SANITATION
FOR MILLIONS

WASHaLOT 3.0

An innovative handwashing technology in Uganda

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PART A)
WASHaLOT 3.0 | Background

UNICEF/WHO reports that 1.7 million children die annually of diarrhea and pneumonia. Handwashing with soap under running water can prevent the majority of infectious diseases, such as COVID-19, influenza, cold, cholera, dysentery, and contagious eye disease. Several studies have reported reduced incidences of pneumonia and diarrheal diseases by over 40% to 50% through handwashing. However, many people in Uganda, like in other low- and middle-income countries have limited access to handwashing facilities, mainly in institutions and public places such as schools, health centres, markets, open parks and prisons, among others. This is due to high costs involved in construction, operation and maintenance of such facilities. High cost of water, for example is reported to cause abandoning of facilities.

The *Sustainable Sanitation Programme* of the *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)* and the Regional *Fit for School Programme* in Southeast Asia have developed in cooperation with the University of Applied Sciences Potsdam the WASHaLOT 3.0, a low-cost and water-saving handwashing facility technology. The WASHaLOT 3.0 is the third iteration of the WASHaLOT design building on the experiences of the Regional Fit for School programme gathered across Southeast Asia since 2013. Handwashing facilities - like the WASHaLOT 3.0 - are designed to enable both group handwashing and individual handwashing at any critical time. The overall aim is to create an environment where all children can realize their right to wash their hands, even if water is a scarce resource and huge numbers of children need to wash their hands at a short period of time. The first version of the WASHaLOT resulted from a workshop conducted in the Philippines in 2013 which brought together production designers from Asia and Germany to address challenges and optimise existing group washing facilities. Since then, three major versions have been introduced.

The first version of the WASHaLOT was a modular punched Galvanized Iron (GI) pipe, which was attached with a flexible garden hose to a container. The school was responsible to elevate the bucket to allow the water to flow through the pipe. The second major redesign reflected the feedback from schools that a group handwashing facility with an attached and elevated water container was needed as well as the possibility for individual handwashing, resulting in the creation of WASHaLOT 2.0.

1 Technology Applicability Framework: TAF Assessment WASHaLOT 3.0
http://www.fitforschool.international/resource/technology-applicability-framework-taf-assessment-washalot-3-0

The initial design of the WASHaLOT 3.0 technology was introduced and further fine-tuned given locally available materials in countries in Southeast Asia in 2016[1]. The centerpiece of the WASHaLOT 3.0 is a blue HDPE water reservoir pipe (3m long, 110mm in diameter) fitted with water-saving stainless steel outlets, which release water only when pushed to the side and automatically close when the hand is removed. One pipe filling carries up to 25 liters of water and accommodates about 150 handwashing activities. The water outlets also attract user curiosity due to the non-traditional nature of water release as compared to the common water taps. In Uganda, the technology was first introduced under the *GIZ Sanitation for Millions programme* in 2018. The facilities were tested in five (5) Kampala public schools, where the students enjoyed them because of their impressive looks, triggering curiosity and promotion of group routines and social interactions. Consequently, the technology was upscaled in all the 79 public schools under *Kampala Capital City Authority (KCCA),* four (4) institutions in Apac Municipality, Gulu district; and the refugee settlement schools in Arua district. Different stakeholders as the Ministry of Water and Environment, other government ministries, the *Appropriate Technology Centre (ATC)* and the civil society expressed interest in promoting appropriate hand washing facilities, including the WASHaLOT 3.0 technology in institutions and public places in Uganda.

WASHaLOTs 3.0 are locally prefabricated, can be quickly installed, are easy in maintenance and repair. Therefore, the WASHaLOT 3.0 qualifies as appropriate technology for public places, institutions and emergency settings such as refugee settlements. PART B of this publication, the "User guide" showcases key features of the WASHaLOT 3.0 and how to address practical issues on setting them up, operating and cleaning them. PART C, the "Production guide" is directed to the reader interested in local production of the WASHaLOT 3.0, illustrating required materials and equipment, production steps and such like.

In this publication the WASHaLOT 3.0 Production Note[2] and WASHaLOT 3.0 Users Guide[3] have been adapted to the Ugandan context. At present, the developers of the WASHaLOT 3.0 technology, *GIZ's Sustainable Sanitation Programme* and the Regional *Fit for School Programme*, further research on options how to adapt the WASHaLOT technology to meet all criteria of design standards related to pandemic prevention. First adaptations are illustrated in the following graphic.

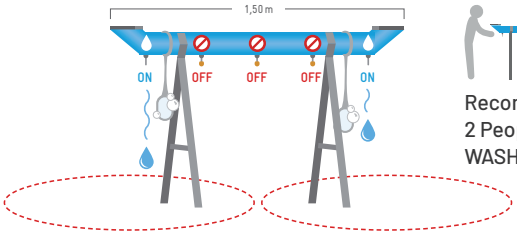
2 *http://www.fitforschool.international/resource/washalot-3-0-producers-note*
3 *http://www.fitforschool.international/resource/washalot-3-0-users-guide*

Pandemic Adjustments

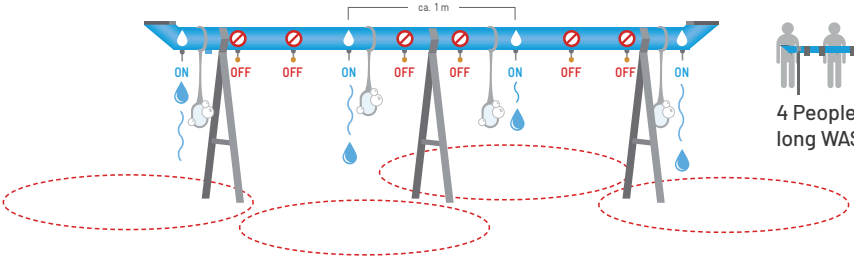
- Water outlets are covered according to the official physical distance guidelines (e.g. with rubber sleeves or foil).
- Stickers can indicate open and closed outlets.
- Floor markings (e.g. with paint, tape, hoops or bike tires) help for orientation and for keeping the distance.

