine this product with other existing agricultural financial products so that beneficiaries could access a slightly higher amount. VSLA members use part of the microcredit for the construction of their Aksuga latrine and the rest of the amount is used to cover other agricultural needs.

"Akasuga" financial product sheet:

Target group: All the population in general and the VSLA members

Eligibility conditions: to have an account with an MFI, to own cultivated land and undertake to build an Akasuga latrine.

Objective of the microcredit: Construction of an agro-ecological Akasuga latrine

Credit amount: Minimum 49.400 BIF, intermediate 73.400 BIF and maximum 106.400 BIF

Interest rate: between 1,5 and 2% per month

Administrative fees and commissions: between 3 and 5%, paid in full at the time of credit release.

Duration: between 2 and 12 months after the harvest period, with an agreed upon grace or deferral period

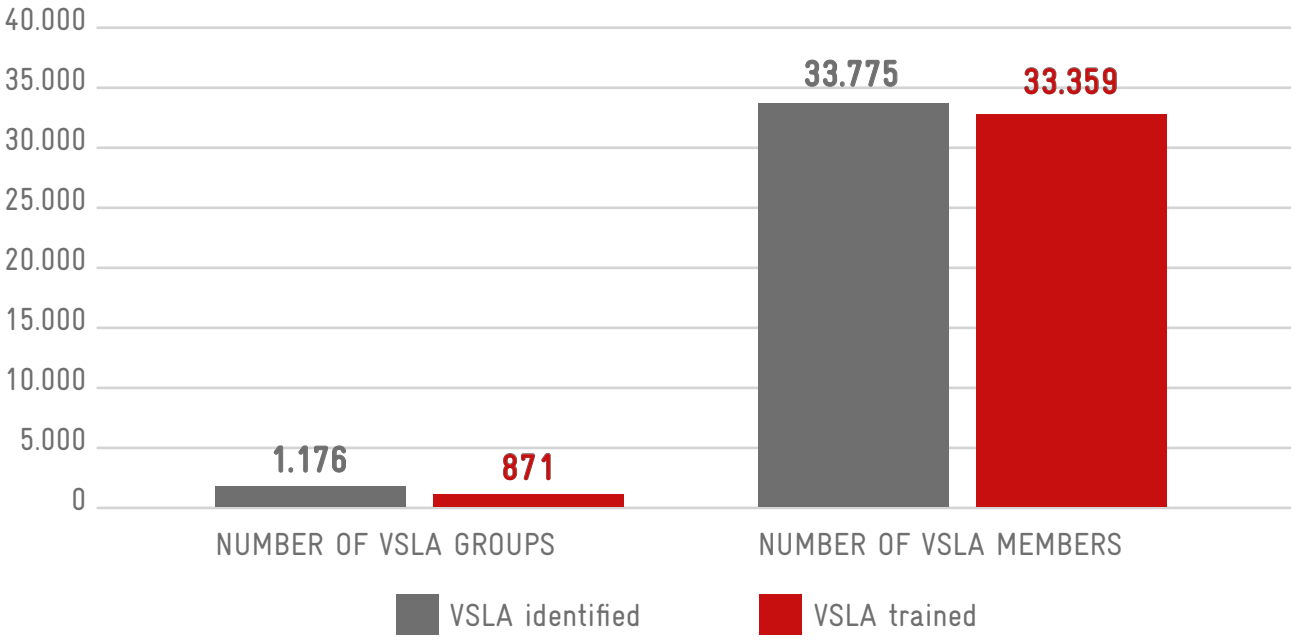
Required guarantee: The joint and several guarantee of each member to guarantee each other and the 10% are committed to the amount of the microcredit requested. The joint and several guarantee is also a form of guarantee required by MFIs for joint and several credits (credit granted to a group of people who meet and know each other well). This means that if one member of the group fails to repay, the other members will repay the credit.

Procedure for releasing the microcredits: After signing the credit contract and granting the guarantee amount of 10% of the requested credit amount, the microcredit is released in a single tranche.

Reimbursement Procedure: The credit is repaid on the due date and the money is paid into the account opened in the name of each MFI member.

As of December 2020, the results in terms of VSLAs trained, accounts opened, microcredits granted and Akasuga latrines built are as follows:

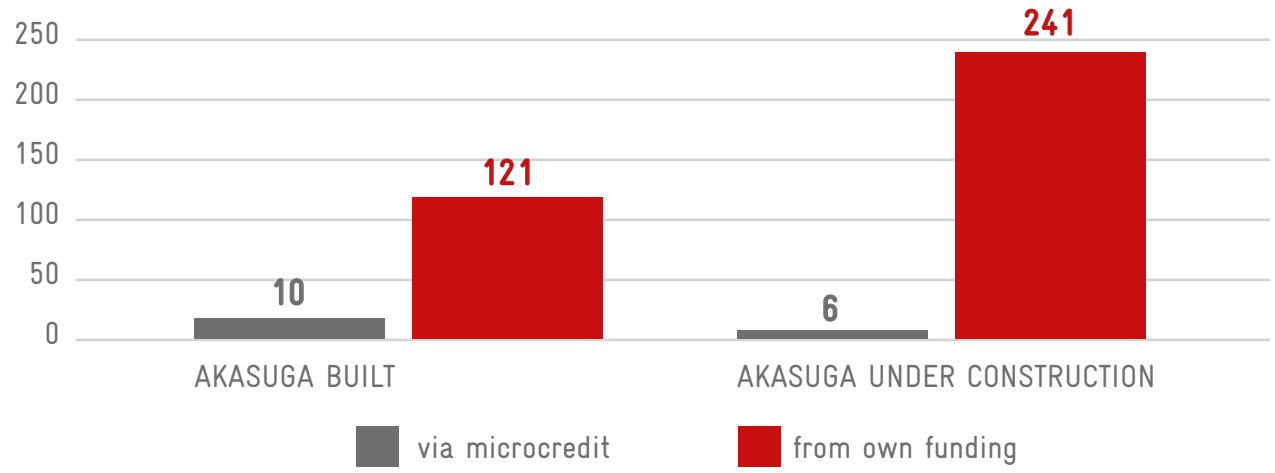
Number of VSLAs and VSLA members identified and trained by December 2020



MFI	Number of accounts opened by VSLA members	Akasuga microcredit applications submitted by VSLA members	Microcredits granted by MFIs for the construction of Akasuga
COOPEC	343	20	
DUKUZE MF	3.720		
ISHAKA MF	1.390		
SOCADE MF	182	55	
HAUGE FAMILY MF	423	80	1 microcredit of 2.900.000 FBu granted to 1 VSLA of 14 members *
Finances Position	26		
BBCI	4		
BCB	2		

