

## ITEMWISE SPECIFICATIONS

**::: SCHEDULE B :::**

**Providing Supplying ,Lowering laying & Jointing of D.I. Pipe Line  
at Nagviri Village Site. Lakhpat Regional Water Supply Scheme  
for General Budget Demand -67 (WSS-6 General)**

**Item No. 1 :- Providing and supplying D.I. pipes for following nominal bore diameter with internal cement mortar lining including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete as per (IS - 8329 / 2000)**

**400 mm dia. DI K - 7 Pipeline**

**Note :- Wherever International Standards or Indian standards / specifications are acceptable.**

Supply and Delivery of **Ductile Iron Pipe as per IS: 8329-2000** or its latest revision or amendments if any including jointing material as EPDM ring as per IS 5382-1985 and ISO: 4633-1996 or its latest revision or amendments if any

**Standards**

The following standards, specifications and codes are part of this specification. In all cases, the latest revision of the including all applicable official amendments and revisions shall be referred to. In case of discrepancy between this specification and those referred to herein, this specification shall govern.

- 1) ISO: 10803-1997 Design method for ductile iron pipes
- 2) IS:8329-2000 Centrifugally Cast (spun) ductile iron pressure pipes for water, gas and sewage
- 3) ISO: 2531-1991 Ductile iron pipes, fittings and accessories for pressure pipelines.
- 4) ISO: 4179-1985 ductile iron pipes for pressure and non-pressure-Centrifugal cement mortar lining – General requirements.
- 5) IS: 8112 Specification for 43 Grade ordinary Portland cement.
- 6) BS: 3416 Bitumen based coatings for cold application, suitable for use in contact with potable water.
- 7) ISO: 8179-1995 ductile iron pipes-External coating-Part-1 Metallic Zinc with finishing layer.
- 8) IS: 638 Sheet rubber jointing and rubber insertion jointing.
- 9) ISO: 4633-1996 Rubber seals-Joint rings.
- 10) IS: 5382-1985 Specification for Rubber sealing rings for gas mains, water mains and sewers.
- 11) AWWA C600 Installation of ductile iron water mains and their appurtenances.

**1.0 INTERNAL DIAMETER**

The nominal values of the internal diameters of pipe, expressed in millimeters are approximately equal to the number indicating their nominal sizes DN.

**2.0 Length**

The working length of socket and spigot pipes shall be 5 m, 5.5 m, or 6 meters.

**3.0 Thickness**

The wall thickness of pipe 'e' in mm shall be calculated as a function of the nominal diameter by the following equation with minimum of 5 mm

$$e = K (0.5 + 0.001 DN)$$

**Where:** e = wall thickness in mm, DN = the nominal diameter, K = the whole number coefficient

**4.0 EPDM Rubber Gasket**

Rubber Gasket shall be suitably for Push-on-Joint.

The spigot ends shall be suitably chamfered or rounded off to facilitate smooth entry of pipe in the socket fitted with the rubber gasket

Rubber Gasket shall confirm to IS 5382-1985 and ISO: 4633-1996 its latest revision or amendments if any.

**5.0 Sampling Criteria**

Sampling criteria for various tests, unless specified in IS 8329-2000, shall be as laid down in IS 11606. Mechanical test, Brinell hardness test, Hydrostatic test etc are shall be as per IS 8329-2000

**6.0 Tolerances on External Diameter**

The nominal external diameter (DE) of the spigot end of socket and spigot pipes and when circumferentially using a diameter tape measured shall confirm to the requirements specified as follow. The positive tolerance is +1 mm and applies to all thickness classes of pipes. The maximum negative tolerance of the external diameter is specified as follow:

**7.0**

DN	Nominal	Positive Tolerance	Negative Tolerance
80	98	+1	-2.2
100	118	+1	-2.8
125	144	+1	-2.8
150	170	+1	-2.9
200	222	+1	-3.0
250	274	+1	-3.1
300	326	+1	-3.3
350	378	+1	-3.4
400	429	+1	-3.5
450	480	+1	-3.6
500	532	+1	-3.8
600	635	+1	-4.0

Pipes shall be as far as possible circular internally and externally. The tolerance for out-of-roundness of the socket and spigot ends is given below:

Nominal Diameter in mm	Allowable Difference Between Minor Axis and DE in mm
80 to 300	1.0

350 to 600	1.75
700	2.0
750 to 800	2.4
900 to 1000	3.5

**8.0 Tolerance in thickness :-**

The tolerance on wall thickness (e) and the flange thickness (b) of the pipes shall be as below:

Dimensions	Tolerance in mm
Wall thickness (e)	- (1.3 + 0.001 DN) <sup>(1)</sup>
Flange thickness (b)	+ (2+0.05b) & - (2+0.05b)

**9.0 Coating**

Pipe shall be delivered internally and externally coated.

**External Coating:**

Pipe shall be metallic zinc coated and after that it shall be given a finishing layer of bituminous paint as per IS - 8329-2000.

Zinc coating shall comply with IS: 8329/EN 545/ ISO 8179. Only molten zinc spray coating shall be acceptable. The average mass of sprayed metal shall not be less than 130 g/sqm with a local minimum of 110 g/Sqm.

