

**CONTRACT NO.**

**GUJARAT WATER SUPPLY & SEWERAGE BOARD  
GANDHINAGAR**

(A WHOLLY OWNED GOVERNMENT OF GUJARAT UNDERTAKING)



**Name of Work :- Providing, Supplying, Lowering Laying & Jointing 110 mm dia. PVC R.M. Pipe line from Amabaradi village sump to malgadh para vistar sump of Amabaradi village under Rejuvenation programme. Ta.Jasdan**

**Estimated Cost :- Rs. 581482.59**

**VOLUME – II B –I  
TECHNICAL SPECIFICATION**

**Chief Engineer  
Gujarat Water Supply & Sewerage Board  
Zone –III, RAJKOT**

**TECHNICAL SPECIFICATION**

# ***SPECIFICATIONS***

## **EARTHWORK**

## EARTHWORK

### Applicable Codes

The following Indian Standard Codes, unless otherwise specified herein, shall be applicable. In all cases, the latest revision of the codes shall be referred to.

IS 3764 - 1992	Excavation work - Code of Safety.
IS 2720	Methods of test for soils:
(Part-1) - 1983	Part 1 Preparation of dry soil samples for various tests.
(Part-2) - 1986	Part 2 Determination of Water Content.
(Part-4) - 1985	Part 4 Grain size analysis.
(Part-5) - 1985	Part 5 Determination of liquid and plastic limit.
(Part-7)	Part 7 Determination of water content - dry density relation using light compaction.
(Part-9)	Part 9 Determination of dry density - moisture by constant weight of soil method.
(Part-14) – 1983	Part 14 Determination of density index (relative density) of cohesion less soils.
(Part-22) – 1978	Part 22 Determination of organic matter.
(Part-26) – 1987	Part 26 Determination of pH Value.
(Part-27) – 1987	Part 27 Determination of total soluble sulphates.
(Part-28) – 1974	Part 28 Determination of dry density of soils in place by the sand replacement method.
(Part-33) – 1971	Part 33 Determination of the density in place by the ring and water replacement method.
(Part-34) – 1972	Part 34 Determination of density of soil in place by rubber balloon method.
(Part-38) – 1976	Part 38 Compaction control test (Hilf Method ).

### General:

The Contractor shall furnish all tools, plant, instruments, qualified supervisory personnel, labour, materials, any temporary works, consumables, any and everything necessary, whether or not such items are specifically stated herein for completion of the work in accordance with the Employer's Requirements.

The Contractor shall survey the site before excavation and set out all lines and establish levels for various works such as grading, basement, foundations, plinth filling, roads, drains, cable trenches, pipelines etc. Such survey shall be carried out by taking accurate cross sections of the area perpendicular to established reference/grid lines at 8m intervals or nearer, if necessary, based on ground profile and thereafter properly recorded.

The excavation shall be carried out to correct lines and levels. This shall also include, where required, proper shoring to maintain excavations and also the furnishing, erecting and maintaining of substantial barricades around excavated areas and warning lamps at night.

Excavated material shall be dumped in regular heaps, bunds, riprap with regular slopes within the lead specified and leveling the same so as to provide natural drainage. Rock/soil & murrum excavated shall be stacked properly as approved by the Employer's Representative. As a rule, all softer material shall be laid along the center of heaps, the harder and more weather resisting materials forming the casing on the sides and the top. Rock shall be stacked separately. Top soil shall be stock piled separately for later re-use.

### Clearing:

The area to be excavated / filled shall be cleared of fences, trees, plants, logs, stumps, bush, vegetation, rubbish, slush, etc. and other objectionable matter. If any roots or stumps of trees are encountered during excavation, they

shall also be removed. The material so removed shall be disposed off as approved by the Employer's Representative. Where earth fill is intended, the area shall be stripped of all loose/ soft patches, top soil containing objectionable matter/ materials before fill commences.

**Excavation:**

All excavation work shall be carried out by mechanical equipment unless, in the opinion of Employer's Representative, the work involved requires it to be carried out by manual methods.

Excavation for permanent work shall be taken out to such widths, lengths, depths and profiles as are shown on the drawings provided by the Contractor or such other lines and grades as may be agreed with the Employer's Representative. Rough excavation shall be carried out to a depth of 150mm above the final level. The balance shall be excavated with special care.

Soft pockets shall be removed below the final level and extra excavation filled up with lean concrete as approved by the Employer's Representative. The final excavation should be carried out just prior to laying the blinding course.

To facilitate the permanent works the Contractor may excavate, and also backfill later, outside the lines shown on the drawings provided by the Contractor as agreed with the Employer's Representative. Should any excavation be taken below the specified elevations, the Contractor shall fill it up with concrete of the same class as in the foundation resting thereon, up to the required elevation at no cost to the Employer.

All excavations shall be to the minimum dimensions required for safety and ease of working. Prior approval of the Employer's Representative shall be obtained by the Contractor in each individual case, for the method proposed for the excavation, including dimensions, side slopes, dewatering, disposal, etc. This approval shall not in any way relieve the Contractor of his responsibility for any consequent loss or damage. The excavation must be carried out in the most expeditious and efficient manner. Side slopes shall be as steep as will stand safely for the actual soil conditions encountered. Every precaution shall be taken to prevent slips. Should slips occur, the slipped material shall be removed and the slope dressed to a modified stable slope.

**Rock:****General:**

'Rock' means a natural aggregate of mineral crystals, which for its excavation would normally require the use of heavy pneumatic/hydraulic breaker and/or cutting equipment or explosives. The term shall exclude any material that can be removed by ordinary excavating machinery and which in any individual mass has a volume not exceeding  $1\text{m}^3$  or  $0.25\text{m}^3$  where the net width of excavation is less than 2 m. Ordinary excavating machinery means a hydraulic back hoe with rated output of 50 kW or less.

Before classification of material as rock the Contractor shall demonstrate to the satisfaction of the Employer's Representative his inability to excavate it without resort to heavy percussion tools complete with rock bits, hydraulic wedges or blasting. Excavation by the use of explosive will not normally be permitted except for pipeline.

Material shall not be classified as rock unless the Employer's Representative has agreed to such classification on the basis of such a demonstration before its excavation. Excavations where rock has been encountered and classified as such shall not be backfilled before examination of the excavated faces by the Employer's Representative to enable the extent of the rock excavation to be determined.

**Excavation by the Use of Explosives**

Unless otherwise stated herein, I.S. Specification "IS: 4081: Safety Code for Blasting and related Drilling Operations" shall be followed. As far as possible all blasting shall be completed prior to commencement of construction. At all stages of excavation, precautions shall be taken to preserve the rock below and beyond the lines specified for the excavation, in the soundest possible condition. The quantity and strength of explosives used shall be such as will neither damage nor crack the rock outside the limits of excavation. All precautions, as directed by Employer's Representative, shall be taken during the blasting operations and care shall be taken that

no damage is caused to adjoining buildings or structures as a result of blasting operations. In case of damage to permanent or temporary structures, Contractor shall repair the same to the satisfaction of Employer's Representative at his cost. As excavation approaches its final lines and levels, the depth of the charge holes and number of explosives used shall be progressively and suitably reduced.

The contractor shall obtain a valid Blasting License from the authorities concerned. No explosive shall be brought near the work in excess of quantity required for a particular amount of firing to be done; and surplus left after filling the holes shall be removed to the magazine. The magazine shall be built as far possible from the area to be blasted. Employer's Representative's prior approval shall be taken for the location proposed for the magazine.

In no case shall blasting be allowed closer than 30 meters to any structure or to locations where concrete has just been placed. In the latter case the concrete must be at least 7 days old.

For blasting operations, the following points shall be observed.

