

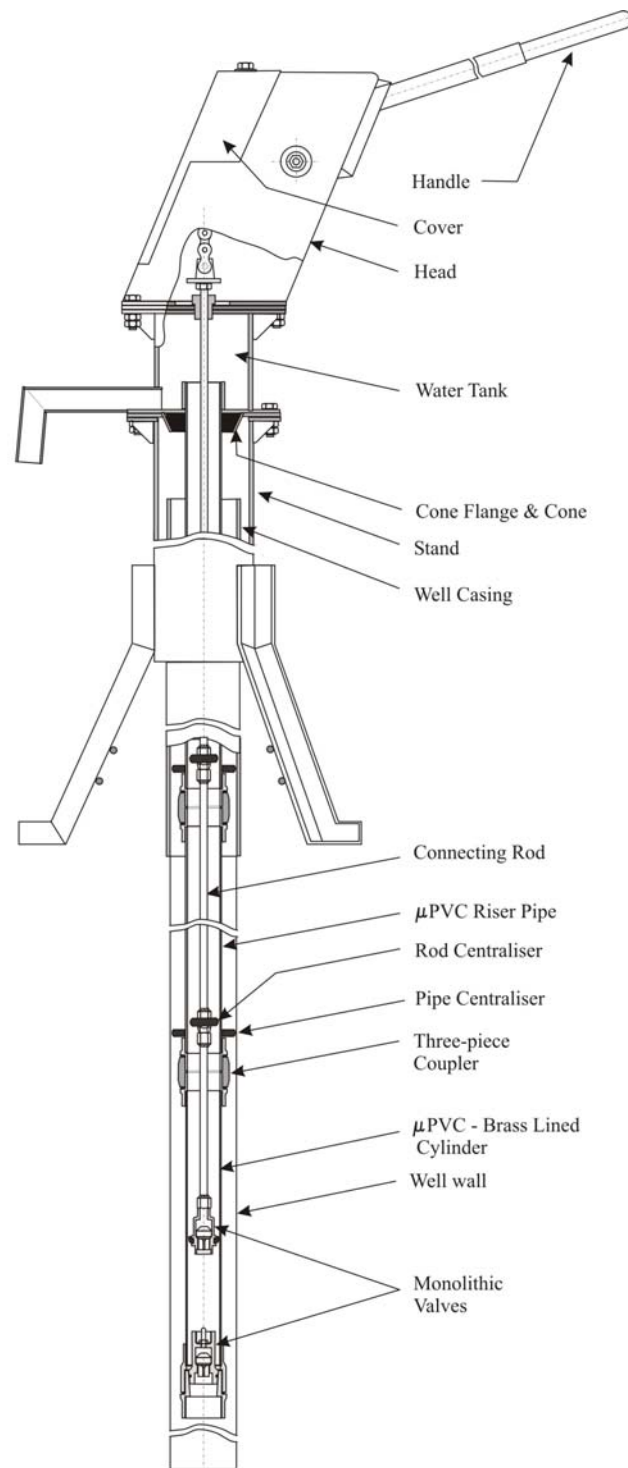
India Mark III with 50 mm uPVC Riser Pipes & Cylinder

The “IM III 50 PVC” has emerged from the need for a handpump based on the IM II/ IM III design suited for installation in “aggressive waters”, where corrosion of GI riser pipes and rods was a major problem. This design uses 50 mm ND PVC pipes as the pipe, with a PVC jacketed brass lined cylinder, incorporating “universal cylinder” components using interchangeable Nitrile rubber bobbin valves, single piece tool-less valve designs and a number of innovative features. Apart from the normal GI-MS pump rods, the below-ground mechanism can also use Stainless Steel or Fibre Glass pump rods, top improve non-corrodible properties and relatively deep cylinder setting of 60 m below ground level and more.

By early 2001. the field tests reported:

*“113 nos. hand pumps using μ PVC Riser pipes with Three Piece couplers, with a median age of 160 days and usage of 1920 hours, have shown no problems so far. The first batch of 10 of these pumps had been installed earlier and had accumulated a median age of 438 days.”**

These field trials were tracked till 2002. The results led the Bureau of Indian Standards to formulate draft specification for the “Village Level Operation and Maintenance (VLOM) Deepwell Handpump with uPVC Riser Pipes – Specifications”. This document is awaiting final approval of the Handpumps Committee of the BIS.