Bitumen overcoat shall be of normal thickness of 70 microns unless otherwise specified. It shall be a cold applied compound complying with the requirements of BS 3416 Type II suitable for tropical climates factory applied preferably through an automatic process. Damaged areas of coating shall be repainted on site after removing any remaining loose coating and wire brushing any rusted areas of pipe.

**Internal lining:**

Internally pipe shall be Portland cement mortar lined (as per IS - 8329-2000). The mortar shall contain by mass at least one part of cement to 3.5 part of sand.

All pipes and fittings shall be internally lined with cement mortar using high speed centrifugal process in accordance with IWO 4179/IS 8329. Cement mortar lining shall be applied at the pipe manufacturing shop in conformity with the aforesaid standards. No admixtures in the mortar shall be used without the approval of the Engineer. The quantity to cement proportion of sand if justified by the sieve analysis.

Pipe lining shall be inspected on site and any damage or defective areas shall be made good to the satisfaction of the Engineer.

Lining shall be uniform in thickness all along the pipe. The minimum thickness of factory applied cement mortar lining shall be as per IS: 8329 Annex-B or ISO 4179. This is given below.

Nominal Pipe Size (mm)	Nominal lining thickness (mm)
Up to 300	3
350-600	5
700-1200	6
1400-2000	9

**10.0 Joint**

Jointing of DI pipes and fittings shall be push-on type

**Push-on-joints**

The Contractor shall source the push-on-joint gaskets only from the pipe manufactures. In turn the pipe manufacturer shall supply at least 10% additional quantity of gaskets over and above the requirement to the Contractor at no extra cost.

The gasket used for joints shall be suitable for natural and purified water conveyance. In jointing DI pipes and fittings, the Contractor shall take into account the manufacturer's recommendations as to the methods and equipment's to be used in assembling the joints. In particular the Contractor shall ensure that the spigot end of the pipe to be jointed is smooth and has been properly chamfered, so that once the rubber ring is correctly positioned before the joint is made, does not get damaged by friction or sharp edges of the spigot Chamfer. The rubber rings and the recommend lubricant shall be obtained only through the pipe manufacturer.

Rubber ring bundles form every lot shall carry with them manufacturers test certificate for the following mechanical properties.

**Hardness**

1. Tensile strength
2. Compression set
3. Accelerated again test
4. Water absorption test
5. Stress relaxation test

Rubber rings shall be clearly labeled in bundles to indicate the type of ring, the type of joint, the size of the pipe with which they are to be used, the manufacturer's name and trade mark, the month and year of manufacture and the shelf life.

**11.0 Testing of Pipe:**

The main test among others to be conducted shall be as per IS: 8329-2000 or with its latest revision/ amendments.

**[a] Mechanical Tests**

Mechanical tests shall be carried out during manufacture of pipes as specified in the Standards. The frequency and sampling of tests for each batch of pipes shall be in accordance with IS 11606-1986. The test results so obtained for all the pipes and fittings of different sizes shall be submitted to Engineer. The method for tensile tests and the minimum tensile strength requirement for pipes and fittings shall be as per IS; 8329/EN 545 for pipes and IS: 9523/EN 545 for fittings.

**[b] Brinell Hardness Test**

For checking the Brielle hardness the test shall be carried out on the test ring or bars cut from the pipes used for the ring test and tensile test in accordance with IS:1500. The test shall comply with the requirements specified in IS: 1500/ISO 6506.

**[c] Re-tests**

If any test piece representing a lot fails in the first instance, two additional tests shall be made on test pieces selected from two other pipes from the same lot. If both the test

results satisfy the specified requirements the lot shall be accepted. Should either of these additional test pieces fail to pass the test, the lot shall be liable for rejection.

[d] For hydrostatic test at works, the pipes and fittings shall be kept under test pressure as specified in the standard for a period of minimum 15 seconds during which the pipes shall be struck moderately with a 700 g hammer for confirmation of satisfactory sound. They shall withstand the pressure test without showing any leakage, sweating or other defect of any kind. The hydrostatic test shall be conducted before surface coating and lining.

## 12.0 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.

## 13.0 PRICE VARIATION - Clause 59 Will Be Applicable.

## 14.0 Mode of measurement and payments

The payment shall be made as mentioned in price bid.

The measurement shall be taken in running meter of the pipes. The payment shall be made on running meter base. Item includes all taxes, Octroi, insurance, transportation, freight charges, loading, unloading, conveyance to site, staking etc. including necessary testing charges.

- **TEM NO. 2 :- Providing and supplying C. I. Temper proof Air valves with SS 304 Float gun metal- nozzle of approved make & quality of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.**
- **100 mm dia Air Valve. Without isolating Sluice Valve PN 1.0**

### General :-

- Tamper proof air valve confirming to AWWA C 512, having outlet for admission and release of bulk volume of air during emptying and filling of the pipeline. The ball sealed orifice shall always remain open while air is exhausting and is immediately closed when Water rises in the chamber, lifts the ball and seals the orifice.
- It shall also ensure that there are no recesses or pockets, sheltering, escaping air for the large orifice (low pressure) ball to drop into when the valve open. Turbulent air at the time of filling of pipe shall not circulate in such cavities and cause the ball to blown into when the valve is open.
- Turbulent air at the time of filling of pipe shall not circulate in such cavities and cause the ball to blown into the discharging air streams, blowing the valve shut prematurely. The cone angle of the lower pressure chamber shall be such that even at the critical velocity of all air escape at 300 m/sec.
- The total impact force on the ball is less than the suction force on the angular area between the ball and the cone. The design of the valve should be such as to allow maximum free air discharge at various pressure differentials.
- The low pressure cover shall be massive and designed to withstand full operating thrust in working Conditions. The seat ring shall be held securely in place under the

low pressure cover by a joint support ring to prevent it from sagging when the ball is not sealing the orifice.