- i) Contractor shall employ a competent and experienced supervisor and licensed blaster in-charge of each set of operation, who shall be held personally responsible to ensure that all safety regulations are carried out.
  - ii) Before any blasting is carried out, Contractor shall intimate Employer's representative and obtain his approval in writing for resorting to such operations. He shall intimate the hours of firing charges, the nature of explosive to be used and the precautions taken for ensuring safety.
  - iii) Contractor shall ensure that all workmen and the personnel at site are excluded from an area within 200 m radius from the firing point, at least 15 minutes before firing time by sounding warning whistle. The area shall also be given a warning by sounding a distinguishing whistle.
  - iv) The blasting of rock near any existing buildings, equipment or any other property shall be done under cover and Contractor has to make all such necessary muffling arrangements. Covering may preferably be done by MS plates with adequate dead weight over them. Blasting shall be done with small charges only and where directed by Employer's Representative; a trench shall have to be cut by chiseling prior to the blasting operation, separating the area under blasting from the existing structures.
  - v) The firing shall be supervised by a Supervisor and not more than 6 (six) holes at a time shall be set off successively. If the blasts do not tally with the number fired, the misfired holes shall be carefully located after half an hour and when located, shall be exploded by drilling a fresh hole along the misfired hole (but not nearer than 600 mm from it) and by exploding a new charge.
  - vi) A wooden tamping rod with a flat end shall be used to push cartridges home and metal rod or hammer shall not be permitted. The charges shall be placed firmly into place and not rammed or pounded. After a hole is filled to the required depth, the balance of the hole shall be filled with stemming, which may consist of sand or stone dust or similar inert material.
  - vii) Contractor shall preferably detonate the explosives electrically.
  - viii) The explosives shall be exploded by means of a primer, which shall be fired by detonating a fuse instantaneous detonator (F.I.D) or other approved cables. The detonators with F.I.D. shall be connected by special nippers.
  - ix) In dry weather and normal dry excavation, ordinary low explosive gunpowder may be used. In damp rock, high explosive like gelatin with detonator and fuse wire may be used. Underwater or for excavation in rock with substantial accumulated seepage electric detonation shall be used.
  - x) Holes for charging explosives shall be drilled with pneumatic drills, the drilling pattern being so planned that rock pieces after blasting will be suitable for handling without secondary blasting.
  - xi) When excavation has almost reached the desired level, hand trimming shall have to be done for dressing the surface to the desired level.
- Any rock excavation beyond an over break limit of 75 mm shall be filled up as instructed by Employer's Representative, with concrete of strength not less than M10. Stopping in rock excavation shall be done by hand trimming.

xii) Contractor shall be responsible for any accident to workmen, public or Employer's property due to blasting operations. Contractor shall also be responsible for strict observance of rules, laid by Inspector of explosives, or any other Authority duly constituted under the State and / or Union Government as applicable at the place of excavation.

**Stripping Loose Rock:**

All loose boulders, detached rocks partially and other loose material which might move therewith not directly in the excavation but so close to the area to be excavated as to be liable, in the opinion of Employer's Representative, to fall or otherwise endanger the workmen, equipment, or the work shall be stripped off and removed from the area of the excavation. The method used shall be such as not to render unstable or unsafe the portion, which was originally sound and safe.

Any material not requiring removal in order to complete the permanent works, but which, in the opinion of Employer's Representative, is likely to become loose or unstable later, shall also be promptly and satisfactorily removed.

**Classification of Strata:**

The decision regarding, classification of strata shall rest with the Engineer in charge and his decision shall be final and binding to the contractor.

All the materials encountered in the excavation shall be classified as under: -

**ORDINARY SOIL AND SOFT MURRUM:**

These will include all materials of an earthy or sandy nature, which can be easily ploughed or small shingle, and gravel, which can be easily removed.

**HARD MURRUM:**

This shall include all kinds of disintegrated rock or shale or inundated clay which can be removed with a shovel without difficulty and which do not require blasting.

**SOFT ROCK:**

This shall include all materials which is rock or hard conglomerate, all decomposed and whether rock, highly fissured rock old masonry and also soft rock boulders bigger than 1/2 cubic meter and other varieties of rock. Which do not require blasting and which can be removed with the pie crowbars wedges and hammer.

**HARD ROCK:**

This shall include rocks, occurring in masses, which could best be removed by chiseling or by blasting.

**Fill, Backfilling and Site Grading:****General:**

All fill material shall be subject to the Employer's Representative's approval. If any material is rejected by Employer's Representative, the Contractor shall remove the same forthwith from the site. Surplus fill material shall be deposited/disposed off as directed by Employer's Representative after the fill work is completed.

No earth fill shall commence until surface water discharges and streams have been properly intercepted or otherwise dealt with to the approval of the Employer's Representative.

**Material:**

To the extent available, selected surplus spoil from excavations shall be used as backfill. Backfill material shall be free from lumps, organic or other foreign material. All lumps of earth shall be broken or removed. Where excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150 mm size, mixed

with properly graded fine material consisting of murrum or earth to fill the voids and the mixture used for filling.

If fill material is required to be imported, the Contractor shall decide to bring such material from outside borrow pits. The material and source shall be subject to the prior approval of the Employer's Representative. The approved borrow pit areas shall be cleared of all bushes, roots of trees, plants, rubbish, etc. Topsoil containing foreign material shall be removed. The materials so removed shall be disposed of as directed by Employer's Representative. The Contractor shall provide the necessary access roads to borrow areas and maintain the same if such roads do not exist.

### **Filling in pits and trenches around foundations of structures, walls, etc.**

As soon as the work in foundations has been accepted and measured, the spaces around the foundations, structures, pits, trenches, etc., shall be cleared of all debris, and filled with earth in layers not exceeding 15 cm, each layer being watered, rammed and properly consolidated, before the succeeding one is laid. Each layer shall be consolidated to the satisfaction of Employer's Representative. Earth shall be ramming with approved mechanical compaction machines. Usually no manual compaction shall be allowed unless the Employer's Representative is satisfied that in some cases manual compaction by tampers cannot be avoided. The final backfill surface shall be trimmed and leveled to a proper profile to the approval of the Employer's Representative.

### **Plinth Filling:**

Plinth filling shall be carried out with approved material as described hereinbefore in layers not exceeding 15cm, watered and compacted with mechanical compaction machines. The Employer's Representative may, however, permit manual compaction by hand tampers where he is satisfied that mechanical compaction is not possible. The finished level of the filling shall be trimmed to the level/slope specified.

The thickness of each unconsolidated fill layer can in this case be up to a maximum of 300mm. The Contractor will determine the thickness of the layers in which fill has to be consolidated depending on the fill material and equipment used and the approval of the Employer's Representative obtained prior to commencing filling.

The compacted surface shall be properly shaped, trimmed and consolidated to an even and uniform gradient. All soft spots shall be excavated, then filled and consolidated.

### **Sand Filling in Plinth and Other Places:**

Where backfilling is required to be carried out with local sand it shall be clean, medium grained and free from impurities. The filled-in-sand shall be kept flooded with water for 24 hours to ensure maximum consolidation. The surface of the consolidated sand shall be dressed to required level or slope. Construction of floors or other structures on sand fill shall not be started until the Employer's Representative has inspected and approved the fill.

### **Filling in Trenches:**

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipe and drains have been tested and passed. The backfilling material shall be properly consolidated taking due care so that no damage is caused to the pipes.

Where the trenches are excavated in soil, the filling from the bottom of the trench to the level of the center line of the pipe shall be done by hand compaction with selected approved earth in layers not exceeding 8 cm; backfilling above the level of the center line of the pipes shall be done with selected earth by hand compaction, or other approved means in layers not exceeding 15 cm.

In case of excavation of trenches in rock, the filling up to a level 30 cm above the top of the pipe shall be done with fine materials such as earth, murrum, etc. The filling up to the level of the centerline of the pipe shall be done by hand compaction in layers not exceeding 8 cm whereas the filling above the centerline of the pipe shall be done by hand compaction or approved means in layers not exceeding 15 cm. The filling from a level 30 cm above the top of the pipe to the top of the trench shall be done by hand or other approved mechanical methods with broken rock filling of size not exceeding 15 cm mixed with fine material as available to fill up the voids.

