

GUJARAT WATERSUPPLY & SEWERAGE BOARD
GANDHINAGAR
(A WHOLLY OWNED GOVERNMENT OF GUJARAT UNDERTAKING)



Name of Work: Supply & Installation work of Chlorination Plant for Effective working AT.Dediyasan Ta & Dist:- Mehsana.

Estimated Cost : Rs. 3522935.86

VOLUME - IV
SPECIFICATIONS

Executive Engineer
Gujarat Water Supply & Sewerage Board
P.H. Works Division, MEHSANA

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Name of Work: Supply & Installation work of Chlorination Plant for Effective working AT.Dediyasan Ta & Dist:- Mehsana.

ITEM WISE SPECIFICATION

ITEM NO. 1 Providing ,supplying and Installing Vaccum Control Direct wall mounted gas chlorinator including necessary fittings, installation and commissioning of plant incl. clamp, copper pipe, ferule filter & control valve with injector. 10 kg. Capacity (cabinet Type)

VACUUM REGULATORS : operate on diaphragm backed by silver spring vacuum regulator remotely mounted on manifold consisting of electrically operated heater for smooth flow of gas in cold climate; and as such, system remains under vacuum condition till dosing point.

DIFFERENTIAL REGULATOR : Maintains steady flow rate and maintains constant vacuum between rate valve and flow meter.

RATE SETTING : Manual adjustment at the rate valve located on differential regulator body along with flow indicator.

WATER REQUIREMENT : The water supply flow rate and pressure requirement depend upon the maximum Chlorine capacity and back pressure at the outlet of the ejector. Back pressure includes the pipe functional losses between Chlorinator and the point of application, plus existing back pressure at the point of application.

SEMI AUTOMATIC OPERATION : The Chlorine regulator will permit gas flow only when the ejector furnishes sufficient vacuum. To operate the Chlorinator, it is necessary to initiate the ejector water flow. To stop Chlorinator, it is necessary to interrupt the water flow. This 'On/Off' operation makes Chlorinator semiautomatic. it can be accompanied by opening and closing of a solenoid valve in the injector water line.

INSTALLATION

The cabinet must be installed vertically and fastened to the floor. Trained service engineers are available to install and service equipment at own cost.

OPERATION

As water under pressure flows through the ejector assembly, the vacuum is created in the ejector. This vacuum exists at reduced values back through the differential pressure regulator and the vacuum regulator are stacked to form a single unit - the Chlorine regulator.

The vacuum in the vacuum regulator moves the diaphragm which unseats the inlet valve, reducing the Chlorine gas from supply pressure to water column vacuum.

The Chlorine gas then passes through the flow meter, the manual rate valve and into differential pressure regulator. This regulator maintains a constant pressure drop across the rate valve .The gas flows from the regulator to the ejector where Chlorine mixes with water to form Chlorine solution, which is carried through the distribution system to the point of application.

Semiautomatic, or start/stop operation is accomplished by starting and stopping the water flow through the ejector by a solenoid valve or other means.

Accessories

1) Copper Tube

Flexible connector, NB 5/16" 16 SWG cadmium plated Adoptor 5/8" BSP thread with nut Lead gasket - 3mm Thick lead.

2) Roller Support

1.1. Part list and MOC for ROLLER SUPPORT (RLS - 65)

Drum Roller tunion fabricated from steel , epoxy coated to resist corrosion, Roller are cadmium

plated and equipped with bronze bushing for ease of drum rotation. Frame have holes in end to attached to floor via anchor bolts or lag anchors. One set of two tunnnions are required for each container

3) Gas Manifold

3/4" CARBON STEEL SCHEDULE 80 ASTM 106 Gr B

Drum gaseous chlorine manifold assembly complete with 3/4" schedule 80 seamless carbon steel pipe work and 3/4" forged steel 3000 lb fittings painted with yellow chlorine resister rubber paint for chlorine use, with manifold header valve (ISO/3224) 3/4" NPT inlet and 1.030-14 NGO out let.

4) Isolation Valve

<u>Sr.No.</u>	<u>Description</u>	<u>MOC</u>
<u>1</u>	SPINDEL	MONAL
<u>2</u>	<u>Bush</u>	<u>Forged Brass</u>
<u>3</u>	<u>Glande Nut</u>	<u>Forged Brass</u>
<u>4</u>	<u>Gland Packing</u>	<u>Teflon</u>
<u>5</u>	<u>Valve Body</u>	<u>Forged Silver Plated Bronze</u>
<u>6</u>	<u>Threads</u>	<u>3/4" Bsp Taper</u>

5) Pressure Guage

Design for	Chlorine Service
Dial Size	65mm to 150mm
Range	0-16 Kg/Cm2
Mounting	Bottom Connection mounting on Header Line
Type	Chemical sealed diaphragm type with magnetic contact Chamber construction
Top chamber type	Brass silver Plated
Bottom chamber type	Brass silver Plated, Ti PTFE Padded (100% CL2 Service)
Diaphragm	PTFE backed with Silver Foil
Connection type	Bottom Connection
Connection size	1/2" NPT
Type of glass	Laminated safety glass
Liquid filled	Silicon Oil filled
Dial marking	Black

6) Vacuum Switch

Loss of Vacuum: switch is designed to provide one normally open and one Normally closed alarm contact in the presence of a loss of vacuum. It should be mounted Vertically as close to the Ejector as practical and -after the gas rate valve. The alarm point is adjustable between 28 and 29 Inches of Mercury to allow the switch to actuate at the Required vacuum.

Contacts rated at	5 A @ 250 Vac or 28 Vdc maximum, (Resistive Load),
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Enclosure	NEMA 4X.
Dimensions	102 mm W x 94 mm D x 145 mm H.
Weight	2 kg.

