

Construction, Installation, & Trouble-shooting of Arsenic Biosand Filter (Kanchan Filter)

Entrepreneurs Training on the Promotion
of
Arsenic Biosand Filter (Kanchan Filter)
In Nepal

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Tommy Ngai, Researcher, Massachusetts Institute of Technology
Bipin Dangol, Engineer, ENPHO

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Presentation Outline

1. Introduction
2. Major Filter Components
3. Filter Construction
4. Filter Installation
5. Trouble-shooting
6. Questions & Discussions



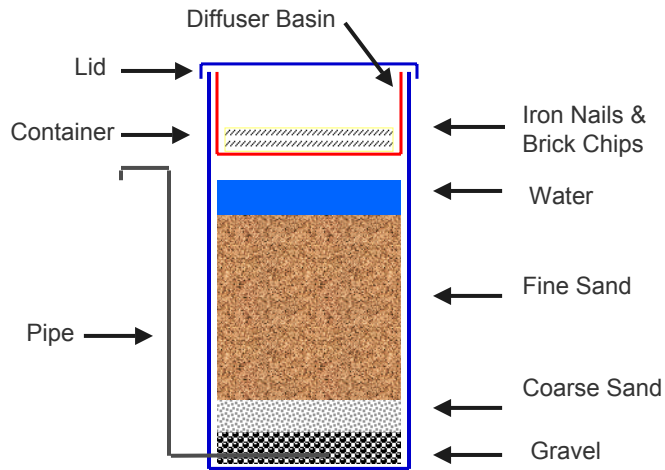
Introduction

Why is proper filter installation important?

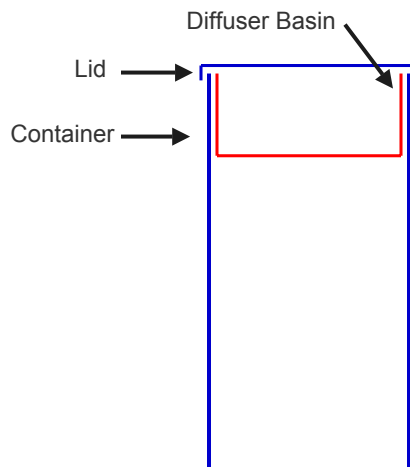
1. To ensure the filtered water is of good quality
2. To make customers happy
3. To increase customers acceptance and usage rate
4. To reduce the need for repair, thus less “down-time”
5. To reduce the need for frequent monitoring and trouble-shooting
6. To save money in the long-term

Major Filter Components

Major Filter Components



Major Filter Components



Specifications:

Container & Lid
→ Gem model 505

Diffuser Basin
→ Gem model 1700

Major Filter Components

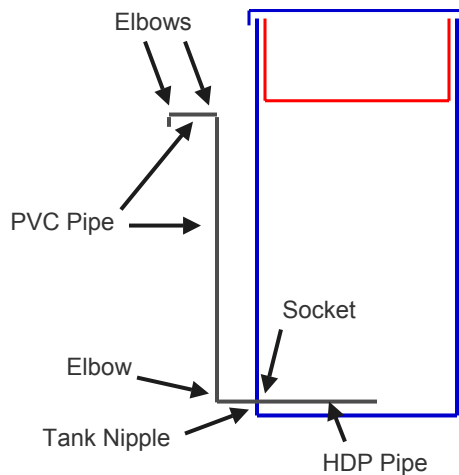


Container & Lid
→ Gem model 505



Diffuser Basin
→ Gem model 1700

Major Filter Components



Specifications:

Pipe
→ ½ inch PVC
→ ½ inch HDP

Pipe fittings
→ 3 G.I. elbows
→ 1 G.I. tank nipple
→ 1 G.I. socket

Major Filter Components



Piping System

→ ½ inch PVC pipe

→ ½ inch HDP pipe

→ ½ inch G.I. fittings

Major Filter Components

Specifications:

Fine Sand

→ 20 Liters

→ less than 1mm diameter

Coarse Sand

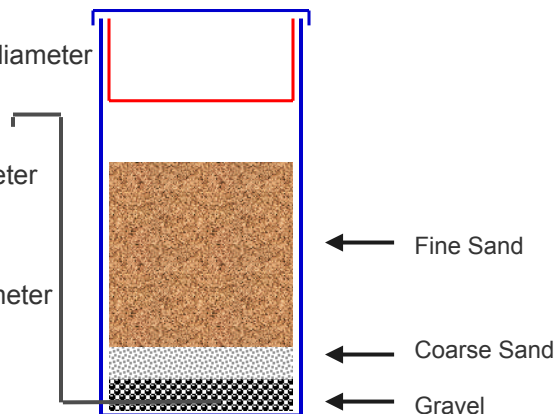
→ 4 Liters

→ 3 to 6 mm diameter

Gravel

→ 6 Liters

→ 6 to 15 mm diameter



Major Filter Components

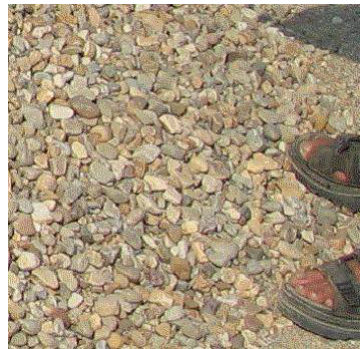


Sand and Gravel can be obtained from nearby rivers or crushers

Major Filter Components



Ideal gravel
– correct size, uniform size,
clean with no silt, dirt, or other
visual contaminations



Poor gravel
– too big size, mixed up large
and small sizes

Major Filter Components



Ideal coarse sand
- may be obtained by sieving



Poor coarse sand
- non uniform size, mixed up
with lots of dirt, silt, and fine
sand

Major Filter Components



Ideal fine sand
- uniform size, little dirt and
silt, no large particles



Poor fine sand
- non uniform size, mixed up
with lots of dirt, silt, and large
particles

Major Filter Components



Avoid sand/gravel sources with animal contamination



Mediocre quality sand/gravel can be improved by sieving

Major Filter Components

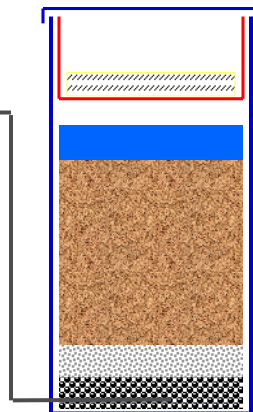
Specifications:

Iron nails

- 5 kg
- smallest size is best
- length < 20mm
- must be non-galvanized (must rust)

Brick chips

- any brick is fine
- about 5 to 10 cm diameter



← Iron Nails & Brick Chips

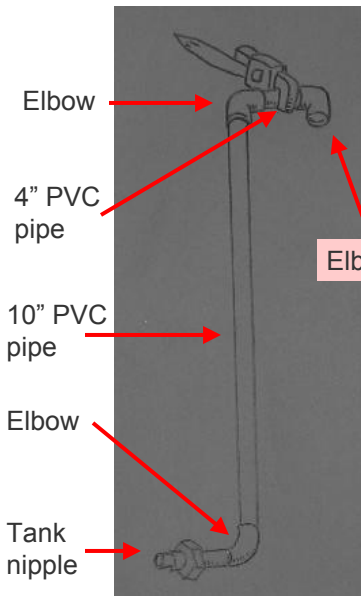
Major Filter Components



Choose the smallest, cheapest, non-galvanized iron nails from your local dealers. Buying in bulk to save money.

Filter Construction

Filter Construction



1. Measure and cut two pieces of PVC pipe (10 inches and 4 inches long)
2. Thread both ends of both PVC sections

Filter Construction



4. Attach elbows and tank nipple. Tighten the pipe fittings to the PVC pipe using a pair of wrenches (spanners)

Filter Construction



Pipes should be properly sealed with Teflon Tape and Glue to avoid leakage



Filter Construction



5. Make a fire to heat a ½ inch G.I. Pipe
6. Puncture one hole in the Gem505 container using hot pipe. The hole center should be 2 inches from the bottom of Gem505.