Filling of the trenches shall be carried out simultaneously on both sides of the pipe to avoid unequal pressure on the pipe.

### **General Site Grading:**

Site grading shall be carried out as indicated in the drawings and as approved by the Employer's Representative. Excavation shall be carried out as specified in the Employer's Requirements. Filling and compaction shall be carried out as specified under Clause 2.7 and elsewhere unless otherwise indicated below.

If no compaction is called for, the fill may be deposited to the full height in one operation and leveled. If the fill has to be compacted, it shall be placed in layers not exceeding 225 mm and leveled uniformly and compacted as indicated in Clause 2.7 before the next layer is deposited.

To ensure that the fill has been compacted as specified, field and laboratory tests shall be carried out by the Contractor.

Field compaction tests shall be carried out in each layer of filling until the fill to the entire height has been completed. This shall hold good for embankments as well. The fill will be considered as incomplete if the desired compaction has not been obtained.

The Contractor shall protect the earth fill from being washed away by rain or damaged in any other way, the Contractor shall remove the affected material and make good.

If so specified, the rock as obtained from excavation may be used for filling and leveling to indicate grades without further breaking. In such an event, filling shall be done in layers not exceeding 50 cms approximately. After rock filling to the approximate level, indicated above has been carried out, the void in the rocks shall be filled with finer materials such as earth, broken stone, etc. and the area flooded so that the finer materials fill up the voids. Care shall be taken to ensure that the finer fill material does not get washed out. Over the layer so filled, a 100 mm thick mixed layer of broken material and earth shall be laid and consolidation carried out by a 12-ton roller. No less than twelve passes of the roller shall be accepted before subsequent similar operations are taken up.

### **Fill Density:**

The compaction, under the plant road area and building plinths shall comply with minimum 95% compaction by Standard Proctor at moisture content differing not more than 4% from the optimum moisture content. The Contractor shall demonstrate adequately by **field and laboratory tests that the specified density has been obtained. In other areas the** soil should be backfilled and compacted suitably as specified by the Engineer.

### **Timber Shoring:**

Close timbering shall be done by completely covering the sides of the trenches and pits generally with short, upright members called 'polling boards'. These shall be of minimum 25 cm x 4 cm sections or as approved by the Employer's Representative. The boards shall generally be placed in position vertically side by side without any gap on each side of the excavation and shall be secured by horizontal walling of strong wood at maximum 1.2 meter spacing, strutted with bullies or as approved by the Employer's Representative. The length of the bully struts shall depend on the width of the trench or pit. If the soil is very soft and loose, the boards shall be placed horizontally against each side of the excavation and supported by vertical walling, which in turn shall be suitably strutted. The lowest boards supporting the sides shall be taken into the ground and no portion of the vertical side of the trench or pit shall remain exposed, so as to render the earth liable to slip out.

Timber shoring shall be 'close' or 'open' type, depending on the nature of soil and the depth of pit or trench. The type of timbering shall be as approved by the Employer's Representative. It shall be the responsibility of the Contractor to take all necessary steps to prevent the sides of excavations, trenches, pits, etc. from collapsing.

Timber shoring may also be required to keep the sides of excavations vertical to ensure safety of adjoining structures or to limit the slope of excavations, or due to space restrictions or for other reasons. Such shoring shall be carried out, except in an emergency, only under instructions from the Employer's Representative.

The withdrawal of the timber shall be done carefully to prevent the collapse of the pit or trench. It shall be started at one end and proceeded with, systematically to the other end. Concrete or masonry shall not be damaged during the removal of the timber.

In the case of open timbering, the entire surface of the side of trench or pit is not required to be covered. The vertical boards of minimum 25 cm x 4 cm sections shall be spaced sufficiently apart to leave unsupported strips of maximum 50 cm average width. The detailed arrangement, sizes of the timber and the spacing shall be subject to the approval of the Employer's Representative. In all other respects, the Employer's Requirements for close timbering shall apply to open timbering.

In case of large pits and open excavations, where shoring is required for securing safety of adjoining structures or for any other reasons and where the planking across sides of excavations/pits cannot be strutted against, suitable inclined struts supported on the excavated bed shall be provided. The load from such struts shall be suitably distributed on the bed to ensure no yielding of the strut.

**Dewatering:**

The Contractor shall ensure that the excavation and the structures are free from water during construction and shall take all necessary precautions and measures to exclude ground/rain water so as to enable the works to be carried out in reasonably dry conditions in accordance with the construction planning. Sumps made for dewatering must be kept clear of the excavations/trenches required for further work. The method of pumping shall be approved by Employer's Representative, but in any case, the pumping arrangement shall be such that there shall be no movement of subsoil or blowing in due to differential head of water during pumping. Pumping arrangements shall be adequate to ensure no delays in construction. The dewatering shall be continued for at least (7) seven days after the last pour of the concrete. The Contractor shall, however, ensure that no damage to the structure results on stopping of dewatering.

The Contractor shall study the sub-soil conditions carefully and shall conduct any tests necessary at the site with the approval of the Employer's Representative to test the permeability and drainage conditions of the sub-soil for excavation, concreting etc., below ground level.

The scheme for dewatering and disposal of water shall be approved by the Employer's Representative. The Contractor shall suitably divert the water obtained from dewatering from such areas of site where a buildup of water in the opinion of the Employer's Representative obstructs the progress of the work, leads to unsanitary conditions by stagnation, retards the speed of construction and is detrimental to the safety of men, materials, structures and equipment.

When there is a continuous inflow of water and the quantum of water to be handled is considered in the opinion of Employer's Representative, to be large, a well point system- single stage or multistage, shall be adopted. The Contractor shall submit to the Employer's Representative, details of his well point system including the stages, the spacing, number and diameter of well points, headers etc., and the number, capacity and location of pumps for approval.

**Rain Water Drainage:**

Grading in the vicinity of excavation shall be such as to exclude rain/ surface water draining into excavated areas. Excavation shall be kept clean of rain and such water as the Contractor may be using for his work by suitably pumping out the same. The scheme for pumping and discharge of such water shall be approved by the Employer's Representative.

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## SECTION 8 : ITEM WISE SPECIFICATIONS

### Schedule-B1

### :: SPECIFICATION FOR PVC PIPELINE WORK ::

#### Item No. 1

Providing, supplying ISI mark rigid Unplasticised PVC pipes suitable for potable water with bell ended pipe with rubber ring joints (ring fit type) including cost of EPDM rubber rings as per IS specification No. 4985/2000 ISO 9002 including all local and central taxes, insurance, transportation, freight charges, Octroi, inspection charges, loading, unloading, conveyance to site and cost of jointing material etc. complete and lowering, laying and jointing PVC ring fit type pipes and specials of different class and diameter including cost of transportation to site of works including cost of labour, material, giving satisfactory hydraulic testing as per ISI code etc. complete.

This item includes:

Including job connection with existing line (if required)

- 1) 110 mm dia. PVC 6 kg/cm<sup>2</sup> pipeline

#### **U-PVC PIPES:**

##### **UNPLASTICIZED PVC PIPES**

For Indian manufacturers a valid license issued by the Bureau of Indian Standards for marking the PVC pipes with ISI mark is a mandatory requirement both for PVC pipes & rings

##### **STANDARDS:**

- The UPVC Pipes to be manufactured, supplied and delivered under the scope of this contract shall be manufactured in accordance and confirming to IS:4985-2000 or its latest revision or amendments or other authoritative standard that ensure at least a substantially equal quality to the IS:4985-2000 or its latest revision or amendments
- Elastometric sealing ring shall be as per specification of IS – 5382- 1985, and ISO: 4633-1996 or it shall be EPDM rubber ring.
- The dimensions, material compositions, tests etc. shall be as per IS:4985-2000 or with its latest revision or amendments.
- The minimum wall thickness weight shall be as per Appendix I of the tender.
- The colour of pipes shall be as per IS 4985-2000
- Bureau of Indian Specifications (BIS) / Indian Standard (IS) shall mean the Latest version issued by BIS.

