

SURAT MUNICIPAL CORPORATION
[HYDRAULIC DEPARTMENT]

Tender Notice (On-Line) No.: DMC/HYD/06/2026-2027. Work No.:01

Issued To: _____

Name of Work:- Providing, Manufacturing, Supplying, Conveying, Lowering & Laying and Conversation of CI/DI TO MS LINE at Various locations of ESR and Leakage spot as per Requirement in East Zone-A (Varachha) of Surat Municipal Corporation.(2nd Attempt)

VOLUME: II
GENERAL TECHNICAL SPECIFICATIONS
&
ITEMWISE TECHNICAL SPECIFICATIONS

LAST DATE OF SUBMISSION OF TENDER FEE & E.M.D IN HARD COPY	:	On or before 24/07/2026 up to 17:00 hrs.
(BY SPEED POST / RPAD THROUGH POSTAL AUTHORITY ONLY)		

:To be submitted to:

The Chief Accountant
Accounts Department,
SURAT MUNICIPAL CORPORATION,
Muglisara, Surat-390 003.

LAST DATE OF ONLINE SUBMISSION OF TENDER (ALONG WITH NECESSARY DOCUMENTS, CERTIFICATES ETC.)	:	16/07/2026 up to 18:00 hrs. (On line)
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9.0 TECHNICAL SPECIFICATIONS

9.1 PREAMBLE

1. In the specification “as directed” / “approved” shall be taken to mean, “as directed / approved by the Engineer-in-charge”.
2. Wherever a reference to any Indian Standard appears in the specifications, it shall be taken to mean as a reference to the latest edition of the same in force on the date of agreement.
3. In “Mode of Measurement” in the specification wherever a dispute arises in the absence of specific mention of a particular point or aspect, the provisions on these particular point or aspects in the relevant Indian Standards shall be referred to.
4. All measurements and computations, unless otherwise specified, shall be carried out nearest to the following limits.

(i)	Length, width and depth (height)	..	0.01Mt.
(ii)	Areas	..	0.01Sq.mt
(iii)	Cubic Contents	..	0.01Cu.mt.

In recording dimensions of work the sequence of length, width and height (depth) or thickness shall be followed.

5. The distance, which constitutes lead, shall be determined along the shortest practical route and not necessarily the route actually taken. The decision of the Engineer-in-charge in this regard shall be taken as final.
6. Where no lead is specified, it shall mean “all leads”.
7. Definite particulars covered in the items of work, though not mentioned or elucidated in its specifications shall be deemed to be included therein.
8. Any material specified in detailed specification of items shall be of quality and property as mentioned in the respective general specifications of materials mentioned in this tender.
9. Approval of the samples of various materials given by the Engineer-in-charge shall not absolve the Contractor from the responsibility of replacing defective material brought on site or materials used in the work found defective at a later date. The Contractor shall have no claim to any payment or compensation whatsoever on account of any such materials being rejected by the Engineer-in-charge.
10. The contract rate of the item of work shall be for the work completed in all respects.
11. No collection of materials shall be made before it is got approved from the Engineer-in-charge.

Collection of approved materials shall be done at site of work in a systematic manner. Materials shall be stored in such a manner as to prevent damage deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work.
12. Materials, if and when rejected by the Engineer-in-charge, shall be immediately removed from the site of work.

13. No materials shall be stored prior to, during and after execution of a structure in such a way as to cause or lead to damage on overloading of the various components of the structure.
14. All work shall be carried out in a workmanlike manner as per the best techniques for the particular item.
15. All tools, templates, machineries and equipments for correct execution of the work as well as for checking lines, levels, alignment of the works during execution shall be kept in sufficient numbers and in good working condition on the site of work.
16. The mode, procedure and manner of, execution shall be such that it does not cause damage or over-loading of the various components of the structure during execution and after completion of the structure.
17. Special modes of construction not adopted in general Engineering practice, if proposed to be adopted by the Contractor, shall be considered only if the Contractor provides satisfactory evidence that such special mode of construction is safe, sound and helps in strength and quality. Acceptance of the same by the Engineer-in-charge shall not, however, absolve the Contractor of the responsibility of any adverse effects and consequences of adopting the same in the course of execution or completion of the work.
18. All installations pertaining to water supply and fixtures thereof as well as drainage lines and sanitary fittings shall be deemed to be completed only after giving satisfactory tests by the Contractor.
19. The Contractor shall be responsible for observing the rules and regulations imposed under the "Minor Minerals Act" and such other laws and rules prescribed by Government from time to time.
20. All necessary safety measures and precautions (including those laid down in the various relevant Indian Standards) shall be taken as also of the work itself.
21. The testing charges of all materials shall be borne by the Contractor.
22. Approval to any of the executed items for the work does not in any way relieve the Contractor of his responsibility for the correctness, soundness and strength of the structure as per the drawings and specifications.
23. All works shall be carried out strictly as per detailed technical specification provided in the tender. If not specified, the work shall be executed according to relevant applicable IS codes and standard engineering practice. In such case decision of the Engineer-in-charge shall be final and binding to the Contractor and in no case the Contractor will claim any extra for the same.
24. If Tenderer feels that detailed technical specifications for item mentioned in Schedule "B" are not provided with the tender, he will raise such points before quoting rates and submitting the tender. No claim on the basis of such argument shall be entertained during the course of work.
25. All measurements shall be considered as mentioned in the drawings / schedule / detailed specifications.
26. The Schedule of Quantities and Rates are to be read for the purpose of pricing in conjunction with instructions of tenderers, technical specifications, drawings and General conditions for contract for Civil works.

27. The price quoted in the summary of costs, sheets of schedule of quantities and rates shall be of all inclusive value for the work described including all costs and expenses which may be required in for the execution of the work described together with all general risks, liabilities and obligations set for ther or implied in the document on which the tender is based.
28. The quantities furnished are approximate. In the even of actual quantities varying form those furnished herein below or items detailed or added. the percentage (plus/minus) quoted for the entire work shall remain, firm and no extra claims in this respect will be entertained. The payment shall be made based on the actual quantities in the complete work.
29. All works shall be carried out strictly as per detailed specification whether actually specified or not If not specified, as per directions of owner/Engineer-in-charge.
30. Percentage (plus/minus) quoted by tenderer shall be firm even if the contract is split.
31. Percentage (plus/minus) and the total amount entertained in the summary of cost. sheet of schedule of quantities and Rates shall be written in ink and shall be entered both in figures and words.
32. Detailed specifications of items of work are described under section Detailed technical Specification for each item of schedule of quantities and Rates. The section gives guidelines to the reference of relevant clauses of specifications and mode of measurement, Tenderer shall read this in conjunction with other technical specifications and quote accordingly.
33. The measurements shall be as described in the detailed Technical specification of items of work, all measurements being not in accordance with the drawings with no allowance for waste.
34. If Tenderers need any clarifications, they should obtain the same in writing from Owner/ Engineer-in-charge. No notice will be taken of any verbal discussion in such matters.
35. For the work to be carried out at river bed level, contractor has to make his won arrangement for dewatering/ diverting river water or sub soil water by making katcha earthen dam, applying dewatering ump or any other mean convient as per site condition.

36. If Tenderers need any clarifications, they should obtain the same in writing from Owner / Engineer-in-charge.

Mm	Millimetres
Cm	Centimetres
Mt.	Metres
Km.	Kilometres
Sq.mt.	Square Metres
Cu.mt.	Cubic Metres
R.Mt.	Running Metres
No.	Numbers
C.I.	Cast Iron
R.C.C.	Reinforced Cement Concrete
Wt.	Weight
Kg.	Kilogram
M.T.	Metric Tonne
M.D.	Metre Depth
M.S.	Mild Steel
I.S.	Indian Standard

**HYDRAULIC ENGINEER
SURAT MUNICIPAL CORPORATION
SURAT.**

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

9.2 GENERAL SPECIFICATIONS OF MATERIALS

M-1 Water

- 1.1 Water shall not be salty or brackish and shall be clean, reasonably clear and free from objectionable quantities of silt and traces of oil and injurious alkalis, salts, organic matter and other deleterious material which will either weaken the mortar or concrete or cause efflorescence or attack the steel in R.C.C. Container for transport, storage and handling of water shall be clean. Water shall conform to the standards specified in I.S. 456-2000.
- 1.2 If required by the Engineer-in-charge it shall be tested by comparison with distilled water. Comparison shall be made by means of standard cement tests for soundness, time of setting and mortar strength as specified in I.S. 269 –1976. Any indication of unsoundness, change in time of setting by 30 minutes or more or decrease of more than 10 percent in strength of mortar prepared with water sample when compared with the results obtained with mortar prepared with distilled water shall be sufficient cause for rejection of water under test.
- 1.3 Water for curing mortar, concrete or masonry should not be too acidic or too alkaline. It shall be free of elements which significantly affect the hydration reaction or otherwise interfere with the hardening of mortar or concrete during curing or those which produce objectionable stains or other unsightly deposits on concrete or mortar surfaces.
- 1.4 Hard and bitter water shall not be used for curing.
- 1.5 Potable water shall generally be found suitable for curing mortar or concrete.