*each beneficiary used 73.400 FBu for the construction of an Akasuga latrine, the rest of the microcredit was used for the commercial activity of VSLA

Construction of Akasuga latrines following the microcredit project



Training VSLA representatives in financial literacy; Coaching VSLA members; Opening accounts at an MFI

At the end of the microfinance project, the results in terms of microcredits granted and Akasuga latrines built through microcredits were relatively low. This is partly due to the short implementation period (the feeding of accounts by VSLAs and the observation by MFIs before granting a microcredit requires a lot of time) and the complexity of the project (new financial product coupled with a new type of latrine to promote). Thus, at the end of the project, the emphasis was put on strategies for the sustainability of activities in order to achieve the expected long-term results. Following the discussions during the closing workshops, the stakeholders committed themselves to:

Local authorities

- Raise awareness among the population on microcredit repayment
- Actively promote the Akasuga technology among the population and administrative authorities (during various meetings at the provincial, communal, zonal and hill levels)

MIN (Microfinance Institutions Network)

- Present the „Akasuga“ financial product to other MFIs
- Encourage and strengthen the integration of the „Akasuga“ financial product in the financial products and services of MFIs

MFI

- Continue to grant microcredits to VSLAs that meet the required conditions
- Continue to offer the Akasuga financial product combined with other financial products (agricultural or other)

CONCLUSION

It took ProSecEau almost 5 years to implement the Akasuga project, from its conception to its realization, including the design of methods for sensitizing the populations and training the masons. The outcomes are largely positive and the results in terms of achievements in the field and acceptance of the technology by the populations is very satisfactory. Nevertheless, despite the size of the intervention area (15 communes spread over three provinces), the impact on the sanitation coverage of these populations is not yet clearly perceptible. In order for Burundi to achieve the Sustainable Development Goal 6.2 of equitable access to adequate sanitation and hygiene services for all by 2030, it is important that the Akasuga project activities continue and be scaled up by the sector stakeholders in close collaboration with the relevant technical and administrative authorities.

This manual is intended to accompany the scale-up and replication of the Akasuga project step by step and at all levels. It supports the planning and budgeting of activities and provides all the technical information necessary for the construction and use of the latrine. Based on the experiences and lessons learned during the 5 years of the project, we propose a list of recommendations that we believe are essential to the success and sustainability of the implementation of an Akasuga intervention.

Key recommendations:

- If several Akasuga latrine construction activities are taking place simultaneously by different organizations, harmonize approaches, particularly in terms of financial contributions and permanent implementation and monitoring actors.
- Ensure that there is sufficient awareness of the target populations and promotion of the technology before embarking on the actual implementation. Use a community outreach and/or mass media approach:
  - → What are the benefits of an Akasuga: https://youtu.be/91GzPNMHwxE
  - → How to build an Akasuga: https://youtu.be/TJ96rwWV7z0
  - → How to use an Akasuga and its by-products: https://youtu.be/qNXEdsiw96k
- Encourage from the start self-financing through own funds or by proposing financing solutions such as microcredits.
- Ensure that skilled labor and construction materials are available. If necessary, train masons and set up sanitation stores beforehand.
- For the training of new implementers, use the trained and experienced human resources of ProSecEau's intervention provinces: Red Cross animators, mason trainers, etc.
- Set up an institutionalized system of support and monitoring of the construction and use of Akasuga latrines, i.e. anchored at the level of permanent local actors.

HOW DO I START?

1. 
Contact your Community Health Worker (CHW) or the Health Promotion Technician (HPT) at your Health Center who will put you in touch with a specialized mason

2. Obtain the construction materials and check their compliance with the mason

3. 
Build your latrine with the help of the mason (the slab must be made by the mason)

4. Inform your CHW or HPT of the progress of your latrine construction so that they can support you in the construction and use of the Akasuga and its by-products

Name of your Health Center's HPT

Name of your Community Health Worker

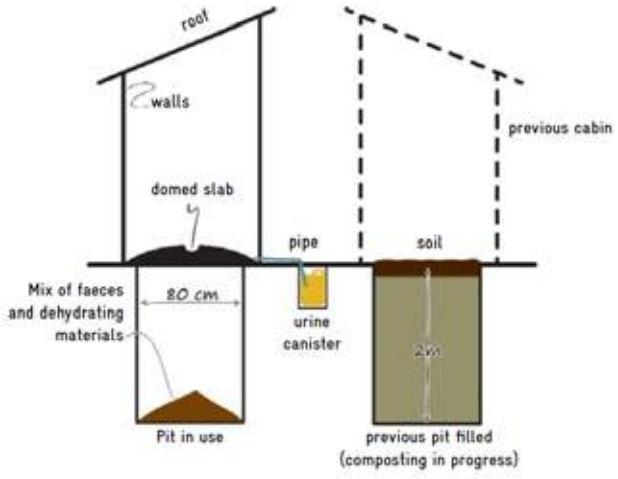
Phone Numbers

Sector Programme Water and Sanitation - ProSecEau

AKASUGA

A COST-EFECTIVE AND EASY-TO-BUILD LATRINE

HOW DOES AKASUGA WORK?

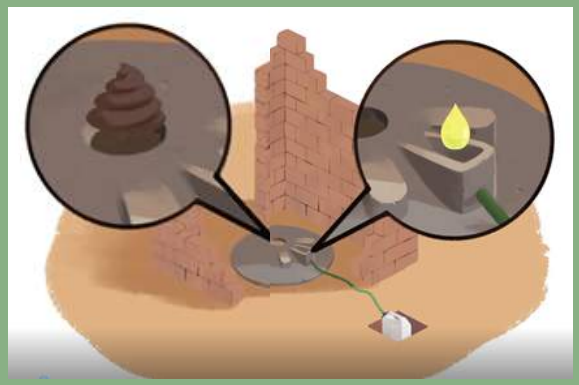


The name "AKASUGA" is an abbreviation of "Akazu ka Surwumwe gatanga Amase": the place where people hide to produce fertilizer. The Akasuga latrine is equipped with a device for separating solid and liquid excrements, placed at the level of the domed slab. The feces land in the pit to produce compost, while the urine is directed to a urine canister outside to produce liquid fertilizer.

WHICH ADVANTAGES DOES IT PROVIDE?