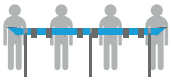
Soap destroys viruses.
It should always be available (Liquid or as a bar).

The who recommends:
Handwashing with soap for at least 20 seconds.



Recommendation:
2 People per short WASHaLOT





4 People per long WASHaLOT

Tip – walking and soaping: Place a soap dispenser about 100 meters away from the handwashing facilities. The students provide themselves with soap first and clean their hands while walking to the WASHaLOT.

Advantages:

- Physical distances are easier to maintain.
- Queues are avoided.
- Students clean their hands within the amount of time recommended by the WHO.

A 1. Sanitation for millions' concept on safe hand hygiene

Handwashing is one of the core activities regarding safe hygiene. It is one of the most efficient responses to pandemics and for infection control since it removes germs, reduces health risks, prevents the spread of germs and pathogens to others and is not costly. Safe hand hygiene is relevant everywhere you stay and at any time you are active, be it at work, at home, in school, or during recreational times and times of travel.

Everybody is exposed to the medical implications of the COVID-19 pandemic. As the virus spreads rapidly when mingling with other human beings, everyone must pay special attention to thorough handwashing or hand sanitizing apart from physical distancing. Against this backdrop, *Sanitation for Millions* has designed a concept on promoting a culture of hand hygiene which is based on four pillars:

- **1. Strengthening the enabling environments** in the partner countries to assist fostering progress for safe hand hygiene. This comprises advocating for safe hand hygiene within policy frameworks and promoting accountability and monitoring mechanisms amongst policies and guidelines.

- **2. Constructing handwashing facilities** at public places and public institutions where physical infrastructure is missing or needs rehabilitation. This comprises the construction of handwashing facilities as part of toilets as well as single wash basins and group handwashing facilities at places where people need to keep their hands clean and sanitized.

- **3. Identifying and promoting best practices** by providing concepts, guidance, and resources to support improved handwashing. This comprises knowledge exchange and translation of knowledge into action and capacity building.

- **4. Promoting and advocating for safe hand hygiene** to educate about the role handwashing plays in each area of human activities and to create awareness about the impacts and benefits of proper handwashing.

Sanitation for Millions follows a child- and gender-friendly, inclusive and equitable approach. This means that *Sanitation for Millions* constructs facilities and promotes activities that encourage safe hygiene practices which are adapted to the needs of the users (especially of girls and women, and persons with special needs) and are culturally appropriate and regard age-related needs (especially of minor children). As a response to the current emergency due to COVID19 pandemic, the adaptation to the local context, repair rehabilitation and adequate maintenance of the existing infrastructure for proper handwashing is priority for *Sanitation for Millions*.

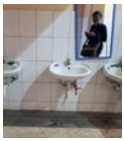
For further details on *Sanitation for Millions*' approach on safe hand hygiene, proper hand washing & sanitizing, hand hygiene in health care facilities, advocacy and best practices, it is referred to the concept paper[4].

A 2. WASHaLOT 3.0 | Key features

- WASHaLOT 3.0 facility can accommodate many people (over 10) to wash hands at the same time
- The water outlets are designed to release water only when manually touched and thereby reduce water consumption.
- A filled pipe of 3.0 m length carries 25 liters of water and can accommodate about 150 handwashing events.
- It is designed to be prefabricated locally, thus promoting local supply chains, creating incomes, ensuring quality and reducing the burden on user communities to build their own facilities.
- It can be connected to an existing piped water supply or can be refilled manually.
- WASHaLOT 3.0 pipe assembly is horizontally fixed onto galvanized iron stands installed at varying heights to accommodate people of different age groups.
- For ease of maintenance and or flexibility to ensure safety in times of no use, the water WASHaLOT main pipe is held in position by openable galvanized iron clamps.
- WASHaLOT 3.0 is easy to operate and maintain/clean due to wide openings of water inlet at both ends.

4 *https://www.susana.org/en/knowledge-hub/resources-and-publications/library/details/3905*

A 3. Comparison of WASHaLOT 3.0 with other handwashing facilities

ATTRIBUTES	 WASH aLOT 3.0	 Ceramic sinks	 Tippy Tap	 Container + Tap
Low construction costs	🟡	🔴	🔵	🔵
Locally constructed	🔵	🔴	🔵	🔵
Easy to operate	🔵	🟡	🟡	🟡
Low or minimal repairs	🔵	🟡	🟡	🟡
Easy to clean	🔵	🔵	🟡	🔵
Group handwashing potential	🔵	🔵	🔵	🟡
Low water per washing event	🔵	🔴	🟡	🟡
Durability	🔵	🟡	🟡	🟡
Not easily vandalized	🔵	🟡	🔴	🔴
Water saving	🔵	🔴	🟡	🟡
Connection to water supply	🔵	🔵	🔵	🟡
Manual refiling	🔵	🔴	🔵	🔵
Low space requirement	🔵	🔴	🟡	🟡
Acceptability in urban settings	🔵	🔵	🟡	🔵
Applicable at household level	🔴	🔵	🔵	🔵
Applicable in refugee setting	🔵	🔴	🔵	🔵
Applicable in health care facilities	🟡	🔵	🟡	🟡

KEY

🔵 Good performance 🟡 Moderate 🔴 Poor

A 4. Reasons to have a WASHaLOT 3.0 testimonies from users

Below are responses from users of the WASHaLOT 3.0 facility for over 2 years. These were mainly schools which had used other technologies before installation of the WASHaLOTs.