The material from which the pipes are made shall consist substantially of unplasticized polyvinyl chloride conforming to IS: 10151, to which may be added only those additives that are absolutely needed to facilitate the manufacture of the polymer, and the production of sound, durable pipes of good surface, finish, mechanical strength and opacity.

The bulk density of the UPVC compound shall be 0.50 to 0.53 and the density of UPVC pipe shall be 1.40 to 1.46 g / cm<sup>3</sup>.

The additional of the manufactures own rework material shall comply to clause 4.2 of IS: 4985.

PVC resin of suspension grade K-66/K-67 shall be used for extrusion of UPVC pipe.

- In line with BIS 4985-2000 the tolerance on outside diameter of the pipe shall be as under:

Nominal outside Diameter	Min. outside diameter in mm		Outside diameter at any point in mm	
	Minimum	Maximum	Minimum	Maximum

90	90	90.3	88.9	91.1
110	110	110.4	108.6	111.4
140	140	140.5	138.3	141.7
160	160	160.5	158.0	162.0
180	180	180.6	177.8	182.2
200	200	200.6	197.6	202.4
250	250	250.8	247.0	253.0
225	225	225.7	222.3	227.7
280	280	280.9	276.6	283.4
315	315	316	311.2	318.8

- “The pipes shall be transported to the store by flat floored trucks in pre packed wooden crate. The height of crate should not be exceeding more than 2 meters. The both ends of packaging unit (crate) shall be covered with plastic sheet to ensure adequate protection during transport. At the time of packing and stacking of pipes, the sockets shall be alternated within the pipe of pipes and shall project sufficiently for the pipes to be correctly supported along their whole length. The pipes shall rest uniformly on the vehicle bed over their whole length during transport to avoid sagging or deformation.

The packing material like wooden crate, plastic sheet etc. shall be the property of tenderer and he is permitted to reuse the packing material for transporting next batch of pipes”.

- The pressure rating of pipes shall be in accordance with IS 4985 with a maximum continuous working pressure at 27° C. of 6 & 10 kg/cm<sup>2</sup>. This working pressure shall be down graded for ambient underground soil temperature of 45° C. as per the figure given in IS 4985 for design purposes.
- The pipes when subjected to internal hydrostatic pressure in accordance with IS: 12235-1986 (part – 8) shall not burst during the prescribed test duration. The temperature, duration and test and induced internal stress shall conform to the parameters given below:

Sr. No.	Test	Temp. (°C)	Min. duration (h)	Induced Stress (Mpa)	Requirements
1	Type test	60	1000	10	No failure
2	Acceptance Test	27	1	36	No failure

- The integral socket of the pipe shall be tested for internal hydrostatic pressure in accordance with ISO: 3603 and ISO 1167.
- The UPVC pipe shall not contain vinyl chloride monomer (VCM) exceeding 1 ppm when determined by means of gas phase chromatography using the “headspace” method according to IS: 10151.
- The wall of the socket and the wall of the plain pipe shall not transmit more than 0.2% of visible light falling on them when tested in accordance with IS:12235 (part -3).

The pipes shall be supplied in straight length of 6 mtrs with tolerance of +20mm and -0mm. The effective length of socket pipe shall be considered as shown in figure 2 of IS 4985.

All plastic and non plastic material for components of the UPVC piping system e.g. Elastomeric sealing ring, lubricants, when in permanent or in temporary contact with water which is intended for human consumption, shall not adversely affect the quality of the drinking water.

Concentrations of chemicals, biological agents or other substance leached from pipe materials in contact with drinking water and the values of the relevant physical parameters, shall not exceed the maximum values recommended by IS: 10500.

The pipe material shall be in accordance with IS 4985, clause 6.3.

- The quality control system and sampling model shall be as under:

<b>Quality Control System and Sampling Model</b>
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Order of Tests to be conducted	By Manufacturer	By Third Party Inspection / PMC representative	Codes/Standards to be followed	Remark
Raw Material 1) Resin K-valve Particle size dis. Bulk density 2) PVC compound density	Laboratory test certificates from the original manufacturer of resin and pipe confirmation of the same by the pipe manufacturer in their laboratory. Both test certificates have to be presented during inspection	Verification of test certificates and witness of sample test at manufacturer's laboratory at discretion	IS: 4669	For every batch of PVC resin used prior to formulation of compound
Process Check Degree of fusion of extruded UPVC pipe by Acetone immersion test.	Minimum one specimen per extrusion condition or moulding condition per day	May witness test during inspection	ASTM D 2152	Test shall be conducted on samples from each machine
On line Check Quality Outside diameter Wall thickness Length of pipe surface finish Socket dimensions	Each & every pipe shall be checked by the manufacturer during extrusion of pipe	Sample testing shall be done for the acceptance of the lot as per sampling procedure given Appendix – A, Table -5 of IS 4985	IS: 4985 ISO: 2045 Specification	Wall thickness shall also be checked by cutting the pipe at any place by the inspector
Finished product check. Reversion test Stress relief test	Min. 2 samples per machine per shift shall be tested	Sample testing shall be done as per IS 4985, Table 6&7	IS: 4985 IS: 12235 Part 5&6	Test records shall be submitted to PMC on request
Drop impact test Internal Hydrostatic pressure test. Pressure test for integral joint	Min. 1 samples per machine per shift	Sample testing shall be done as per IS 4985, Table-8	IS: 4985 IS: 12235 Part 8&9 ISO 3603 ISO 1167	Whenever the pipe is cut for hydrostatic test, the inspector will also verify the pipe thickness
Capacity Effect on water	Min. one sample for every change in compound formulation	One sample per 100 km of length of supply at the discretion of inspector	IS: 4985 IS: 12235 Part 3,4&10	Test records shall be submitted to PMC on request
Long term hydrostatic test	Min. 3 samples of different diameter from the regular production lot.	May witness test during inspection	IS: 4985 IS: 12235	Test records shall be submitted to PMC on request
Density	Min. one sample per machine per shift	Min 5 samples per lot	IS: 8543 part 1/sec 2	Reconfirmation may be done at store by checking the

Quality Control System and Sampling Model				
Order of Tests to be conducted	By Manufacturer	By Third Party Inspection / PMC representative	Codes/Standards to be followed	Remark
				samples at the approved laboratory
Ash content	Min. one sample per machine per shift	Min 5 samples per lot	MTNL Standard/ISO: 3451-5	Reconfirmation may be done at store by checking the samples at the approved laboratory
Vicat softening temp.	Min. one sample per machine per shift	Min. one sample per lot.	ISO : 2507	

#### TEMPERATURE VARIATIONS:

All the pipes to be manufactured, supplied and delivered shall be subjected to weather conditions like sun, dust, rain, wind as available in State of Gujarat. They shall be also subjected to carry and convey drinking water under variable temperature conditions ranging from 4 C<sup>0</sup> to 45 C<sup>0</sup>.

#### MARKING :

The methods of marking all the pipes to be delivered under scope of contract shall ensure that all the information will remain legible even after transportation, storage in open space etc. In general the legible and indelible marking upon the goods shall indicate the followings;

- i) Certification mark on each pipe.
- ii) Manufacturers brand name and/or trademark.
- iii) Purchasers mark as "GWSSB" be inscribed.
- iv) The outside diameter and pressure rating.
- v) Batch number or lot number.
- vi) Inspector's mark on each pipe
- vi) Any other important matter that the manufacturer or purchaser deems fit to be inscribed.