M-2 LIME:

- 2.1 Lime shall be hydraulic lime as per I.S. 712-1973. Necessary tests shall be carried out as per I.S. 6932 (Parts I to X) 1973.
- 2.2 The following field tests for limes are to be carried out –
 - a) A very rough idea can be formed about the type of lime by its visual examination. I.e. fat lime bears pure white colour. Lime in form of porous lumps of dirty white colour, indicates quick lime, and solid lumps indicate the unburnt lime stone.
 - b) Acid tests for determining the carbonate content in lime. Excessive amount of impurities and rough determination of class of lime.
- 2.3 Storage shall comply with I.S. 712-1973. The slaked lime, if stored, shall be kept in a weather proof and damp proof shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it. All lime that has been damaged in any way shall be rejected and all rejected materials shall be removed from site of work.
- 2.4 Field-testing shall be done according to I.S. 162-1974 to show the acceptability of materials.

M-3 CEMENT

- 3.1 Cement shall be ordinary Portland cement as per I.S. 269-1989 or Portland slag cement as per I.S. 455 –1989.

M-4 WHITE CEMENT:

- 4.1 The white cement shall conform to I.S. 8042-1978.

M-5 SAND:

5.1 Sand shall be natural sand, clean, well graded, strong, durable and gritty particles free from injurious amounts of dust, clay, kankar nodules, soft or flaky particles, shale, alkali, salts, organic matter, loam, mica or other deleterious substances and shall be got approved from the Engineer-in-charge. The sand shall not contain more than 8% of silt as determined by field tests. If necessary the sand shall be washed to make it clean.

5.2 Coarse Sand : The fineness modulus of coarse sand shall not be less than 2.5 and shall not exceed 3.0. The sieve analysis of coarse shall be as under:

I.S. Sieve Designation	% by weight passing sieve	I.S. Sieve Designation	% by weight passing sieve
4.75 mm	100	600 Micron	30 – 100
2.36 mm	90 – 100	300 Micron	5 – 70
1.18 mm	70 – 100	150 Micron	0 – 50

5.3 Fine Sand: The fineness modulus shall not exceed 1.0. The sieve analysis of fine sand shall be as under –

I.S. Sieve Designation	% by weight passing thru	I.S. Sieve Designation	% by weight passing thru.
4.75 mm	100	600 Micron	40 – 85
2.36 mm	100	300 Micron	5 – 50
1.18 mm	75-100	150 Micron	0 - 10

M-6 STONE GRIT:

6.1 Grit shall consist of crushed or broken stone and be hard, strong, dense, durable, clean, of proper gradation and free from skin or coating likely to prevent proper adhesion of mortar. Grit shall generally be cubical in shape and as far as possible flaky elongated pieces shall be avoided. It shall generally comply with the provisions of I.S. 383-1970.

Unless a special stone of a particularly quarry is mentioned, grit shall be obtained from the best black trap or equivalent hard stone as approved by the Engineer-in-charge. The grit shall have not deleterious reaction with cement.

6.2 The grit shall conform to the following gradation as per sieve analysis:

I.S. Sieve Designation	% passing thru' sieve	I.S. Sieve Designation	% passing thru' sieve
12.50 mm	100%	4.75 mm	0-20%
10.00 mm	85-100%	2.36 mm	0-25%

6.3 The crushing strength of grit will be such as to allow the concrete in which it is used to built-up the specified strength of concrete.

6.4 The necessary tests for grid shall be carried out as per the requirements of I.S. 2386 (Parts I to VIII) 1963, as per instruction of the Engineer-in-charge. The necessity of test will be decided by the Engineering –in-charge.

M-7 LIME MORTAR:

7.1 LIME: Shall conform to specification M-2. WATER: water shall conform to specification M-1. SAND: Sand shall conform to specification M-5.

- 7.2 PROPORTION OF MIX: Mortar shall consist of such proportions of slaked lime and sand as may be specified in the item. The slaked lime and sand shall be measured by volume.
- 7.3 PREPARATION OF MORTAR: Lime mortar shall be prepared by wet process as per I.S. 1625-1971. Power driven mill shall be used for preparation of lime mortar. The slaked lime shall be placed in the mill in an even layer and ground for 180 revolutions with sufficient water. Water shall be added as required during grinding (care being taken not to add more water) that will bring the mixed material to a consistency of stiff paste. Thoroughly wetted sand shall then be added evenly and the mixture ground for another 180 revolutions.
- 7.4 STORAGE: Mortar shall always be kept damp, protected from sun and rain till used up, covering it by tarpaulin or open sheds.
- 7.5 USE: All mortar shall be used as soon as possible after grinding. It should be used on the day on which it is prepared. But in no case mortar made earlier than 36 hours shall be permitted for use.

M-8 CEMENT MORTAR:

- 8.1 Water shall conform to specification M-1. Cement shall conform to specification M-3. Sand shall conform to M-5.
- 8.2 PROPORTION OF MIX: Cement and sand shall be mixed to specified proportions, sand being measured by measuring boxes. The proportion of cement shall be by volume on the basis of 50 Kg./bag of cement being equal to 0.0342 cu.m. The mortar may be hand mixed or machine mixed as directed.
- 8.3 PREPARATION OF MORTAR: In hand mixed mortar, cement and sand in the specified proportions shall be thoroughly mixed dry on a clean impervious platform by turning over at least 3 times or more till a homogeneous mixture of uniform colour is obtained. Mixing platform shall be so arranged that no deleterious extraneous material shall get mixed with mortar or mortar shall flow out. While mixing, the water shall be gradually added and thoroughly mixed to form a stiff plastic mass of uniform colour so that each particle of sand shall be completely covered with a film of wet cement. The water cement ratio shall be adopted as directed.
- 8.4 The mortar so prepared shall be used within 30 minutes of adding water. Only such quantity of mortar shall be prepared as can be used within 30 minutes.

M-9 STONE COARSE AGGREGATE FOR NOMINAL MIX:

- 9.1 Coarse aggregate shall be of machine crushed stone of black trap or equivalent and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.
- 9.2 The aggregate shall generally be cubical in shape. Unless special stones of particular quarries are mentioned aggregates shall be machine crushed from the best black trap or equivalent hard stone as approved. Aggregate shall have no deleterious reaction with cement. The size of the coarse aggregate for plain cement concrete and ordinary reinforced cement concrete shall generally be as per the table given below. However, in case of reinforced cement concrete the maximum limit may be restricted to 6 mm. less than the minimum lateral clear distance between bars or 6 mm. less than the cover whichever is smaller.

TABLE

I.S. Sieve Designation	Percentage passing for single sized aggregates of Nominal size		Sieve	I.S. Designation	Percentage passing for single sized aggregates of Normal size		
	40	20			40	20	16
	mm	mm			mm	mm	mm
80 mm	-	-	-	12.5 mm	-	-	-
63 mm	100	-	-	10.00 mm	0-5	0-20	0-30
40 mm	85-100	100	-	4.75 mm	-	0-50	0-50
20 mm	0-20	85-100	100	2.36 mm	-	-	-
16 mm	-	-	85-100				

NOTE: This percentage may be varied somewhat by the Engineer-in-charge when considered necessary for obtaining better density and strength of concrete.

