

**SPECIFICATIONS &
SPECIAL CONDITIONS
FOR INSTALLATION
OF
TUBEWELLS
WITH
REVERSE ROTARY RIG/
HAND BORING/
PERCUSSION RIG**

**WATER SUPPLY & SANITATION
DEPARTMENT PUNJAB**

INSTALLATION OF TUBEWELL

SPECIFICATIONS:

1. The installation of Tubewell shall conform to IS 2800-1979 (Part I & II) with latest amendments.
2. Specifications of Housing Pipe, Stainless steel cage type wire wound screen specials and gravel etc.
 - a) M.S. Housing Pipes shall conform to IS Specification No. 4270-2001 or latest. The make shall be engraved on the pipe.
 - b) Unless otherwise specified Stainless steel cage type wire wound screen should confirm to IS 8110-2000.
 - a) 300 mm N.B.M.S. Pipe:
300 mm nominal bore steel Electric Resistant welded pipes having outside diameter as 323.9 mm; wall thickness 8mm. Both ends of pipe shall be threaded with 88.90mm length of threaded portion one each end. The Threads shall be 'V' type and 8 threads per inch. The pipes shall be capable of withstanding Hydraulic test pressure of 7 Mpa.
 - b) 250 mm N.B.M.S. Pipe:
250 mm nominal bore mild steel Electric Resistant welded pipes having outside diameter as 273.100 mm; wall thickness 8mm. Both ends of the pipes shall be threaded with 88.90 mm length of threaded portion on each end. The threads shall be 'V' type and 8 threads per inch. The pipe shall be capable of withstanding Hydraulic test pressure of 7 Mpa.
 - c) 200 mm N.B. M.S. Pipes:
200 mm nominal bore mild steel Electrical welded pipes having outside diameter as 219.10 mm; wall thickness 8mm. Both ends of the pipes shall be threaded with 76.20 mm length of threaded portion on each end. The threads shall be 'V' type and 8 threads per inch. The pipes shall be capable of withstanding Hydraulic test pressure of 7 Mpa.
 - d) 150 mm N.B.M.S. Pipes:
150mm nominal bore mild steel Electric Resistant welded pipes having outside diameter as 168.30 mm, wall thickness 5.4mm. Both ends of the pipes shall be threaded with 63.50mm length of threaded portion on each end. The threads shall be 'V' type and 8 threads per inch. The pipes shall be capable of withstanding Hydraulic test pressure of 7 Mpa.

GENERAL CONDITIONS APPLICABLE TO ALL SIZES.

1. The length of the pipe should be 4 to 7 meters.
- 2.1 The grade of steel to be used shall be of Fe 415. the pipe shall be manufactured from steel which when analyzed in accordance with methods specified in IS 228-1959 or latest, shall not show more than 0.06% phosphorus and 0.06% sulphur.
- 2.2 The pipes shall be painted with black bitumen paint.
- 2.3 The pipe shall be circular truly straight.
- 3.1 **STAINLESS STEEL CAGE TYPE WIRE WOUND SCREEN**
(AS PER IS 8110-2000 WITH LATEST EDITION)

It shall be ERW stainless steel cage type wire bound screen as per IS: 8110-2000 or latest and material specifications as per ISI type 304-Grade, S.S. 304. Screen will be of continuous trapezoidal wire spirally wound fabricated cage. The wrapping wire having a V shaped wedge type profile wire with flat surface on the outside a reducing expanding slots on the inside of various dimensions, resistance welded to a cylindrical body made of number of longitudinal high tensile support rods to provide smooth unrestricted bore which are in turn welded into cylindrical ring couplings body made of number of longitudinal high tensile support rods to provide smooth unrestricted bore which are in turn welded into cylindrical ring couplings at either end.

1. Ring will be 150 mm in length with 8 tpi (threads per inch).
2. Screen will have evenly distributed slot openings.
3. Open area of the screen will be designed so that the entrance velocity is less than 0.03 m/sec at design discharge/the rated discharge whichever is less.
4. Slot will be smooth with clean edges.
5. Wedge shaped inwardly widening slots will be of non-clogging type.
6. Thickness of screen with slot size 0.75 mm or 1.0 mm shall be as per table given below:

Sr. No.	N.B. of the S.S. Screen in mm	Depth of T/well in m	Thickness in mm
1	150	Upto 200	5.00
2	150	201 to 350	6.30
3	200	Upto 200	6.30
4	200	201 to 350	8.00

The lowering assembly shall be approved by the Superintending Engineer on recommendation of Executive Engineer concerned which in turn shall be based upon the recommendation of qualified experienced and reputed Geologist/Hydrologist along with likely safe ultimate yield of the tubewell. The reputed Geologist/Hydrologist shall be engaged by the contractor for all matters of installation from start of drilling to the end of development. The consultant shall base his recommendation on proper analysis and documents such as strata

chart, Sieve analysis chart and electric logging. He shall give his recommendations for the slot size of the screen against each strata tapped, gravel size of the packing and thickness of the strainers at various locations and the thickness & depth of impervious clay seal below ground level and the length of housing pipe keeping in view the existing spring level, expected fall in spring level for the full life of Tubewell i.e. 15 years, expected draw down and the adequate submergence depth etc. The contractor will not lower the assembly until & unless the size of screen and the design of the Assembly is approved by the Superintending Engineer. In case he lowers the assembly without the approval of Superintending Engineer the same will not be payable.