BM5987, High Vacuum switch is designed to provide one normally open and one normally closed alarm contact in the presence of a high vacuum level. It should be mounted Vertically as close to the Vacuum Regulator as practical and before the gas rate valve. The alarm point is adjustable between 2 and 5 Inches of Mercury to allow the switch to actuate at the required vacuum.

Contacts rated at	5 A @ 250 Vac or 28 Vdc maximum, (Resistive Load)
Enclosure	NEMA 4X.
Dimensions	102 mm W x 94 mm D x 145 mm H.
Weight	2 kg.

TEM	QTY	Description
1	1	ADJUSTMENT PLUG
2	1	O-RING
3	1	HOUSING BCDY
4	1	SPRING
5	2	SCREW, 6-32 X 3/8 LG BD HD
6	1	SPRING ADAPTOR
7	1	LOWER DIAPHRAGM PIN
8	2	DIAPHRAGM
9	1	DIAPHRAGM SPACER
10	1	UPPER DIAPHRAGM PIN
11	1	DIAPHRAGM SEAL
12	1	ENCLOSURE
13	2	SCREW, 10-24 X 3/8 LG RD HD
14	2	SCREW, 2 -56 X 1/2 LG RD HD
15	1	MICROSWITCH
16	1	LEVER ASSEMBLY
17	2	NUT, 10-24
18	2	SCREW, 10- 24 X 1/2 LG RD HD
19	1	MOUNTING BRACKET

20	1	TUBING CONNECTOR, 1/4 X 3/8 X 90'
21	1	SCREW, 2-56 X 3/16 LG RD HD

7) Motorized Operated Valve

Body	CS
Ball	Monal
Steam	Monal
Seat	Teflon
Type	Flange End as per ANSI-B-16.5

1.1. Motorized Valve

ype	Ball Valve
Valve Size	3/4"
Media	Chlorine Gas (Dry)
Port Size	Full Bore
End Connection	Flange End as per ANSI-B-16.5
Body Material	C.S.
Plug Material	Monal
Seat Material	PTFE
Test Pressure	40 Kg/Cm2
Make	AUDCO

1.2. Actuator

Model	QT3
Rated Output Torque Kg m	3
Operation Speed sec/90	18

Switching Frequency Operation/hr

A) Short Time	2000
(B) Normal	1200
Weight	11 Kg
Degree Of Protection	IP 65 / IP 67

Area Of Operation	Safe
Motor Type	Non Blocking A.C. Motor
Supply Std.	220 V AC 50 Hz Single Phase
Supply optional	110 V AC 50 Hz Single Phase
Nominal Current	150 m A
Class Of Insulation	F
Embient Temperature C	45

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

Item No.2 Providing & Supplying digital chlorine detector monitor meter - 0 to 20 ppm capacity

All Operating and storing rooms for chlorine gas appliances and containers shall be fire proof. Chlorine storage rooms should preferably be provided with chlorine gas alarm device which gives out an acoustic or an optical signal when the chlorine gas concentration is reached, the set value for which is 1.0 mg chlorine per cubic metre of air in case of a person working in the room and 20 mg. chlorine per cubic metre of air when no human being is inside the room. The sensor for alarm device shall be placed not higher than 300 mm above the floors of the room. Bottle of ammonia is essential to detect leaks, etc. in case alarm device is not provided. Cylinder as well as chlorine shall be tested at every shift period for leaks, first by trying to detect the sharp irritating smell of chlorine, then by passing over each cylinder and around each valve and pipe connections, a rod with a small cotton – wool swab tied on the end, dipped in an aqueous solution of ammonia. IF chlorine is present in the air, the swab will appear to smoke due to formation of white cloud of ammonium chloride. If the leak appears to be heavy, all persons not directly concerned should leave the area and the operator should put on his mask and make a thorough search of the leak. 4 In tracing a leak, always work down-stream that is start at the cylinder and work down along the line of flow until the leak is found. Safety equipment, like gas masks, rubber gloves, aprons shall be housed in easily accessible (unlocked) cupboard placed outside the chlorination room. Faulty gas mask is worse than none at all. Hence these shall be tested frequently and canisters shall be changed at proper intervals. First aid box and eye wash fountain shall be provided outside chlorinator room. The Provisions shall be made for emergency disposal of chlorine from leaking containers. The proportions of alkali and water recommended for this purpose are given in Table -1.

TABLE – 1 RECOMMENDED ALKALINE SOLUTIONS FOR ABSORBING CHLORINE.

Container Capacity.	Caustic soda		Soda Ash		Hydrated Lime	
Kg.	100% Kg.	Water	Kg.	Water	Kg	Water

45	57	180	136	450	57	570
67	85	275	204	680	85	850
1000	115	3640	2272	9090	115	1150
NOTE ::- When Chlorine is to be absorbed in hydrated lime, the solution should be continuously and vigorously agitated.						

Water shall never be applied to the chlorine leak to stop, as it will only make it worse.

When a chlorine leak occurs, the ventilation system should be operated immediately before any person enters the chlorination room.

The exhaust pipe of the apparatus shall lead to the open through the shortest part and the outlet of this exhaust pipe shall not be readily accessible.

Specification for welded low carbon steel gas cylinders for chlorine gas. Code of practice for steel cylinders for compressed gases : Part-6 Liquefied chlorine.

In case of fire the cylinders and drums containing chlorine shall be protected by spraying with water since the containers can burst & temperatures of over 70o C. Source of pressurized water shall be provided adjacent to the chlorination room

Fusible plug, a safety device, shall be provided over all cylinders and containers designed to melt or soften between 70 to 75o C. to preclude buildup of hydrostatic pressure resulting from thermal expansion due to fire and other hazardous conditions.