**VLOM Deep Well Hand Pump with
50 mm μ PVC Cylinder and Riser Pipes
(India Mark III 50 PVC)**

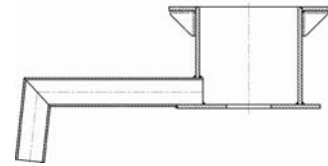
* UNICEF supported Handpump R&D Project, Rangareddy District, Andhra Pradesh, Concluding Report, March 2001

Features:

Head, Handle & Pedestal: These are similar to that of India Mark II or III, but with minor modifications. The conventional IM II/ IM III pump head and handle with 100-125 mm stroke will produce around 8 –10 litres water per minute when used with 50 mm PVC cylinder and riser, as compared to 12-15 litres per minute (at 40 strokes per minute) when used with a usual 63.5 mm diameter cylinder of the IM II/ IM III.

Hence, the Head has been modified to provide a handle stroke of 175 mm to increase the discharge per stroke. In practical terms, it means a slightly taller pump Head with a slightly larger opening for the handle travel. The handle and axle assembly does not change. Hence there is no major implication for the more common spare parts.

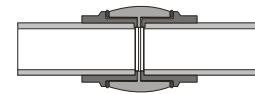
Water Tank: This has been modified. There is no riser pipe holder, the bottom flange has a hole to allow PVC pipe to pass through. The flange holes remain unchanged. So the new water tanks can be fitted onto old pump pedestals.



Pipe-holding: This is done by a rubber cone slipped over the PVC riser pipe. The rubber cone fits into a cone flange. The cone flange is clamped between pedestal and water tank flanges. This compresses the rubber cone which grips and holds the PVC riser pipes.

minute produced from a 63.5 mm dia cylinder.

PVC Riser pipes: The pipe used is 50 mm nominal diameter (OD 60 mm – 60.2 mm, wall thickness 4.0 – 4.6 mm, as per IS 12818, dimensions as per designation CM 50), in 3 m lengths, with pipe centralisers on each length. There are external (male) threaded couplings at both ends, solvent cemented to pipe ends. The couplings are injection moulded to knuckle thread profile. The solvent cementing can be done at the factory (which makes the packing more bulky), or at the eventual store (where plain ended pipes and couplings can be received separately, in more convenient packs). Solvent cementing should never be done at site. Precautions like roughening and cleaning matching surfaces and curing are necessary to get a good solvent cement joint. Pipes with male threaded ends have rubber “O” rings for sealing and are joined to each other by a double ended female (internal threaded) coupling. This coupling system is called the Three Piece Coupler. The entire riser pipe fitting can be assembled by hand tightening or with simple light-weight tools. The use of conventional tools like pipe lifters is unnecessary and pipe wrenches will damage the PVC pipe. It is advisable to order a few set of spare couplings, cementing compound and sealing ‘O’ rings, along with the initial procurement.



A Pipe Joint



Three Piece Coupler

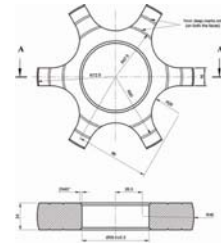


PVC Pipe fitting Tools



Joining PVC Riser pipes

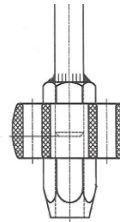
Pipe Centralisers: Since well diameters vary, pipe centralisers have been made to suit wells of 150 mm (6”) to 100 mm (4”) diameters. These are “spider” type centralisers with six legs, which are manufactured for 150 mm wells and are marked so that they can be cut to suit 125 mm or 110 mm dia wells. If well diameter can be specified, centralisers can be made to the required size. A few extra centraliser should be ordered initially.



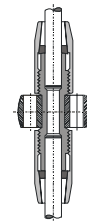
Pump Rods: The GI rod assembly of the standard IM II/ IM III can be used, but centralisers are needed to prevent couplings from cutting into the pipes.



Rod Centralisers



MS/ SS Rod with Rod Centraliser



Fibre Glass Rods Joint with Brass Coupling

For very deep connections (over 50 m depth settings of the cylinder), light weight fibre glass rods, in 3 m lengths, are recommended. The coupling system for fibre glass rods is called as the Brass/SS Coupling which are still relatively expensive. Spare coupling should be ordered at the start.

Experience with fibre glass rods was good during field trials in Ranga Reddy. In desert areas of India (Rajasthan), fibre glass rods have not performed so well, because dropping water levels (due to 4 years of drought) caused sand to enter into the cylinders and risers, jamming the plungers. As a result, the fibre glass rod joints kept failing.

For aggressive water situations the use of Stainless Steel Rods is recommended.

Cylinder: The cylinder is made from 50 mm PVC pipe with a brass liner. Cylinder components are: gun-metal plunger and foot valves, common interchangeable nitrile rubber bobbin valves for plunger and lower valve, and nitrile rubber cup seal and ‘O’ ring. The plunger and foot valve bodies are designed so that bobbin valves and cup seal can be replaced by hand, without any tools.