- 9.3 The grading test shall be taken in the beginning and at the change of source of materials. The necessary tests indicated in I.S. 383-1970 and I.S. 456-2000 shall have to be carried out to ensure the acceptability. The arrangement shall be stored separately and handled in such a manner as to prevent the intermixing of different aggregates. If the aggregates are covered with dust, they shall be washed with water to make, them clean.

M-10 BLACK TRAP OR EQUIVALENT HARD STONE COARSE:

- 10.1 Aggregate for Design Mix concrete: Coarse aggregate shall be of machine crushed stone of black trap or equivalent hard stone and be hard, strong, dense, durable, clean and free from skin and coating likely to prevent proper adhesion of mortar.
- 10.2 The aggregates shall generally be cubical in shape, unless special stones of particular quarries are mentioned, aggregates shall be machine crushed from the best, black trap or equivalent hard stones as approved. Aggregate shall have no deleterious reaction with cement.
- 10.3 The necessary tests indicated in I.S. 383-1970 and I.S. 456-2000 shall have to be carried out to ensure the acceptability of the material.
- 10.4 If aggregate is covered with dust it shall be washed with water to make it clean.

M-11 BRICK BATS AGGREGATE:

- 11.1 Brick bat aggregateS shall be broken from well burnt or slightly over burnt and dense bricks. It shall be homogeneous in texture, roughly cubical in shape, clean and free from dirt of any other foreign material. The brickbats shall be of 40 mm to 50 mm size unless otherwise specified in the item. The under burnt or over burnt brick shall not be allowed.
- 11.2 The brick bats shall be measured by volume by suitable boxes as directed.

M-12 BRICKS:

- 12.1 The bricks shall be hand or machine moulded and made from suitable soils and kiln burnt. They shall be free from cracks and flaws not nodules of free lime. They shall have smooth rectangular faces with sharp corners and shall be of uniform colour. The bricks shall be

- moulded with a frog of 100 mm x 40 mm and 10 mm to 20 mm deep on one of its flat sides. The bricks shall not break when dropped on the ground from a height of 600 mm.
- 12.2 The size of modular bricks shall be 190 mm x 90 mm x 90 mm.
- 12.3 The size of conventional bricks shall be as under:
225 x 110 x 75 mm .
- 12.4 Only bricks of one standard size shall be used on one work. The following tolerances shall be permitted in the conventional size adopted in a particular work.
- | | | |
|--------|---|---------|
| Length | : | 3.00 mm |
| Width | : | 1.50 mm |
| Height | : | 1.50 mm |
- 12.5 The crushing strength of the bricks shall not be less than 35 kg./Sq.cm. The average water absorption shall not be more than 20% by weight. Necessary tests for crushing strength and water absorption etc. shall be carried out as per I.S. 3495 (Part I to IV) –1976.

M-12A FLYASH BUILDING BRICKS

The flyash building bricks shall confirm to IS-13757, IS-5454, IS-12894, IS-3495, IS-3812. The frog of 80 to 100 mm X 40 mm X 10 to 20 mm size

The size of modular bricks shall be 190 mm X 90 mm X 90 mm.

The size of conventional brick shall be 230 mm X 110 mm X 70 mm.

Only bricks of one standards size shall used on one work. The following tolerances shall permitted in the conventional size adopted in a particular work:

Length	:	□3 mm
Width	:	□2 mm
Height	:	□2 mm

The physical characteristic of bricks shall be as follows –

The minimum compressive strength of Burnt Clay Flyash building bricks shall not be less than 70 kg/sq. cm. And the test shall be conform to IS-3495 (Part-I)

The average water absorption shall not be more than 20 percentage by weight and the test shall confirm to IS-3495 (Part – 3). Sampling of flyash building bricks and criteria for conformity shall be as per IS: 5454

M-13 STONE:

- 13.1 The stone shall be of the specified variety such as Granite / Trap stone/Quarzite or any other type of good hard stones. The stones shall be obtained only from the approved quarry and shall be hard, sound, durable and free from defects like cavities, cracks, sand holes, flaws, injurious veins, patches of loose or soft materials etc. and weathered portions and other structural defects and strength. The stone with round surface shall not be more than 5% of dry weight. When tested in accordance with I.S. 1134 – 1974. The minimum crushing of the strength of the stone shall be 200 Kg./Sq.cm. unless otherwise specified.
- 13.2 The samples of the stone to be used shall be got approved before the work is started.
- 13.3 The Khanki facing stone shall be dressed by chisel as specified in the item for khanki facing in required shape and size. The face of the stone shall be so dressed that the bushing on the

exposed face shall not project by more than 40mm. from the general wall surface and on face to be plastered it shall not project by more than 19 mm nor shall it have depressions more than 10 mm from the average wall surface.

M-14 MILD STEEL BARS:

- 14.1 Mild steel bars reinforcement for R.C.C. work shall conform to I.S. 432 (Part-I) – 1982 and shall be of tested quality. It shall also comply with the relevant part of I.S. 456-2000.
- 14.2 All the reinforcement shall be clean and free from dirt, paint, grease, mill scale or loose or thick rust at the time of placing.
- 14.3 For the purpose of payment, the bar shall be measured correct upto 10 mm length and weight payable worked out as per the rate specified below:

i)6 mm	0.22 Kg/Rmt.	viii) 20 mm	2.47 Kg/Rmt.
ii)8 mm	0.38 Kg/Rmt	ix) 22mm	2.98 Kg/Rmt.
iii)10mm	0.62 Kg/Rmt.	x) 25 mm	3.85 Kg/Rmt.
iv)12 mm	0.89 Kg/Rmt.	xi) 28 mm	4.83 Kg/Rmt.
v)14 mm	1.21 Kg/Rmt.	xii) 32 mm	6.31 Kg/Rmt.
vi)16 mm	1.58 Kg/Rmt.	xiii) 36 mm	7.31 Kg/Rmt
vii)18 mm	2.00 Kg/Rmt.	xiv) 40 mm	9.86 Kg/Rmt

M-15 T.M.T. BARS:

- 15.1 T.M.T. steel deformed bars shall be either cold twisted or hot rolled and shall conform to I.S. 1786-1985. or I.S.1139-1966 respectively.
- 15.2 Other provision and requirements shall conform to specification No. M-14 for Mild Steel bars.

M-16 HIGH TENSILE STEEL WIRES:

- 16.1 The high tensile wires for use in pre stressed concrete shall conform to I.S. 2090-1962.
- 16.2 The tensile strength of the high tensile steel bars shall be as specified in the item. In absence of the given strength, minimum strength shall be taken as per para. 6-1 or the I.S. 1785-1962. Testing shall be done as per I.S. requirements.
- 16.3 The high tensile steel shall be free from loose mill scale, rust, oil, grease or any other harmful matter. Cleaning of steel bars may be carried out by immersion in solvent solution, wire brushing or passing through a pressure box containing carborundum.
- 16.4 The high tensile wire shall be obtained from manufacturers in coils having diameter not less than 350 times the diameter of wire itself so that wire springs back straight on being uncoiled.

M-17 MILD STEEL BINDING WIRE:

- 17.1 The mild steel wire shall be of 1.63 mm or 1.22 mm (16 or 18 gauge) diameter and shall conform to I.S. 280 –1972).
- 17.2 The use of black wire will be permitted for binding reinforcement bars. It shall be free from rust, oil, paint, grease, loose mill scale or any other undesirable coating which may prevent adhesion of cement mortar.

M-18 STRUCTURAL STEEL:

- a. All structural steel shall conform to I.S. 226 – 1965. The steel shall be free from the defects mentioned in I.S. 226 –1975 and shall have a smooth finish. The material shall be free from loose mill scale, rust pits or other defects affecting the strength and durability. Rivet bars shall conform to I.S. 1148-1973.
- b. When the steel is supplied by the Contractor. Test certificates of the manufacturers shall be obtained according to I.S. 226-1975 and other relevant Indian Standards.