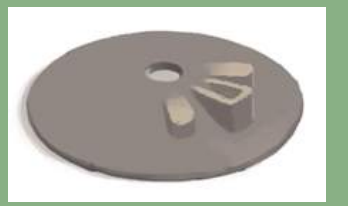
1 Seperation of urine and feces

- no odors or flies
- good quality fertilizer production



2 Round and domed concrete slab

- strong, durable and safe
- reusable: can be moved from one pit to another by rolling it
- no rebars: reduced construction costs



WHICH MATERIALS ARE USED?

materials and local labor force


Adobe bricks


unskilled worker


sand


gravel


mulch

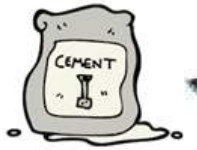
Materials to buy


funnel


pipe


canister


specialized mason



cement

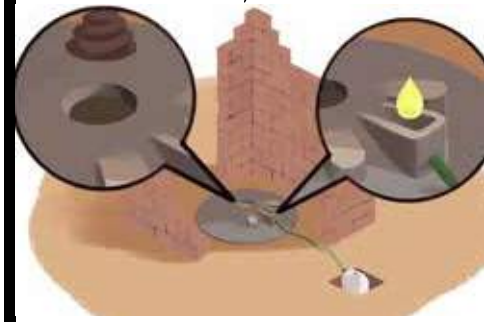

roofing liners


poles

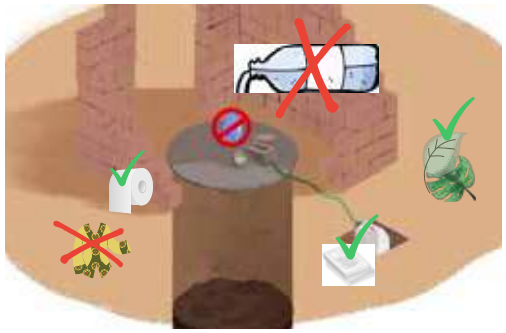
Periodically renew the roofing liner and mulch. Eventually, you may want to replace them with more durable materials such as sheet metal or tile.

USE OF THE AKASUGA LATRINE

Properly direct urine into the funnel and feces into the defecation hole (Keep the defecation hole closed when a man is urinating)

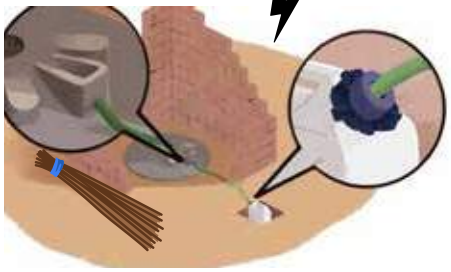


Avoid anal washing with water, use biodegradable materials such as paper or tree leaves instead



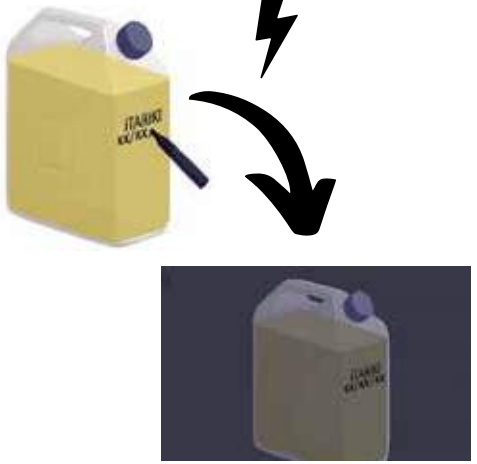
Add 1 or 2 handfuls of ash after each defecation. Add more ash if it is a baby's excrements

Keep the interior of the cabin clean by sweeping whenever necessary and regularly check that the pipe is tightly connected to the urine canister or that it is not clogged



When the canister is full, carefully unscrew it and replace it with another empty canister

Carefully screw the can full of urine, write the date on it and keep it in a dark place



