Pump parts

Cap

Wheel

Joint

Bolt & Nut

Bushing

Locker

Handle

Water Outlet
- Reducer
- Tee-Piece
- PVC pipe
- Elbow

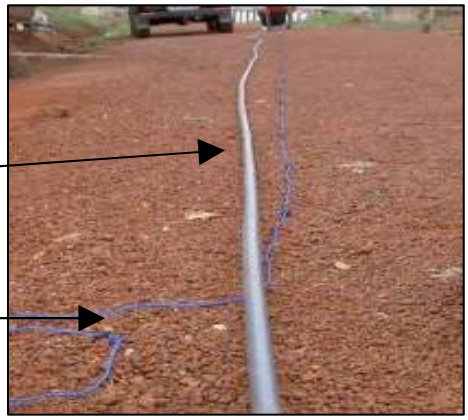
Bore hole

Rope inlet

Frame

Apron

Soak pit



Rising main

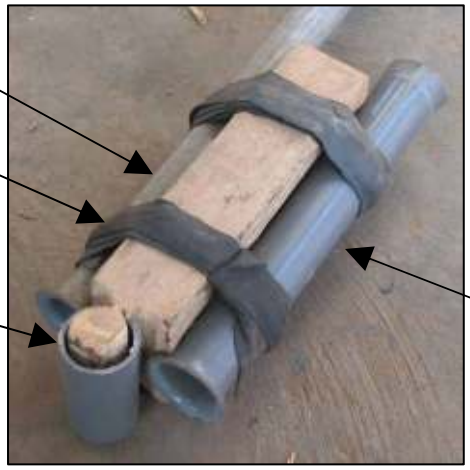
Rope with washers

Guide Box

Rising main

Tie

Turning point



Rope inlet

Rope pump Bore hole

Selection of parts.

Item	Size	Remarks
▪ Frame	standard	-
▪ Wheel	standard	-
▪ Handle	standard	-
▪ Bushing	standard	-
▪ Cap	standard	-
▪ Rising main	fit to size	use 1"for wells up to 10 m. (33 ft.) use ¾ " beyond 10 m. (33 ft.)
▪ Water outlet	1 ½"	Pipe, reducer T-piece and elbow
▪ Rope inlet	1 ¼"	Pipe
▪ Guide box	fit to size	¾" or 1"
▪ Washers	fit to size	¾" or 1" (1 / meter)
▪ Rope	fit to size	Ø 5 mm, length ≈ 2 x depth well + 2m + 5% (knots)
▪ Apron	3m	Cement floor with soak pit, plant a fruit tree next to the soak pit

To check

- General
  - Pump is symmetrical
    - Parts are in the middle, straight, and symmetrical, to check go and stand at 3m /10 ft
  - Cap is covering wheel, but not touching
  - Centre of wheel is at belly button height
  - Wheel does not wiggle and tyre halves are closed nicely along circumference of Tyre
  - All welds look nice and are full (no holes)
  - Pump is fixed proper. Frame and PVC parts do not move/wiggle when pumping
  - Tension of rope is correct.
  - "Not galvanised parts" are painted (both primer and colour)
- PVC
  - Outlet and inlet are fixed proper true the cap of the bore hole
  - Rope does not touch the edges of inlet or outlet
- Measurements
  - Holes Bushing Ø 12 mm distance between two holes between 79,5 mm and 80,5 mm
  - Height centre of wheel around 1m (25")

Part: Frame

Selection of materials

Item	Size	Remarks
▪ Frame	¾"GI Pipe	take as thick as possible
▪ Joint	Angle 30x30x3	used for joint
▪ Rod	½" rod	used for reinforcement of frame and slab
▪ Rest	1½" GI Pipe	Used to fixate the rising main

Production

Jigs & Tools:

- Jig for drilling holes
- Jig for cutting pipes
- Jig for welding frame sides
- Jig for welding frame
- Marker, spanner 17, square, file

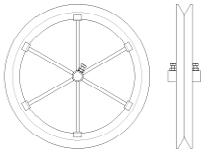
Working sequence:

- Cut materials with jig and break edges
- Drill holes true angle iron with jig
- Check measurements
- Frame
  - Weld poles and reinforcement rod for frame side in jig
  - Weld frame sides, reinforcement pipes and rod in jig
  - Mount angle irons square in jig and tag them to frame
  - Remove jig and weld true
  - Tag and weld rest for water outlet and rest for rope inlet
  - Check all welds
- Paint all welds with primer
- Paint frame

