

Concrete BioSand Water Filter Construction Manual

Book 3: Construction of Concrete Filter Body

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



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

www.manzwaterinfo.ca

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1. Elements of steel mold used to make the body for the concrete filter.
2. Vegetable oil causes the steel mold to release concrete.
- 3-4. Use vegetable oil to coat mold surfaces that will be in contact with concrete.

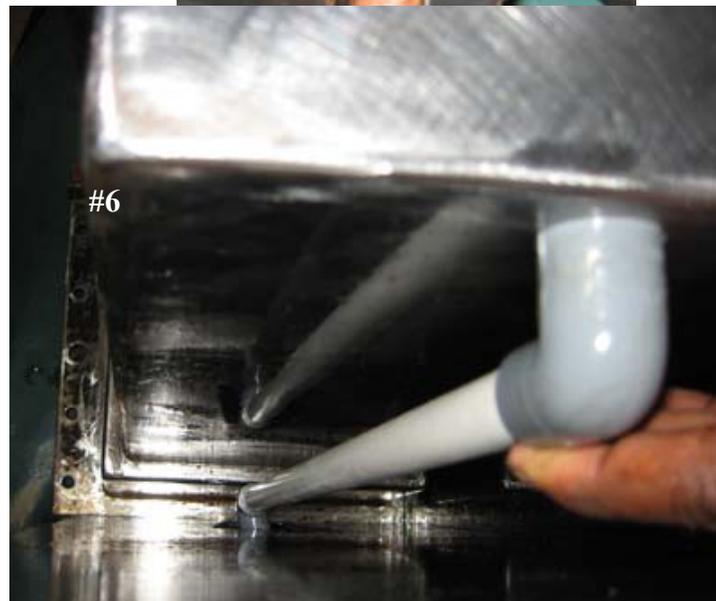


5-6. Fitting the standpipe to steel mold and determining the lengths of individual sections of pipe. This process is performed only when the type of PVC plastic fittings change. The dimensions of plastic fittings will vary from country to country. It is important to record the lengths so that the fitting process does not need to be repeated.

5. Fitting the short piece from the 'nose' to inside of wall of mold.

6. Fitting the long piece from where pipe goes to nose to inside of bottom of filter (remember the concrete filter is poured upside down.)

**Two lengths of pipe are required.
Lengths will differ with mold and
with pipe and fitting manufacturer.
Short piece: 80 mm.
Long piece: 600 mm.**



7 - 8. Measuring length before cutting.



9. Cutting pipe

10. Sanding ends of cut pipe.



11. Laying out standpipe elements.



12. Assemble 'nose' piece.

Push pieces tightly together.



13. Nose piece should fit through 'nose' and exactly between front panel and interior mold. Shorten as required.



14. Push all pieces together and check vertical pipe. Shorten as required.

(Note that once 'fit' is established pieces of pipe should be accurate reference. Pipe fittings and molds may be slightly different.)

15. Using PVC cement to assemble the nose piece.



16. Insure that the elbows and pipe are 'square'.



17. Cement the remainder of standpipe being careful to insure that it is square..



(Note that there are two systems for cementing pipe. One uses a primer and cement and the other uses a combined primer – cement. Both are good.)

18. Locating completed standpipe.

19 – 24. Locating and attaching panels.

(Note: Loosely bolt side panels together close to the correct location. Then loosely locate all bolts attaching panels to the base of the interior mold. Hand tighten all bolts. Use wrenches to firmly tighten bolts.)



26. Place wedge to hold standpipe in place.



- 27. Use piece of plastic or paper to cover top of interior mold. This will avoid having the oil removed from surface.
- 28. Put a piece of paper into outlet of standpipe to prevent cement from plugging the pipe.



- 29. Located and ready for leveling. (Make sure there is enough space to allow demolding.)



- 30. Typical level.
- 31. Using level on top of mold.
- 32. Placing spacers under feet to level mold



- 33 – 37. Mold setup and leveling in Haiti.



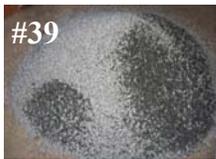
38. Normal Portland Cement.

39. Sand and gravel supply.

Ordinary construction sand. (Clean.)



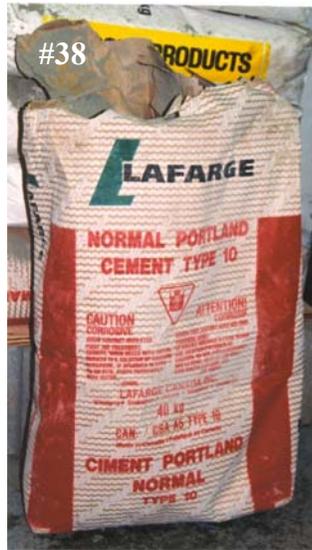
Gravel – 6 mm to 12 mm in size. (Clean.)



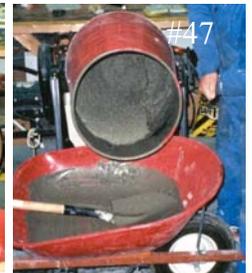
40 – 46. Using a cement mixer to make concrete.

Concrete Mixture:
(Starting point that can be refined with experience.)