No Tubewell assembly shall be lowered at night. The lowering of the Tubewell must start at early morning i.e. not later than 10 AM in the presence of Engineer or his representative, to complete the same during day time.

Note: Where ever Screen or any other material is supplied by the Department, the contractor shall also be fully responsible for loading, unloading and its safe carriage to site. Any damage to the screen during transportation or its handling shall be borne by the contractor. The agency should quote his labour rates including its transportation, loading, unloading and lowering in the bore well complete in all respects. All the accessories and T & P required if any should be included in these rates. Nothing extra will be paid by the department what so ever.

3.2 a) Reducer

.....mm N.B.M.S. Housing Pipes are to be connected through properly designed reducer withmm N.B.M.S. Blind pipes. Both the joints are to be screwed type and to be provided with suitable threaded socket.

b) M.S. Centering Guide

Suitable M.S. Centering Guides fabricated out of M.S. flat 32 mm x 6mm thick are to be provided in the Tubewell after every 10 to 12 m interval from bottom upwards till housing. The diameter of centering guides should be 50mm- 75 mm less than the bore hole diameter. Centering guides should also be provided at the starting & finishing point of screen for securing the position of the well as well as for proper gravel packing all around the screen area.

c) Gravel

The gravel shall consist of hard well rounded particles reasonably uniform in diameter and its size shall be determined by the contractor after carrying out the sieve analysis of the sand in water bearing strata. (Drawing of gravel pit D- 11 attached).

DEVELOPMENT OF TUBEWELL

4. The Tubewell shall be developed for discharge with the help of the Air Compressor of the capacity corresponding to the depth of suitable size as per the table below. It should be continued until the stabilization of sand and gravel pack takes place.

Sr.No.	Depth of T/well in m	Capacity of Air Compressor to be used.
1	Upto 180	300 cfm at 250 PSI
2.	180 to 400	550 cfm at 600 PSI

Finally the development of the T/well by over pumping should be done with suitable capacity pump set as expected ultimate discharge from the Tubewell. In the end 4-5 surges (Sudden start and sudden off when the water just start coming out from the Tubewell. Finally the discharge shall be totally free from sand, after 20 minutes of starting the pump, otherwise the Tubewell shall be redeveloped. In case the Tubewell is still not sand free the pump may throttled till the discharge is total sand free after 20 minutes of starting the pump. The turbidity and hardness of the discharge shall be as specified in the IS 10500; 1983 / CPHEEO.

Note: Engineer will satisfy himself regarding the proper rating of CFM & PSI of the compressor before it is applied at site.

5. VERTICALITY ALIGNMENT

For verticality and alignment, the requirement as laid down in clause 4 of IS 2800. 1979 part -II will be ensured.

6. FINAL TEST

a) After the development is by over pumping and surging is complete the, the well shall be tested for its performance, i.e. yield characteristics and efficiency. This shall be achieved by conducting a step draw down test – determining draw down at the end of the hour by pumping at 5 to 8 different rates of discharge near the rated discharge. Preferably, the test should be conducted in a single day and the time of running of tubewell for each discharge shall be same say 1 - 2 hour. The data from the test can be used to determine the relative proportion of laminar and turbulent flow occurring, true efficiency and rated discharge of the well and working out the suitable parameter for the pump.

b) The performa attached at annexure-B is to be completed by the driller after the Tubewell has been completed.

c) In case of any quantity of cement, steel, screen or any other controlled/ un-controlled, commodity issued to the contractor by the Engineer for use, directly in the

aforesaid work or manufacture or material required in connection thereof, which is not utilized for the work for which it is issued and is otherwise disposed off by him or spoilt or lost or allowed to get deteriorated or used in excess of quantity actually required to be used as per specification herein stipulated or these fixed by the Engineer, the cost of such quantity of that material shall without prejudice to other rights and remedies available to the Govt. be recoverable from the contractor at double the stock issue rates at which it is able to be supplied to the contractor or at double the stock issue rates for quantity of material issued free of cost.

The DWSS reserve the right to abandon a particular Tubewell due to lack of sufficient water bearing strata and the contractor will be paid at the rate quoted by the firm for Test Bore. If the T/well is to be abandoned due to caving or negligence of the contractor, nothing will be paid to the contractor. The decision of the EIC will be final and binding on the contractor.