- **Testing**
- All valves shall hydrostatically tested by the manufacturer before dispatch. The pressure shall be obtained without any significant hydraulic shock. Testing shall be carried on before application of paint. There shall be no air entrapped within the part of the valves subjected to test pressure. Test pressure as per AWWA C512 or API 598.
- **Positive material Identification (PMI Test)**
- PMI test shall be checked at random for Stainless steel parts.
- **Test Certificates**
- When specified by Owner, the manufacturer shall issue a test certificate confirming that the valves have been tested in accordance with this standard and stating the actual pressures and medium used in the test.
- **Marking**
- Marking shall be cast integral on the body or on a plate securely attached to the body for 'DN' size, 'PN' rating, Heat Number and Serial number.
- **Painting**
- Each valve shall be drained, cleaned, prepared and suitable protected with 2 coats of red oxide and then black bituminous paint for minimum of 150 micron DFT on surfaces before dispatch.
- **Datasheet :-**

TAMPER PROOF AIR VALVE				
Sr No	Component	PN- 1.0	PN-1.6	PN-2.0
1	Body	CI IS 210 Gr. FG260	CI IS 210 Gr. FG260	ASTM A216 Gr. WCB
2	Cover	CI IS 210 Gr. FG260	CI IS 210 Gr. FG260	ASTM A216 Gr. WCB
3	Float	SS 410	SS 304	SS 304
4	Seat	EPDM	EPDM	EPDM
5	Float Guide	SS 410	SS 304	SS 304
6	Orifice	SS 410	SS 304	SS 304
7	Gasket	EPDM	EPDM	EPDM
8	Nut Bolt	Carbon steel	Carbon steel	Stainless Steel
9	Flange End	IS 1538	IS 1538	ASME/ANSI B16.5 Class 150

### **MODE OF MEASUREMENT AND PAYMENT**

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

- **ITEM NO – 3 :- Erection of Air Valve Riser by installing New M.S pipe of 6mm thick and 3.2mt length with necessary fittings such as flange of Appropriate size, Nut bolts and embedded the pipe in R CC M;15 with offset of 10 cm around pipe with necessary steel etc complete**  
**100 mm dia. Air Valve, Without isolating Sluice Valve PN 1.0**

➤ 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.

➤ 1.2 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.

➤ 1.3 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).

➤ 1.4 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.

➤ Specifications for Air Riser for Pipeline are as under.

### **For All dia. of Pipe :-**

- 1) The work of Air valve riser shall be carried out as per the approved drawing and as per the instruction of Engineer in charge.
- 2) The work shall be carried out as per the description of the Item.
- 3) The M.S. pipe of 6 mm thick shall be 3.20 m Long of As per Drawing dia.
- 4) Necessary reinforcement @0.12 % at cross section Area shall be placed in footing and column as per the Grade of RCC Work will be M:15 instruction of Engineer in Charge.
- 5) Necessary flanges, Nuts, bolts, Clamp and all type jointing materials shall be provided and

fixed by agency.

- 6) Air valve shall be fixed by agency with jointing materials
- 7) Item includes all type labors, excavation, refilling etc.
- 8) Item includes necessary cost of form work etc.
- 9) Minimum 10cm Offset has to be Provided Both Side of shaft and water main pipeline
- 10) PCC has to be provided at bottom of the Foundation as instruction of Engineer in Charge.

#### **18.0 MODE OF MEASUREMENT AND PAYMENT :-**

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

- **ITEM NO- 4 :- Manufacture, Supply & Delivery of Ductile Iron Flange socket spigot bends, tees, reducers or any other specials as per BS-EN-545/1995 Class-A series K12 suitable for use with D.I. Pipes manufactured as per IS:8329/1994 delivery of specials is to be made to GWSSB store or site of works anywhere in Gujarat including all taxes, loading, unloading, carting, stacking, insurance, inspection charges, octroi etc. complete. With external bitumen & zinc coating & internal cement mortar lining.**
- **Socket & Spigot Type**  
**Above 350 mm dia. D.I. K-7 Pipe Line**

#### **DI Specials :-**

DI Specials with all types of diameters suitable of K-7 grade pipes with inner cement mortar lining. The necessary DI Specials required during the lowering & lying of Ductile Iron Pipe shall be supplied by the agency and shall be as per standard specification. And per IS specification.

It shall be of best quality as per requirement Rate shall be including loading, unloading, carting, insurance and labour charge etc. complete.

The payment shall be made on kg. Basis.

#### **DI Specials & Fittings :-**

Manufacture, Supply & Delivery of Ductile Iron (DI) Specials & Fittings as per IS:9523/2000 and its latest amendments, Class-K12 with suitable Flange Drilling dimensions per PN-10/PN-16 suitable for the use with DI Pipes manufactured as per IS:8329/2000 with its latest amendments.