WASHaLOT Attribute	Uganda Testimonies at places with WASHaLOT 3.0 Facility
Why prefer WASHaLOT to other handwashing technologies?	*"WASHaLOT has enabled our students to improve handwashing habit while consuming little water. It can accommodate many students to wash hands at once and students are so much in love of the facility."* – Sanitation Teacher, St. Peters Primary School, Kampala. *"Students are very proud of the school and always talk about the facility with parents and peers. This has led to increased student enrollment. The facility saves water, allows many students to wash at the same time and is durable."* – Sanitation Teacher, Katwe Primary School, Kampala. *"It was easy for us to talk about handwashing during COVID-19 outbreak since students had developed the handwashing culture by using WASHaLOT facility."* – Sanitation Teacher, Katwe Primary School, Kampala.
Adaptation by the users	*"Our students enjoy using the WASHaLOT and this increased the handwashing practices"* – Sanitation Teacher, St Peters Primary School, Kampala. *"This facility looks attractive, making students not to miss washing hands."* – Sanitation Teacher, Ggaba Demonstration School, Kampala.
Cleaning intervals	*"The pipe interior is cleaned using a sponge or brush attached to a rod and this is done every week."* – All interviewed Schools.
Challenges in operation and/or maintenance and solutions	*The observed challenges from the schools include:* • *Student playing on facility, mainly those in P1 and P2. This is solved through continued sensitization.* • *Throwing rubbish in aggregates found in drainage box.* • *Students breaking or plucking off covers, solved through sensitization and replacement of broken covers.*

PART B)
User's guide

B 1. WASHaLOT 3.0 | Components

A package of the WASHaLOT 3.0 facility delivered to the user should always include the following modular items:

- 1 No. Main pipe system WASHaLOT 3.0
- 3 No. GI pipe stands (standard legs)
- 2 No. Spare water outlets

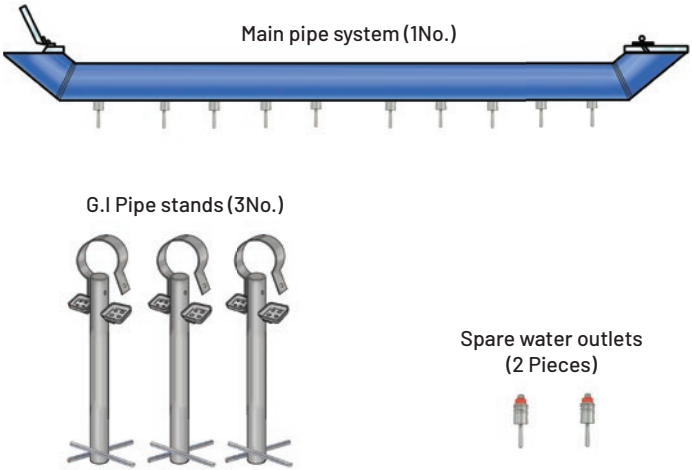


Illustration 1: Package of the WASHaLOT 3.0 (illustrated by D. Egessa / © GIZ Fit for School)

The detailed items for each of the WASHaLOTs are listed below. However, one should note that these items are already pre-assembled. In some cases, a user may decide to cross-check the component items with this list.

WASHaLOT 3.0 Component	Items	No. of pcs
Main pipe system	HDPE Blue pipe 110 mm, 8 mm thick.	1
	Stainless steel water outlet (with a strainer)	12*
(1 No.)	Polyethylene ½" pipe adopter (threaded male, no thread female)	1
	Polyethylene ½" plug	1
	HDPE plate 110 mm x 170 mm x 6 mm thick	2
	Rivets for the hinge	8
	Stainless screws (4.8 mm x 1/2")	6
	Stainless Hinge (50 mm x 30 mm)	2
GI pipe Stands – standard legs (3 No.)	Galvanized Iron (GI) pipe (1.2 m length, 4 mm thickness and 50 mm dia)	3
	Stainless steel clamps/pipe holders (100 mm dia, 50 mm wide and 1.2 mm thick)	3
	Bolts M12	3
	Stainless steel soap dishes (150 x 100 mm)	6
	Mild steel flat plates (150 mm length, 20 mm width and 4 mm thickness)	6
	Mild steel flat plates (350 mm length, 20 mm width and 4 mm thickness)	6
	T12 steel bars (anchors) – 12 mm diameter and 20 cm length.	6

** 10 pcs used on the WASHaLOT main pipe and 2 for spare pieces*

B 2. WASHaLOT 3.0 | Installation

- Dig three holes of 30 cm diameter and 30 cm depth in a straight line. *Illustration No. 2.1*
- Place the WASHaLOT stands in vertical position (using the basic tools). *Illustration No. 2.2*
- Cast concrete mixed at a ratio of 1:2:4 (Cement: Sand: Aggregates) in the hole and leave it to cure for up to 2 days. *Illustration No. 2.3*
- The main WASHaLOT pipe system is then fixed onto the stands (set in concrete) and secured in position by use of stainless-steel clamps attached to the stands with M12 bolts. One bolt is used for each stand. *Illustration No. 2.4*

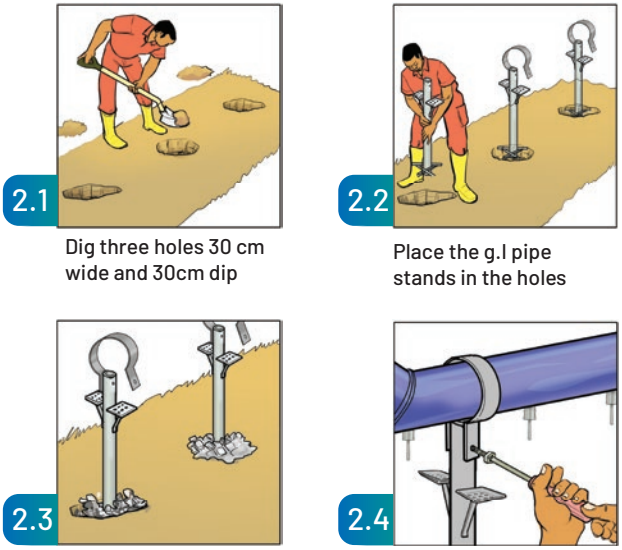


Illustration 2: Installation of the WASHaLOT 3.0
(illustrated by D. Egessa / ©GIZ Fit for School)

B 3. Construction of drainage platform and soak pit

The drainage platform prevents the wash water from ponding on the surface. In places without public sewer connections, a soak pit is provided. The procedure involves the following:

- Dig a foundation around the WASHaLOT stands. *Illustration No. 3.1*
- Build a rectangular box using bricks in a mortar layer (1:4 mix) *Illustration No. 3.2*
- Plaster on the inside and outside of the box *Illustration No. 3.3*
- Apply a layer of cement screed on the inside of the box
- Fill the box with aggregates (half inch size) *Illustration No. 3.4*
- For the WASHaLOTs draining into existing channels or sewers, do not fill the box with aggregates but instead provide a smooth surface such as cement screed, tiles or terrazzo finish.
- Dig a soak pit (650 mm dimeter and 750 mm depth) and fill it with stones/hardcore.
- Place a polyethene sheet (gauge 1000) on top of hardcore and backfill the pit with soil.