M-19 SHUTTERING:

- 19.1 The shuttering shall be either of wooden planking of 30 mm minimum thickness with or without steel lining or of steel plates stiffened by steel angles. The shuttering shall be supported on battens and beams and props of vertical ballies properly cross-braced together so as to make the centering rigid. In places of ballie props, bricks pillar of adequate section built in mud mortar may be used.
- 19.2 The form work shall be sufficiently strong and shall have camber, so that it assumes correct shape after deposition of the concrete and shall be able to resist forces caused by vibration of concrete, live load of men, working with it and other incidental loads associated with it. The shuttering shall have smooth and even surface and its joints shall not permit leakages of cement grout.
- 19.3 If at any stage of work during or after placing concrete in the structure, the form work sags or bulges out beyond the required shape of the structure, the concrete shall be removed and work redone with fresh concrete and adequately rigid form work. The complete formwork shall be got inspected by and approved from Engineer-in-charge, before the reinforcement bars are placed in position.
- 19.4 The props shall consists of bullies having 100 mm minimum diameter measured at mid length and 80 mm at the end and shall be placed as per design requirement. These shall rest squarely on wooden sole plates 40 mm. thick and minimum bearing area of 0-10 sq.m. laid on sufficiently hard base.
- 19.5 Double wedges shall further be provided between the sole plate and wooden props so as to facilitate tightening and easing of shuttering without jerking the concrete.
- 19.6 The timber used in shuttering shall not be so dry so as to absorb water from concrete and swell or bulge nor so green or wet so as to shrink after erection. The timber shall be properly swan and planed on the sides and the surface coming in contact with concrete. Wooden form work with metal sheet lining or steel plates stiffened by steel angles shall be permitted.
- 19.7 As far as practicable, clamps shall be used to hold the forms together and use of nails and spikes avoided.
- 19.8 The surface of timber shuttering that would come in contact with concrete shall be well wetted and coated with soap solution before the concreting is done. Alternatively coat of raw linseed oil or oil of approved manufacture may be applied in place of soap solution. In case of steel shuttering either soap solution or raw linseed oil shall be applied after thoroughly cleaning the surface. Under no circumstances black or burnt oil shall be permitted.
- 19.9 The shuttering for beams and slabs shall have camber of 4 mm per metre (1 in 250) or as directed by the Engineer-in-charge so as to offset the subsequent deflection. For cantilevers, the camber at free end shall be 1/50 of the projected length or as directed by the Engineer-in-charge.

M – 20 Paints:

20.1 Oil Paints:

Oil paints shall be of the specified colour and shade, and as approved. The ready mixed paints shall only be used.

However, if ready mixed paint of specified shade or tint is not available white ready mixed paint with approved strainer will be allowed. In such a case, the Contractor shall ensure that the shade of the paint so allowed shall be uniform.

All the paints shall need with the following general requirements –

- i) Paint shall not show excessive setting in a freshly opened full can and shall easily be re-dispersed with paddle to a smooth homogeneous state. The paint shall show no curling, levering, caking or colour separation and shall be free from lumps and skins.
- ii) The paint as received shall brush easily, possess good leveling properties and show no running or sagging tendencies.
- iii) The paint shall not skin within 48 hours in a three quarters filled closed container.
- iv) The paint shall dry to a smooth uniform finish free from roughness, grit unevenness and other imperfection
- v) Ready mixed paint shall be used exactly as received from the manufacturers and according to their instructions and without any admixtures whatsoever.

20.2 Enamel Paints

The enamel paint shall satisfy in general requirements as mentioned in specification of oil paints. Enamel paints shall conform to I.S. 2933-1975.

M-21 CAST IRON PIPES AND FITTINGS:

21.1 All soil, waste, vent and anti syphonage pipes and fittings shall conform to I.S. 1729-1964. the pipes shall have spigot and socket ends with head on spigot end. The pipes and fittings shall be true to shape, smooth, cylindrical their inner and outer surfaces being as nearly as practicable concentric. They shall be sound and nicely cast and shall be free from cracks, laps, pin holes or other imperfections and shall be neatly dressed and carefully fettled.

21.2.1 The end of pipes and fittings shall be reasonably square to their axis.

21.3 The sand cast iron pipes shall be of the diameter as specified in the description and shall be in length of 1.5 M., 1.8 M. & 2.0 M. including socket ends of the pipe unless shorter length are either specified or required at junction etc. The pipes and fittings shall be supplied without ears unless specified or directed otherwise.

21.4 Tolerances: The standard weights and thickness of pipes shall be as shown in the table below. A tolerance upto minus 10% may however be allowed against these standard weight.

Sr. No	Nominal Dia	Overall Thickness	Weight of Pipe Excluding Ears		
			1.5M.long	1.8M long	2M. long
	1				
1.	75 mm.	5.0 mm.	12.83 Kg.	16.52 kg.	18.37 kg.
2.	100 mm.	5.0 mm.	18.14 kg.	21.67 kg.	24.15 kg.
3.	150 mm				
4.	250 mm				

A tolerance upto minus 15% in thickness and 20 mm. in length will be allowed. For fittings tolerance in lengths shall be plus 25 mm. and minus 10 mm.
The thickness of fittings and their socket and spigot dimensions shall conform to the thickness and dimensions specified for the corresponding sizes of straight pipes. The tolerance in weights and thickness shall be the same as for straight pipes.

**HYDRAULIC ENGINEER
SURAT MUNICIPAL CORPORATION
SURAT.**

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

9.3 ITEMWISE DETAILED TECHNICAL SPECIFICATIONS (IDTS)

DTS No. 1

Providing & supplying sleeve/swaged ended Spirally submerged arc welded M.S pipe of following dia (Outer dia) confirming to IS 3589:2001 bearing ISI mark including all taxes, insurance, transportation, freight charges, octroi, inspection charges, loading, unloading, conveyance to departmental stores, stacking etc. complete.

- (i) 168.30 mm dia(OD of Steel Tube) 4.5 mm thickness
- (ii) 219.10 mm dia(OD of Steel Tube) 6.3 mm thickness
- (iii) 508 mm dia(OD of Steel Tube) 6.3 mm thickness
- (iv) 610 mm dia(OD of Steel Tube) 6.3 mm thickness
- (v) 711 mm dia(OD of Steel Tube) 7.1 mm thickness
- (vi) 813 mm dia(OD of Steel Tube) 7.1 mm thickness
- (vii) 1016 mm dia(OD of Steel Tube) 8.8mm thickness
- (viii) 1219 mm dia(OD of Steel Tube) 10mm thickness

1. This specification covers the general requirements for supply, fabrication, delivery at site laying, stacking at site, jointing, testing and commissioning of all welded M.S pipeline, appurtenances, specials etc. above/below ground, including Civil works required for the same.

Applicable codes (M.S. pipes)

The following standards and codes are made a part of the specification. All standards, tentative specifications, codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions.

In case of discrepancy between this specification and those referred to herein, this specification shall govern.

Sr. No.	Code	Description
1	IS : 2062-2011	Hot Rolled Medium and High Tensile Structural Steel- Specification
2	IS : 814	Covered Electrodes for manual Metal Arc Welding of carbon and C-Mn steel.
3	BS EN 499	Welding Consumables. Covered Electrodes for Manual Metal Arc Welding of Non Alloy and Fine Grain Steel. Classification
4	AWS : A-5.1	Specification for Mild Steel Covered Arc Welding Electrodes.
5	IS : 3613	Acceptance Tests for Wire Flux combinations for Submerged – arc Welding.
6	AWS : A-5.17	Specification for Bare Mild Steel Electrodes and Fluxes for Submerged Arc Welding. IS : 1377 - Technical Supply Conditions for Threaded Fasteners
7	IS : 1367	Technical Supply Conditions for Threaded steel Fasteners (Parts 1 to 3).
8	IS : 2074	Ready Mixed Paint, Air drying, Red Oxide Zinc Chrome and Priming- specification
9	IS : 102	Ready Mixed Paint, Brushing, Red Lead, non-setting, Priming.
10	IS : 816	Code of practice for use of Metal Arc Welding for General Construction in mild steel.
11	IS : 4353	Submerged Arc Welding of Mild Steel & Low Alloy Steels