#### ELASTOMERIC SEALING RING

These sealing ring shall be Sturine Butadin in red color as specified in IS. The lubricant applied for jointing of elastomatic rubber ring shall be of good quality and comply the following specifications:

- a) Must have paste like consistency and be ready for use, preferably soap jelly.
- b) Has to adhere wet and dry surfaces of UPVC pipes and rubber ring.
- c) Must be non-toxic.
- d) Must be water-soluble.
- e) Must non-affecting physio-chemical and organoleptic properties of drinking water carried on the pipe.
- f) Must not have an objectionable odour.
- g) Must not harmful to the skin.

Elastomatic sealing ring shall be in accordance with one of the types (Type - 1 to Type – 6) as per ISS 5382. These sealing rings shall be EPDM rubber ring. The sealing ring shall be with ISI mark.

In case of imported EPDM Ring, such rings shall conform to relevant International Standards or the Standards of country of origin, which are equivalent or higher than the Bureau of Indian Standard Specifications. In case of manufacturers who have applied for getting a BIS certification mark, it would be mandatory for such bidders to produce the BIS certification license on or before the date of opening of the price bids. An undertaking in this regard shall have to be provided along with the technical bid.

The rubber sealing rings shall be vulcanized from Ethylene Propylene (EPDM) with strengths as per table 2 of IS 5382-1985.

**TYPE TEST:**

- a) Type test capacity, test for effect on water, test for resistance to Sulfuric Acid, internal Hydrostatic pressure test for 1000 Hrs. shall be carried out at least once at any time during the contract. Or shall be taken at least once during every six months irrespective of the ordered quantity.
- b) The said type test shall be taken by the GWSSB's representative or third party inspection agency at the in-house laboratory of the manufacturer

**COLOR OF PIPES:**

- The color of the pipes shall be as per IS 4985-2000.
- The pipes shall bear ISI mark confirming to IS:4985-2000 or its latest amendment/revision if any.

**TEST FOR PVC RESIN & PIPE:****Test For PVC Resin**

It shall be sufficient to show the certificate of chemical test (in accordance with IS 4669) to the inspecting authority to confirm the 'K' value to be 64 to 67 as per clause No. 6.1.2. of IS 4985-2000

**Specific Gravity and Ash Content Tests:****a) Density:**

These tests shall be carried out by the inspection agency as per the IS:4985-2000 OR its latest revision OR amendments. The value shall be between 1.40 and 1.46 as per the ISS clause No. 10.6

**b) Sulphate Ash content:**

When tested as per Annex B, of IS 4985-2000, the sulphated ash content in the pipe shall not exceed 10 percent.

c) Other test shall be carried out as per ISS 4985-2000 or its latest revision or amendment

**TOLERANCE IN WEIGHT OF PIPES:**

(-) 1% tolerance in actual weight of pipes shall be allowed but in overall weight there should not be any minus tolerance i.e. minus tolerance may be compensated in overall weight. If the tolerance is in minus, the consignment shall be outright rejected. The weight of pipes as given in Appendix-I shall be considered. If required the consignee can weight the whole lot of supply for verification.

**Quality Assurance**

The manufacturer shall have a laid down Quality Assurance Plan for the manufacture of the products offered which shall be submitted along with the tenders.

Unit weight and minimum wall thickness of unplasticized ring fit type PVC pipes are as per IS 4985-2000.

The bidder shall have to arrange for random testing of pipes brought on site, in CIPET in the presence of GWSSB's representative and on satisfactory report from the CIPET the payment of pipes will be made.

**Price Variation:****(A) PVC pipe**

The prices are firm and fixed except for variation in the prices of PVC resin.

In case of variation in basic price of PVC resins, the accepted rates for the pipes shall be subject to increase or decrease per tonne. The price variation will be based on price announced by IPCL from time to time. For price variation calculation the weight of PVC pipes purchased and actually brought on the site during the calendar month shall be considered. The weight of PVC pipes is given below.

Sr.No.	OD in mm/ Kg/Cm <sup>2</sup>	Pressure in Kg / Meter for Ring fit type pipes
1	90 / 6	1.323
2	110 / 6	1.905

3	140 / 6	3.120
4	160 / 6	4.018
5	200 / 6	6.362

The amount payable to the contractor for the work done involving use of PVC pipes shall be adjusted for the increase or decrease in the rates of these materials as explained below:

Materials	Basic Rate announced by IPCL as on _____. In Rs/MT (Ex. Gandhar Complex)
PVC resin grade 67 GER 092	Rs. _____ - _____ Only per MT

The above basic rates are as per announcement of IPCL as on 1<sup>st</sup> August, 2007. The above rates are inclusive of Excise Duty but excluding Sales tax, any other levies and transportation etc. The price adjustment shall be carried out based on the basic price announced by the IPCL from time to time for their Gandhar Complex. The average rate of calendar month shall be the base rate for price adjustment. The increase or decrease in the basic price shall be adjusted for the quantity of pipes purchased and actually brought on the site during the calendar month.

Price variation shall be calculated as under.

$$P = 0.90(A-B) * C$$

P= Amount of price variation to be adjusted.

A= Average rate of the calendar month

B= Basic rate as mentioned above (i.e. Rs. \_\_\_\_\_ per MT)

C= Weight of PVC pipes purchased and actually brought on the site during the calendar month. The purchase date will be the effective date for price variation.

#### **Condition for variation:**

1. No ceiling for variation for the difference in cost of PVC resin will be applicable.
2. The condition will be operative from the date of work order. No escalation shall be granted beyond stipulated time. However, in case of work carried after original time limit, only decrease in prices shall be adjusted.

## **Item No. 2**

### **EXCAVATION FOR PIPE LINE TRENCHES**

**Excavation for pipeline trenches including all safety provisions using the site rails, stacking the excavated stuff up to a lead of 90 mt. Cleaning the site etc complete. In all sorts of soil, soft/hard murrum, boulders incl. macadam road.**

#### **1) 140 mm dia. PVC 6 kg/cm<sup>2</sup> pipeline**

- a) In all sorts of soil and soft murrum
- b) In hard murrum, boulders including macadam road
- c) In soft rock, Masonry C:M or L:M
- d) In Hard rock, or C:C in 1:2:4 or RCC including blasting or / chiseling

#### **1.0 GENERAL**

- 1.1 The excavation for trenches will generally, refer to open excavation for trenches in wet / dry conditions for pipe laying work.

#### **2.0 CLEARING OF SITES:**

##### **3.0**

- 2.1 The site on which the pipelines are to be laid and shown on plan and the area required for setting out and other operations shall be cleared and all obstruction loose stones and materials, rubbish of

all kinds, stumps, brushwood as trees shall be removed as directed the roots shall be entirely grubbed up.

- 2.2** The products of the clearing to restocked in such a place and in such a manner, as directed by the engineer in charge.
- 2.3** In jungle clearings, all trees not specially marked for preservation, bamboo's jungle wood and brushwood shall be cut down their roots grubbed up. All wood and materials from the clearing shall be the property of the Board shall be arranged as directed by the Board Engineer or his authorized agent, the material pronounced as useful by the Engineer will be conveyed and properly stacked as directed within the specified limit. Unless materials will be burnt or otherwise disposed off as directed.
- 2.4** All holes or hollows whether originally existing or produced by digging up roots, shall be carefully filled up with earth, well earth, well rammed leveled off, as may be directed.

**3.0 SETTING OUT:**

The center lines of all pipe trenches etc. shall be given by the Engineer-in-charge and it will be the responsibility of the contractor to install substantial reference marks, bench marks, etc. and maintain them as long as required true to line, level curve and slopes. The contractor shall assure full responsibility for alignment, and dimension of trench.

The labor materials etc. required for setting out and establishing benchmarks and other reference marks shall be arranged by the contractor at his own cost.