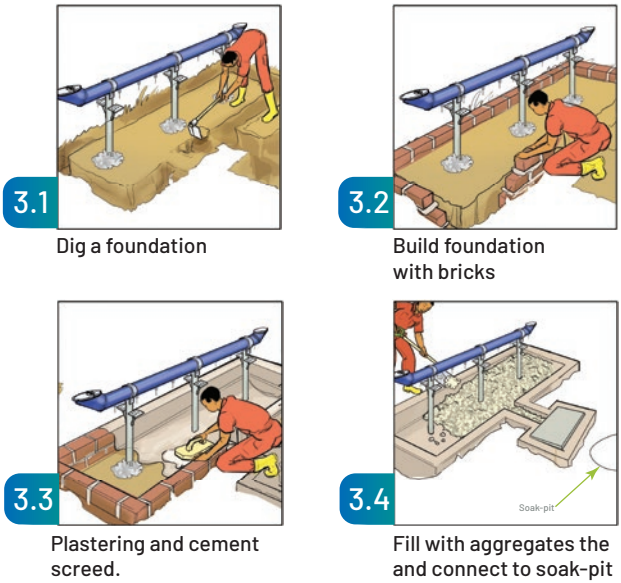


Illustration 3: Construction of drainage platform (illustrated by D. Egessa / ©GIZ Fit for School)

B 4. Materials required for installation and drainage construction

Activity	Materials	Unit	Quantity
WASHaLOT Installation, Drainage Platform and soak pit	Portland cement (50kg per bag)	bags	7
	Aggregates	Wheel barrows	10
	Sand	Wheel barrows	15
	Clay bricks	pcs	280
	Timber (12" x 1")	pcs	8
	Hardcore	Wheel barrows	5

B 5. WASHaLOT 3.0 | Facility cost

Item	Unit	Quantity	Amount (UGX)	Amount (USD)*
WASHaLOT Main pipe and accessories	Pcs	1	660,000	175
GI pipe Stands	Pcs	3	415,000	110
Material and Labour for Installation, Drainage platform and soak pit	LS	1	568,000	150
GRAND TOTAL			**1,643,000**	**435**

*Note: 1. * Exchange rate: 1 USD = 3780 UGX*

2. The costs are based on material costs in the market as of 3rd May 2020

3. Estimate is based on direct materials and labour costs within Kampala, hence can vary depending on procurement method used and number of units under consideration

4. Installation costs may increase due to factors such as transport cost, material sourcing variances, and distance to water supply connection, among others

B 6. WASHaLOT 3.0 Operation

- The WASHaLOT pipe should be refilled with water daily.
- The 3.0m long pipe has capacity of 25 liters and can accommodate up to 150 handwashing activities.
- The WASHaLOT must be refilled every day either manually or it can be connected directly to existing piped water system.
- Soap should be available at the WASHaLOT at all times and during group hygiene activities.

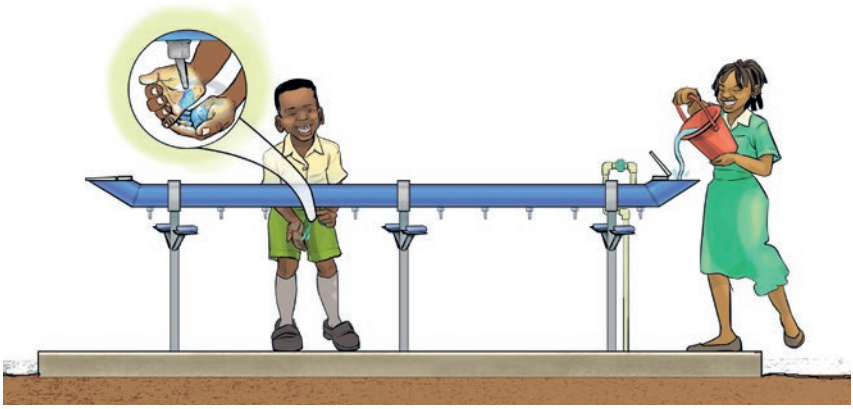
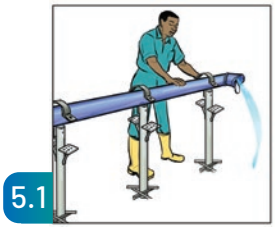


Illustration 4: Operation of WASHaLOT 3.0 (illustrated by D. Egessa / © GIZ Fit for School)

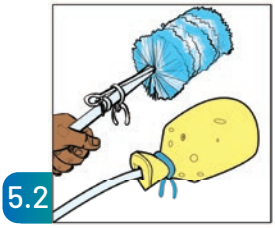
B 7. Cleaning of WASHaLOT 3.0

- Unbolt the stainless-steel holders and remove the main WASHaLOT pipe from the stands. *Ilustration No. 5.1*
- Open the inlet cover at both ends of the main pipe.
- Flush the remaining water until only a quarter of the water is left inside the pipe.
- Tie a piece of sponge or a brush on a flexible rod (or 20mm pipe) which is at least 3 m long. *Ilustration No. 5.2*
- Insert it in to the main pipe through the inlet. *Ilustration No. 5.3*

- Brush the interior surfaces of the main pipe from both ends. *Ilustration No. 5.4*
- After brushing both ends of the WASHaLOT, flush the dirty water and rinse the pipe with clean water. *Ilustration No. 5.5*
- Fix the cleaned pipe onto the stands and fasten the holders with bolts. Then clean the exterior pipe surfaces and the stands using a kitchen sponge scrubber *Ilustration No. 5.6*

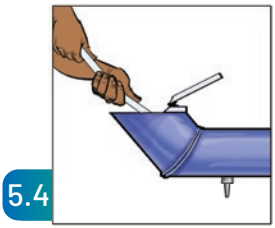


Empty washalot pipe to a quarter fill



Tie brush or sponge to a flexible rod that is atleast 3m long

Insert brush into the main pipe to clean.