Before disconnecting the flexible leads from containers to gas headers the cylinder valves should be closed first and then the gas under pressure should be drawn from the header and flexible leads before the header valve is closed.

Solvents, such as petroleum, hydrocarbons or alcohols should not be used for cleaning parts which come in contact with chlorine. The safe solvents are chloroform or carbon tetrachloride. Grease should never be used where it comes in contact with chlorine.

No direct flame should be applied to the chlorine cylinder when heating becomes necessary.

The Protective hood over the valve should always be kept in place except when the cylinders are in use.

In addition to this, the relevant provisions of IS: 4263-1967 shall also be observed as far as applicable.

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

Item No.3 Providing & Supplying safety kit for 900 kg. cap Tonner

1. Design Code : BS-1500 Part 1 1958
2. Design Pressure : 20.771 Kg/sq.cm (305 PSIG)
3. Design Temperature : Suitable for Temperature upto 65/10 Deg. C
4. Radiography : 100% for all welded seams, by x-ray machine only.
5. Heat Treatment : Fully Stress Relieved
6. Corrosion Allowance : 1.6 mm (1/6") minimum
7. Water capacity (App.) : 769.4 Kgs (1696.23 16s)
8. Chlorine capacity (App.) : a) Normal Capacity : 916 kgs. (2019.43 16s) Approx.
9. Approval of design by
 - 1) Lloyd's Register Industrial Services (India) P. Ltd.
 - 2) Chief Controller of Explosive, Govt. of India
10. Inspection by : Lloyd's Register Industrial Services (India) P. Ltd.
11. Material of construction : C.S. Plates – SA 516 GR.70
12. Shell thickness "S" : 12 mm
13. Dished ends thickness "T" : 12 mm (nominal)
14. Overall length "L" : 2060 + 12 mm
15. Diameter : 794 mm O.D.
16. Shape of Domes : Concave
17. Tare weight : 625 kgs (1377.88 16s) approx.

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

Item No.4 Providing & Supplying air breathing apparatus as per IS: 10245 part- II

AIR BREATHING APPARATUS SPECIFICATION.

CAPACITY OF CYLINDERS: 30 MINUTES & 45 MINUTES DURATION.

ACCSSORIES: Maintenance & Operation manual

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

Item No.5 Chloroscope 0.5 ppm including testing material

Chloroscope 0.1 to 5 ppm. It should be got approved from Engineer-in-charge before supply should be carried out as per instruction of Engineer-in-charge.

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

Item No.6 Supply & ETC of Chlorine gas leakage handling system with necessary components including PLC & Automation, Auto Shut off valve with all Necessary Accessories & Support System etc.

Auto Shut off Gas Guard Drive of Tonner Valve Package

Dual Cylinder Emergency Shutoff system includes Gemini 1 – Channel Controller

Terminator Actuators w/6 ft. cables, Storage Racks

Remote Shutoff Switch

Low Voltage Relay Output

Single tonner mounted actuator with 3 days back up , 12 VDC 8.5 Amp hour

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

Item No.6.1 Chlorine leak absorption package (Pre & Post Chlorination) with Scrubber and Scrubber foundation

The system consists of Hoods for covering the chlorine tonner / cylinder where chlorine gas outlet valves are fitted. The storage tank are fabricated as one piece. Highly efficient centrifugal blowers of suitable size, necessary Hoods and Ductings are provided as per the number of tonner / cylinder accounted for service. Centrifugal pumps for caustic solution re- circulation is also a part of the tonner based system.

1. FRP HOOD FOR CHLORINE TONNER / CYLINDER – FULL HOOD :

The system consists of a hood covering the complete chlorine tonner / cylinder where liquid / gas chlorine outlet valves are fitted. Hoodas are provided with 20 mm peripheral air gap for entry of fresh air during working of system.

2. FRP DUCTING :

Required quantity of FRP Ducting of size 150 MM ID is provided for leaked chlorine gas from Hoods to Centrifugal Blowers and From Blowers to absorption tank.

3. BLOWER WITH ELECTRIC MOTOR (FOR Cylinder) :

The system consists of 1 No. of highly efficient centrifugal blower of 500 M3/Hr at 800 mm WG capacity for suction of leaked chlorine from Hoods to the Absorption Tank.

4. BLOWER WITH ELECTRIC MOTOR (FOR Toner) :

The system consists of 2 Nos. of highly efficient centrifugal blower for suction of leaked chlorine from Hoods to the Absorption Tank.

5. DAMPER FOR FRP DUCTING :

01 No. FRP Dampers of size 150 mm ID is provided at discharge line of Blower and per Hoods 01 No. FRP Dampers of size 150 mm ID is provided at suction line of Blower to control the flow of Chlo – Air mixture through FRP ducting.

6. PRESSURE INDICATOR ON CAUSTIC PUMP DISCHARGE (FOR Toner) :

01 No. Pressure Indicator is provided on discharge line of Caustic Pump for indication of caustic line pressure.

7. PRESSURE INDICATOR ON BLOWER DISCHARGE :

01 No. Pressure Indicator is provided on discharge line of Blower for indication of pressure of Blower Discharge Line.

8. CAUSTIC SOLUTION TANK (For Toner) :

01 No. Caustic Tank of Capacity 8 M3 made of PP + FRP is provided for storage of 20 % conc. Caustic Solution.

The Caustic Tank consists of :

01 No. – Level Indicator of Glass Tube type for indication of level of caustic solution in the tank. Various Nozzles for inlet and outlet of caustic solution, Drain Valve with Drain Line, Overflow Line, Water Supply Inlet Line, Manhole, Vent, Diffuser etc.