**4 EXCAVATION**

- 4.1** The excavation incl. Bailing out of water for the pipe trenches shall also incl. Removal of all materials of whatever nature and whether wet or dry condition necessary for laying of pipelines exactly in accordance with alignment, levels grades and curves shown on the plans or as directed by the Engineer-in-charge. Trenches shall be excavated to the exact width and depth according to the size of pipe and the sides shall be left vertical as far as possible or according to the angle of repose of various soils. Unless there is a specific extra provision in the contract for shoring and strutting or for cutting side slopes the contractor shall at his own cost do the necessary shoring and strutting or cutting of slopes to a safe of repose or both approved by the Engineer-in-charge. As per Site condition if Extra width or depth require then prior permission of concern chief engineer is require. The contractor shall notify the Engineer before starting excavation to enable him to take cross sectional levels for purpose of measurements before the ground is disturbed. The bottom of the trenches shall be leveled both longitudinally and transversely or slopped as directed by the Engineer. The contractor shall at his own cost to remove such portions of boulders or rocks, as are rectified to make the bottom of the trench level. No filling shall be allowed to bring the trench to level. If by contractor's mistake excavation is made deeper than shown on the plans and if ordered by the Engineer the extra depth shall have to be made with selected excavated stuff only with watering, remedying etc. as directed, by the Engineer and at the cost of the contractor. Other hard excavation shall be cleared of all sorts and loose materials and cut to firm surface, either level, stepped as directed by the Engineer. The Engineer may order such charges in the dimensions and alignment of pipe trench as may be deemed necessary to secure satisfactory cover over pipeline. The contractor shall, at his own expense, make provision for bailing out of draining water and the trenches shall be kept free of water, during laying work.

After each excavation is completed, the contractor shall notify the Engineer to that effect and no laying of pipeline will be allowed to laid until Engineer has approved the depth and dimensions of trenches level and measurements.

The earth cover over the pipe shall be 1.0 mt. for all

The minimum width of trench should be 25 CM on each side  
of the pipe the rate includes cost of dewatering,

blasting if required and as per detailed specification etc complete.

## **5.0 SHORING AND STRUTTING:**

- 5.1** Shoring & strutting and dewatering if required shall have to be carried out by the contractor, for which any extra charge will not be paid
- 5.2** During excavation if water connections, sewage connections, telephone lines khalkuva (soak pits) etc. are damaged by the contractor, the same shall have to be restored by the contractor without any extra payment.

## **6.0 PROTECTION**

- 6.1** The trenches shall be strongly fenced and red light signal shall be kept at night and arrangement of watchman to prevent accidents should be done, sufficient care protective measure shall be taken to see that the excavation shall not affect or damage the adjoining structure. The contractor shall be entirely responsible for any injury to life and damage to the properties etc. Necessary protection work such as guide ropes, crossing places, barricades, caution boards etc. shall be provided by the contractor.
- 7.0** The excavation in all sorts of soil, hard murram, soft rock or hard rock or any type of soil shall have to be carried out up to the required depth by the agency, no extra payment shall be given for soft/ hard rock.

## **8 DISPOSAL OF EXCAVATED STUFF**

- 8.1** No excavated stuff from trench are to be placed even temporarily nearer than 1.5 meter or greater distance up to 90 meter or as prescribed by the Engineer from the outer edge of trench. All excavated material will be the property of the board. The rate of excavated includes sorting out of useful materials and stacking then separately as directed within specified lead. The excavated stuff suitable and useful for refilling or for other use shall be stacked at convenient places. The materials not useful in any wet shall be disposal off as directed by the Engineer from the outer edge of trench.
- 8.2** The site should be cleared off on completion of work.

## **9.0 ADDITIONAL REQUIREMENTS**

- 9.1.1** At the joints of pipes, the trench shall be excavated to an additional depth of 15 cm. and width of 30 cm. And length of 15 cm. beyond the edge of collar on both the sides or as directed. The rate include for such extra excavation made at the joints. The trenches shall be excavated perfectly in straight line. The bottom of the trench shall be kept as per invert level or as directed. To maintain the proper slop the usual method of site rails and boning rods shall be adopted. The contractor shall have to provide and fix and maintain sight rails and boning rod without any extra cost.

If the contractor fails or makes delay to give hydraulic test of the pipe line laid in any of the section, without any genuine reason, he shall be responsible to get any part of the length trenches refill in such case i.e. before tasting for safety of pedestrian and/or vehicular traffic as found necessary by the engineer-in-charge without any extra cost. If found necessary any directed by the Engineer-in-charge. The contractor shall have to excavate the refilled trenches, during hydraulic test without any extra cost.

At all road crossings, trenches shall be excavated only for half width of the road and pipe shall be laid. The other half shall be excavated only after back filling over the laid pipeline is done so as to make it suitable for the traffic. The contractor shall provide direction when the pipeline is to be laid along the road as required and shall maintain the diversion or any part of it, without any extra cost. At all road crossings, the pipe shall be laid below the crest of read.

- 9.2** The contractor shall break the road surface by excavation chiseling to the exact width and length as shown on the drawing or as directed by the Engineer-in-charge.

The excavated stuff shall be deposited in uniform layers to avoid mixing with other kind of materials at non-objectionable place or as directed by the Engineer-in-charge.

## 10.0 MEASUREMENT AND PAYMENT

10.1 The payment of excavation shall not be made separately of this item as pipe line work item is a consolidate item which includes excavation.

10.2 Minimum pipe trench Dimension shall be strictly followed as under.

PVC Pipe with elastomeric sealing ring			
Dia in mm	Length in Mtr.	Width of Trench	Depth of Trench
110 – 6 kg/cm <sup>2</sup>	1800.00	0.60	1.10

10.3 This item of excavation shall include unless and otherwise mentioned.

- (a) Clearing of site
- (b) Setting out work including all materials and labour.
- (c) Providing and subsequently removing, shoring and strutting outing slopes etc.
- (d) Excavation and removal and staking of all excavated stuff as directed.
- (e) Necessary protection including labour materials equipment etc. to ensure safety and protection against risk or accident.
- (f) Providing facilities for inspection and damage to property if caused during progress of work.
- (g) Compensation for injury to life and damage to property if caused during progress of work.
- (h) Restoring of water supply connections, sewer connections, telephone lines, khalkuva soapiest etc. if damaged by contractor without extra payment.
- (i) Dewatering of excavated pit trench during the progress of work.
- (j) Clearing the site on completion of works directed by the Engineer.

## ITEM NO. 2

### Air valves

Providing and supplying C.I. Air Valves of approved make & Quality of following class & Diameter including all taxes, insurance, transportation, freight charges, Octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. comp.

Air Valves as per IS – 14846 : or its latest revision.

50 mm dia. Single acting Air valve S2 Type

### A) SUPPLY OF MATERIAL

#### 1.0 SCOPE OF CONTRACT:

The contract shall be covering manufacturing, supplying and delivering of;  
 Air valves single ball flanged /screw type  
 Air valve double ball flanged  
 Air isolated valves double ball flanged  
 Air cushion valve with C.I. body as per item of tender

### GENERAL

The contractor shall be covering manufacturing, supplying and delivery of:  
 Air valve conforming to IS: 14846 or its latest revision (Specification for Air valves with ISI certification

**2.0 CLASSIFICATION****2.1** Air valve shall be of two types

- (a) Single Air valve
- (b) Double Air valve

2.1.1 Single air valve shall have single small or large orifice for releasing air during pipe filling and ventilating the pipe during emptying. Air valves up to 40 mm dia directly shall be screwed on the main.

2.1.2 Double air valve shall have two ball chambers, on outlet of large capacity shall be provided for admission and release of bulk volume of air during emptying and filling of the main, another of small outlet type for the escape of smaller quantities of air accumulating under pressure. They shall be of flanged type.

**3.0 MATERIALS****3.1 CAST IRON**

Cast Iron for bodies' pressure covers, splash covers, glands, caps, joints support rings shall be best gray iron of selected grade, 20 of I-S-210-1978 specification for grey iron castings.

**3.2 GUN METAL**

Gunmetal shall be of mixture of 88% copper, 10% tin 2% Zinc having excellent hard wearing qualities, Ball guides of small orifice units and outlet bushes of large orifice valves shall be of gunmetal.