Use the rod to control bushing of the interior of the pipe

Rinse with clean water until it is clean.

Wash the exterior of the washalot with a sponge and soap / detergent.

Illustration 5: Cleaning the WASHaLOT 3.0 (illustrated by D. Egessa / © GIZ Fit for School)

Note:

1. For main WASHaLOT pipes with drain valves, there is no need of unclipping it and removing it from stands. Cleaning is done in one place and dirty water is let out through the valve. The pipe is rinsed with clean water until it is clean.
2. If the WASHaLOT facility is not to be used for more than 2 days, it is advisable to empty the water because stagnant water in the pipe can lead to algal growth.
3. Drainage channels and Soak Pits for effluent disposal can be checked for clogging on a regular basis.
4. In an emergency setting during active hygiene promotion campaigns a staff member can be next to the WASHaLOT facilities to remind people to wash their hands and provide guidance on its operation.

B 8. WASHaLOT 3.0 | Repairs

Challenge	Explanation	Repairs/ Potential Solution
Water leakage from water outlets *(not between outlet and pipe).*	Dirt and silts might have entered into the water outlet and clogged it. Small dirts can affect the leak-free mechanism and cause the water to drip.	Push the lever five (5) times upwards then at the fifth time, move the lever in a circular motion also five (5) times to drain the clog.
Stones, dirt, rubbish in WASHaLOT pipe thrown in through the water inlets.	Covers are easy to open, giving opportunity to users to throw in unwanted solids.	- Continued sensitization of users. - Use of locks should be considered.
Loss, vandalizing or damaging of the water outlets	Users can easily reach the outlets at both ends of the pipe through the open water inlet covers	- Always advise student not to play with the WASHaLOT - Remove the damaged outlet and replace it with a spare one Mind the teflon tape! - The dismantled ones can be reassembled.
Leakage from piped water supply	Increased pressure in the pipes causing leakages or bursts.	- Contact any locally available plumber to fix it.

PART C)
Production guide

C 1. Materials for WASHaLOT 3.0 | Production

The following bill of materials are required for production of one unit of WASHaLOT 3.0 facility. The materials are locally available in various hardware supply outlets in Uganda.

WASHaLOT 3.0 Component	Items	Unit	Quantity
Main pipe and accessories	HDPE Water-Blue pipe 110 mm, 8 mm minimum thickness.	m	3.2
	Stainless steel water outlet (with a strainer)*	pcs	12
	Polyethylene ½" pipe adapter (threaded male, no thread female)	pcs	1
	Polyethylene ½" plug	pcs	1
	Teflon tape	Rolls	3
	HDPE plate 110 mm x 170 mm x 6 mm thick	pcs	2
	Rivets for the hinge (5/32" x 1/2")	pcs	8
	Stainless screws (4.8 mm x 1/2")	pcs	6
	Stainless Hinge (50 mm x 30 mm)	pcs	2
GI pipe Stands	Galvanized Iron (GI) pipe (1.2 m length, 4 mm thickness and 50 mm diameter)	m	3.6
	Stainless steel clamps/pipe holders (100 mm diameter, 50 mm wide and 1.2 mm thick)	pcs	3
	Bolts M12	pcs	3
	Welding rods	pcs	3
	Stainless steel soap dishes (150 x 100 mm)	pcs	6
	Mild steel flats (20 m width and 4 mm thickness)	m	3
	T12 steel bars (anchors)	m	1.2

** 10 pcs used on the WASHaLOT main pipe and 2 for spare pieces*

C 1. 1) Materials quality control

Care should be taken when procuring materials in order to maintain the quality of the produced WASHaLOT facility. The following common mistakes should be avoided when purchasing materials.

Common Mistakes	Explanation	Potential Solution
Use of PVC pipes instead of HDPE	PVC pipes cannot be fused together. Also, PVC material deteriorates under UV light since WASHaLOTs are usually left under the sun.	Do not use PVC pipes
Purchase of bent HDPE pipes	The pipes are thick (8 mm) hence presents challenges to straighten them by ordinary means.	Do not purchase bent HDPE pipes
Use of chrome plated water outlets and pipe holders disguised as stainless steel.	These can easily corrode and affect the proper functioning of the facility.	Use a magnet. Place the magnet at least half centimeter away, if the object is not attracted, then it is stainless steel.

C 2. WASHaLOT Production steps

C 2. 1) STEP 1: **Water outlets preparation**

- Disassemble the parts of the stainless-steel water outlet. Make sure to keep all five parts not to get lost. *Ilustration No. 6.1*
- With an electric cutter, cut the bottom part of the body 3.5 cm from the top part of the thread. *Ilustration No. 6.2*
- Grind the cut part to remove sharp edges. *Ilustration No. 6.3*
- Reassemble the parts. Be sure that the parts are arranged in the right sequence as before it was disassembled. *Ilustration No. 6.4*