9. CAUSTIC SOLUTION TANK (For Cylinder) :

01 No. Caustic Tank of Capacity 3 M3 made of PP + FRP is provided for storage of 20 % conc. Caustic Solution.

The Caustic Tank consists of :

01 No. – Level Indicator of Glass Tube type for indication of level of caustic solution in the tank. Various Nozzles for inlet and outlet of caustic solution, Drain Valve with Drain Line, Overflow Line, Water Supply Inlet Line, Manhole, Vent, Diffuser etc.

10. CAUSTIC SERVICE PIPING :

Required quantity of PP Caustic Service Piping of size 63 mm OD, 50 mm OD and 90 mm OD as per standard DIN : 8077 / 8078 is provided for re-circulation of caustic solution.

11. 'Y' TYPE STRAINER FOR CAUSTIC SERVICE (For Toner) :

01 No. Polypropylene 'Y' Type Strainer of size 2 " is provided on Caustic Service line at suction line of Caustic Pump to avoid passage of small particles.

12. NON RETURN VALVE FOR CAUSTIC SERVICE (For Toner):

01 No. Polypropylene Non Return Valve of size 2 " is provided on caustic service line at discharge of Caustic Pump.

13. CAUSTIC RE – CIRCULATING PUMP WITH ELECTRIC MOTOR (For Toner) :

01 No. Caustic Re-Circulating Pump of capacity 10 M3/Hr at 10 Mtr head along with suitable motor is provided on caustic solution line to re – circulate the caustic solution in to the absorption tank.

14. WATER SUPPLY PIPING FOR CAUSTIC TANK :

Required quantity of GI water supply pipe of size 1 " to deliver water into the Caustic Tank for dilution of Conc. Caustic Solution.

LUBRICATION SCHEDULE

The lubrication schedule is mainly required for the rotating parts of the Caustic Pumps and Blowers. The Caustic Pumps and Blowers are required to be lubricated once in three months time. Caustic Pumps shall be replenished with oil as per SAE – 30 or equivalent.

Magar test the motor and check for direction of rotation.

Check for foreign material inside the Blower.

Check the Impeller and remove any material formed on the blades.

Rotate the Impeller by hand and see whether it is rotating freely without any friction of the sides

When the direction etc. are checked, start the Blower.

GENERAL WRITE- UP OF CHLORINE GAS ABSORPTION SYSTEM FOR TONNERS / CYLINDERS

IN THE CHLORINATION ROOM

LEAKED CHLORINE ABSORPTION SYSTEM

The system is designed to absorb leakage of chlorine leaking from one filled Toner / Cylinder in one hour time. The system is designed to absorb the chlorine gas and not liquid chlorine leaked from the Toner / Cylinder. To stop the leakage of liquid chlorine from toner is the difficult task as the liquid chlorine expands as soon as it enters into the atmosphere. Normally as soon as you find the liquid chlorine is leaking from the valve or body of the toner, you must rotate the toner in 180 degree to convert the liquid chlorine leakage into gas chlorine leakage. The chances is very less for leakage of liquid chlorine from cylinders because it is always used in vertical position.

PROCESS DESCRIPTION OF ABSORPTION SYSTEM :

The system is designed to absorb leakage of chlorine leaking from one filled Toner / Cylinder in one hour time. The system is designed to absorb the chlorine gas and not liquid chlorine leaked from the Toner / Cylinder. To stop the leakage of liquid chlorine from toner is the difficult task as the liquid chlorine expands as soon as it enters into the atmosphere. Normally as soon as you find the liquid chlorine is leaking from the valve or body of the toner, you must rotate the toner in 180 degree to convert the liquid chlorine leakage into gas chlorine leakage. The chances is very less for leakage of liquid chlorine from cylinders because it is always used in vertical position.

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

Item No.6.2 Supply of all Necessary Electrical Cable, Instrument Cable with cable Tray , Pump Starter , Scrubber Panel etc.

- As per approved make of R & B electrical department and confirming to standard specification booklet of R & B electrical. (Booklet Attached)

Mode of measurements and payment:

The measurement shall be taken in Pt. and payment shall be paid on Job. basis as per payment schedule

ITEM NO.7 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.

(A) Upto 1.50 mt depth

(i) In all sorts of soil and soft murrum.

(ii) In soft rock and / or masonry in CM or LM or Lime concrete.

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:

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.

The products of the clearing to restocked in such a place and in such a manner, as directed by the engineer in charge.

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.

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

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 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:

Shoring & strutting and dewatering if required shall have to be carried out by the contractor, for which any extra charge will not be paid 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

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.

8.0 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 road.

- 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.

Mode of measurements and payment:

The measurement shall be taken in Cum.. and payment shall be paid on Cum.basis as per payment schedule

Item No.8 & 8.1 Providing and supplying in standard length ISI mark unplasticised PVC pipes

suitable for potable water with ringfit joint including cost of rings as per IS specificaiton no. 4985/1988 including all local and central taxes, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to the departmental stores and including cost of jointing material etc. complete.

- 1) 63 mm Dia.
- 2) 160 mm Dia.

Pipes supplied must be purchased from the latest vendors approved by GWSSB at the time of purchase of 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
- Elastomeric 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 unplasticised 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 / cm³.

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	Mean outside diameter in mm		Outside diameter at any point in mm	
	Minimum	Maximum	Minimum	Maximum
63	63	63.3	62.2	63.8
75	75	75.3	74.1	75.9
90	90	90.3	88.9	91.1
110	110	110.4	108.6	111.4
125	125	125.4	123.5	126.5
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
225	225	225.7	222.3	227.7
250	250	250.8	247.0	253.0
280	280	280.9	276.6	283.4
315	315	316.0	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 270 C. of 6 & 10 kg/cm². This working pressure shall be down graded for ambient underground soil temperature of 450 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. (0C)	Mi. 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 metres 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:

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 C0 to 45 C0.