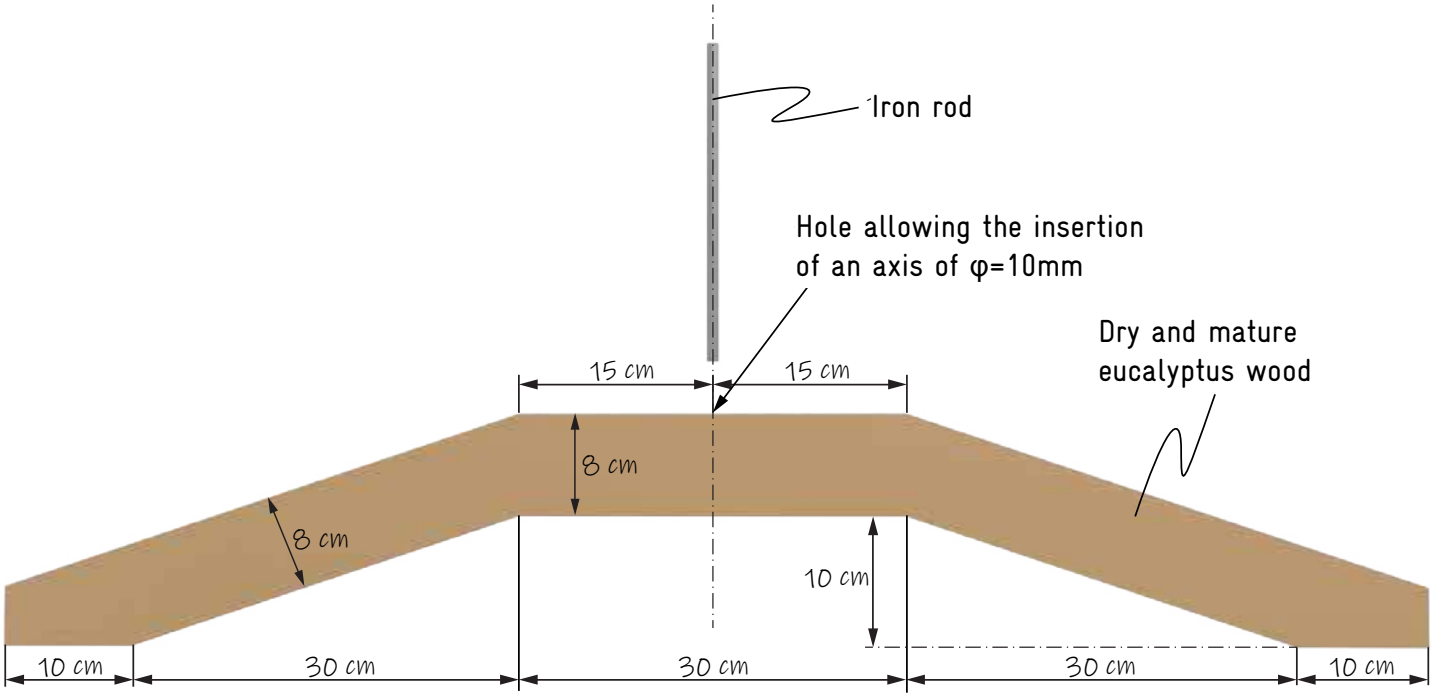
1 MONTH

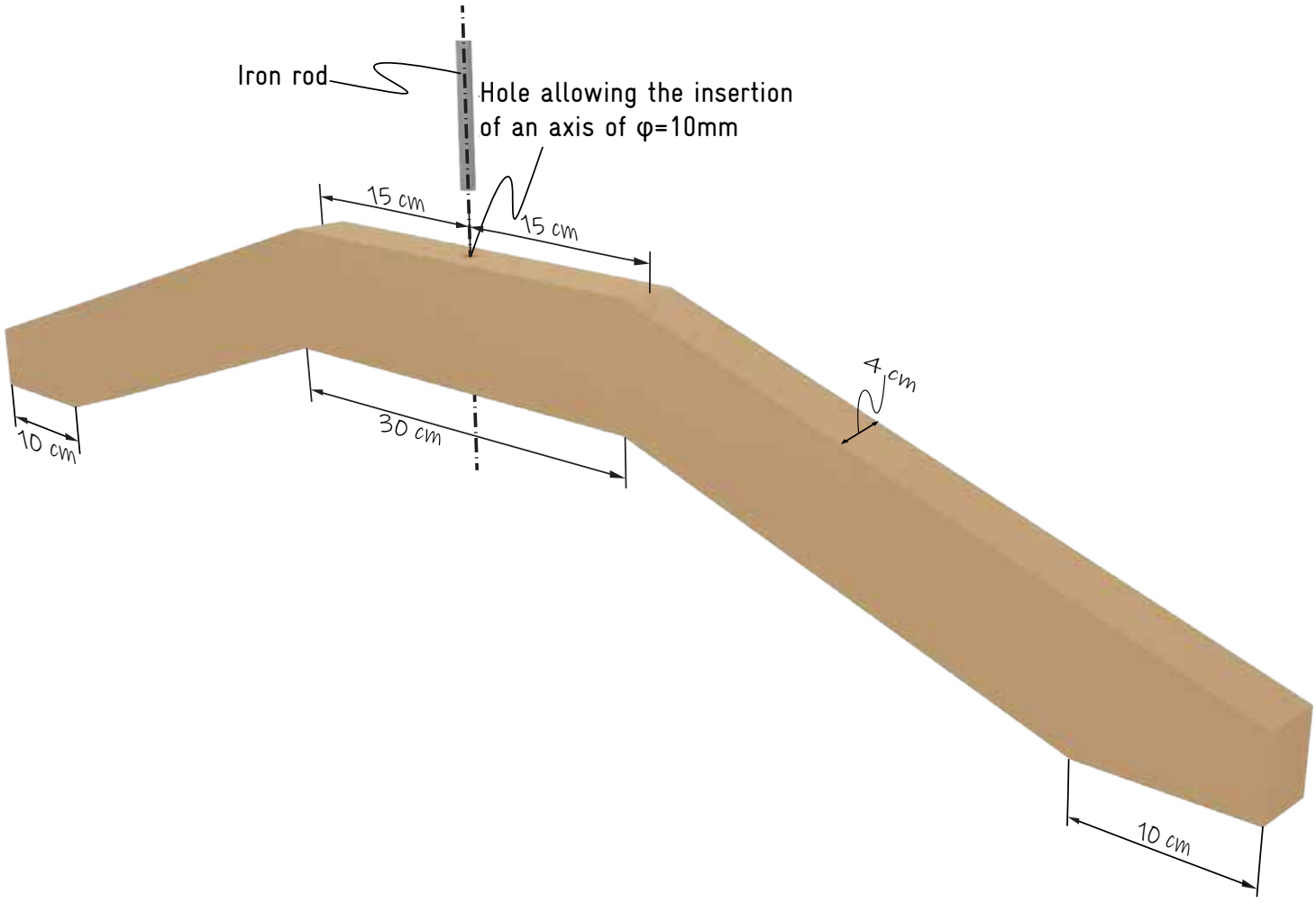
Start using the diluted urine after a one-month rest period

1 YEAR

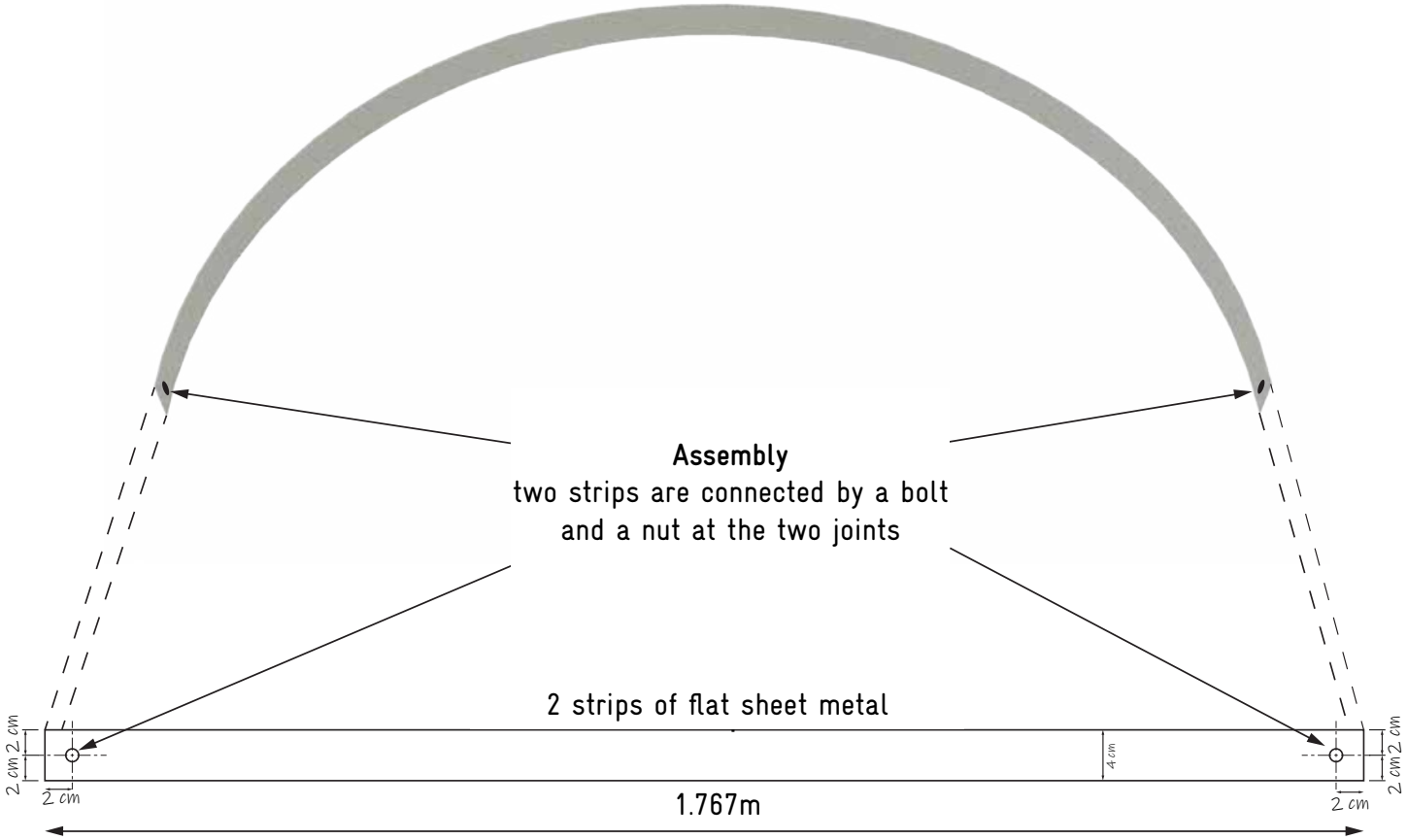
The compost from the feces can be used one year after filling the pit