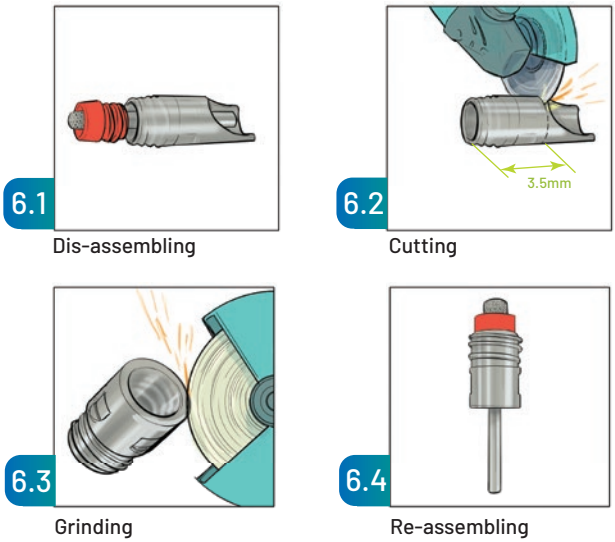
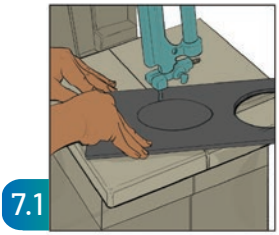


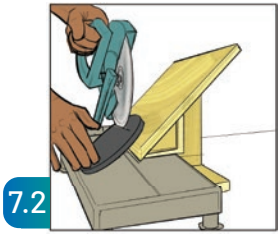
Illustration 6: Step 1 - Water outlet preparation
(illustrated by D. Egessa / ©GIZ Fit for School)

C 2. 2) STEP 2: **Water inlet covers**

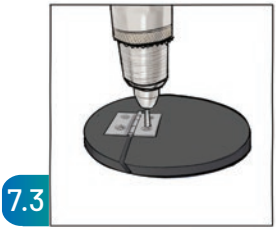
- Prepare a preferably black 6 mm thick HDPE plate with dimensions of 17 cm x 11 cm. *Ilustration No. 7.1*
- Cut the corners of the plate to form an elliptical shaped plate.
- From the elliptical plate, cut it horizontally 3.5 cm from one end of the plate. The cut should be made slanted at 50 to 60 degrees angle to avoid sun light getting into the pipe thus minimizing algae accumulation. *Ilustration No. 7.2*
- Position the hinge on the plate. Drill the holes for the rivets to anchor using a drill (bit size 4 mm). Make sure that clearance between the slant cut does not exceed 1.5 mm. *Ilustration No. 7.3*
- Fix the hinge using rivets to the drilled holes to form the cover. *Ilustration No. 7.4*



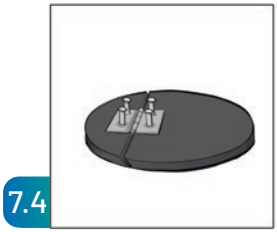
Cut elliptical shaped plate



Cut at 3.5mm from one end at 50˜-60˜ angle



Drill holes with 4 mm bit for the rivets

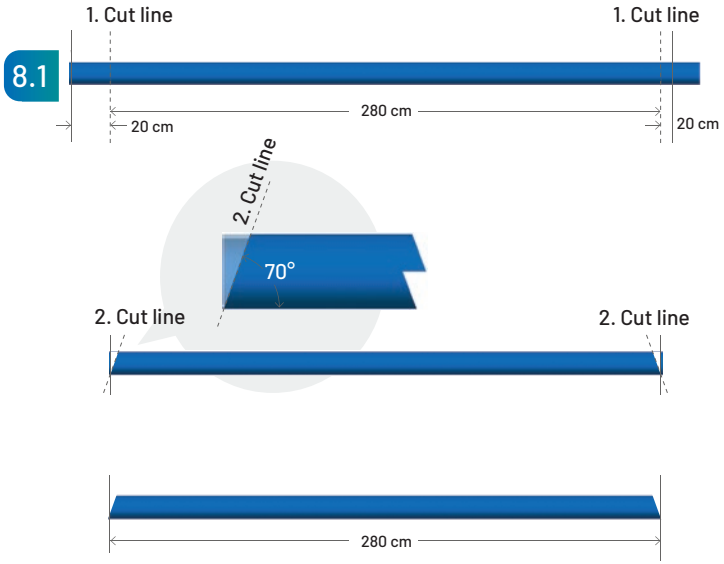


Fix hinge with rivets

Illustration 7: Step 2 - Water inlet cover (illustrated by D. Egessa / ©GIZ Fit for School)

C 2. 3) STEP 3: **Main pipe**

- Cut an HDPE pipe to a length of 2.8 m. *Ilustration No. 8.1*
- Make a cut at an angle of 70° at both ends of the pipe.
- Cut two short HDPE pipes with a length of 20 cm each. *Ilustration No. 8.2*
- At the ends of the shorter HDPE pipe, cut a 70° resp. a 40° angle to form the water inlet.
- Butt fuse the two shorter HDPE pipes at both ends of the longer HDPE pipe with the 70° angle cut facing each other. *Ilustration No. 8.3*
- Position the newly butt fused main pipe and mark the locations for holes. The markings in the bottom part of the main pipe should be aligned to each other and the mark at the top part is directly opposite to the outlet holes. *Ilustration No. 8.4*
- Using an 18 mm bit to drill holes on the markings. Make sure that the drill is always perpendicular to the main pipe.
- With a tap, make a thread in all the 12 holes. Use a tap size of M20 x 1.5.