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;

- ISI Certification mark on each pipe.
- Manufacturers brand name and/or trademark.
- Purchasers mark as “GWSSB” be inscribed.
- The outside diameter and pressure rating.
- Batch Number Or Lot Number.
- Inspector’s Mark on Each Pipe

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: Must have paste like consistency and be ready for use, preferably Soap Jelly. Has To Adhere Wet And Dry Surfaces Of Upvc Pipes And Rubber Ring. Must Be Non-Toxic. Must Be Water-Soluble.

Must non-affecting physio-chemical and organoleptic properties of drinking water carried ion the pipe.

Must not have an objectionable odour.

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

Colour 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

Tests for PVC Pipes as per IS: 4985-2000

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 11 percent.

C) Reversion Test

When tested by the immersion method a length of pipe 200 +/- 20 mm long shall not alter in length by more than 5 %. In case of socket end pipes this test shall be carried out on the plain portion of the pipe taken at least 100 mm away from the root of the socket.

D) Vicat softening temperature

When tested by the method prescribed in IS 6307, the vicat softening temperature of the specimen shall not be less than 80 degree Celsius.

E) Resistance to external bows

When tested by method, the pipe shall have a true impact rate of not more than 10 %. In case of socket ended pipes this test shall be carried out on the plain portion of the pipe taken at least 100 mm away from the root of the socket.

F) Opacity

The wall of the plain pipe shall not transmit more than 0.2 % of the visible light falling on it when tested in accordance with IS 12235 Part-3

G) Effect on water

The pipe shall not have any detrimental effect on the composition of water flowing through them. When tested by the method described in IS 12235 part 4, toxic substances extracted from the internal wall of pipe shall not exceed the following concentrations in the solution.

H) Dimensions of pipe as per IS: 4985: 2000

Tolerance as per IS: 4985: 2000

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.

Inspection:

Inspection of pipe will be carried out at factory site by inspecting agency to be fixed and authorised by GWSSB. The inspecting agency will inspect the material as per the specification and on satisfying itself will mark the inspecting mark on all pipe and issued inspection note to the supplier and concerned consignee.

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

Pipes supplied must be purchased from the latest vendors approved by GWSSB at the time of purchase of pipes.

Mode of measurements and payment:

The measurement shall be taken in Rmt. and payment shall be paid on Rmt. basis as per payment schedule

ITEM NO. 9 Providing and supplying UPVC specials including all taxes, Transportation etc complete for laying jointing of UPVC pipes

All Special should be of ISI mark.

It should be properly Fitted with PVC/GI pipe with necessary fitting, Vicel, rubber packing etc complete.

Mode of measurement and payments:

The payment shall be made on No. basis as per Price bid or Payment schedule.

ITEM NO. 10 & 10.1 Providing and supplying ISI mark CI D/F Sluice Valves as per IS:14846 (Latest Edition) of following class and diameter including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.

Sluice valves with ISI mark only

- (A) PN-1.0 With hand wheel /Cap operated (PD type short body)
- (i) 50 MM Diameter
- (ii) 150 MM Diameter

Design Features

Sluice valve shall conform to IS 14846 (ISI Marked). Except pump house, these valves are to be installed in valve chamber. All valves of pump house and rising mains shall be non-rising stem type.

The valves shall be free from sharp projections, which are likely to catch and hold stringy materials. Valves shall close with clockwise rotation of the hand wheel. The direction of closing and opening shall be marked on the hand wheel.

Necessary joining materials viz. bolts, nuts, washers, packing etc. shall be provided by the contractor at his cost. The valves shall be fixed so as to have axis perfectly horizontal. If required the contractor shall also carry out drilling of holes of appropriate diameter in flanges in required numbers. A hand wheel shall be provided for emergency operation. The hand wheel drive shall be mechanically independent.

The valve design shall take care of the pressure drop across the valve disc in case of partial opening of the valve and shall take care of the erosion and cavitation effect on the body and disc during such operation. Valve(s) subjected to back pressure shall have the valve seat, disc and the operator suitably designed to ensure trouble-free operation. The shaft diameter shall take into consideration, the maximum torque required for the valve operation, the maximum differential pressure across the valve disc when the valve is closed and the shock load due to accidental closure of the valve disc. The disc shall be designed for maximum differential pressure across the valve as well as the shock load due to accidental closure of the valve. Disc design shall offer minimum head loss. Disc shall also offer minimum resistance to flow. Disc shape shall be contoured.

Valve seats shall be of a design that permits removal and replacement at site and shall be securely clamped on the body or disc of the valve. Seat material shall be suitable for the operating conditions and handling fluid and may be suitably reinforced, if required. The seat design shall permit easy removal for replacement purposes without the need for removing the valve from the line. No deposited or welded seat rings permitted. The valve bearings shall be of 'self-lubricated' type and shall not have any harmful effect due to handling fluid. Adjustable thrust bearing(s) shall be provided to hold the valve disc securely in the center of the valve seat. Each Sluice Valve shall be provided with a hand wheel for manual operation. For the Valves located at inaccessible position, it shall be provided with extension spindle and floor stand or hand lever / round chain to facilitate manual operation.

Hydrostatic Test

Each valve body shall be subjected to hydrostatic test (Body and Seat) as per IS 14846. For valves subjected to back pressure condition, leakage test shall be carried out on both sides of the disc.

Performance Test

Each valve complete with operator shall be shop operated at least three (3) times from fully closed to fully open conditions and reverse, hold at intermediate positions under no flow condition, to prove the workability of the assembly.