Jig

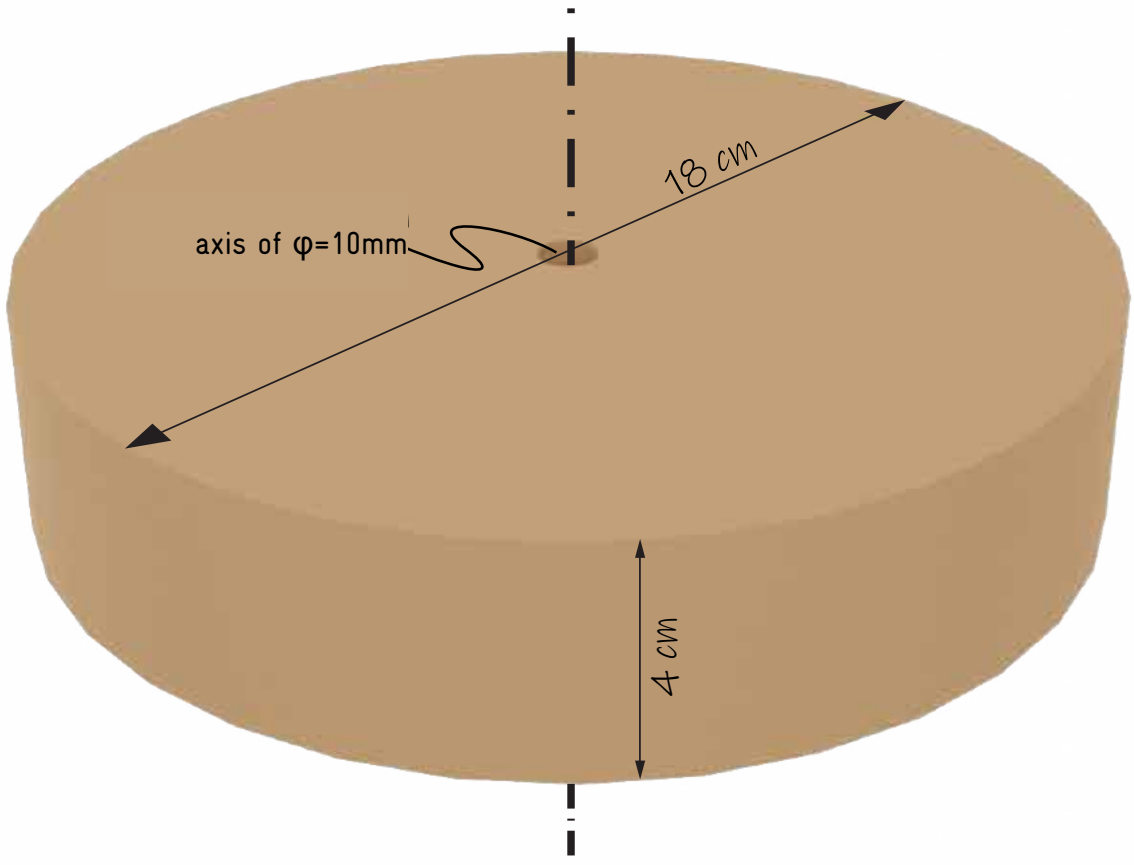

Iron rod
Hole allowing the insertion
of an axis of φ=10mm
Dry and mature
eucalyptus wood
15 cm
15 cm
8 cm
8 cm
10 cm
10 cm
30 cm
30 cm
30 cm
10 cm


Iron rod
Hole allowing the insertion
of an axis of φ=10mm
15 cm
15 cm
4 cm
10 cm
30 cm
10 cm