DI Specials and Fittings are to be only used for the jointing with DI pipes. DI Double Socket Tee with Flange Branch (DSTFB) of suitable size must be used as Air Valve Tee for the connection of Air Valve with DI Pipe.

The DI Specials and Fittings shall be preferably manufactured and supplied by the same pipe manufacturer &/or its subsidiary company, having valid BIS Licence, to ensure the quality and compatibility of Ductile Iron (DI) Pipes with DI Specials and Fittings for the better pipeline performance. In case the same DI pipe manufacturer does not manufacture and supply DI Specials and Fittings, DI Special and Fittings must be procured from any of DI pipe manufacturer, having valid BIS Licence, to ensure the best DI quality product for DI Specials and Fittings.



QAP approval and Inspection is to be ensured by the concerned GWSSB Executive Engineer and Third Party Inspection Agency like DI Pipes. The rates of DI Specials and Fittings shall be of FOR site including loading, unloading, carting, insurance and labour charge etc. Complete.

### **Technical Specification for Double Chamber Restrained Joints Ductile Iron (DI) Pipes**

Restrained joints DI pipes and fittings shall be utilized where pipelines have DI Fittings (such as bends, Tees, reducers etc.), needs to crossroads through existing ducts or in areas with restricted accessibility or in case of heavy thrust forces or as directed by engineer – in- charge. The use of concrete anchor/thrust blocks shall be submit with his bid, the full details of the type of restrained joint propose to use.

The manufacturer will have to demonstrate the allowable operating pressure of the proposed restrained joints by type test duly approved by third party inspection agency such as Bureau VERITAS India / Italy, BSI UK or DVGW Germany. The allowable operating pressure & permissible angular deflection for various size range shall be as mentioned given below:

<b>DN</b>	<b>DE, mm</b>	<b>Allowable operating Pressure * (PFA), bar</b>	<b>Allowable Angular Deflection,(Degree)</b>
100	118	40	5
150	170	40	5
200	222	40	4
250	274	40	4
300	326	40	4
350	378	40	3
400	429	40	3
500	532	40	3
600	635	40	2
700	738	25	1.5
800	842	25	1.5
900	945	25	1.5
1000	1048	25	1.5
1100	1152	25	1
1200	1255	25	1

Calculation of the number of pipe lengths with restrained joint required, shall be as per the manufacture's recommendation and shall be subject to Engineer- in- Charge approval.

Restrained joints shall be designed to resist the axial thrust forces maintain flexibility and angular deflection mentioned in the above Table. Restrained joints shall be designed in accordance with ISO 10804. The thrust resisting mechanism shall be separated from the sealing action of the gasket and shall not be in contact with portable water in the pipeline.

The Double chamber restrained DI Pipes and Fitting shall be supplied with internal OPC lining and external zinc coating with finish layer of Blue Epoxy conforming to IS 8329:2000/IS 9523:2000 with latest amendment.

**Payment shall be made KG basis of completed item as per BOQ .**

- **ITEM NO- 5 :- Excavation for pipe line trenches for water supply, sewerage line, manhole etc. all with shoring and strutting if required as per required gradient and line including safety provisions using site rails and stacking excavated stuff including up to all required lead cleaning the site etc. complete for all lifts and strata as specified. Up to 1.50 Mt depth from avg. GL**
- **A ) in All sorts of Soil and soft murrum**
- **B ) In Hard murrum, boulders incl. macadam road**
- **C )In Soft Rock**

## **1.1 GENERAL**

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

## **2.0 CLEARING OF SITES:**

**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 Engineer-in-charge 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.

## **4.0 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 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. 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 lying of pipeline will be allowed to lie until Engineer has approved the depth and dimensions of trenches level and measurements.

**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 amount 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 a way as 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. Blasting for excavation in hard rock will only be allowed if permitted by competent authority otherwise shall be done with chiseling only.

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, which 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, equipments 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.

i) 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 weathered 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 & Bhat rock**

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

**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, khal kuva (soak pits) all other utility services like gas pipe line, Oil pipe line, drainage lines, Storm water line 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 murrum, soft rock or hard rock or any type of soil shall have to be carried out up to the required depth by the agency.

**8.0 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** 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 MEASURMENT AND PAYMENT :-**

**10.1** The payment of excavation shall be made at the unit rate per cubic meter for the quantity actually excavated and accepted by the Engineer in charge limited to dimensions shown in the sanctioned plans or as directed by the Engineer. Excavation in excess of the sanctioned dimensions shall not be measured not paid for and if an ordered by the Engineer the contractor shall have to fill up the excess depth with excavated stuff with watering ramming etc. (Completed as specified) for trench without any extra payment to the contractor.

**10.2** Dimension shall be correct to two places of decimals of a meter and individual quantity shall of decimals of a meter and individual quantity shall be calculated to two places of decimals of a cubic meter.

**10.3** The rate for the item of excavation shall include unless and otherwise mentioned.

- (a) Clearing of site
- (b) Setting out work including all materials and labor.
- (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 labor 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, khal kuva soapiest etc. if damaged by contractor without extra Payment.
- Dewatering of excavated pit trench during the progress of work.
- (j) Clearing the site on completion of works directed by the Engineer.

