

Concrete BioSand Water Filter Construction Manual

Book 4: Diffusers and Lids

May 2008

Dr. David H. Manz, P. Eng., P. Ag.



Manz Engineering Ltd.
2703 Cannon Rd. NW
Calgary, Alberta, Canada
T2L 1C5

www.manzwaterinfo.ca

Copyright claimed by Dr. David H. Manz, P. Eng., P. Ag., May 12, 2008

The purpose of the diffuser is to prevent the surface of the filter media from being disturbed when water is added to the top of the filter.

The diffuser should fit as snugly as possible to the sides of the concrete to protect the integrity of the biologic layer.

Shallow box diffuser

1. Wood and galvanized steel required to construct a simple box diffuser.
2. Assemble frame.
3. Create a 2.5 cm x 2.5 cm (1 inch x 1 inch) grid on each zinc coated steel sheet. Hammer holes into sheet at grid points. Holes should be 1/8" in diameter.
4. Attach steel sheet to wooden frame.
- 5 – 6. Installation of simple box diffuser. Place a cloth between the frame and filter edges to create a seal.

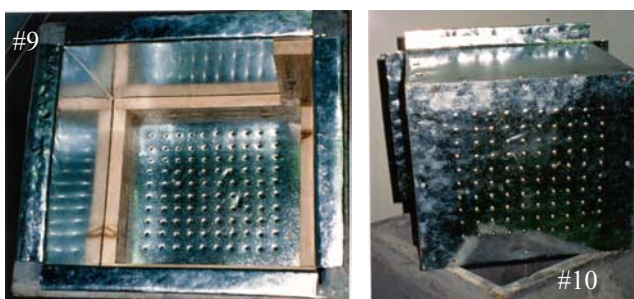


Note: This type of diffuser is adequate but is definitely not the best as leakage can occur around the edge of the diffuser and disturb the surface of the filter media and reduce the ability of the filter to remove bacteria and viruses. Cloth will deteriorate with use.



Deep overlapping metal box diffuser

- 1 - 10. To create a deep metal box diffuser, attach high metal walls to the simple box diffuser. Note that the top edges cover the top of the concrete walls of the filter and water cannot disturb the media when poured in. Hole spacing and size is the same as that for shallow box diffuser.



Note: This is the best type of diffuser but is also the most expensive to make.

Simple lids are required for the simple box and deep metal box diffusers.

Lids are always required and must be used to avoid contamination from air borne contamination and insects.

Plate-type diffuser

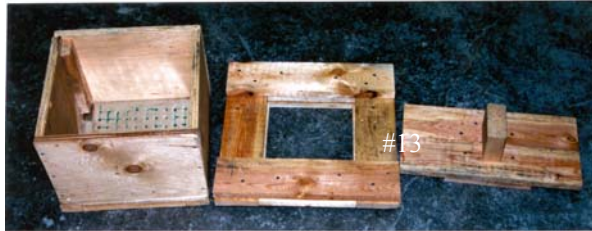
11 – 12. Create the same pattern of holes as used in the shallow box diffuser in a large piece of wood, plastic or other type of strong flat material.



To install, place a cloth between the plate-type diffuser and filter edges to create a seal (similar to shallow box diffuser).

Simple lids are used with this type of diffuser.

Note: This is the least effective type of diffuser because of the difficulty in achieving a tight enough fit between the diffuser edge and the walls of the filter. Leakage will impair filter performance in unpredictable ways. Diffuser should always be checked for leakage.



Tall wood box diffuser with double lid assembly

13. Components of tall wood box diffuser with double lid assembly.

14. Double lid assembly on filter.

16 - 17. Installation of tall wood box diffuser with double lid assembly. The double lid ensures that water is poured into the center of the tall box.



18. Pouring water through double lid. Water MUST be poured into the centre of the diffuser and cannot go around the edges.

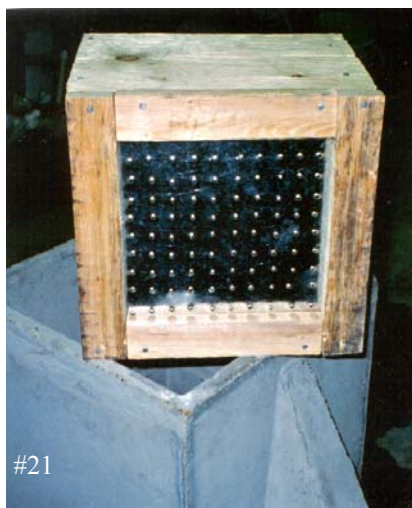


Note: The tall wood box type diffuser or the plastic bucket diffuser used with the double lid are the BEST type of diffuser lid assemblies.

Tall wood box diffuser

19 - 21. Construction of tall box.
Simple lid on filter.

22. Double lid sitting tightly on top of filter.



23. Components of simple lid.

24. Bottom of simple lid.



Plastic bucket diffuser

25. Clean 20 litre plastic bucket.



26. Note how bucket fits into top of filter.



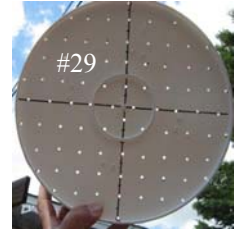
27. Layout of holes to be drilled into bottom of bucket. Holes are laid out on a 2.5 cm grid and are 3 mm (1/8 inch) in diameter.



28. Bucket with hand drill and bit.



29. Holes drilled into bottom of bucket.



30. Bucket inserted into top of filter. Location of top of filter is marked on bucket.



31. A line 3 cm below mark is drawn around bucket to guide cutting the bucket down with a saw or sharp knife. This will allow for the spacer sticks (see below) and the thickness of the lid.



32. Bucket cut into two parts.



33. Bucket sitting on two spacer sticks. The spacer sticks are approximately 1 cm thick and are placed across the inside of the filter sitting on the ledge.



34. Bucket is sitting on top of the spacer sticks inside top of filter.



35. Water is being poured directly into plastic bucket diffuser.



Note that the plastic bucket diffuser is always used with the double lid similar to the deep wooden box diffuser.

The plastic bucket diffuser used with the double lid is perhaps the best combination of diffuser and lid.