The Tubewell should be handed over to the DWSS in the complete shape. The housing pipe should be closed by a well cap for the period between the completion of the Tubewell and the installation of the pump set. The cap should be of such a design that it is easily removable causing no damage to the housing pipe.

The method of drilling i.e. REVERSE ROTARY/ HAND BORING/PERCUSSION RIG method shall be taken by the concerned Superintending Engineer based upon the technical data such as type of strata, depth of boring etc.

The following information should be furnished by the drilling agency to the GPWSC/DWSS on completion of the Tubewell:-

- A Strata Chart of the borehole indicating the different type of soil met with at different depth.
- B Samples of strata collected & neatly packed; correctly marked in sample bags kept in wooden sample box.
- C Chart of the actual pipe assembly lowered, indicating the size of pipes depth ranges where SS screen has been used depth and diameter of housing pipe, from the top of the housing pipe and the diameter and depth of borehole.
- D Hours of developing by Air Compressor and Pumping set duly certified by authorized official of the GPWSC/ DWSS
- E Results of development and its draw down test on the performance of the Tubewell to be recorded.
- F Results of mechanical (sieves) analysis of samples of aquifer material where ever applicable.
- G Recommendation on the safe pumping yield pump set and specification for suitable pump set.
- H Vertically test results to be recorded.

Sr. No.	Brief Description	Relevant Code reference (with latest amendment)		Remarks
		Indian Standards (IS)	Pb. PWD Book of specification Chapter No.	
1	2	3	4	5
1.	M.S. Pipe	4270-2001 OR LATEST		JINDAL / TATA
2.	Stainless steel wire cage strainer	8110-2000 OR LATEST		JOHNSON / SUPER
3.	Construction of Tubewell	2800-1979 (Part - I & II) OR LATEST		-
4.	Development of Tubewell	2800-1979 (Part - I) OR LATEST		-

TERMS AND CONDITIONS

1. All measurements will be taken from the ground level where the bore is drilled.
2. The rates quoted must include octroi, terminal tax, sales tax and all taxes applicable. The rates must include carriage of all the material, boring equipments. T & P and other consumables.
3. The rates must include cutting, threading, assembling of pipe etc.
4. Nothing extra will be payable for temporarily suspension of work on any ground.
5. The work shall be carried out by the contractor strictly in accordance with ISI specification subject to the note at the end of this chapter.
6. The digging of pits for storage of water and the water required for drilling the Tubewell will be arranged by the contractor/ firm at its own cost and nothing is payable on this account.
7. After installation & development of the t/well the water works site shall be restored to the original condition i.e. free of pits & heaps of earth.
8. All the material shall be ISI Marked unless otherwise the make some other better make has been approved in these specifications.

APPENDIX -A
(Clause 4.3)
VERTICALITY TEST REPORT

Name of work I.D. of wellmm
 Pump Serial No. O.D. of disc.....mm
 Conducted by Disc correction.....,mm
 In the presence at Point of suspension in above top of well
 Date: Static Water Levelmm
 Depth of well housingmm

Depth in m. below top of Tubewell	Readings from arbitrary datum		Deviation from vertical at top of Tubewell				Calculated deviation from vertical at respective depth				Calculated deviation from vertical at respective depth adding Disc correction				Resultant deviation Remarks & its direction.
	X	Y	N	S	E	W	N	S	E	W	N	S	E	W	
0			0	0	0	0	0	0	0	0	0	0	0	0	0

Signature of Customer Signature of Tester.....

APPENDIX – B
(Clause 7.2)

INFORMATION TO BE FURNISHED BY TESTING AGENCY TO OWNER ON
COMPLETION OF THE TESTING OF TUBEWELL.

1. Agency conducting the tests.....
2. Location of the Tubewell;/.....
3. Date of starting.....
4. Date of completion.....
5. Total depth of Tubewell.....
5. Depth of water level.....
Method adopted.....
7. Result of verticality and alignment test.....
8. Draw down test (for each step pumping, 5 – 8 steps):
Time of pumping test
Speed rev/ minDiv.....
Period of running (1-2 hrs but same for all steps).....
9. Rated discharge in LPM (as per the analysis of reputed geologist/consultant (copy of report to be attached)
10. Depression head of the production well.....
11. Recommendation with regard to a suitable pump (as per the analysis of all data available by the reputed geologist/consultant (copy of report to be attached)
12. Further details appended:
Chemical and biological analysis of Tubewell test
13. Remarks

Owners.....

Tester.....

NOTE: The PWD specification book, relevant IS/ISO codes/ any other reference in works relevant to the various material and workmanship etc. shall be read apart from this schedule provide. However, wherever the provisions in this schedule are in variance with any provisions of the above mentioned specification book/ relevant IS/ISO codes/ any other reference, the specification of this schedule shall be followed.