- 1 part cement
- 1 part gravel
- 1 part sand



Mixture is well mixed before water is added. Start with one measure of water. Mix well. Keep adding measures of water until it looks 'close' – on the verge of looking 'runny'.



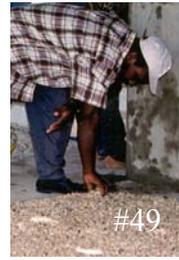
Then add water with your hand or in very small quantities until consistency is right (slightly runny).

Make a careful note of how much water was used so that you have a recipe for the next batch.

48. Preparing sand for concrete.



49. Laying out gravel on a cleared surface.



50. Placing sand over gravel.



51. Carefully measuring out cement.



52. Cement has been spread.



53. Dry mixing by shoveling from outside in.



54. Make a hole in centre of pile



55. Measure out water to be added.



56. Add water to hole.



57. Mix water with dry ingredients 'in the hole'.



58 – 60. Completing mixing.



61 – 62. Mixture is a little dry.



63 – 65. Adding and mixing additional water.



65. Looks OK.



66. Adding concrete to mold.



67 – 68. Adding concrete to mold.



69. **Rodding** the concrete using a steel rod. (Insures that concrete is in all places. Be careful not to disturb standpipe.)



70. Using a rubber hammer to remove air bubbles.

71. Complete rodding. Note that piece of paper or plastic covering top of interior mold has been removed.



72. Concrete is 'heaped' on top.



73. Note that the wood wedge is still in place.



74. Concrete, with wood wedge in place is allowed to 'set' for 3 to 4 hours.



75. After 'setting' and settling cracks will be observed. This is what is expected. Surface is ready for leveling.



76. Wood wedge is removed. Surface is 'chopped' up using a trowel



77. A straight piece of wood is used to level the surface (also called 'floating'.)

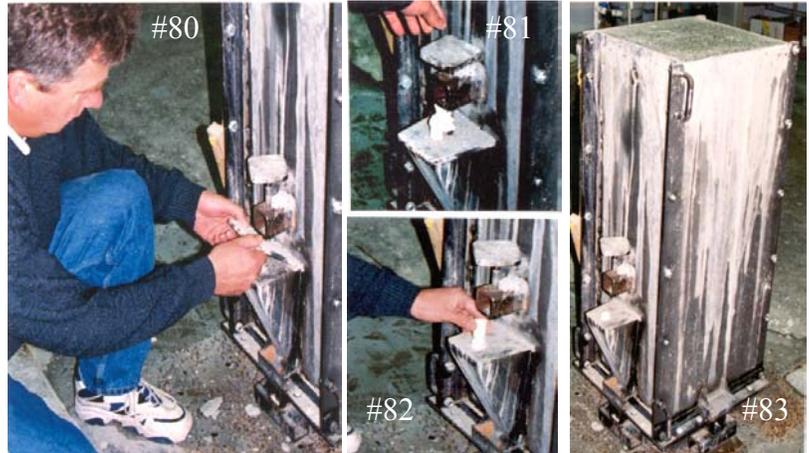


78. Surface is leveled and smooth.



79. Mold is cleaned up and concrete is allowed to set for another 18 to 24 hours.

80 - 83. Remove nose plate



84 - 87. **Carefully** turning mold onto its base.



88. Removing bolts from around base.



89. Placing puller into holes.

90 - 91. Attaching puller bolt by hand and then tightening with a large wrench.



92. Start tightening the puller nut.

- 93. Considerable effort may be required to loosen the interior mold. (Note grimace on Ali's face.)
- 94. Once loosened the bolt turns easy. Loosen until interior mod is well separated.
- 95. Several people (2 or more) lift interior mold from within mold.



- 96. Interior mold is carefully put aside.
- 97 – 100. Back and side panels are removed and set aside. **Front panel that includes the nose is still in place.**

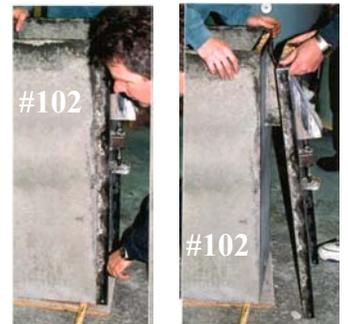


- 101. Cast is **carefully pushed** backward to allow a short stick (1 cm or so thick to be inserted just past the remaining steel panel.

(Be careful pushing and do not pull the mold because the concrete is very weak and easily damaged.)



- 102. Sharply strike the edges of the steel mold with a steel hammer, Gently pull panel out from bottom and up to remove.



- 104. Demolded filter body.



- 105. Note irregularities and chips. These will be repaired.



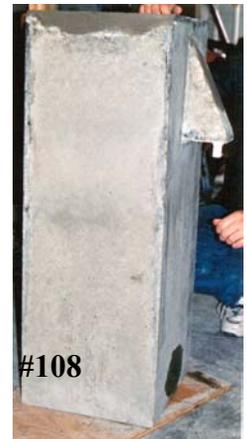
- 106. Looking into inside of body.



107. Remove sharp edges on corners as soon as demolding is complete to avoid injury.



108. Repairing and smoothing all irregularities using a paste of cement, sand and a little water.



109 – 110. Cleaning and oiling all pieces of the steel mold.