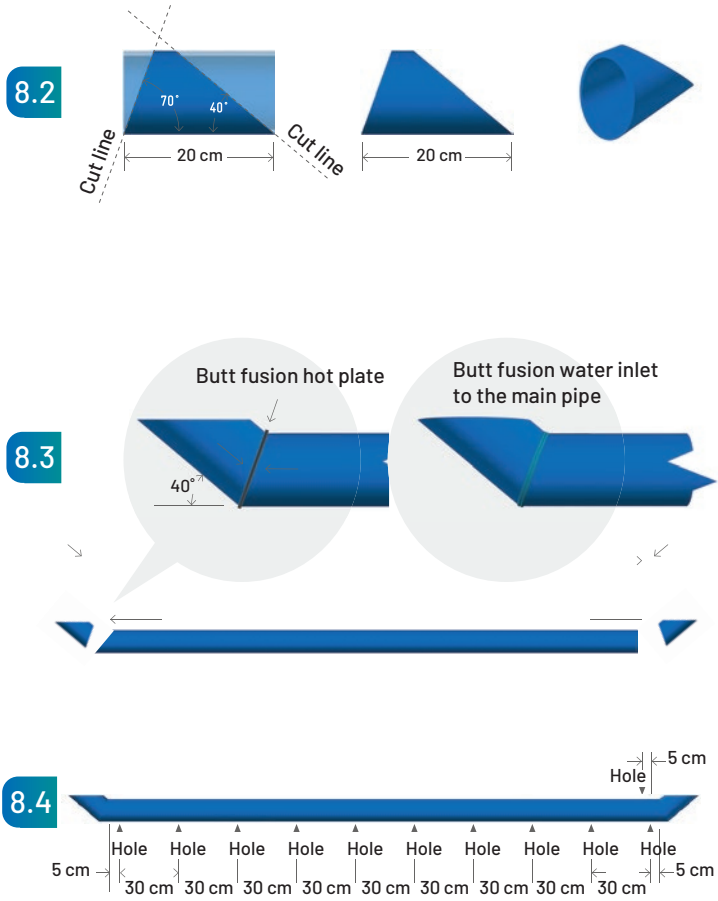
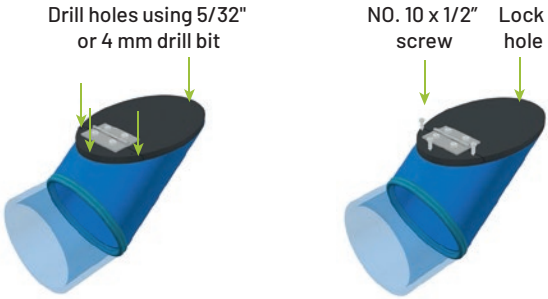


Illustration 8: Step 3 - Main pipe (© GIZ Fit for School)

C 2. 4) STEP 4: **Assembly of parts**

- Position the fabricated cover onto the water inlet. Using a drill bit size of 4 mm, drill holes on the location marked in *Illustration No. 9.1 left*.
- Fix the fabricated cover to the water inlet with three No. 10 x 1/2" screws as shown in *Ilustration No. 9.1 right*. Leave the hole at the other end of the cover open to serve as a lock hole.
- Apply teflon tape to the 10 modified stainless water outlets (Step 1) and screw into the holes indicated in *Ilustration No. 9.2* (water outlets).
- Apply teflon tape to the polyethylene adaptor and screw it at the location marked "pipe water connector".

9.1



9.2

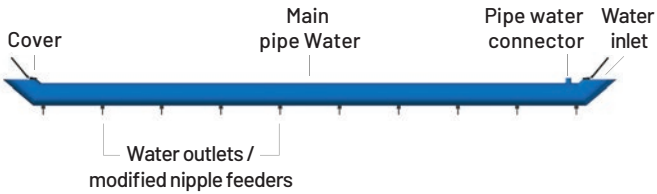
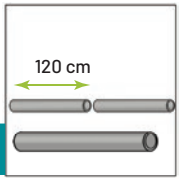


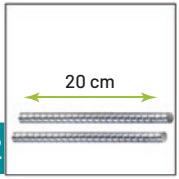
Illustration 9: Step 4 – Assembly of parts (© GIZ Fit for School)

C2.5) STEP 5: **GI Pipe stands**

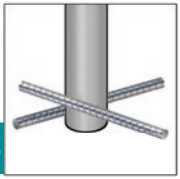
- Cut three pieces of GI pipes with length of 120 cm each to form the stands. The pipes are of 50 mm diameter and 4 mm thick. *Illustration No. 10.1*
- Cut 2 pieces of T12 steel bar, each of length 20 cm. Weld the pieces on one end of GI pipe (bottom) to form the anchors. *Illustration No. 10.2* and *10.3*
- Drill a hole through the GI pipe at 5cm from top end of the pipe using 8mm drill bit. Also, drill a similar hole through one end of the stainless-steel clamp. *Illustration No. 10.4*
- Weld one end of the stainless-steel clamp (without a hole) on the opposite end of the drilled hole and leave the end with a hole free. Stainless steel clamp is of dimensions 11cm diameter, 5cm width and 1.2 mm thickness. *Illustration No. 10.5*
- With a tap, make threads in the hole. Use a tap size of M12 x 1.5.
- Cut 2 pieces of mild steel flat, each of length 15 cm. Cut other 2 pieces for length of 35 cm. The width and thickness of the flats is 2 cm and 0.4 cm, respectively. *Illustration No. 10.6*
- In line with the drilled hole along the pipe, weld a 15cm-long mild steel flat. Weld a similar piece on the opposite side. These two are useful in fixing the soap dishes. *Illustration No. 10.7*
- Weld soap dishes onto the 15 cm long steel flats. *Illustration No. 10.8*
- Support the soap dishes by welding a 35 cm long mild steel flat piece on to the end of soap dish and on the GI pipe stand. *Illustration No. 10.9*
- Paint the mild steel flats with silver paint to have the same appearance as the GI pipe. *Illustration No. 10.9*



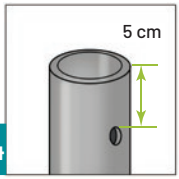
10.1 Cut 3 g.I pipes at 120 cm each



10.2 Cut two t12 steel bars of 20 cm each

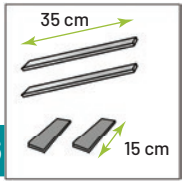


10.3 Weld two t12 steel bars on each g.I pipe to form anchors

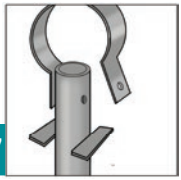


10.4 Drill hole through the pipe using 8 mm bit

10.5 Weld a clamp onto the opposite side of the hole



10.6 Cut two 35 cm long pieces and 2 cm pieces for each g.I pipe.



10.7 Weld the 15 cm pieces onto the g.I pipe in opposite sides.

10.8 Weld a soap dish onto each flat piece.

10.9 Weld a 35 cm flat piece from the saop dish to the pipe.

Illustration 10: Step 5 - Pipe stand (illustrated by D. Egessa / ©GIZ Sanitation for Millions)

C 3. Checklist – WASHaLOT 3.0 Quality assurance

It is recommended to use following quality assistance (QA) while producing the WASHaLOT 3.0 units. However, in case the fabrication is done at the local factory with already approved quality assurance protocols in place, they could be adopted.