**Mode of Measurement & Payment:** Measurements will be taken for cubic meter basis and payment will be as per BOQ .

- **ITEM NO- 6 :- Lowering Laying and jointing C.I. S.& S.spun pipes suitable for tyton joints/mortarlined D.I. pipes of various classes with CI/MS specials of following diameters in proper position, grade and alignment as directed by engineer In charge including hydraulic testing etc. complete.**
- **400 mm dia. D.I. K - 7 Pipe Line with E. D**

**GENERAL:**

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.

➤ The trenches shall be well leveled so that pipes are laid evenly among them. The pipes shall be fixed within two rubber rings to be supplied by department at the place shown in schedule A, if directed by the Engineer-in-charge or mentioned in item of schedule B. The specification for titan joints i.e. Rubber Rings shall be as per details specification material section.

➤ The contractor shall make his own arrangement for obtaining permission for storing & stacking of pipes etc. from land boards whether they are Government, Municipal Local Bodies or Private land owner.

➤ Every pipes before lowering into the trenches shall be got checked and thoroughly cleaned and the beds of the trenches shall be properly graded and leveled as required on the line, without any claim for extra cost whether it is required. The pipe shall be carefully lowered into the trenches with the help of a suitable type of chain pulley blocks, which shall first be approved by the Engineer-in-Charge. Each pipe shall be properly jacked and the spigot perfectly fixed into the socket. No jointing operation shall be started unless the gradients levels are approved by the Engineer-in-Charge or his representatives.

➤ The pipes shall be laid complete in centerline ranged accurately by means of a string attached to both marked center of site rails and no deviation shall be permissible without the permission of Engineer-in-Charge. The pipe shall be laid in reasonably dry trenches and no circumstances on slushy bedding.

➤ The pipes shall be brushed before lowering any laying or remove any soil or dirt etc. that may have accumulated.

➤ The inside socket and outside of the spigot-shall be carefully cleaned. The pipe shall be lowered carefully with socket and toward and the flow of water or up till or as directed and spigot and should be carefully inserted into the socket and the space shall be filled with the joint.

➤ 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.

➤ 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.

- Before laying the pipes it shall be brushed throughout length so that the dust and soil can be removed.
- Reducer bends tees, and adopter etc. to be supplied by the contractor as per requirement.
- All the specials such as bends, tees, reducer, etc. shall be fixed as per instruction of engineer-in-charge in the pipeline.
- 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.

➤ **DI Specials & Fittings**

- Manufacture, Supply & Delivery of Ductile Iron (DI) Specials & Fittings as per IS:9523/2000 and its latest amendments, Class-K12 with suitable Flange Drilling dimensions per PN-10/PN-16 suitable for the use with DI Pipes manufactured as per IS:8329/2000 with its latest amendments.
- DI Specials and Fittings are to be only used for the jointing with DI pipes. DI Double Socket Tee with Flange Branch (DSTFB) of suitable size must be used as Air Valve Tee for the connection of Air Valve with DI Pipe.
- The DI Specials and Fittings shall be preferably manufactured and supplied by the same pipe manufacturer &/or its subsidiary company, having valid BIS Licence, to ensure the quality and compatibility of Ductile Iron (DI) Pipes with DI Specials and Fittings for the better pipeline performance.
- In case the same DI pipe manufacturer does not manufacture and supply DI Specials and Fittings, DI Special and Fittings must be procured from any of DI pipe manufacturer, having valid BIS Licence, to ensure the best DI quality product for DI Specials and Fittings.
- QAP approval and Inspection is to be ensured by the concerned GWSSB Executive Engineer and Third Party Inspection Agency like DI Pipes. The rates of DI Specials and Fittings shall be of FOR site including loading, unloading, carting, insurance and labour charge etc. Complete.

**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 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 anywhere 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 is 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 opening 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 rate shall be per meter of pipe line laid including all specials and fitting jointly etc. Cutting and waste shall not be paid separately. The length shall be measured not on the straight line and curves along the center line over the pipe and specials correct up to 1 cm.

➤ **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.

**Payment shall be as per payment schedule And as per BOQ.**

- **ITEM NO. : 7 :- Lowering, laying and jointing in position following C. |. / 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.**
- **100mm Dia Air valve, Without isolating Sluice Valve PN 1.0**

**JOINTING MATERIAL :-**

1.1 The contractor shall provide all necessary jointing materials such as nuts bolts, rubber packing white zinc jute lead wool C. I. tailpiece etc.

1.2 All tools and plant required for installation of sluice valve shall be provided by the contractor.

1.3 All jointing materials shall be approved from the engineer-in-charge before use

1.4 The nut and bolts shall conform to Item No MSP-19 of specification of materials.

1.5 The rubber packing shall conform all specifications as narrated in Item No MSP-20 of specifications of materials.

## **2.0 INSTALLATION**

2.1 The sluice valve/ butterfly valve shall be lowered in to the trench carefully, so that no part is damaged during lowering operation.

2.2 If necessary tailpieces shall be fitted with sluice valve first outside the trench and then lowered in to the trench.

2.3 The rubber packing shall be three ply and of approved thickness. The packing shall be of full diameter of the flange with necessary holes and the sluice/butterfly valve bore. It shall be even at both the inner and outer edges.