Sr. No.	Code	Description
		– Recommendations.
12	IS : 817	Code of practice for Training and Testing of Metal Arc Welders.
13	IS : 1182	Recommended practice for Radiographic examination of Fusion - Welded Butt Joints in steel plants
14	IS : 2595	Code of Practice for Radiographic Testing.
15	IS : 3658	Code of Practice for Liquid Penetrate Flaw Detection
16	IS : 5334	Code of practice for Magnetic Particle Flaw Detection of welds.
17	ASTM E 94	Guide for Radiographic Testing
18	ASTM E 709	Guide for Magnetic Particle Examination.
19	ASTM E 165	Test Method for Liquid Penetrate Examination.
20	IS : 3600	Methods of Testing Fusion Welded Joints and weld metal in steel (Parts 1 to 9)
21	IS : 4853	Recommended Practice for Radiographic Inspection of Fusion Welded Butt Joints in Steel Pipe
22	IS : 3589	Seamless or Electrically welded steel pipes for Water Gas and Sewage (168.3 to 2540 Outside Diameter)
23	IS : 6631	Specification for Steel pipes for Hydraulic Purposes
24	IS : 7343	Code of practice for ultrasonic Testing of Ferrous Welded Pipes and Tubular Products
25	IS : 2598	Safety Code for Industrial Radiographic Practice
26	IS : 5822	Code of Practice for Laying of Electrically Welded steel pipes for water supply
27	IS : 1608	Metallic material-tensile testing at ambient temperature
28	IS : 9595	Metal Arc welding of Carbon and Carbon-Manganese Steels – Recommendations
29	IS : 2825	Code of unfired Pressure Vessels
30	IS : 5504	Specification for Spiral Welded pipes
31	IS: 10748	Hot-rolled Steel Strip for Welded Tubes and Pipes - Specification

Manufacturing, Supplying, Delivery, Lowering, Laying, Jointing of MS Pipeline

Standards

Submerged Arc welded Hot finished mild steel **sleeve/swaged ended pipes** to be manufactured supplied and delivered under the scope of this contract shall be manufactured in accordance and conforming to IS-3589 and/or IS-5504.

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 marking upon the goods shall indicate the followings.

1. Manufacturer's brand name and / or trade mark.
2. Purchaser's mark as "**SMC**" be stencilled
3. Diameter, Length and wall thickness.
4. Pipe No., Pipe Designation
5. Date of manufacture
6. Any other important matter that the manufacturer deems fit to be inscribed.

All the MS pipes of diameter up to **1524mm (I.D.)** shall be provided with ISI certification mark on each pipe.

Packing and Handling

The materials shall always be packed separately dispatched from manufacturer's works with adequate protective measures to prevent damages and deterioration while in transport or stored at any place. The pack shall always to be so neat and tidy that may withstand any robust and rough handling.

The supplier shall use proper handing instruments / equipments and shall follow to a suitable method of handing of pipes as may be approved by Engineer In-charge, while unloading and stacking materials in the stores.

Test Certificate

The contractor shall always provide manufacturer's test certificate in accordance with every batch / lot of goods as manufactured and supplied.

Materials

Steel Plates/H.R. coil

The steel plates for pipes, fittings, specials and stiffeners shall be of mild steel conforming to IS: 2062, Grade-E250 BR or H.R. coil conforming to IS: 10748 grade III.

Welding Consumable

Such as electrodes, filler rods and wires shall conform to IS: 814, IS: 3613, IS: 6419 and IS: 7280.

Manufacturing

The mild steel pipes shall be manufactured from H.R. coils conforming to IS-10748 Grade-III or mild steel plate confirming to IS 2062-2011. The pipes are to be fabricated as per terms and conditions as laid down in IS-3589 and/or IS-5504. The pipe shall be manufactured from Fe-410 grade steel.

The steel material viz. MS plate or coils having required thickness (with no negative tolerance) and minimum 1500 mm width with no negative tolerance in trimmed condition having length & width as shown in the schedules of material should have been manufactured and tested under ISI mark scheme or such license under other institution valid for the respective country conforming to IS specification No.IS-2062-2011 Grade- E250 BR for MS plates and IS 10748 Gr.-III for hot rolled steel coils.

The collection and testing of samples will be in accordance with the following Indian Standard and para testing of samples. Imported steel plates shall not be allowed for manufacturing of pipeline.

Note :

- for MS Plate: IS 2062 is to be read as IS: 2062; Gr. E250 BR
- For H.R. Coil: IS 10748 is to be read as IS:10748 Gr. III

Sr. No.	I.S. No.	Title
1	228	Method of chemical analysis of steel (Second revision)
2	1599:1985	Method for Bend test (Second revision)
3	1608:1995	Mechanical testing of metals- Tensile testing
4	3803:1984	Steel conversion of elongation value part-I Carbon and loow alloy Steel (Second revision)
5	8910:1978	General Technical delivery requirements for steel and steel product.
6	9595:1996	Metal arc welding of carbon and carbon manganese steels (First revision) - Recommendation
7	1730:1989	Dimension for steel plates, sheets, strips & flats for general engineering purposes (second revision)
8	1852:1985	Rolling & cutting tolerances for Hot re-rolled steel products. (Forth revision)

In addition to above wherever necessary and suggested by inspecting agency, API or other relevant standards will be used for testing and collecting of samples.

Unless otherwise specified, the MS plates supplied under this tender should conform to the applicable requirements of the current addition of the IS specifications No. IS: 2062- 2011 Grade-E250 BR killed Quality or equivalent standard and or IS 10748, Gr. III for hot rolled steel coils for manufacturer of spirally welded pipes.

The permissible variations in dimensions & tolerances applicable in length and width of MS plates should be as per IS specification No 1852:1985 as applicable to rectangular, sheared cut MS plates but no negative tolerance in thickness will be acceptable.

The plates/ HR coil older than 6 months from the date of award of work shall not be allowed to manufacture pipes and these plates/ HR coil shall be free from any cracks, surface flaws, laminations, scares, pits, splits, harmful scratches and other defects.

The MS plates shall be capable of forming operations and should not un-duly loose the specified strength and property during various operations viz. drilling, threading, plugging welding etc. and process adopted for fabrications & erection of pipe line. Also the plates shall be resistant to cleavage, fractures & effect of ageing.

Acceptance of Goods

At the time of delivery of materials, the manufacturer will have to provide test results in accordance with IS specification No. IS-2062-2011 or equivalent standard of the MS plates or IS 10748 for hot rolled steel coils supplied along with the challans. The material will not be accepted without test results of the manufacturer. If the test results of the respective lots will be found satisfactory with respect to relevant IS or equivalent standard specification and with no negative tolerance in thickness only then material will be accepted by the department otherwise rejected.

Thus in case of non-acceptance and return of materials by the department, the department will not be responsible for the cost of materials and it's transportation or any other cost.

Testing of Samples

Three samples shall be drawn per heat or from a lot of 500MT of HR coils/MS plate

whichever is less jointly as above by the Engineer-in-charge/ his representative and authorized representative of the Contractor. Each sample will be given identification No. and a slip indicating identification No., date of sampling and signature of above representatives should be kept with the samples.

Out of three samples drawn one sample will be sent for testing in accordance with relevant IS specifications by the Inspection team / third party agency to any one of the following laboratories as per testing requirement or any other laboratory as may be decided by the Engineer-in-charge.

1. Gujarat Engineering Research Institute (GERI)
2. State/ Central Govt. laboratory/ Government Engineering College.
3. State/Central Government/ BIS approved laboratory.

Out of remaining two samples, second sample will be kept by the department and third will be kept by the supplier as reference sample. The test result should be obtained within ten (10) days from the date of sampling positively without fail and furnish to the department duly countersigned by the authorized official of Inspection team / third party agency. The test result should indicate physical and chemical properties of the test samples in accordance with relevant IS specifications. The necessary Inspection & samples testing charges will also be borne by the Contractor. In addition to the above whenever necessary and suggested by Engineer-in-charge, API or other relevant standards will be used for testing and collection of samples. The M S plates supplied under this tender should confirm to applicable requirements of the current edition of IS specification No. IS:2062 Grade-E250 BR killed quality and IS10748 for hot rolled steel coils.

The Inspection/ Testing note regarding the testing of the plates/ HR coils shall have to be furnished with all relevant test certificates/ documents to the Engineer-in-charge and acceptance shall be given, if they are manufactured as per the standards.