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.

Electric Actuator

Each actuator shall be adequately sized to suit the application and be continuously rated to suit the modulating control required. The gearbox shall be oil or grease filled, and capable of installation in any position. All operating spindles, gears and head stocks shall be provided with adequate points for lubrication. The valve actuator shall be capable of producing not less than 1½ times the required valve torque and shall be suitable for at least 15 minutes continuous operation.

The actuator starters shall be integrally housed with the actuator in robustly constructed and totally enclosed weatherproof housing. The motor starter shall be capable of starting the motor under the most severe conditions. The starter housing shall be fitted with contacts and terminals for power supply, remote control and remote positional indication, and shall also be fitted with internal heaters so as to provide protection against damage due to condensation.

Each starter shall be equipped as follows: i. A.C. electric motor. ii. Reduction gear unit. iii. Torque switch mechanism complete with set of torque switches. iv. Limit switch mechanism complete with set of limit switches. v. Hand wheel for manual operation. vi. Hand-auto changeover lever with suitable locking arrangement. vii. Local control switch / push buttons viii. 415 V / 240 V AC control transformer.

The actuator shall be suitable for operation in the climate conditions and power supply conditions given in the specification. The actuator shall be capable of producing not less than 1½ time the maximum required torque and shall be suitable for at least 15 minutes continuous operation. All local controls shall be protected by a lockable cover.

Datasheet:

SLUICE VALVE/GATE VALVE					
Sr No	Component	PN- 1.0/1.6	PN-2.0	PN-2.5	PN-4.0
1	Body	CI IS 210 Gr. FG260	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB/ ASTM A351 Gr. CF8
2	Bonnet	CI IS 210 Gr. FG260	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB/ ASTM A351 Gr. CF8
3	Wedge	CI IS 210 Gr. FG260	ASTM A217 Gr. CA15	ASTM A217 Gr. CA15	ASTM A217 Gr. CA15
4	Gland	CI IS 210 Gr. FG260	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB	ASTM A216 Gr. WCB/ ASTM A351 Gr. CF8
5	Stem	SS 410	SS 410	SS304	SS 316
6	Body Ring/Wedge Ring	IS 318 Gr LTB-2	ASTM A217 Gr. CA15	ASTM A217 Gr. CA15	ASTM A217 Gr. CA15
7	Gland Packing	Jute and Hemp	Graphoil Filler	Graphoil Filler with SS 304 wire winding	Graphoil Filler with SS 304 wire winding
8	Nut Bolts	Carbon steel	ASTM A320 Gr L7 and ASTM A194 Gr 4	ASTM A320 Gr L7 and ASTM A194 Gr 4	ASTM A320 Gr L7 and ASTM A194 Gr 4
9	Wedge Nut and Stem Nut	IS 318 Gr LTB-2	SS 304	SS 304	SS 304
10	Hand Wheel	Cast Iron	Cast Steel	Cast Steel	Cast Steel/SS
11	Flange End	IS 1538	ASME/ANSI B16.5	ASME/ANSI	ASME/ANSI B16.5

			Class 150	B16.5 Class 300	Class 400
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Mode of measurements and payment:

The measurement shall be taken in No.. and payment shall be paid on No.. basis as per payment schedule

ITEM NO.11 &11.1 Lowering, laying, fixing and jointing PVC/uPVC/cPVC pipes and specials of following class and diameter including cost of conveyance from stores to site of works including cost of labour, material, cement solvent, giving satisfactory hydraulic testing as per ISI code.

- (i) 63 mm dia 6 kg/cm² PVC pipe.**
- (ii) 160 mm dia 6 kg/cm² PVC pipe.**

- 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 throughout 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.

b) PVC Specials

1. Specials as per site requirement shall be supplied by the contractor. The specials should be as per standard and shall be got approved by the Engineer in charge before being used. The specials should be perfectly in working condition and having necessary threads holes etc. as per standard.
2. PVC specials should be as per IS standard specification and should be price make. All the specials should be suitable for PVC pipes for which it is being used.

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

Providing, supplying and fixing all PVC specials required for laying.

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.

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 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 opening of pipes etc. as directed without claiming any extra cost. The pipelines shall be kept filled with water for a work line 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.

Mode of measurements and payment:

The measurement shall be taken in Rmt.. and payment shall be paid on Rmt .basis as per payment schedule

ITEM NO. 12 & 12.1 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.

Sluice valves, Butterfly Valves, Reflux Valves

- (i) 50 MM Diameter**
- (ii) 150 MM Diameter**

1.0 Lowering, Laying and Jointing of Sluice valve

- (i) Cast iron double flanged sluice valve/butterfly valves with two tail pieces suitable to pipe shall be supplied by the board and they shall be carted by the contractor at his own cost from the departmental store or any other store as directed. The rate shall include loading, unloading and stacking at site.
- (ii) The sluice valve/butterfly valves and tail pieces shall be examined before laying for cracks and other flows. They shall be undamaged in all respect.

- (iii) The sluice valves/butterfly valves shall be operated before laying.
- (iv) All grits and foreign materials shall be removed from the inside of the valves before placing.
- (v) All the four faces shall be thoroughly cleaned and coated with a thin layer of mineral grease.
- (vi) The tightening of gland shall be checked with a pair of inside-calipers. Clearance between the top of stuffing box and the underside of the gland shall be uniform all the sides.

2.0 JOINTING MATERIAL

- 2.1 The contractor shall provide all necessary jointing materials such as nuts bolts, rubber packing white zinc jute lead wool etc.
- 2.2 All tools and plant required for installation of sluice valve shall be provided by the contractor.
- 2.3 All jointing materials shall be not approved from the engineer-in-charge before us
- 2.4 The nut and bolts shall conform to Item No MSP-19 of specification of materials.
- 2.5 The rubber packing shall confirm all specifications as narrated in Item No MSP-20 of specifications of materials.