2.4 The flange faces thoroughly greased.

2.5 If flange faces are not free, the contractor shall use thin fibers of lead wool.

2.6 After placing the packing, nuts and bolts shall be inserted and tightened to make the joint.

2.7 The valve shall be tightly closed when being installed to prevent any foreign materials from getting in between the working parts of the valve.

2.8 Each flange bolt shall be tightened a little at a time taking care to tighten diametrically opposite bolts alternatively.

2.9 The sluice valve/butterfly valve shall be installed in such a way that its Spindle shall remain in truly vertical position.

2.10 The other end of tailpiece shall be fitted with pipes so that continuous lines can work.

2.11 Extra excavation required for facility of lowering and fixing sluice valve shall not be paid for.

## **3.0 TESTING**

3.1 After installation of sluice valve/ butterfly valve the same is tested to 1 1/2 times of its test pressure.

3.2 The joints sluice valve/butterfly valve shall withstand the test pressure of pipelines.

3.3 Defects noticed during test and operation of sluice valve shall be rectified by the contractor at his own cost without any extra claim to the entire satisfaction of the Engineer-in-charge.

## **4.0 MODE OF MEASUREMENT AND PAYMENT**

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

**ITEM NO. : 8 :- Providing C.C. M. :100 for encasing pipes using trap metal size 12 mm to 50 mm incl. form work curing consolidation etc. complete for various location on pipe line (using trap metal 20 mm Nominal size)**

➤ For all practical purpose and in absence of proportioning of concrete on base of preliminarily tests, C.C. 1:3:6 may be provided as a levelling course i.e. one part of cement three parts of sand and six parts of black trap kapachi. Specification for various ingredients of concrete such as sand, cement, kapachi, water shall be as these given in specification for C.C. M 100.

➤ While laying base concrete for levelling course the concrete shall not be dumped from above but shall be carried out to the bottom and gently placed from a height not exceeding 1.5 meter. If concrete is transported by chutes, then the same shall be remixed at bottom of chutes to overcome any segregation that might have occurred.

**1. General**

The concrete shall consist of one part of ordinary Portland cement conforming to IS 269-1976 Three parts of well graded angular best quality river sand free of dust and organic matter and size 1 mm. To 3 mm and Six parts of approved quality black trap kapachi of size 12 mm to 25 mm. All C.C. work shall be carried out as per I.S.S. regulations and as per standing practice and ordered prevailing in PWD. All the items are to be carried out as per details supplied and as required and directed by the engineer in charge or his authorized agencies. The work will have to be strictly as per approved design and as directed by the engineer in charge.

**2. Aggregate**

The course aggregate and the fine aggregate for the concrete shall be hard, clean, tough & durable and shall be free from all deleterious matter such as dust, lump of clay, soft & flaky pieces, shale alkali, organic matter.

The materials shall be got approved by the Engineer-In-Charge or his agent.

**3. Proportion**

The proportion of course and fine aggregate shall be that one part of cement, three parts of fine aggregates & Six parts of course aggregates by volume. The proportion of cement & water of the water cement ratio shall be as specified, having regard to the nature of work & strength to be developed.

**4. Mixing** Whether the concrete is mixed by hand or in a mechanical mixture. it shall be thoroughly mixed and the concrete placed in its final position with the minimum of delay. every pieces of aggregate shall be uniformly coated by cement paste.

**5. Laying & Consolidation**

The concrete must be laid gently (Not dumped) from height so as not to prevent segregation of aggregates. after placing it shall be well compacted by tamper and/or mortar to cream up. in no case ramming shall be prolonged after the cement has begun to take its initial set. In no case, more water be added in order to reduce the work of completion.

**6. Curing**

As soon as the concrete has set sufficiently the surface shall be protected from rapid drying by being covered with wet sand, wet gunny bags or where possible by forming shallow pools of water on the top. the setting shall be continued for at least 10 days & usually two to three weeks.

**7. Workmanship**

Water stops shall be cleaned before placing them in position. Oil or grease shall be removed thoroughly using water and suitable detergents. Water stops shall be procured in long lengths as manufactured to avoid joints as far as possible. Standard L or T type of intersection pieces shall be procured for use depending on their requirement. Any non-standard junctions shall be made by cutting the pieces to profile for jointing. Lapping of water stops shall not be permitted. All jointing shall be of fusion welded type as per manufacturer's instructions. Water stops shall be placed at the correct location/level and suitably supported at intervals with the reinforcement to ensure that it does not deviate from its intended position during concreting and vibrating. Care shall also be taken to ensure that no honey-combing occurs because of the serrations/end grips, by placing concrete with smaller size aggregates in this region. Projecting portions of the water stops embedded in concrete shall be thoroughly cleaned of all mortar/concrete coating before resuming further concreting operations. The projecting water stop shall also be suitably supported at intervals with the reinforcement to maintain its intended position during concreting so as to ensure that it does not bend leading to formation of pockets. In addition, smaller size aggregates shall be used for concreting in this region also

**8. Mode of Payment :-**

80% payment if necessary shall be made after laying of concrete & 20% payment shall be release after completion of curing period of exposed surface.