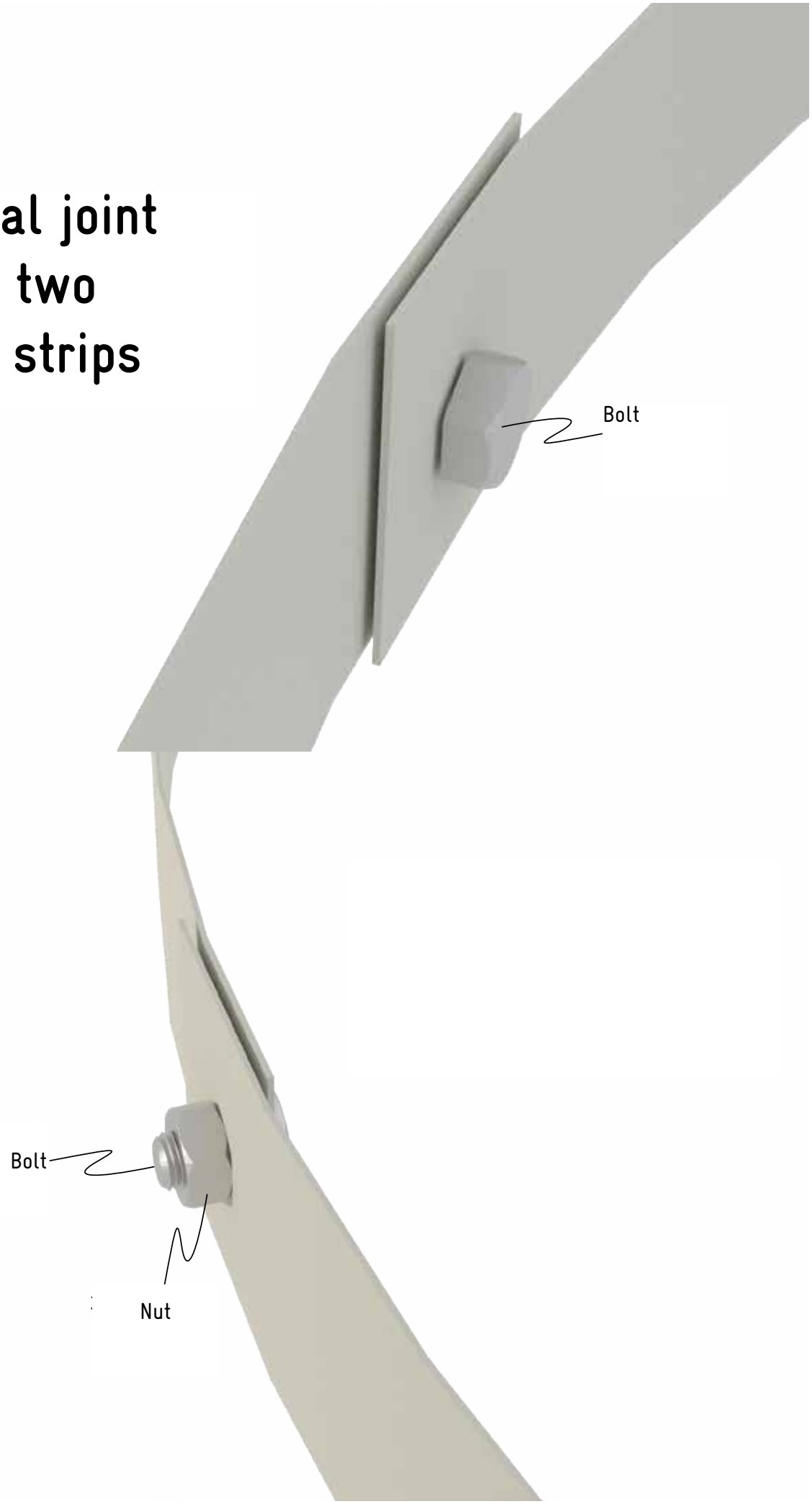
Metallic ring



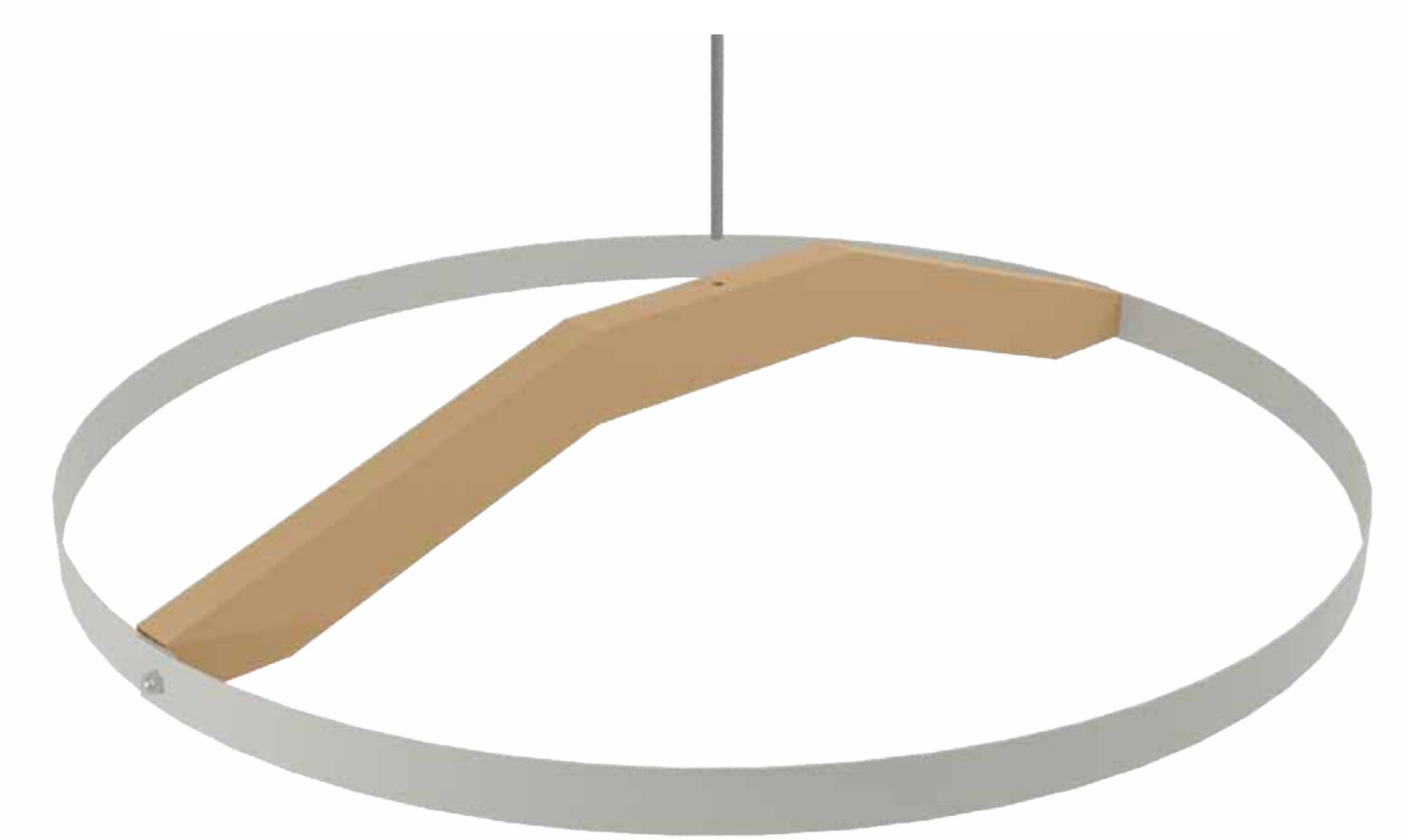
DH mold

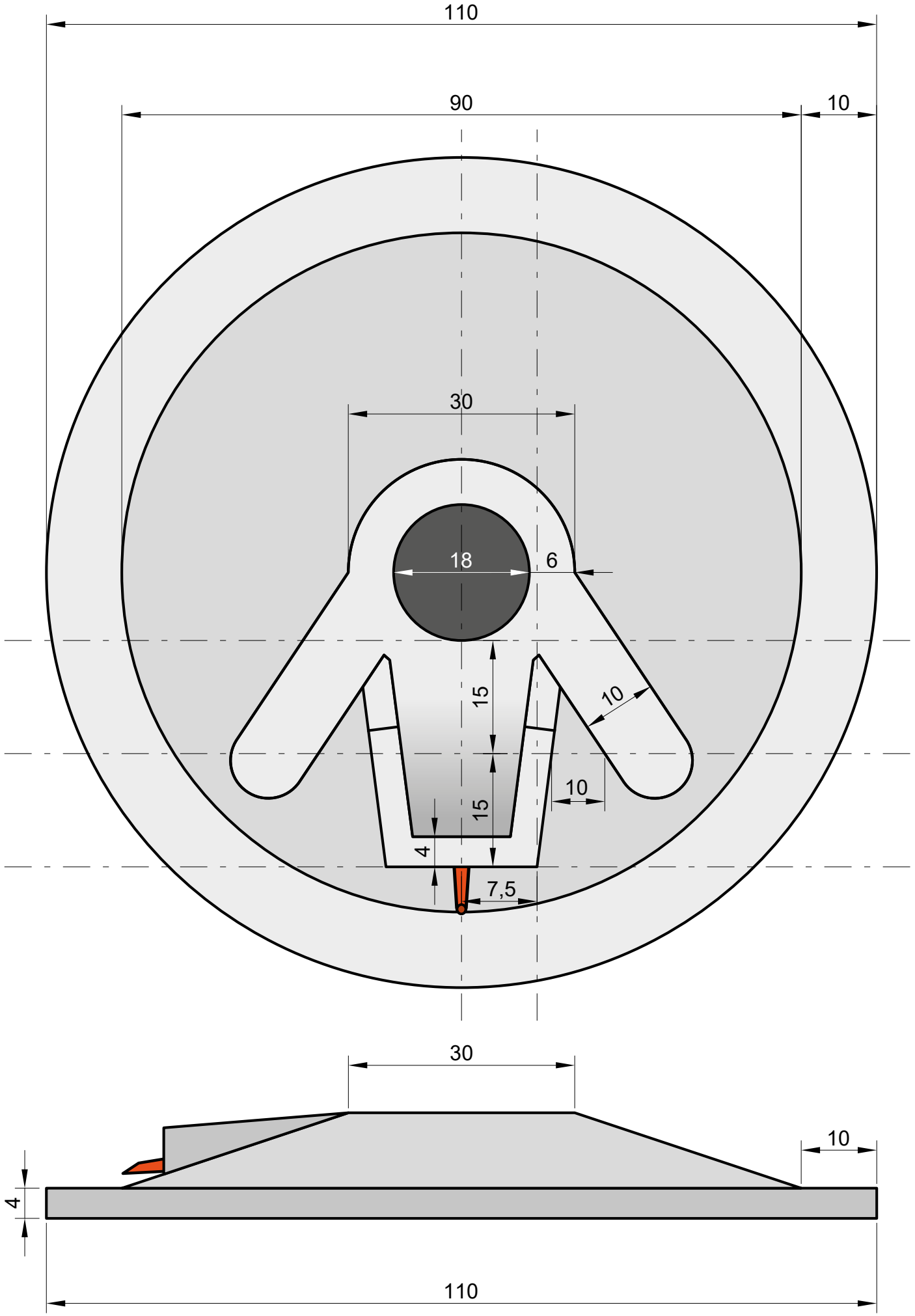


Internal joint of the two metal strips