3.0 INSTALLATION

- 3.1 The sluice valve/butterfly valve shall be lowered in to the trench carefully, so that no part is damaged during lowering operation.
- 3.2 If necessary, tail pieces shall be fitted with sluice valve first outside the trench and then lowered in to the trench.
- 3.3 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.
- 3.4 The flange faces thoroughly greased.
- 3.5 If flange faces are not free, the contractor shall use thin fibers of lead wool.
- 3.6 After placing the packing, nuts and bolts shall be inserted and tightened to make the joint.
- 3.7 The valve shall be tightly closed when being installed to prevent any foreign materials from getting in between the working parts of the valve.
- 3.8 Each flange bolt shall be tightened a little at a time taking care to tighten diametrically opposite bolts alternatively.
- 3.9 The sluice valve/butterfly valve shall be installed in such a way that its spindle shall remain in truly vertical position.
- 3.10 The other end of tail piece shall be fitted with pipes so that continuous lines can work.
- 3.11 Extra excavation required for facility of lowering and fixing sluice valve shall not be paid for.

4.0 TESTING

- 4.1 After installation of sluice valve/butterfly valve the same is tested to 1 1/2 times of its test pressure.
- 4.2 The joints sluice valve/butterfly valve shall withstand the test pressure of pipelines.
- 4.3 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.

5.0 Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

ITEM 13 Construction of valves chambers in brick or bela stone masonry, locally available in C. M. 1:6. Foundation concrete 150 mm thick in C. C. 1:4:8 of trap metal size 25 mm to 40 mm thick, inside cement plaster in C. M. 1:3 and cement pointing outside in C. M. 1:3 and top cover of precast RCC slab 100 mm thick (with key hole in two parts, each with handles or MS Bar etc. complete as give

size) Upto 1 Mt. depth from G. L. to pipe invert level incl. complete civil works but excl. cost of excavation and refilling. With cast in situ RCC slab in one single piece with fixing of CI-MH Frame and cover (excl. cost of CI-MH Frame and cover) with 23 cm. thk. BM wall in C.M. 1:6.a)

d)Size of Chamber 0.60 m x 0.60 m and 1 mtr deep 1)with precast slab in two parts 15 mm

Materials such as Cement, sand, coarse aggregate, bricks, reinforcement, water etc. to be used for this work shall be confirming to specification laid down in material section.

Location

Chamber shall be constructed at places approved by the Employer's Representative.

Where valves are provided for maintenance of the pipeline.

Excavation / P.C.C.

Excavation, shoring, dewatering/ P.C.C. etc. for the pits of chambers, laying of pipes and fittings/specials shall be done in accordance with Employer's Requirements described elsewhere in the document.

Bed Concrete

The bed concrete 150 mm thick for chamber shall be done in C.C. 1:4:8 as directed by the Engineer-in-charge using trap metal of 25 mm to 40 mm.

Bricks

Bricks used for construction of manholes shall conform to the relevant Indian Standards. They shall be sound, hard, and homogeneous in texture, well burnt in kiln without being vitrified, table molded, deep red, cherry or copper coloured, of regular shape and size and shall have sharp and square and parallel faces. The bricks shall be free from pores, chips, flaws or humps of any kind. Bricks containing ungrounded particles, which absorb water more than 1/6th of their weight when soaked in water for twenty-four hours, shall be rejected. Over burnt or under burnt bricks shall be liable to rejection. The bricks shall give a clear ringing sound when struck and shall have a minimum crushing strength of 50 kg/sq.cm. The class and quality requirements of bricks shall be as laid down in IS: 1077.

The size of the brick shall be 23.0 x 11.5 x 7.5 cm. unless otherwise specified; but tolerance up to 3 mm in each direction shall be permitted. Only full size brick shall be used for masonry work. Brick bats shall be used only with the permission of Employer's Representative to make up required wall length or for bonding. Sample

bricks shall be submitted to the Employer's Representative for approval and bricks supplied shall conform to approved samples. If required by the Employer's Representative, brick sample shall be tested as per IS: 3495 by Contractor. Bricks rejected by the Employer's Representative shall be removed from the Site within 24 hours.

Cement Mortar

Mortar for masonry shall be as per IS: 2250. Chambers shall be constructed in brick masonry with cement mortar (1:6) unless otherwise specified. Gauge boxes for sand shall be of such dimensions that one bag containing 50 kg. of cement forms one unit. The sand shall be free from clay, shale, loam, alkali and organic matter and shall be of sound, hard, clean and durable particles. Sand shall be as approved by the Employer's Representative. If required by the Employer's Representative sand shall be thoroughly washed till it is free of any contamination.

For preparing cement mortar, the ingredients shall first be mixed thoroughly in dry conditions. Water shall then be added and mixing continued to give a uniform mix of required consistency. Cement mortar shall be used within 25 minutes of mixing. Mortar left unused in the specified period shall be rejected.

The Contractor shall arrange for tests on mortar samples if so required by Employer's Representative. Re-tempering of mortar shall not be permitted.

Brick Masonry

All bricks shall be thoroughly soaked in clean water for at least one hour immediately before being laid. The cement mortar for brick masonry work of Chambers shall be in the proportion specified in drawing. Brick work 230 mm thick and over shall be laid in English Bond unless otherwise specified. 115 mm thick brick work shall be laid with stretchers. For laying bricks, a layer of mortar shall be spread over the full width of suitable length of the lower course. Each brick shall be pressed into the mortar and shoved into final position so as to embed the brick fully in mortar. Bricks shall be laid with frogs uppermost.