Filter Construction



Filter Construction



7. Measure and cut HDP pipe 8 inches long
8. Seal one end of the HDP pipe by heating



Filter Construction

9. Connect the HDP pipe to a socket



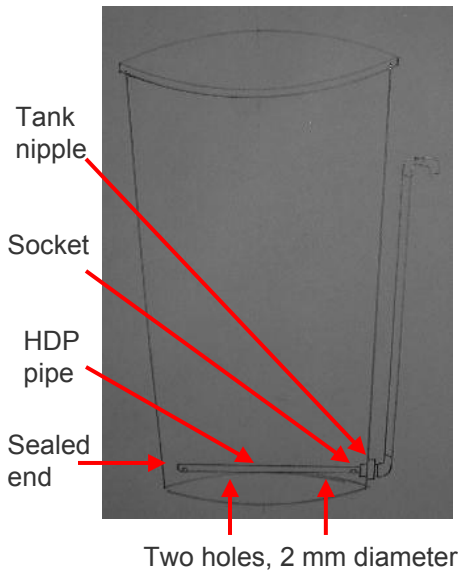
10. Drill two holes on HDP pipe (at location 2 inches from the sealed end, and at 2 inches from open end), using a hot bicycle spike/rod.

Filter Construction



11. Fix the PVC piping system to the outside of the Gem container
12. Connect the HDP pipe & socket to the tank nipple inside the container. The hole should be on the bottom (down) side

Filter Construction



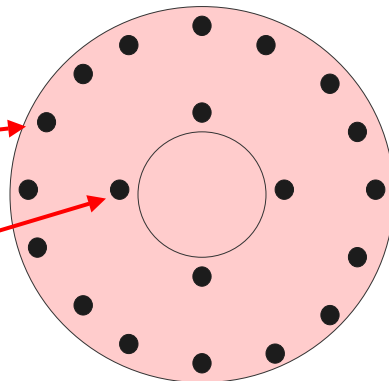
Filter Construction



13. Heat bicycle wheel rod.
14. Puncture holes on the bottom side of basin

16 holes in outer ring

4 holes in inner ring



Filter Construction

15. Fill up the container to full with water
16. Visually check for leakage from the outside
17. Check time needed to fill a 1L jug (Gem016). Time should be between 2 to 3 minutes.
18. If time is less than 2 minutes (i.e. flow rate too fast), then the holes in the HDP pipe may be too large, or there may be leakage in the HDP pipe connection
19. Use your fingers to close the two holes in HDP pipe. There should be no flow
20. Make a new HDP pipe if necessary



Filter Construction

15. To check for HDP pipe leakage, cover the two holes with your two fingers, there should be no flow.
16. If there is still water coming from the PVC pipe, then there may be leakage in HDP pipe and/or the connection at socket is not tight enough.
17. Fix the problem(s) if necessary
18. Otherwise the filter construction is finished



Filter Installation



Filter Installation

1. Add two bottles of Piyush in 10 Liters of water.

2. Pour Piyush water into filter





3. Using a Gem016 jug (1 L capacity), measure 6 L of previously washed gravel.



4. Slowly add gravel to the filter. Flatten the gravel surface with your hand. The gravel should cover the entire HDP pipe. If not, then the HDP pipe was incorrectly setup. Either the hole in the Gem505 is at the wrong location, or the tank nipple was not tight enough. Tie a rope around the PVC pipe to the outside handle may also help to level (lower) the HDP pipe inside.



5. Using a Gem016 jug, measure 4 L of previously washed coarse sand.

6. Slowly add coarse sand to the filter. Make sure the interface is flat, and do not mix the gravel and sand

7. Using the Gem016 again, slowly add 5 L of water (non-Piyush) to the container. Do not disturb the sand and/or gravel layers.

Filter Installation



8. Measure 20 L of previously washed fine sand.



9. Slowly add fine sand to the filter. Make sure not to disturb/ mix the different media layers.

Filter Installation



10. The water may appear dirty with foam. This is normal as the Piyush is working to disinfect the sand.

Filter Installation



11. Wash iron nails. Nails can be dirty, containing lots of dust.



12. Break some brick chips. Diameter of 5-10 cm is the best. Wash the brick chips to remove dirt and silt.

Filter Installation



13. Put iron nails in the diffuser basin. Lay the nails flatly. Then add brick chips to cover the entire basin.



Filter Installation



Insufficient brick chips may cause iron nails to disperse. This may jeopardize arsenic removal efficiency as water passes through the basin without contact with iron nails.