**The rate shall be paid per cum. of completed work As per BOQ.**

➤ **ITEM NO- 9 :- Refilling the pipeline trenches incl. ramming, watering, consolidating disposal of surplus stuff as directed within a radius of 3 km. (Refilling as directed with Excavated Stuff)**

➤ **REFILLING OF TRENCHES :-**

- On completion of the pipe laying operations in any section, for a length of about 100m and while further work is still in progress, refilling of trenches shall be started by the Contractor with a view of restricting the length of open trenches. Pipe laying shall closely follow the progress of Trench Excavation and the Contractor shall not permit unreasonably excessive lengths of trench excavation to remain open while awaiting testing of the pipeline. If the Engineer considers that the Contractor is not complying with any of the foregoing requirements, he may prohibit further trench excavation until he is satisfied with the progress of laying and testing of pipes and refilling of trenches. The excavated material nearest to the trench shall be used filling. Care shall be taken during backfilling, not to injure or disturb the pipes, joints or coating. Filling shall be carried out simultaneously on both sides of the pipes so that unequal pressure does not occur. Walking or working on the completed pipeline unless the trench has been filled to height of at least 30cm over the top of the pipe except as may be necessary for tamping etc., during backfilling work.
- The remaining portion of the trench may be filled in with a mixture of hard and soft material free from boulders and clods of earth larger than 150mm in size if sufficient quantity of good earth and murrum are not available. The trench shall be refilled so as to build up to the original ground level, keeping due allowance for subsequent settlement

likely to take place. The top 300mm layer of fertile agricultural soil shall be kept aside during excavation and shall be laid in layers near ground level during refilling.

- To prevent buckling of pipe shell of diameters 1200mm and above, pipes shall be strutted from inside while the work of refilling is in progress, for which no separate payment shall be made.
- Strutting shall be done by means of strong spiders having at least 6 arms which shall be sufficiently stiff to resist all deformation. Spiders shall be provided at a maximum interval of 2m & shall be welded in such a way that internal coating does not get burnt.
- The Engineer shall, at all times, have powers to decide which portion of the excavated materials shall be for filling and in which portion of the site and in what manner it shall be so used.
- If any material remains as surplus it shall be disposed of as directed by the Engineer, which includes loading, unloading, transporting and spreading as directed within all lead. If the Contractor fails to remove the earth from site within 7 days after the period specified in a written notice, the Engineer may arrange to carry out such work at the Contractor's risk and cost or may impose such fine for such omission as he may deem fit. Particular care shall be taken to keep the trench dry during the entire refilling operation.
- If suitable material for refilling is not available for excavation the Contractor shall bring earth, murrum of approved quality as directed by the Engineer.
- No mechanical plant other than approved compacting equipment shall run over or operate within the trench until backfilling has reached its final level or the approval of the Engineer has been obtained.
- Subsidence in filling in : Should any subsidence take place either in the filling of the trenches or near about it during the maintenance period of 24 months from the completion of the Contract Works, the Contractor shall make good the same at his own cost or the Engineer may without notice to the Contractor, make good the same in any way and with any material that he may think proper, at the expense of the Contractor. The Engineer may also, if he anticipates occurrence of any subsidence, employ persons to give him timely notice of the necessity of making good the same, and the expenses on this account shall be charged to the Contractor.
- 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.
- **Mode of Measurement & Payment :** Payment shall be done on Cum. bases as per Rate mentioned in BOQ.

➤ **ITEM NO- 10 :- JOB Work of Main Existing Pipeline 400 mm dia. And newly laid pipeline of same size of existing pipeline (Khirasara H.W. To Zumara H.W.) 2 Nos**

- 1.0 Pre-Shutdown Verification & Material Checking

Dimension Matching: Before initiating the shutdown, the contractor shall accurately measure the outer diameter (OD) and thickness of both the existing and new 400mm DI pipes to ensure the interconnecting mechanical collars or sleeves fit without any tolerance issues.

Readiness of Specials: All jointing components—including 400 mm DI mechanical collars/sleeves, EPDM rubber gaskets, and high-tensile nut-bolts—must be physically present at the joint location beforehand.

- 2.0 Dewatering of Connection Pocket

Pocket Dewatering: Immediately after the water supply shutdown is enforced, the connection pocket (local pit) must be cleared of all residual water. Heavy-duty dewatering pumps must run continuously to keep the jointing area completely dry, clean, and free from mud during the welding/jointing process.

- 3.0 Precision Cutting and Edge Chamfering

True Vertical Cutting: The existing and new 400 mm DI pipes shall be cut exactly perpendicular to the pipe axis using a petrol/diesel-driven Abrasive Wheel Pipe Cutter to achieve a smooth, square-faced cut. Gas cutting is strictly prohibited.

Joint Edge Preparation: The newly cut ends of the DI pipes must be instantly grinded and chamfered/beveled at an angle of 15 degree using an electrical angle grinder. Extreme care must be taken to ensure that the internal cement mortar lining (CML) does not chip off or crack during grinding.

- 4.0 Alignment and Mechanical Jointing (The Core Work)

Mechanical Collar/Sleeve Fitting: For non-flanged ends, a heavy-duty DI Mechanical Collar (Sleeve) shall be slipped over the cut gap. The EPDM rubber rings shall be properly seated into the locking grooves of the collar.