Jig and Metallic ring

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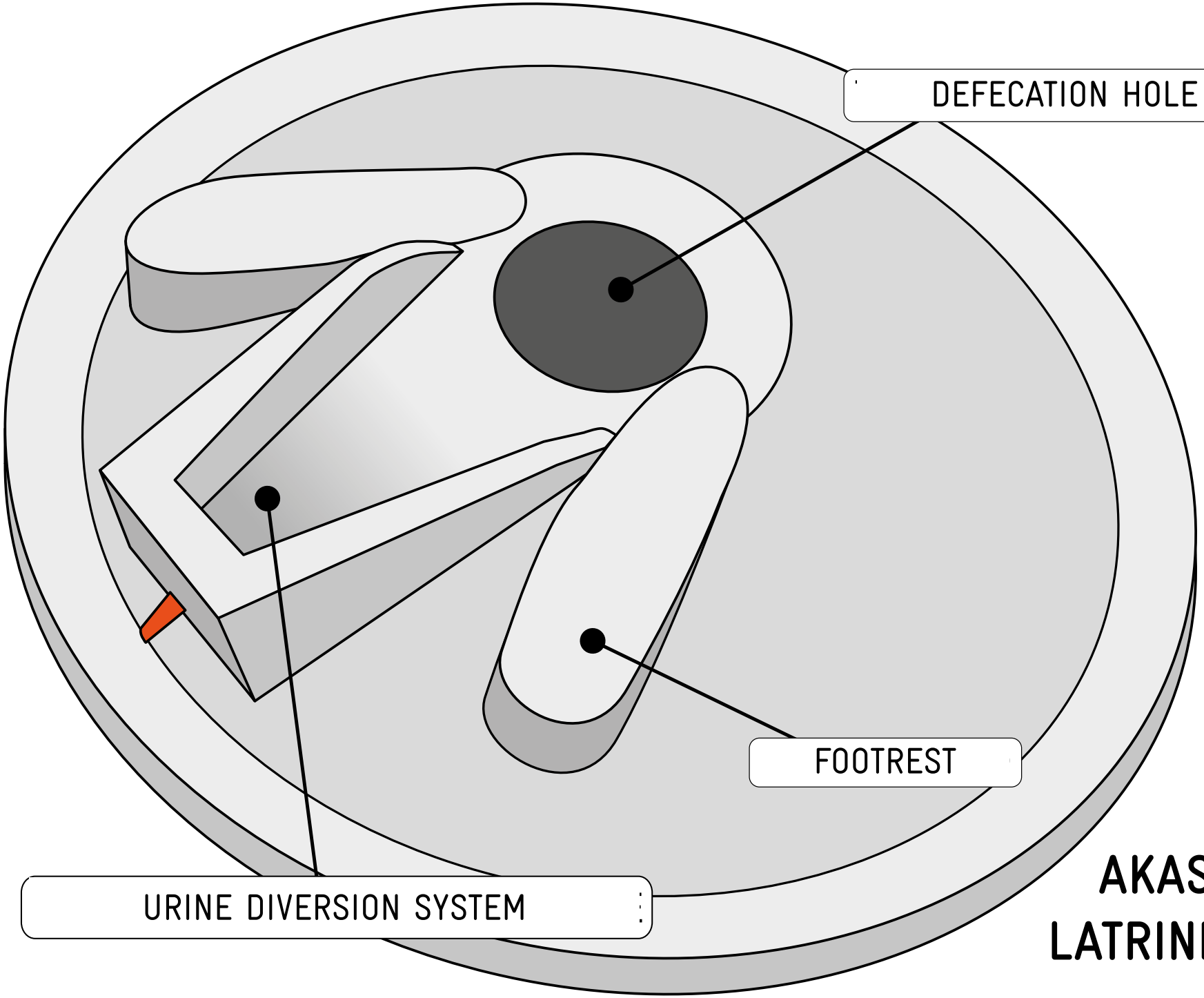
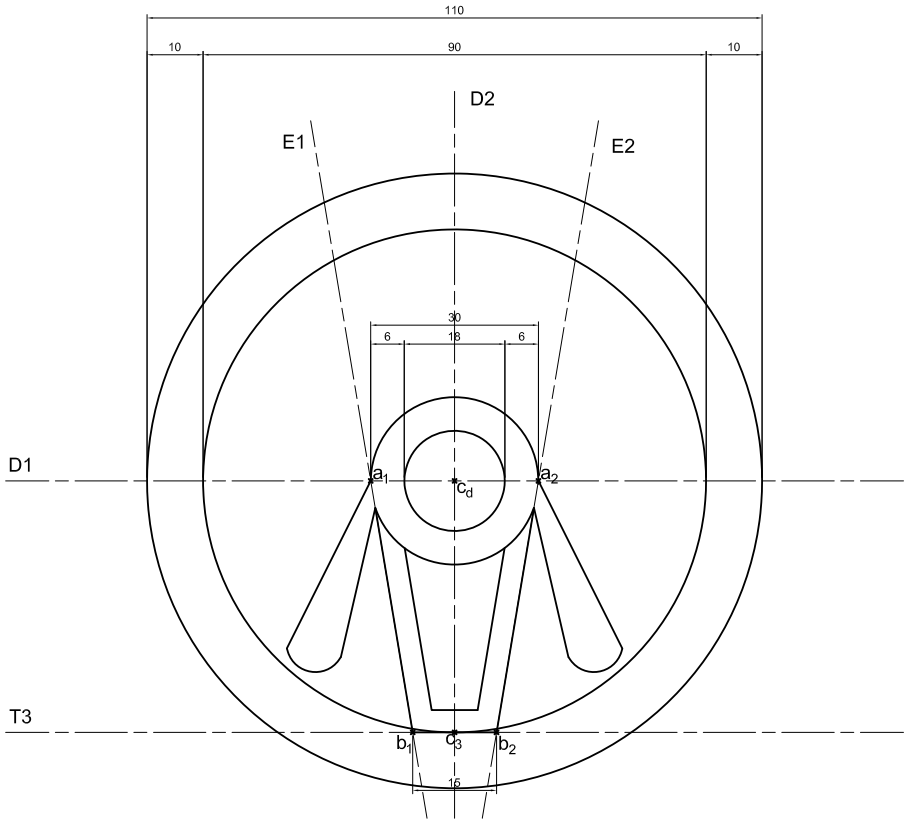
4
110