Wall Thickness

The wall thickness of pipes shall be as per the minimum mentioned in the tender. No negative tolerance will be allowed, only positive tolerance will be allowed. Tolerance in wall thickness shall be within + 5.0 % limit.(Higher side only)

Pipe Ends

All the pipes shall have one end swaged and other end plain / suitable for field welding. The edge of each pipe must be truly vertical. The swelled/swaged end shall be formed, strictly as per the dimensions and process mentioned in IS:3589:2001. Normally the dimension of the swelled/swaged end shall be such that the plain end can be inserted easily at the time of laying on site.

Length of Pipes

The random length of pipes shall be 6 meter. In specific locations, smaller lengths can be accepted as per Engineer-in-charge.

Straightness of Pipes

Finished pipes shall not deviate from straightness by more than 0.1% of the total length. Checking for straightness shall be carried out using as taut string or wire from end to end along the side of the pipe to measure, the greatest deviation.

Testing of Pipes

The main tests among others to be conducted on each pipe shall be as per IS-3589 and/or IS-5504 with its latest version.

3. Mechanical Test:-

3.1 Tensile Test:-

Tensile test shall be carried out as mentioned in IS:1894:1972 or its latest version as well as IS:3589:2001. The tensile strength & percentage elongation of the pipes shall strictly conform to the provision of IS:3589: 2001. The Manufacturers shall submit the required test certificates at free of cost, both for the pipes as well as steel strips also.

3.2 Guided Bend Test:-

Guided Bend test shall be carried out as per the provisions of IS:3589:2001 and necessary test certificate shall be submitted by the Manufacturers at free of cost.

4. Chemical Composition :-

As mentioned earlier in 2.2, the steel used for manufacturing shall strictly conform to IS:2062:1992 having grade designation Fe 410W B. Chemical composition should be conforming to IS:2062: 1992. Laddle analysis shall be carried out as mentioned in IS:2062:1992 and various constituents viz. Carbon, Manganese, Sulphur, Phosphours, Silicon, copper etc. shall be within prescribed permissible limits. The Manufacturers shall submit the required test certificates at free of cost, both for the pipes as well as steel strips/H.R.Coils also.

Sampling of pipes

The sampling of pipes shall be as in IS:4711 with latest version/amendment or as directed by the Engineer-in- charge.

Condition of Supply

The pipes with non toxic anticorrosive Epoxy paint of food grade quality inside lining and outside non toxic anticorrosive Epoxy paint with Zinc rich primer as per detailed specifications, shall be as per specifications.

Other Tolerances

As per IS-3589 and/or IS-5504 with latest version (Except for wall thickness). M.S. Pipes shall be welded either longitudinally or spirally.

Before fabrication of pipes and specials / fittings is commenced, the copies of the mill sheets and the manufacturer's test certificates for plates and other materials required for fabrication shall be submitted by the Contractor to the Engineer In-charge for his approval.

When instructed by the Engineer In-charge, the Contractor shall supply free of charge to the Engineer-in-charge for testing suitable samples of the materials to be used / used in the Works.

Inspection

All materials will be subjected to inspection by the Engineer In-charge, his authorized representative. The inspection charges shall be borne by Contractor. However, in any case of re-inspection due to rejection / rework required of inspected goods or inspection could not be carried out due to non-readiness of material called for inspection etc., the additional charges for inspection will be borne by the contractor and are required to be paid directly to the inspection agency. All such incidents will be reported to the Engineer-in-charge in writing within a week.

The Contractor shall notify the Engineer In-charge, in advance of the production of materials and fabrication thereof, in order that the Employer may arrange for mill and shop inspection.

The Engineer In-charge may reject any or all materials or work that does not meet with any of the requirements of this specification. The Contractor shall rectify or replace such rejected material/performed work at his own cost, to the satisfaction of the Engineer In-charge.

The Engineer In-charge shall have free access to those parts of all plants or any other premises and sites that are concerned with the furnishing of materials or the performance of work under this specification.

The Contractor shall furnish to the Employer's inspector reasonable facilities and space without charge for inspection, testing and obtaining of any information he desires in respect of the character of material used and the progress and manner of the work.

5. Fabrication of MS Pipe

General

1. The pipes shall be truly cylindrical, and straight in axis. The ends shall be accurately cut and prepared for field welding. The external circumference of the pipe pieces, which are to be fixed adjacent to flange adapter with fixed outer diameter, shall not deviate from theoretical one by more than 1 mm. To obtain this accuracy the pipe shall be rolled several times, if necessary, as pipe pieces should be truly cylindrical.

The external longitudinal welding of this pipe shall be ground smooth flush with surface to the satisfaction of the Engineer In-charge, for a length of 200 mm. No extra cost shall be charged by the Contractor for this grinding work.

2. Minor repair by welding or otherwise shall be permitted at the discretion of the Engineer In-charge, but such repairs shall be done only after obtaining the previous permission of the Engineer. Any pipe or part thereof which develops injurious defects during shop welding or other operations shall be rejected.

Fabrication

Pipe shall be manufactured by continuous process, Spiral Submerged Arc Welding (SAW) facility with on line testing sequentially, dust free environment, X-ray, Ultrasonic testing, adequate Hydraulic testing, etc.

The contractor shall get the MS pipe fabrication at well established, proven, having adequate test facility, having pipe coating facility (with non toxic anticorrosive Epoxy paint of food

grade quality inside lining and outside non toxic anticorrosive Epoxy paint with Zinc rich primer as per detailed specifications), having valid factory license. The contractor shall propose such manufacturing unit/s for with credentials of manufacturing unit/s approval by the department prior to placement of order. The department shall not be responsible for non acceptance of MS pipes manufactured/ being manufactured in absence of such approval from the department of particular manufacturing unit/s.

In no case manufacturing/ fabrication of MS pipes shall be permitted at site. This manufacturing unit/s should have the following minimum set-up viz.,

1. Continuous Plate bending machines for rolling.
2. SAW (Submerged Arc Welding) machine & Automatic welding machines (suitable for circumferential as well as longitudinal welding) - suitable for 3000 mm Dia pipes.
3. Pipe coating facility (with non toxic anticorrosive Epoxy paint of food grade quality inside lining and outside non toxic anticorrosive Epoxy paint with Zinc rich primer as per detailed specifications.) set-up
4. Hydraulic Testing Machines
5. Travelling gantry or crane of suitable capacity
6. Mobile cranes of suitable capacity for loading/unloading of HR/Plates and Pipes.
7. Lathe for machining of the flanges rings, plates etc.
8. Equipment for abrasive/ shot blasting and applying paint by spray gun.
9. Equipment for cold forming of plates up to 25 mm thick to the required curvature
10. Pipe hydro-testing set-up
11. Testing equipment online and off line such as UT / radiography / DPT / Chemical & mechanical laboratory for DT & NDT etc.

In addition to above, the details such as company profile, manufacturing experience, order in-hand, client list, quality certifications or other details pertaining to pipes fabrication information as asked by the department.

Cutting plates to size

The plates shall be indented in such length as to have minimum wastage and so as to make the pipe as far as possible with one longitudinal weld joints.

Before cutting, all the edges of the plates shall be cleaned by brushing/grinding on both the sides.

After the plates are cut, the edges shall be made smooth and even by polishing with an electrical or pneumatic grinder to remove all inequalities. Care shall be taken to see that the cut edges of the plate are perfectly straight. Jigs to be used for this purpose shall depend upon the types of cutting machine used. The plates cut to the required shape shall be checked for correctness before they are rolled into pipe drums. If any corrections are required, the Contractor shall do the same by re-cutting, if necessary. If any plate or flat is found to be warped, to have corrugations, the defects shall be removed by putting the plate or flat into a roller press, and no extra payment for this rectification work shall be made. The laminated or heavily corroded plate shall not be used in the manufacturing of the pipe.

Rolling of Plates

The plates cut to the exact size shall be put into a rolling machine to form a pipe of the required diameter. The Contractor shall adjust the rolling machine so as to give a uniform curvature to the pipe throughout its circumference. The curvature obtained shall be checked by the Contractor's foreman during the process of rolling and if proper curvature is not obtained at any place including the ends, the rolling operation shall be repeated at this stage or even after the longitudinal welding of the drum where directed. Heating of plates to obtain the desired curvature shall not be permitted.