To check

- Joint / Angle iron
  - The 12 mm holes are in the middle
  - Distance is between 79,5mm and 80,5 mm (80 ± 0,3 mm)
  - Distance between holes in joint is 300 mm (± 3 mm)
- Frame is symmetrical
- Position of rest
  - In the middle between frame sides
  - Centre of rest for water outlet is 190 mm from the middle of the pump
- Welds are full, no holes
- All welds are painted with primer
- Frame is painted with primer and colour

Part: Wheel



Selection of Materials:

Item	Size	Remarks
▪ Tyre	14”	Make sure inside edges are not damaged. (Change of wheel size will effect yield)
▪ Spoke	Rod	Length of spoke should be exact and equal to prevent the wheel from “wiggling”
▪ Clamp	GI Pipe	
▪ Shaft	1” GI Pipe	Thick wall, make sure shaft and handle are matching. Handle slides into shaft with small margin
▪ Bolt & Nut	M10 (Bolt 17)	Used on all pump parts.

Production

Jigs & Tools:

- Jig for marking tyre
- Jig for assembling / welding
- Spanner 17, file, hammer, knife

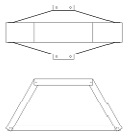
Working sequence:

- Cut materials / break edges
- Drill holes
- Check measurements
- Weld clamp to spoke
- Weld Nuts to shaft
- Cut tyre, use water to grease
- Assemble parts in jig
- Tag all parts
- Check measurements
- Weld all parts
- Clean, sandpaper and paint

To check

- After tagging put wheel on a handle and rotate.
  - Wheel should turn nicely. No wiggling (sideways or up/down) Use hammer to reduce sideway wiggling.
  - Tyre half’s are closed throughout the circumference. If Clamps are to tight tyre will open up
- Tyre circumference is smoothly cut
- Shaft
  - Enough space to fasten/loosen bolts
  - Tread of bolt & Nut are not damaged
- Welding is full, no holes
- All metal part are painted

Part: Cap



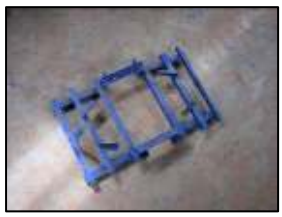
Selection of materials

Item	Size	Remarks
▪ Cap	GI Plate	1000 x 200mm x 1 mm
▪ Flat bar	30x3mm	
▪ Rivets	8x	
▪ Washers	16x	

Production

Jigs & Tools:

- Jig for drilling holes
- Jig to join guide and cap
- Rivet blocks, file, vice, spanners 17

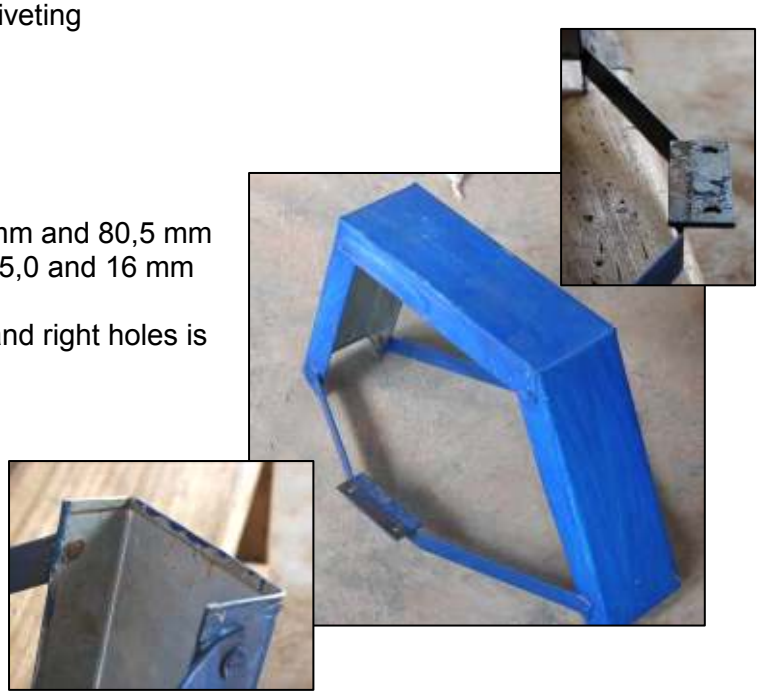


Working sequence:

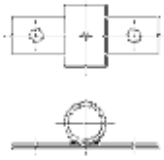
- Cap
  - Cut plate
  - Mark and cut for bends in plate
  - Make save edge
  - Mark and drill holes for riveting
  - Bend and countermark for riveting
  - Check measurements
  - Drill and Rivet (use washers)
- Guide
  - Cut flat bar / break edges
  - Drill holes with jig
  - Check measurements
  - Bend guides
- Assembly
  - Bolt flat bar in jig
  - Position cap and guides
  - Tag guide and countermark for riveting
  - Take parts out of jig and weld
  - Rivet (use washers)

To check

- Guide
  - Distance holes is between 79,5mm and 80,5 mm
  - The 12 mm holes are between 15,0 and 16 mm from inside edge.
  - Distance between holes on left and right holes is 300 mm
- Cap is symmetrical



Part: Bushing



Selection of materials

Item	Size	Remarks
▪ Flat bar	30x3 mm	Used on all pump parts
▪ Bushing	1" GI pipe	Thick wall, make sure bushing and handle are matching. Handle slides into bushing with small margin

Production

Jigs & Tools:

- Jig for drilling holes
- Jig for welding pipe
- Square, spanners 17, file

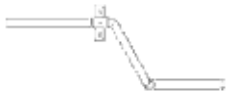
Working sequence:

- Cut materials / break edges
- Mark holes with jig
- Drill holes in flat bar
- Drill hole for greasing, drill close but not on seam
- Fix both flat bars square on pump frame with jig
- Position pipe on flat bar, square and centred
- Tag in the jig
- Check measurements
- Tag other side before continue welding
- Clean, sandpaper and paint

To check

- Flat bar
  - Distance of holes is between 79,5mm and 80,5 mm (80 ± 0,3 mm)
  - The 12 mm holes are in the middle
- Welding
  - Bushing and flat bare are welded square
  - Bushing is in centred on flat bar
  - Hole for grease on topside

Part: Handle



Selection of materials

Item	Size	Remarks
▪ Handle	¾" GI pipe	Always use same pipe for handle, it makes parts exchangeable
▪ Locker	1" GI Pipe	Slices of pipe used for bushings and wheel shaft.
▪ Grip	1" PVC Pipe	Make sure grip is at least "two hands wide"
▪ Bushing		

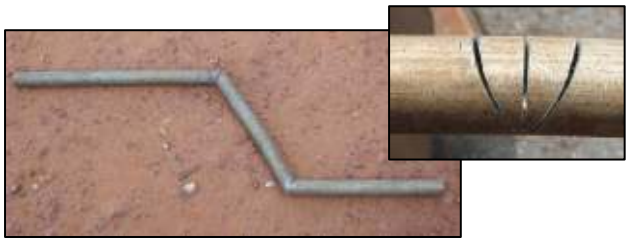
Production

Jigs & Tools:

- Jig for cutting pipe
- Hacksaw, file

Working sequence:

- Cut materials / break edges
- Mark and cut for bends in Handle
- Bend
- Check measurements*
- Weld "locker – grip – locker"
- Weld "locker – bushing – locker"
- Paint welds with primer



To check

- Arm should be a little longer (~3cm) than radius wheel
- Both ends on wheel side and grip side are perfectly parallel
- Grip and bushing can freely rotate but clearance is minimal
- Welds are painted with primer

Part: Guide box Bore hole

Selection of materials

Item	Size	Remarks
▪ Inlet	PVC pipe	1¼ " – 30 cm, To guide the rope in the guide box
▪ Outlet	fit to size	¾" or 1" PVC pipe depending on size rising main
▪ PVC pipe	¾" - 80 mm	Turning point
▪ Holder	2"x3" - 150	Wooden block
▪ Tie		

Production

Jigs & Tools:

- Hammer and chisel
- Jig for tapering PVC

Working sequence:

- PVC
  - Cut pipes / break edges
  - Taper both sides of rope inlet
  - Taper one end of rising main
  - Check that tapered ends are perfectly round
- Wooden block
  - Cut wood and chisel out slots for
    - Rising main
    - Rope inlet
    - Turning point
    - Tie
- Connect all part with tie

To check

- PVC
  - Pipes are equal lined
  - Tapered pipe ends are perfectly round

Note:
This guide box is an other type as defined on drawing

Part: Guide box Dug Well

Selection of materials

Item	Size	Remarks
▪ Inlet	PVC pipe	1¼ " – 30 cm, To guide the rope in the guide box
▪ Outlet	fit to size	¾" or 1" PVC pipe depending on size rising main
▪ Glass bottle	30 mm	Turning point
▪ Holder	PVC pipe	4" 10 cm, to position parts in guide box
▪ Mould	PVC pipe	4" – 50 cm
▪ Binding wire		
▪ Cement / sand		Mix 1 unit cement to 3 units sand / chipping

Production

Jigs & Tools:

- Mould
- Steel pipes (3x with Diameters of glass bottle, inlet, rising main)
- Wood to remodel PVC pipes
- Pliers, shovel

Working sequence:

- PVC
  - Cut pipes / break edges
  - Remodel 4"pipe to square pipe and burn holes with heated steel pipe
  - Taper one side of rope inlet
  - Place rope inlet in 4" pipe and taper 2nd end of inlet
  - Taper one end of rising main and place it
  - Check that tapered ends are perfectly round
  - Place glass bottle
  - Fill up all holes with paper
  - Place guide box in mould
    - Check, bottle is fixed horizontal and square to rising main
    - Check lowest part of PVC is 5cm (2") from bottom mould
- Cement
  - Mix cement with sand/chippings
  - Fill moulds with cement
  - Let guide box harden for at least 5 days in water

To check

- PVC
  - Pipes are equal lined
  - Glass bottle is horizontal and square to rising main
  - Tapered pipe ends are perfectly round
  - Water inlet starts 5 cm (2") above bottom guide box
  - Cement is hard and has no cracks.

Part: Apron bore hole

Selection of materials

Item	Size	Remarks
▪ Frame		Frame AB
▪ Plate	6” high	length enough to circumference and split the slab.
▪ Pegs	1/2” – 1 ft	Pegs to position the plate
▪ Cement & sand		Mix always 1 unit cement with 3 units sand/chippings

Production

Jigs & Tools:

- shovel, soso, measuring tape, plastic sheet, bucket
- Logbook, write down specifications of well and pump

Working sequence:

- Measure well
  - Well; Depth, water level (measure from ground level)
  - Top; Height, outside diameter, inside diameter
- Make mould for apron
  - Circumference 1,5 m around bore hole
  - Dig the apron edge, 20 cm wide, 20 cm deep. Use sand to make wall of 10cm high
  - Position the frame round the borehole (Agree with customer on position of outlet and soak pit)
  - Dig the channel and soak pit at 3m of borehole
- Make and pour cement
  - Make sure apron is slightly sloping towards the channel and sink pit

To check

- Centre of wheel will end up at ~1m (belly button height)
- Frame
  - Frame is positioned nicely and straight
  - Rising main can be fixed exactly vertical
- Cement
  - Usually 2 bags are more than sufficient
  - Mix 1: 3 (1 bucket cement to 3 buckets sand with chippings)
  - Sprinkle twice a day during the hardening time (at least 5 days)

Part: Slab dug well

Selection of materials

Item	Size	Remarks
▪ Frame		Size frame is depending on height of well.
▪ Outlet	1½ ” PVC Pipe	Outlet for rising main
▪ Inlet	1½ “ PVC Pipe	Inlet rope
▪ Rest	1½ “ GI Pipe	Rest for outlet
▪ Grips	½” rod	Grip to (re)move slab
▪ Rod & Wire	1/2” Rod	To reinforce the slab
▪ Plate	6” high	length enough to circumference and split the slab.
▪ Pegs	1/2” – 1 ft	Pegs to position the plate
▪ Cement & sand		Mix always 1 unit cement with 3 units sand/chippings

Production

Jigs & Tools:

- Mould
- Hammer, pliers, shovel, soso, measuring tape, plastic sheet, bucket
- Logbook, write down specifications of well and pump

Working sequence:

- Measure well
  - Well; Depth, water level (measure from ground level)
  - Top; Height, outside diameter, inside diameter
- Choose frame (height)
- Make mould for slab
  - Place centre peg and draw outside diameter of slab
  - Place plate with pegs on slab circumference
  - Split mould with the two short plate and pegs
  - Position the parts in mould. (Agree with customer on position of outlet)
- Make and pour cement
  - Remove pegs inside the mould

To check

- Find a shady place, so the slab can harden gradually
- Centre of wheel will end up at ~1m (belly button height)
- Frame
  - Handle can be easily be reached
  - Rising main is as centred as possible in the well
  - The loose part of the rope does not well wall
  - Rope inlet and outlet are exactly on “diameter of wheel”
  - Rope inlet outlet and rest are in straight line with the outlet rest of the frame
- Reinforcement
  - Bars are firmly connected with binding wire
  - Bars are 1” from floor level (put small stones under)
- Cement
  - Usually ½ bag is more than sufficient
  - Mix 1: 3 (1 bucket cement to 3 buckets sand with chippings)
  - When cement is in the mould, remove all pegs from the inside of the mould.
  - Sprinkle twice a day during the hardening time (at least 5 days)

Installation on Bore hole

Selection of materials

Item	Size	Remarks
▪ Apron		is finished
▪ Rising main	fit to size	¾" or 1" depending on depth of well
▪ Outlet	1½ " PVC Pipe	PVC; 1 ½" pipe, 1 ½" T, 1 ½"elbow
▪ Reducer	PVC	1½ " to "size rising main"
▪ Pump parts		Wheel, handle, bushing, cap
▪ Guide box	fit to size	¾" or 1" depending on depth of well
▪ Rope	fit to size	¾" or 1" depending on depth of well. Length rope is roughly 2x depth of well + 3m (10ft)
▪ Cap	4"	Cap with holes to guide trough rising main and rope inlet
▪ Bolt & Nut	M10 (Bolt 17)	
▪ Tools		hacksaw, glue, sandpaper, matches, spanners (17) measuring tape, rope with weight

Jigs & Tools:

- hacksaw, glue, sandpaper, matches, spanners(17) measuring tape, thin rope with weight
- Logbook, write down specifications of well and pump

Working sequence:

- Measure well
  - Depth, water level (measure from ground level)
- Cut and glue rising main with guide box to the correct length.
- Mark position of rope inlet (guide box) at the top of the rising main.
- Cut and glue Reducer, T-piece, water outlet and reservoir
- Guide rising main true Cap
- Glue rising main and outlet. Check mark for on rising main for correct positioning (rope inlet of guide box is opposite the water outlet.)
- Cut reservoir pipe to right length (use wheel to mark the proper length)
- Cut water outlet to the proper length and glue elbow
- Guide rope trough the rising main
  - Drop the small weight on a rope trough the rising main. Lift rising main up, tie "pump rope" to the "small rope" Pull "pump rope" trough the guide box and into the rising main. Lower rising main and pull the "pump rope" out on top.
- Install the wheel, handle and bushings.
- Measure the rope and cut it at right length
- Burn the rope ends and knot the rope together
- Test and clean the well
- Instruct customer (Greasing, rope tension, cleaning, guarantee,..)

To check

- Water is flowing gradually
- Rope tension (not to tight, not to loose)
- Bushings are greased
- Apron has no cracks, especially not on edges and close to the pump
- Height wheel is correct (~1m. = belly button height)
- Check the pump after one week

Installation on Dug well

Selection of materials

Item	Size	Remarks
▪ Slab		is finished
▪ Rising main	fit to size	¾" or 1" depending on depth of well
▪ Outlet	1½ " PVC Pipe	PVC; 1 ½" pipe, 1 ½" T, 1 ½"elbow
▪ Reducer	PVC	1½ " to "rising main"
▪ Pump parts		Wheel, handle, bushing, cap
▪ Guide box	fit to size	¾" or 1" depending on depth of well
▪ Rope	fit to size	¾" or 1" depending on depth of well. Length rope is roughly 2x depth of well + 3m (10ft)
▪ Bolt & Nut	M10 (Bolt 17)	
▪ Tools		hacksaw, glue, sandpaper, matches, spanners (17) measuring tape, rope with weight

Jigs & Tools:

- hacksaw, glue, sandpaper, matches, spanners(17) measuring tape, thin rope with weight
- Logbook, write down specifications of well and pump

Working sequence:

- Measure well
  - Depth, water level (measure from ground level)
- Place the slab with pump frame on well
- Check if centre of wheel is going to be at belly button height (~1m)
- Cut and glue rising main with guide box to the correct length.
- Mark position of rope inlet at the top of the rising main.
- Cut and glue Reducer, T-piece, water outlet and reservoir
- Guide rising main true slab
- Glue rising main and outlet. Check mark for on rising main for correct positioning (rope inlet of guide box is opposite the water outlet.)
- Cut reservoir pipe to right length (use wheel to mark the proper length)
- Cut water outlet to the proper length and glue elbow
- Guide rope trough the rising main
  - Drop the small weight on a rope trough the rising main. Lift rising main up, tie "pump rope" to the "small rope" Pull "pump rope" trough the guide box and into the rising main. Lower rising main and pull the "pump rope" out on top.
- Install the wheel, handle and bushings.
- Measure the rope and cut it at right length
- Burn the rope ends and knot the rope together
- Test and clean the well
- Instruct customer (Greasing, rope tension, guarantee,..)
- Arrange for mason to "dress the well"

To check

- Water is flowing gradually
- Rope tension (not to tight, not to loose)
- Bushings are greased
- The well is completely closed
- Height wheel is correct (~1m. = belly button height)
- Check the pump after one week

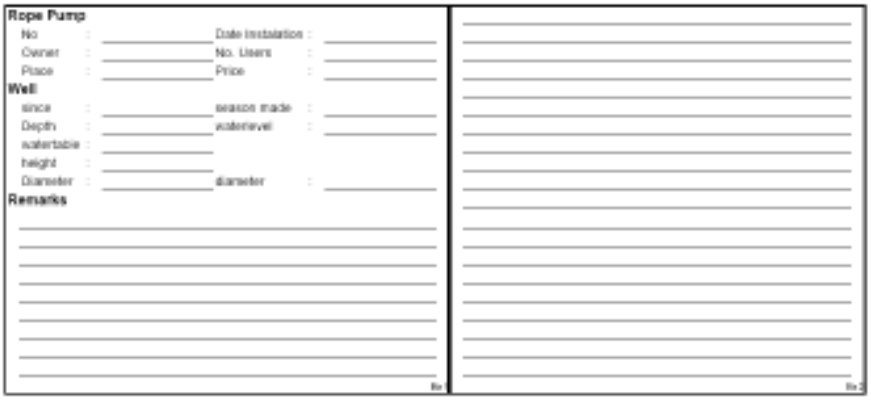
Pump visit

Tools:

- Spanners 17, matches, glue, sandpaper, small rope with weight, hacksaw, rivet kit
- Logbook, write down specifications, maintenance and repair of well and pump.

Parts:

- Well & Apron
- Pump
  - Frame & Bushings
  - Wheel & Handle
  - Rope & washers
  - PVC
  - Guide box



To check

- Well & Apron.
  - Slab closes the well completely.
  - Slab half with pump is plastered, therefore fixed permanently
  - Water that leaks flows from well top to sink pit. No water is returning in the well
- Pump
  - Bushings are not damaged and well greased. Wall is thick all round
  - Wheel does not wiggle or slip
  - Handle is rotating smoothly in bushings, clearance is small
  - Grip on handle is in tact and rotating freely
  - Welds are in tact
  - Paint is not coming off, parts are not rusting
- Rope and washers
  - Rope quality is ok, no loose ends and not worn out
  - Washers are all there and not worn out
  - Rope tension is ok. Not to tight and not slipping
  - Rope is not touching top of outlet
- PVC
  - All glued connections are in tact and not damaged
  - T-piece, reducer, and rising main are in fixed and proper positioned
- Guide box
  - All connections are ok
  - Rope inlet, bottle are not damaged
  - Concrete is in tact, no cracks, no missing pieces
- Performance
  - Yield is good and regular when handle rotates at one round per second
  - Pump effort is low at one round per second
  - Water is clean and “leakage” on slab is small
- Logbook
  - Write down date and purpose of visit.
  - Write down all the work done during the visit
  - Write down “current status” of the installation
  - Involve and inform owner with maintenance and repair