AKASUGA LATRINE SLAB

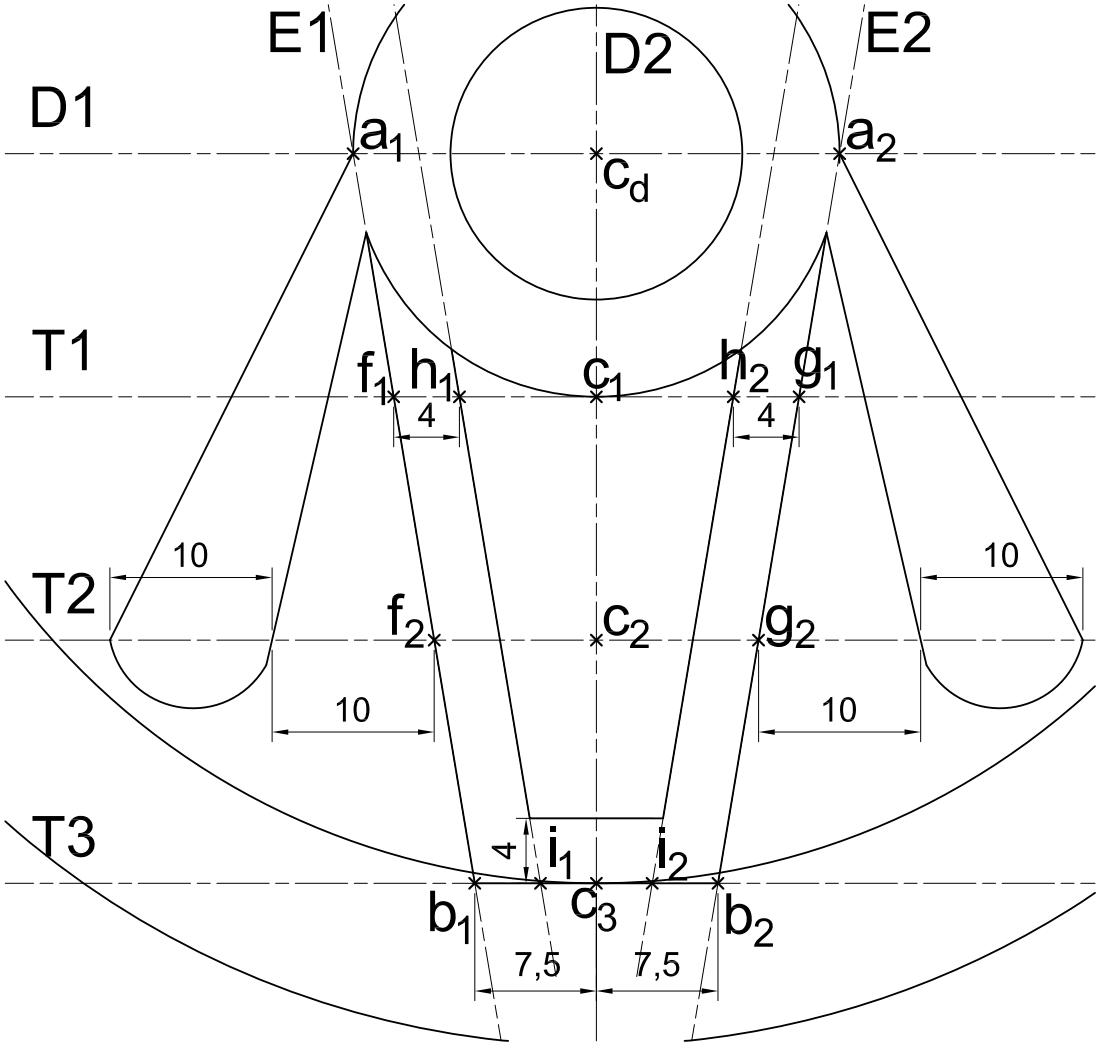


Construction plan of the Akasuga latrine slab

The measurements are in cm

Details of the urine deviation system and the footrests

The measurements are in cm



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