Filter Installation



11. Cover with lid.
12. Wait for 48 hours for Piyush to disinfect the sand and gravel.
13. After 48 hours, perform filter maintenance, that is, to clean the top layer of sand according to maintenance procedure.

Filter Installation



14. Clean the top layer of sand until you get clear water

Filter Installation

15. Pour 50 L of water in the filter and discard the filtered water.

16. Now the filter is ready to be used



Trouble Shooting

Trouble-Shooting

Problem No.1 - Too low flow rate (less than 5 Liters per hour)

1. Filter maintenance. Clean the top layer of sand. If doesn't work, then
2. Check clogging in the diffuser basin. Take the basin out and pour water into the basin. If basin clogs, then remove and wash iron nails and brick chip to clean out the dirt. Also wash the basin and clear out any holes that has been blocked by iron sludge/ dirt. If doesn't work, then
3. Remove all sand and gravel. Check for blockage in the pipe. Sieve sand and gravel. Re-install gravel and sand. Keep in mind that that there should be always water in the filter before adding gravel and/or sand to avoid trapped air bubbles. If doesn't work, then
4. Contact ENPHO. This is interesting. We also want to know why.



Top sand layer will clog. It is normal. It is because of the accumulation of dirt, dust, iron particles, and/or other contaminant particles.



Filter maintenance (i.e. cleaning the top layer of sand) can often return the flow rate to normal



Iron nails and/or brick chips can be very dirty. They must be washed to remove dirt and sand particles before placing into the diffuser basin

Remove the diffuser basin to check for clogging in the basin





Iron nails and/or brick chips were not washed prior to installation. Dirt from nails and/or brick clogs the holes in the diffuser basin.

Holes too small will get clogged easily.
Holes too large will allow iron nails to pass.
Proper size is necessary.



Trouble-Shooting

Problem No.2 - Too high flow rate (more than 25 Liters per hour)

1. Check for apparent pipe leakage from outside. If none, then
2. Remove all sand and gravel. Check for seal at the end of the HDP pipe. Check for pipe leakage at pipe joints, tank nipple. Re-seal if necessary. If doesn't work, then
3. The holes in the HDP pipe are too big. Replace the HDP pipe and re-drill the two holes. If doesn't work, then
4. Sand and gravel may be inappropriate. Obtain new sand and gravel of correct size and properly sieved. Reinstall the filter. If doesn't work, then
5. Contact ENPHO. This is interesting. We also want to know why.

Trouble-Shooting

Problem No.3 - Leakage

1. If the leakage is on the outside pipe system, re-seal with Telfon tape and/or glue. If not, then
2. Remove all sand and gravel. Check for seal for the entire piping system. Re-seal if necessary. The tank nipple rings may be jammed. Replace entire pipe or fitting parts if necessary. If doesn't work, then
3. Replacement of the plastic Gem505 container may be needed. If doesn't work, then
4. Contact ENPHO. This is interesting. We also want to know why.

Trouble-Shooting



Leakage is commonly found here. Possible reasons may include: Inadequate tightening of the tank nipple, tank nipple ring jammed, insufficient Telfon tape.

Conclusions

Conclusions

What is your role in filter construction?

1. To gather all necessary construction materials from appropriate sources
2. Buying in bulk can save money
3. To gather all necessary tools for construction
4. To construct the piping system and basin



Conclusions

What is your role in filter construction?

5. To sieve and wash fine sand, coarse sand, gravel, iron nails
6. To measure exact amount of fine sand, coarse sand, gravel, and iron nails, and put them in separate bags
7. To explain to your customers on filter installation
8. To demonstrate to your customers on filter operation and maintenance
9. If necessary, travel to your customers' place and install the filter



Conclusions

What is your customers' role in filter installation?

1. To purchase a "ready" filter package from you
2. To install the filter (putting in sand, gravel, nails, brick chips)



Conclusions

What is your customers' role in filter installation?

3. To crush and wash brick chips, and to place in diffuser basin



Thank You.
Any Questions?