All brickwork shall be in plumb and square/ circular unless otherwise shown on drawing and true to dimensions shown. Vertical joints in alternate courses shall come directly one over the other and be in line. Horizontal courses shall be leveled. The thickness of brick courses shall be kept uniform. For walls of thickness greater than 230 mm both faces shall be kept in vertical planes unless otherwise specified. All interconnected brickwork shall be carried out at nearly one level so that there is uniform distribution of pressure on the supporting structure and no portion of the work shall be left more than one course lower than the adjacent work. Where this is not possible, the work shall be raked back according to bond (and not saw toothed) at an angle not exceeding 45 degrees. But in no case the level difference between adjoining walls shall exceed 1.25 M. Workmanship shall conform to IS: 2212.

Brick shall be so laid that all joints are well filled with mortar. The thickness of joints shall not be less than 6 mm and not more than 10 mm. The face joints shall be raked to a minimum depth of 12 mm by raking tools daily during the progress of work when the mortar is still green, so as to provide a proper key for the plastering to be done. When plastering is not required to be done, the joints shall be uniform in thickness and be struck flush and finished at the time of laying. The face of brickwork shall be cleaned daily and all mortar droppings removed. The surface of each course shall be thoroughly cleaned of all dirt before another course is laid on top. If mortar in the lower courses has

begun to set, the joints shall be raked out to a depth of 12 mm before another course is laid.

Cement Plaster

All joints in masonry shall be raked to a depth of 12 mm with hooked tool made for the purpose when the mortar is still green and in any case within 48 hours of its laying. The surface to be rendered shall be washed with fresh clean water free from all dirt, loose material, grease etc. and thoroughly wetted for 6 hours before plastering work is commenced. Concrete surfaces to be rendered will however be kept dry. The wall should not be too wet but only damp at the time of plastering. The damping shall be uniform to get uniform bond between the plaster and the wall.

The proportion of the cement mortar shall be as approved on relevant drawings. Cement shall be mixed thoroughly in dry condition and then just enough water added to obtain a workable consistency. The quality of water, sand and cement shall be as per relevant I.S. The mortar thus mixed shall be used immediately and in no case shall the mortar be allowed to remain for more than 25 minutes after mixing with water.

Curing of plaster shall be started as soon as the applied plaster has hardened enough so as not to be damaged. Curing shall be done by continuously applying water in a fine spray and shall be carried out for at least 7 days.

Plastering shall be done on inner face of brick masonry in cement mortar (1:3) and 15 mm thick unless otherwise specified.

Cement pointing in C: M (1:3) shall be done on outside the chamber including racking out joints, curing etc. complete as directed by the engineer-in-charge.

Cement Concrete Block

The C.C. blocks for the chamber shall be constructed in cement concrete of M15 grade to take care of weight of valves.

Pipe Entering or Leaving Chamber

Whenever a pipe enters or leaves a chamber, bricks on edge must be cut to a proper form and laid around the upper end of the pipe so as to form an arch. All around the pipes, there shall be a joint of cement mortar (1:2) 13 mm thick between it and the bricks.

Precast Reinforced Cement Concrete Slab with key holes

Precast Reinforced cement concrete top slab shall be casted in pieces for covering the chamber. Necessary keyholes shall be provided at appropriate place for operation of spindle of valve. The minimum thickness of slab shall be 100mm and same shall be casted in C.C. of M20 grade. The required reinforcement shall be provided. The top & bottom surface of precast slab shall be finished with cement mortar 1:3.

Mode of measurements and payment:

The measurement shall be taken in No. and payment shall be paid on No. basis as per payment schedule

ITEM NO. 14 Refilling the pipeline trenches incl. ramming, watering, consolidating disposals of surplus stuff as directed within a radius of 3 km. Refilling as directed

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 or 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.

Mode of measurements and payment:

The measurement shall be taken in Cum.. and payment shall be paid on Cum .basis as per payment schedule

Item No.15 Supplying & erecting approved make low noise decorative exhaust fan having square frame ABS body with inbuilt lowers & square frame.

- Supplying and erecting low noise decorative exhaust fan having square frame ABS body as directed by engineer in charge.
- Size: 200 mm
- Colour – White/Black
- Easy Maintenance: Quick dismantling of blades for easy cleaning
- Performance: Robust motor for continuous running of fan
- Gravity Shutter: To prevent entry of foreign objects like dust, bird, pets etc
- Includes: 1 Fan ; Gravity Shutter: To prevent entry of foreign objects like dust, bird, pets etc ; Motor speeds (No.): 1 ; Rated Speed: 1350RPM ; Motor protection through thermal overload protection device
- Power: 35 watts; Operating Voltage: 230 voltsThe noise level is 44 dB and the rated frequency is 50 Hz.
- (MAKE- Havells/ crompton or equivalent)
- The Size & material shall be as directed by engineer in charge.

Mode of measurements and payment:

The measurement shall be taken in Each and payment shall be paid Each basis as per payment schedule

DECLARATION

I HERE BY DECLARE THAT I HAVE MADE MY SELF THROUGHLY CONVENANTS WITH THE LOCAL CONSITIONS REGARDING THE AVAILABILITY OF ALL MATERIALS AND LABOUR ON BASED OF WHICH I HAVE QUOTED RATES FOR THIS WORK.

THE SPECIFICATIONS AND NATURE OF THIS WORK HAVE BEEN CAREFULLY STUDIED BY ME BEFORE SUBMITTING THE TENDER.

Signature of Contractor

Executive Engineer
P.H.Dharoi Project Division
GWSSB Mehsana