**3.3 FOREGED BROZNE**

Nipples, spindles shall be machined from rolled, extruded or forged high tensile brass or aluminum bronze. The produce shall possess much greater strength than ordinary cast product.

**3.4 MILD STEEL**

Bolts, nuts, flanges etc. shall be of mild steel unless otherwise specified and shall confirm to I.S. 226-1975 specification for structural steel.

**3.5 MATERIALS FOR BALLS**

The balls shall be of rubber covered and vulcanite covered. The rubber shall have a smooth and hard surface. It shall be as per I.S. 638-1965 specification for rubber and insertion jointing.

**3.6 FLANGE JOINTING MATERIALS**

The jointing material used between the flanges of components part of the valve shall be compressed fiberboard or rubber of thickness between 1.5 mm to 3 mm. The rubber shall be as per I.S. 683:1965 specifications for rubber and Insertion jointing. The fiberboard shall be impregnated with chemically natural mineral oil and shall have a smooth and hard surface.

**4.0 DIMENSION**

Dimension of the Air valves shall be as per relative item mentioned in schedule B of the tender.

**5.0 CHARACTERISTICS**

5.1 Small orifice valves shall have rubber covered balls and nipples of foreged bronze or special alloy in to brass pluge.

5.2 Large orifice valve shall have vulcanite-covered ball closing on rubber sealing backed with leather and gunmetal outlet bushes. They shall be screwed or flanged. The flanged shall be faces and drilled to I.S.S.

5.3 For sewage mains, the air valves shall be actuated by mild steel floats bronze spindles and shall be fitted with synthetic rubber seals.

- 5.4 Air valves shall be sound in all respect and uniformly forged so as to have uniform bore. They shall be free from any defects such as unwanted projection, holes or roughness and shall have inner and outer surface perfectly smooth.

## **6.0 COATING**

- 6.1 Immediately after casting and before machining, all cast iron parts shall be thoroughly cleaned and before rusting commences shall be coated by dipping in a bath containing a composition having a tar base.
- 6.2 The coating shall be such that it shall not impose any test of small to water. The coating shall be smooth glossy and sufficiently hard. It shall not chip when scratched lightly with the point of penknife.

## **7.0 INSPECTION AND TESTING**

- 7.1 The engineer in charge or his authorized representative shall have free access to the works for inspection at any stage of manufacture and to reject any materials, which does not confirm to the specified requirements.
- 7.2 The manufacturer shall arrange to supply all labour and appliance for the tests if the testing is to be done at his works. Each valve shall be subjected to the hydraulic test and shall show no sign of leakage under these tests i.e. the balls shall function properly. The valve shall be tested to double the maximum working pressure.

## **8.0 MANUFACTURERS GUARANTEE**

- 8.1 The manufacturers shall guarantee that if any defects chargeable to faulty workmanship, design or materials are found in the valves within a period of one year of dispatch he shall replace any part that prove defective, free of charge at the place of dispatch.

- 9.0 The following information shall be cast on each valve body:

- (a) Manufacturer's name or trademark.
- (b) Size of valve

## **10.0 TENDER PRICE:**

The tender price shall include all labour, material and machinery cost necessitated to be utilized for;

- a) Proper manufacturing of the valves.
- b) All tests required to be undertaken at manufacturer's premises.
- c) Transportation of the valves either by Rail and/or Road services with all the covers duly and appropriately insured.
- d) Delivery of specials with proper loading, unloading, stacking at GWSSB store as indicated by Engineer-in-charge.
- e) Further towards proper discharge of all contractual obligations. The storage of all specials to be manufactured, supplied and delivered under the scope of contracts shall be in general be made as described in Technical specification document.

## **11.0 DELIVERY SCHEDULE:**

The delivery schedule shall be governed by the Executive Engineer of GWSSB

## **12.0 MARKING**

The methods of marking all the valves to be delivered under scope of contract shall ensure that all the information will remain legible even after transportation, storage in open space etc. In general the legible and indelible marking upon the valves shall indicate the followings:

- i) Manufacturer's brand name and/or trademark.
- ii) Purchaser's mark as "GWSSB" be inscribed.
- iii) Diameter and class of valves.
- iv) Any other important matter that the manufacturer or purchaser deems fit to be inscribed.

**13.0 PACKING AND HANDLING:**

- 13.1 The materials shall always be packed separately dispatched from manufacturers works with adequate protective measures to prevent damages deterioration while in transport or stored at any place. The packing shall always be so neat and tidy that may withstand any robust and rough handling.
- 13.2 When the materials are transported at railway risk, special packing as per IRCA rules are absolutely necessary for which the extra cost, if any, shall be borne in total by supplier only.
- 13.3 The supplier shall use proper handling instruments/equipment's and shall follow to a suitable method of handling pipes as may be approved by Engineer, while unloading and stacking material in the stores.

**14.0 MATERIALS AND WORKMANSHIP:**

- 14.1 General requirements of materials and workmanship shall mean any material or article either raw or finished one is required to be used in the manufacturing process of tanks.
- 14.2 All the material shall be new and of high quality.
- 14.3 In case, if material is not specified by relevant ISS for manufacturing part or the whole as item, the supplier shall prepare specifications in concurrence with manufacturer and shall seek an approval of Engineer prior to its use in the manufacturer.

**15.0 TEST CERTIFICATE:**

- 15.1 The supplier shall always provide manufacturer's test certificate in accordance with every batch/lot of goods so manufactured and supplied.
- 15.2 The supplier shall also produce in addition to manufacturer's test certificate as mentioned in para 7.1 above, the inspection certificate issued by the authorized person/agency appointed by Engineer or Board for the same purpose.

**16.0 INSPECTION**

This clause is applicable in general to all materials such as all types of valves, Pre-cast chambers, other specials and materials etc. which are to be supplied by the contractor.

Inspection of materials will be carried out at factory site by Inspecting agency to be fixed and authorized by GWSSB. The supplier on receipt of supply order from GWSSB shall intimate inspecting agency to carry out inspection as soon as material is ready.

The inspection call for Air valve should be given. Inspection will be carried out normally within one weeks time and on receipt of such intimation the inspecting agency will inspect the materials as per the specification and on satisfying itself, will mark the inspection marks on all pipes and issued inspection note to the supplier and concerned consignee.

For inspection purpose the manufacture has to go in for stenciling for identifying size and class for proper segregation. The stock of offered material shall be in a manageable batch with adequate space like spreading the pieces etc. to permit proper inspection and inspection authority to be present during stamping so as to ensure that only actually cleared material is stenciled. Manufacturer does not load material after sunset to avoid inadvertent dispatch of wrong material.

Inspection note issued by the inspection agency to supplier as well as consignee (Concerned Executive Engineer) materials with inspection mark will be dispatched to stores stipulated in supply order and on receipt at stores the verification will be carried out by concerned Deputy Executive Engineer as regards quantity and quality. Here quality means physical soundness of materials as precaution against breakage during transit. The supplier has to submit the test certificate as well as detailed test results carried out by inspection authority to the consignee along with the dispatch documents of materials. The material shall be considered as received only on receipt given by the concerned Deputy Executive Engineer after verifying and satisfying the above requirements.

**17.0 MODE OF MEASUREMENT AND PAYMENT**

Measurement shall be paid on number basis as per relevant dia of the item as per payment schedule.