Compliance aspect	Tick (✓)
Installed parts	
10 Water outlets installed [a]	☐
HDPE plate installed [a]	☐
Pipe water connector [a]	☐
Drilled hole for the lock in the cover [a]	☐
Material quality	
Stainless steel water outlets [b]	☐
8 mm HDPE pipe thickness [c]	☐
Craftmanship	
Slanted cut for the cover [d]	☐
All water outlets are aligned	☐
Clean butt fuse connection	☐
Water outlets can't be turned by hand [e]	☐
Leak free test	
All water outlets are leak free [f]	☐
Leak free butt-fuse connection [f]	☐
Stands	
Main pipe fits to the pipe holder [g]	☐
Firmly fixed soap holder with clean weld joint	☐
Presence of anchors at the bottom	☐

Checklist notes and instructions

a *Visually check the part indicated if properly fixed into the main pipe of the WASHaLOT 3.0.*

b *Using a magnet, check if all water outlets (modified nipple feeder) installed are stainless. The water outlets should not be attracted to the magnet when placed half a centimeter away.*

c *The inspector should have a caliper. Using the caliper, measure the wall thickness of the pipe. The thickness of the pipe should be 8.0mm ± 0.4 mm.*

d *Check the cut of the elliptical plate. The clearance between of the plate should not exceed 1/16 of an inch and the cut should be slanted as indicated in Illustration No. 7.2.*

e *Try turning all installed water outlets. If the outlets can still be turned by hand it can cause leaking. If this is the case, remove the water outlet and add more teflon tape onto the thread of the outlets.*

f *Fill the main WASHaLOT pipe with water to check whether there are no leakages from the joints and through water outlets.*

g *Try fitting a sample of the HDPE pipe to all the holders on the stands.*

C 4. Testimonies on local fabrication of WASHaLOT 3.0

From 2018 to date, the WASHaLOTs in use in Uganda have been locally fabricated using materials which are locally available. Fabrication of the main pipe and inlet covers is done at *Multiple Industries (Uganda) limited*, while water outlet preparation, GI pipe stand and WASHaLOT assembly is done in various places, one of them being Mechanical workshop at *Makerere University*, Kampala, Uganda.

Joining shorter pipe to Main WASHaLOT pipe using SGH-315 fitting fusion welding machine at Multiple Industries (U) Ltd. (photo by C.Mukiibi)

Pipe cutting at an angle using a machine (photo by C.Mukiibi)

The technicians/fabricators involved in fabrication of WASHaLOT 3.0 shared their experiences on the availability of local materials, labour and potential opportunities involved in WASHaLOT fabrication in Uganda.

Question	Response
Comment on availability of materials for WASHaLOT	*"The materials for WASHaLOT 3.0 are available in Uganda. However, the readily available white-water inlet covers (previously in use) are brittle and some users used to break them. The black HDPE covers are long lasting but can only be purchased in large quantities. Secondly, the substandard water outlets and soap dishes are very common on market, hence always care should be taken to ensure they are stainless steel. Water outlets which are not stainless steel are fond of rusting and oozing very little water."* **– Mr. Peter Kyazze – Technician, Mechanical Workshop (Makerere University, Uganda)**

Question	Response
Local availability of labour to fabricate WASHaLOTs	*"The materials are readily available. 110 mm dia HDPE pipes used for WASHaLOTs are the same pipes used by National Water & Sewerage Corporation (NWSC) in water supply. Also, the tools required for fabrication are available. We have capacity of butt-fusing both ends on Main pipe within 3 to 4 minutes."* **– Mr. Christopher Mukiibi – Field Technician and Quality Control Manager, Multiple Industries - Uganda**
Anything interesting in WASHaLOT fabrication?	*"The way the water outlets function is amazing. Opening our common tap with dirty hands introduces the dirt when closing, but there is no chance of retouching the dirt when using WASHaLOT water outlets. These outlets also lead to water saving since they give no user a chance to leave tap running"* **– Mr. Peter Kyazze – Technician, Mechanical Workshop (Makerere University, Uganda)** *The nature of WASHaLOT which is good for public places and it is hygienic. One cannot easily leave germs on the outlets. Since people are developing a habit of handing washing during this COVID-19 pandemic, WASHaLOTs can well fit in places like markets, schools and other public places.* **– Mr. Christopher Mukiibi – Field Technician and Quality Control Manager, Multiple Industries - Uganda**
Are there opportunities in WASHaLOT fabrication?	*"Fabricating WASHaLOTs is a nice job. I feel proud to work on something that people treasure. WASHaLOTs are durable, for example, where we installed them over 2 years ago, I find students enjoying them and they are still functional without problems like the traditional handwashing stations and schools like them so much. Every fabricator would feel privileged to produce such a product"* **– Mr. Peter Kyazze – Technician, Mechanical Workshop (Makerere University, Uganda)**
What is the most challenging this to fabricate?	*"Some materials on the market fit for inlet covers are brittle and can easily develop cracks when drilling holes or during tightening of screws and any such mistakes costs the entire cover. This can however be solved by using HDPE material that is recommended."* **– Mr. Christopher Mukiibi – Field Technician and Quality Control Manager, Multiple Industries - Uganda** *"When you tap poorly while making threads, the hole in the pipe can widen and this is irreversible, causing one to waste the entire pipe."* **– Mr. Peter Kyazze – Technician, Mechanical Workshop (Makerere University, Uganda)**

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