Flanged / Detaching Joint Fixing: Where Detaching Joints (DJ) or flanged specials are utilized to bridge the gap, they must be aligned perfectly in a straight line. A 3mm to 5mm thick compressed rubber gasket must be placed uniformly between the flanges.

Uniform Torque Tightening: High-tensile nuts and bolts must be progressively tightened using torque wrenches in a cross-diagonal pattern. This ensures even

compression on the rubber seal, preventing stress concentration and future joint failure.

➤ **5.0 Pressure Charging & Leakage Inspection**

Testing Under Pressure: Once the joints are secured and the line is charged with water, the interconnection points (2 Nos. locations) must be kept fully exposed.

Leakage Rectification: The joints shall be inspected under normal working pressure for at least 1 hour for any signs of sweating, weeping, or drop-leakage. If any defect is noticed, the bolts must be re-torqued or the joint remade immediately until it is 100% water-tight.

## **MODE OF MEASUREMENT AND PAYMENT**

**Measurement shall be paid on per Job basis as per relevant dia. of the item as per BOQ.**

- **ITEM NO- 11 :- Removing of Existing Pipeline incl. removing of specials, valves jointing, material including carting and stacking of removed material from site to work to The Department store as directed excl. excavation and refilling**
- **400mm Dia D.I. Pipeline**

➤ **Alignment Inspection and Isolation**

Alignment Identification: Before starting the dismantling work, the contractor shall identify the layout of the existing pipeline section in coordination with the Engineer-in-charge.

Dewatering & Isolation: The contractor must ensure the pipeline is completely isolated from the active water supply system. Any residual water remaining inside the trench pocket or within the pipeline must be pumped out using mechanical dewatering pumps to create a safe and dry working area.

➤ **2.0 Safe Joint Dismantling and Pipe Cutting**

Cleaning of Fittings: All exposed joints, specials (Tees, Bends, Reducers), and valves shall be cleaned thoroughly using wire brushes to remove mud, rust, or debris before attempting removal.

Dismantling Method:

For flanged connections, nuts and bolts shall be carefully unscrewed using mechanical wrenches or spanners. If bolts are completely rusted, they may be cut without damaging the valve or pipe flange body.

For socket and spigot joints, jointing material shall be cleared systematically.

Precision Cutting: If the pipes cannot be separated at the joints, they shall be cleanly cut using an appropriate mechanical or abrasive pipe cutter. The cutting must be done in an engineering manner to maximize the salvage value of the removed material and minimize structural wastage.

➤ **3.0 Safe Lifting and Trench Clearance**



**Mechanical Lifting:** Since handling heavy pipelines manually poses safety risks and causes damage to the materials, all pipes, large specials, and valves shall be lifted from the trench strictly using mechanical equipment (such as a Hydra Crane).

**Protection of Scrap Value:** Heavy-duty nylon or canvas slings must be used for lifting. The use of bare steel wire ropes or chains directly wrapped around the pipes is prohibited to prevent denting, cracking, or destroying the structural integrity of the salvageable material.

#### MODE OF MEASUREMENT AND PAYMENT

Measurement shall be paid on RMT basis as per relevant dia. of the item as per BOQ.

➤ **ITEM NO- 12 :- Transportation of Pipe with manual loading & unloading as per annexure (A) & Transportation of pipe with loading & unloading with a crane as per annexure(B)**

➤ 1.0 Loading, Carting, and Transportation

**Secure Loading:** The removed pipes, valves, and specials shall be systematically loaded into commercial trucks or tractor-trailers.

**Transit Safety:** The materials must be properly secured, chained, or blocked during transit to prevent shifting, rolling, or falling off the vehicle, ensuring safe transportation from the site of work to the designated GWSSB Departmental Store.

➤ 2.0 Unloading and Systematic Stacking at Department Store

**Delivery Verification:** On reaching the departmental store, the contractor shall count, catalog, and log the quantities of pipes, valves, and specials removed from the site in the presence of the store keeper or Engineer-in-charge.

**Ground Stacking:** All removed pipes shall be systematically unloaded using a crane and stacked horizontally on top of wooden or concrete sleepers. They must not come into direct contact with the bare earth.

**Tier Limitations:** Pipes must be stacked in proper layers (tiers) with wooden wedges fixed at the bottom rows to prevent accidental rolling. Specials and valves shall be categorized and stacked separately in designated bins or areas within the store.

#### MODE OF MEASUREMENT AND PAYMENT

Measurement shall be paid on per Trip basis as per relevant dia. of the item as per BOQ.



➤ **Schedule of Payments :-**

Item	Description of Item	Percentage Payment to be Released
Part-A	<b>Pipeline</b>	
a	On receipt materials on site	65%
b	On lowering, laying and Jointing	20%
c	On refilling and disposal of surplus stuff	5%
d	On Hydraulic Testing	5%
e	After commissioning	5%

➤ **NOTE :-** Government of India has Circulated a New Circular for application of GST applicable from date- 01.07.2017. These Rules Under GST Will be applicable to this work. Also any other conditions/Rules Shall be declared by govt. Will also be included and applicable to Work.

Signature of Contract

Deputy Executive Engineer,  
P. H. Sani. Sub, Division  
Dayapar – Kachchh

Executive Engineer,  
P. H. Works Division  
Nakhatrana - Kachchh