**Item No. 4****LOWERING LAYING & JOINTING PVC PIPELINE**

**Lowering laying, jointing PVC pipes and specials of following class and diameter including cost of conveyance from store to site of works including cost of labour, material, giving satisfactory hydraulic testing as per ISI code etc. complete. This item includes,**

**Including job connection with existing line**

**140 mm dia. PVC 6 kg/cm<sup>2</sup> pipeline**

- 1) The excavation for trenches shall be done before laying of the pipes as per required depth and width so that adequate space can be made available for joint.
- 2) The pipes & joints shall be procured, supplied by the Contractor at work site at his own cost. Every care shall be taken in carting them to site. During transportation any damage shall be occurring to pipes for fittings the replacement of pipes given by the contractor at his own cost.
- 3) Before laying the pipes it shall be brushed through out length so that the dust and soil can be removed.
- 4) Reducer bends tees, and adopter etc. to be supplied by the contractor as per requirement.
- 5) All the specials such as bends, tees, reducer, etc. shall be fixed as per instruction of engineer-in-charge in the pipeline.
- 6) The pipe shall be hydraulically tested during the testing no leakage shall be observed. If, leakage observed, it shall be set rightly by the contractor at his own cost as per the instruction of engineer-in-charge. The payment shall be as per payment schedule.

**THE SCOPE FOR THE ITEM COVER**

Cost of additional excavation required for jointing clearing the site of all scrubs, bushes, and trees and dewatering where necessary.

Labour for laying pipes in trenches to correct alignment at required depth with tools, including cutting of pipes and specials if required for laying of pipes including connecting pipes to specials and appurtenances. Cost of the scaffolding, tools and plants, ropes etc.

Protection of existing works from damage and cost of repair to the damages carried out to the existing structure, sewer line telephone/electricity cables, electric cables, electric lines, gas pipe line, irrigation pipe line etc.

The pipe laying across the state highways, national highways etc. will have to be done either through open cut method or through push through method depending upon the requirement to be prescribed by the sanctioning authority. However, mostly it would be push through method.

**GWSSB will not be able to provide water for testing of the pipelines & water containers of the project. This shall have to be managed by the contractor at his cost and risk.**

Labour for making joints including jointing material for joints, tools as well as tests. Testing of pipes for leakage under water pressure and flushing the pipes after testing and construction work shall have to be arranged by the contractor at his own cost.

#### **METHOD OF MEASUREMENT OF PIPES:**

The measurement shall be recorded in running meter of pipe length laid along center line or axis of pipe line including tees, enlarges, reducers and bends correct up to 0.01M. length. No payment shall be made for overlaps etc. The payment shall be paid after completion of whole item as mentioned in price bid on Running Meter basis.

#### *Mode of measurement and payments*

Payment will be as per payment schedule

#### **TESTING OF WATER PIPES:**

After each section of the pipeline has been completed it shall be tested for water tightness before being covered. The contractor shall at his own cost fill up water in pipe line and given necessary hydraulic test section by section and the pipe line shall stand the pressure which shall exceed the working pressure by (a) 50% of the highest pressure in the section. (b) 30m whichever is less without showing any leakage or sweating any where in the pipes joints specials valves etc. if any defect are found the contractor shall be made good the same at his own cost.

Any leaking joints shall be made good and above test pressure in to be lowered gradually after satisfactory test is & over.

GWSSB will not be able to provide water for testing of the pipelines & water containers of the project. This shall have to be managed by the contractor at his costs and risk.

The hydraulic test shall be given again if considered necessary by the Executive Engineer or his representative to show that no further leakages or sweating is there. The contractor shall have to make necessary arrangements for water testing as well as plugging the opened of pipes etc. as directed without claiming any extra cost. The pipelines shall be kept filled with water for a work lines shall be kept filled with water for a week or till it is situated for testing is done.

If the pipe lines are laid in detached sanctioned & not in continuous length due to any reasons such as non availability of specials or due to obstacle etc. The contractor shall see that no end of pipes length is kept open-ends are immediately covered up either by suitable blank flange or cap slug or by means of double layer gunny bags clothes tied properly by mild steel wire without any claim for extra-cost.

The pipe laying across the state highways, national highways etc. will have to be done either through open cut method or through push through method depending upon the requirement to be prescribed by the sanctioning authority. However, mostly it would be push through method.

#### *Mode of measurement and payments*

Payment will be as per payment schedule

### **Item No. 5**

#### **Concrete Encasing**

**Providing C.C.M -100 for encasing using trap metal size 12 mm to 40 mm including Form work, curing, consolidation etc. comp.**

- 1) Specification for Encasing of Pipe is as under:
- 2) "Encasing of pipe shall be carried out in cement concrete M-100 using trap metal as per instructions of the engineer in charge. Materials and workmanship shall be as per specification of concrete.
- 3) Payment shall be made of Cum. basis.
- 4) The payment shall be made as per the Cubic meter of Cement Concrete Executed.

## **Item No. 6**

**Lowering, laying and jointing in position following C. I. / D/F Reflux valves, Butterfly valves, Sluice valves and Air valves including cost of all labour, jointing material, including nut bolts and giving satisfactory hydraulic testing, etc. complete.**

### **50 MM DIA SINGLE ACTING AIR VALVES S2 TYPE**

- 1.1 The double acting air valve shall be supplied and carted by the contractor as per latest IS. The rate shall include loading, unloading and stacking at site.
- 1.2 The materials shall be carted to store or site of work including all freight, loading, unloading including all taxes, insurance, including necessary jointing materials such as G.I Nipple saddle pieces shall be brought by the contractor for fixing of air valve.
- 1.3 A suitable hole shall be drilled on the pipeline. The pipeline shall be of any type such as AC, PVC or CI pipes. A clamp shall be got prepared with a nipple welded on it. The clamp shall be fixed on pipe with bolts and nuts in such a way that the part of nipple fixed in the clamp shall remain in the hole drilled in pipe. The rubber packing shall be provided between the clamps and the pipe. White zinc spun yarn shall be used for fixing the nipple of air valve.
- 1.4 Bolt holes shall be drilled according to center- lines. Bolt heads and nuts shall be hexagonal and shall conform to IS: 1363 (specification for black hexagonal bolts, nuts and lock nuts and black hexagonal screws).
- 1.5 The neoprene seat ring shall be held security in place under the low pressure cover by jointing support ring to prevent it from sagging when the ball is not soaking the orifice.

## **2.0 JOINTING MATERIAL**

- 2.1 Jointing material shall be brought by contractor with all necessary joint rings, nuts, bolts and washers for completing the joints on all the flanges of valve supplied under this contract including these flanges which will be jointed to pipe system. The lengths of bolts shall be assumed to be suitable for jointing material supported under the contract shall be inclusive of rates.
- 2.2 Joint rings shall be of flat section at least 3 mm thick. They shall be of rubber in accordance with Is: 638-1965 or its latest edition (specifications for rubber and insertion jointing) of hardness proven in practice so as form a water tight joint and use of jointing paste shall not be allowed.

**Item No. 7****Refilling:**

**Refilling the pipeline trenches incl. ramming, watering, consolidating, disposal of surplus stuff as directed within a radius of 3 KM.**

This item include labour charges required for refilling the pipe line trenches, ramming, watering, consolidating in each 20 cm thick layer.

The surplus stuff shall be dispose as per instruction of Engineer-in charge within radius of 3.0 km.

The deficit quantity of earth in case of rain or other circumstances shall be brought by contractor with out any extra cost.

**The payment of refilling shall not be made separately of this item as pipe line work item is a consolidate item which includes refilling.**

**Item No.-8**

**Erection of airvalve riser by installing new GI pipe medium Duty 3.2mt length with necessary fittings such as flange of appropriate size, nut bolts and embeded the pipe in RCC M-15 with offset of 10 cm around pipe with necessary steel etc complete  
Dia of Single acting S2 type Air Valve 50 mm**

The size and Quality of construction of elevated air vlave stand shall be as specified in item of schedule-B . Agency shall be submitted detail drawing and design and got approval from department prior to items use

Necessary jointing materials such as nut bolts, GI pipe 6 mm thick, C.C. block M-15 (1:2:4) and Rubber packing etc shall be provided & fixed by the contractor.

**Mode of payment:**

**Payment shall be made as pe schedule-B No. of air vlave fitted**

**Signature of  
Contractor**

**Deputy Executive Engineer  
P.H.S. Sub Division, Jasdan**

**Executive Engineer  
PHW Division, Rajkot**