Tacking the Drums

The rolled drums shall be kept on an assembly platform for tacking, care being taken to ensure that the tacked drums have their end faces at right angles to the axis of the pipe. While tacking the drum a gap of 2 mm to 4 mm shall be maintained where hand welding is permitted. However, where the welding is to be done on automatic welding machine, there is no need of maintaining such gap depending on the penetration through complete thickness of the welding required. To achieve this objective, clamp spiders, tightening rings and or any other approved gadgets shall be used. Each such drum, before being taken to the assembly platform, shall be numbered on the inside with oil paint, stating the plate thickness as well.

Assembly of Drums into Pipes

The tacked drums shall then be transported to an assembly platform where they shall be tack-welded together to form suitable pipe-lengths. Plate shall be bent in the maximum possible width to reduce the number of circumferential joints.

The longitudinal joints shall be staggered at 90 deg. The drums when tacked together shall have no circumferential gap when the welding is done on automatic welding machine. But when hand welding is adopted, a gap of 2mm to 4mm shall be maintained to obtain a good butt-welded joint.

The assembly shall be truly cylindrical and without any kinks. The faces shall be at right angles to the axis of the cylinder. A suitable arrangement for testing the correctness of the face shall be provided by the Contractor at the assembly platform. Factory made spirally welded pipes are also permitted.

Welding

All components of a standard shell, either straight or bent etc. shall be welded, by use of automatic arc welding machine by Submerged Arc welding process with alternating current. Manual welding shall not be permitted except for sealing runs/ field weld joints and such other minor works at the discretion of the Engineer In-charge. The strength of the joint shall be at-least equal to that of the parent material.

The contractor shall use radiographic quality electrodes and to be carry-out the welding procedure specification (WPS) and Pre-qualification Requirement (PQR). For welding the contractor shall ensure use with standard current and arc voltage required for the machine. For this purpose, samples of welded joints shall be prepared and tested in the presence of the Engineer in-charge. The values once determined shall be maintained throughout the work and if any modifications are to be made, a written permission of the Engineer In-charge shall be obtained. In the case of thin sheets, electric arc welding may not give satisfactory results and gas welding shall be resorted to. Gas welding shall be

subject to the same specifications and tests as those for electric welds. Welding should be carried out inside as well as outside. The contractor should engage all qualified welder for field welding at least having of 6G level qualification. The contractor should submit such qualified welders list prior taking up welding work.

All welding shall conform to the requirements of IS 4353 latest version

All longitudinal and circumferential joints shall be double welded butt joints. Field joints shall be from outside, with a sealing weld from inside. End preparation for such welding shall conform to IS:2825.

All circumferential welds involving plates of unequal thickness shall be so kept that the inside surfaces of plates match to provide stream lined joints without alteration in the internal diameter. As far as practicable, welding of dissimilar thickness of shells shall be carried out in the shops.

The welding shall be of the best workmanship free from flaws, burns, etc. and the Contractor shall provide for his own electrodes and equipments, ovens to keep the electrodes at the desired temperatures and dry. In order to maintain a good standard in welding, welders shall have to undergo for testing. Such testing's shall be organized by the Contractor before they are entrusted with the job. Qualification standard for welding procedures, welders and welding operation shall conform to the requirements of IS:7307 and IS: 7310 (latest) and/or ASME section-IX (latest). Periodical tests as regards their efficiency shall also be taken at intervals of about 6 months and those found inefficient shall be removed from the job. Only those who pass the test shall be posted on the job. If an incompetent welder has already welded some pipes, all welding done by him previously shall be fully checked by X-ray in addition to the regular X-ray inspections. The defects if any shall be set right to the satisfaction of the Engineer In-charge. All such check tests and rectifications of defects shall be entirely at the cost of the Contractor. No pipes or steel sections shall be erected unless the work of the welder concerned has been proved to be satisfactory. Site welds shall be done by specially selected welders.

A record shall be maintained showing the names of welders and operators who have worked on each individual joint. Hand welding shall preferably be carried out by a pair of welders so that, by observing proper sequence, distortion can be avoided. A joint entrusted to a particular individual or a pair shall be as far as possible, completed by them in all respects, including sealing run. No helper or other unauthorized person shall be permitted to do any welding whatsoever. In case of infringement of above, the persons shall be punished as directed by the Engineer In-charge.

The welded joint after welding should not become brittle or sensitive to blows and there should be no loss of toughness due to welding or heat treatment. The material after welding and heat treatment is to be tougher than the base metal and is to retain its original ductility. No allowance will be made for thinning of weld and the weld should in no point be less than the nominal thickness of plate.

Upon receipt of the order and prior to the start of fabrication, the Contractor shall submit to the Engineer In-charge for his approval the "welding procedure" he intends to use in the shop work. Similarly, prior to the start of the field welding, procedure for the field welding must be submitted to the Engineer In-charge for his approval. Manual welding shall be adopted only when machine welding is not possible.

Tolerance

The shell in the completed work shall be substantially round. The difference between maximum and minimum inside diameters at any cross section shall not exceed 1% of the nominal diameter of the cross section under consideration subject to a maximum of 10 mm.

Straight pipes shall have their faces perpendicular to the axis of the section with a maximum deviation of 2 mm on either side of the plane. Pipe ends shall be sleeve/swaged ended as per IS-3589 and/or IS-5504.

For the shell thickness, no negative tolerances are acceptable.

Shop Testing

After fabrication, but before application of protective coatings all pipes and specials shall be subjected to a shop hydraulic test. Standard lengths of pipes shall be directly subjected to test and non-standard pipe and elbows can be tested as standard pipe before being cut to size.

The Hydraulic test pressure for individual pipe in the factory shall be as per IS: 3589 (refer latest version).

Prior to testing, the pipe shall be inspected thoroughly and all the apparent defects in welding such as jumps, porosity etc. shall be repaired by gouge and re-welding.

The hydraulic test shall be carried out under cover at the fabrication shop, in the presence of and to the satisfaction of the Engineer In-charge or the inspection agency appointed by the Employer.

For indicating the pressure inside the pipe an accurate pressure gauge of approved make duly tested and calibrated for the accuracy of readings shall be mounted on one of the closures, which close the pipe ends.

The pressures shall be applied gradually by approved means and shall be maintained for at least 5 seconds or till the inspection of all welded joints is done during which time the pipe shall be hammered throughout its length with sharp blows, by means of a 1 Kg hand hammer.

The pipe shall withstand the test without showing any sign of weakness, leakage, oozing or sweating. If any leak or sweating is observed in the welded joints, the same shall be repaired by gouging and re-welding after dewatering the pipe. The repaired pipe shall be re-tested to conform to the specified pressure.

If any leak or sweating is observed in pipe shell the pipe under test shall be rejected temporarily. The Contractor shall stack such rejected pipes separately in his yard. The Engineer In-charge shall inspect the same and after taking cuts if necessary, shall determine the nature of repairs to be carried out thereon and shall then decide as to how and where they shall be used. No payment shall be made for handling or carrying out repairs, but, payment for the fabrication and hydraulic testing of the pipe shall be released only after acceptance of the pipe with necessary repairs and subsequent testing etc. are carried out by the Contractor to the satisfaction of the Engineer In-charge. The Engineer In-charge shall be supplied with two copies of the results of all the tests carried out.

Transportation of Pipes, Specials, etc.

All pipes and specials fabricated in the factory and temporarily stacked in the Contractor's yard shall be transported to the site of laying after cleaning them internally etc. The loading in the factory shall be carried out by means of either a crane, gantry or shear legs, so as not to cause any damage to the finished material. Similarly, while unloading and stacking, great care shall be taken to ensure that the material (pipe & special) is not damaged or dented. The contrivances to be used for unloading will be different in different situations and in each case the one approved by the Engineer In-charge shall be adopted. The material stacked at site shall be jointly inspected by the Engineer In-charge and the Contractor and defect or damage noticed shall be repaired to the satisfaction of the Engineer In-charge before payment is admitted.

Props of approved designs shall be fixed to the pipes during transit to avoid undue sagging and consequent distortion. After the pipes are carefully stacked, props may be removed and re-used for subsequent operations. The stacking ground, both in the Contractor's yard and at the site of laying shall be selected in such a way as not to get waterlogged during monsoon. If this cannot be done, the pipes shall be supported on sleepers to avoid contact with wet earth and subsequent rusting. In order to prevent sagging during transit, savings of steel plates can be utilized by cutting to the required length and tacking the same to the pipe ends, in place of props, if approved by the Engineer In-charge.

As explained in earlier paragraphs, materials such as pipes, tapers, etc. may be transported to the site of laying as soon as the material is finished in all respects with the permission of the Engineer In-charge to avoid congestion in the Contractor's yard. However, materials such as expansion joints, composite bends, 'T' branches and other complicated materials shall be stacked in the Contractor's yard until they are required for laying in the field. In view of this, the work of fabrication of such materials shall be properly synchronized as far as possible with the laying operations.

Fabricated materials such as manhole covers, appurtenances, bolts, nuts, distance pipes, flanges, saddles, collars bypass arrangements etc. shall be transported to the site of laying from the fabrication shop according to the needs of the laying operations only. In regards access roads, the Contractor shall note that access road may lead up to some points on the alignment the Contractor shall have to make his own arrangement for connecting approaches to transport the pipes cross country to the actual site of laying at his own cost. Whatever may be the mode of transport he uses it shall be incumbent on the Contractor to carry and stack the pipes and specials along the alignment as close as possible to the site of laying.

Procedure for receiving Steel Pipes

General

To ensure that the work of erecting pipes is not held up at any stage and place, the Contractor shall maintain an adequate stock of standard specials, flange rings, plug plates, manhole covers, etc. and short length of smaller diameter pipelines, etc. at site in his field stores, in consultation with the Engineer. Wherever possible, the Contractor shall arrange one full month's requirement of pipes, specials, etc. stacked along the alignment.

Stacking of pipes, etc. and Inspection

The Contractor shall keep in each section a responsible representative to take delivery of the pipes, specials and appurtenances, etc. transported from the fabricating stockyard or received from any other work site to the site of laying and to stack along the route on timber

skids. Padding shall be provided between coated pipes and timber skids to avoid damage to the coating. Suitable gaps in the pipes stacked shall be left at intervals to permit access from one side to the other. The pipes, specials, appurtenances so received on site shall be jointly inspected and defects recorded, if any, such as protrusions, grooves, dents, notches, damage to the internal coating etc. shall be pointed out immediately to the Engineer In-charge at the site and in the acknowledgement challans. Such defects shall be rectified or repaired to the satisfaction of the Engineer In-charge entirely at the Contractor's risk and cost.

Handling of Pipes, Specials, Appurtenances, etc.

It is essential to avoid damage to the pipes, fittings and specials, etc. or their coatings at all stages during handling. The pipes and specials shall be handled in such a manner as not to distort their circularity or cause any damage to their surface treatment. Pipes shall not be thrown down from the trucks nor shall they be dragged or rolled along hard surfaces. Slings of canvas or equally non-abrasive materials of suitable width of special attachment shaped to fit the pipe ends shall be used to lift and lower coated pipes to prevent damage to the coating.

Great care shall be taken in handling the pipe right from the first operation of manufacture until they are laid and jointed. The Contractor will provide temporary props in order to prevent any sagging of the pipes while they are stacked in their yard and while transporting to the site of delivery, i.e. laying. The props shall be retained until the pipes are laid. If at any time these props are found to be dislodged or disturbed, the Contractor shall immediately reinstate them in such a way that the true shape of the pipe shell or specials is maintained to the satisfaction of the Engineer In-charge. No defective or damaged pipe or special shall be allowed to be used in the work without rectification to the satisfaction of the Engineer In-charge. Any damage to the coating shall be repaired by the Contractor at his own cost to the satisfaction of the Engineer In-charge.

Mode of payment :

The payment shall be made on Running Meter basis.

DTS No. 2

Providing, manufacturing, and supplying at site the M.S. specials as required at site and suitable for field welding at site. The size and dimensions shall be conforming to IS:7322, with providing and applying on outer coating of corrosion and chloride resistant treatment and inner coating of food grade quality epoxy paint as approved by Engineer in charge. The item includes cost of providing M.S. plate, fabrication and conveyance etc. complete as directed by the Engineer-in-charge..

Note:-

- (1) All the dimensions of the specials as well as flange shall be conforming to IS:7322.
- (2) Quantities of the specials stated in Schedule-'B' of the tender are very approximate and orders will be placed as required according to exigency/requirement during progress of work. Thus, the quantity may vary as per the requirement and contractor shall have to carry out the work at the quoted rates only.
- (3) Pipes having 8 mm/10mm wall thickness are of the 1000 mm to 200 mm dia. inner diameter. Specials except the flanges shall be made of 8 mm/10mm thick M.S. Plate & M.S. Plate thickness of flanges shall be as specified in IS:7322. Required M.S. Plates shall be provided

by the Contractor. Inner coating of the M.S.Special shall be done by applying non toxic anticorrosive epoxy paint conforming to RDSO Specification.

Ends of the specials shall be made bevelled (where not flanged) properly which shall be suitable for field welding alongwith the adjacent pipe.

Outer coating/ inner coating shall be as per DTS No.6 of this tender.

The M.S. Plate required for manufacturing of the specials shall be provided by the contractor. The M.S. Plates shall conform to IS:2062 with its latest amendments. The contractor shall provide all the required test certificate at free of cost for each and every lot of the plates. The thickness of M.S. Plates shall be within the permissible limits of IS:1852 with its latest amendments. Any kind of wastage of M.S. Plates shall be on account of the contractor only.

Pipes/specials not conforming to the specifications and not serviceable in the opinion of the Engineer-in-charge, shall have to be removed from the site by the Contractor at his own cost.

In case of difference of opinion between the contractor and the Engineer-in-charge, the decision of the Commissioner shall be considered final and binding to the contractor.

The welding shall be done by using the submerged Arc welding process using approved electrodes as instructed by the Engineer-in-charge.

Manufacturing of the specials shall be done at the own premises/factory of the Contractor at Surat only. Surat Municipal Corporation will not allot any space for the same. Alternatively, contractor may manufacture the specials at site in such a manner that it does not obstruct the vehicular traffic or pedestrains on road.

Electrodes and Welding:

Electrodes to be used welding work shall conform to IS:814 & 815 and welding shall conform to IS 816:822 & 823. The electrodes must be of make "ESAB-INDIA", "Advani", and "D&H" only.

The steel core shall be formed by shaping and welding together steel plates of specified thickness. But welding shall be adopted for all longitudinal and circumferential welds. All welds shall be made down hand by the automatic shielded submerged arc welding process. Welding shall be done so that there shall be thorough fusion and complete penetration. Prior to welding the plates shall be fitted closely and during welding they shall be held firmly. The metal arc welding shall be done as per I.S.816/1969 code of practice for use of metal ARC welding for general construction in mild steel and I.S. 823-1964 code of procedure for manual metal arc welding of mild steel.

NOTE:-

For Item No.10 "Providing ,Manufacturing ,supplying and laying at site the M.S. specials in the following sizes suitable for field welding at site having 12 mm thick plate. The size and dimensions shall be confirming to IS :7322 as directed by Engineer-in-charge. The item includes cost of M.S. plate, fabrication and conveyance etc. comp". It is further to clarify as below.

The contractor shall have to procure the plates for manufacturing the specials from the M.S. Plates steel shall be of Grade A designated Fe415 W A confirming to IS:2062-1992 or its latest amendment.

1. Sail (Steel authority of India Ltd.)
2. Essar Steel
3. Ispat
4. Tata Iron & Steel Co.
5. Electrotherm

Contractor shall have to produce the copy of purchase Bill / Invoices, Challan, Test certificates etc. of the plate. The plate so purchase shall have to be pre-approved from Engineer-in-Charge prior to manufacturing the specials. In short, the specials shall have to be manufactured from the approved plates and the finished product shall be as per the IS:7322. The rates of the special is inclusive of all materials, cost of fabrication, cuttings, rolling, bending, welding, wastage and all labour for Providing & laying the specials in proper position at site. No negative tolerance will be allowed for the thickness of the plate.

Mode of measurement :-

The payment shall be made on kg basis which includes all the materials, M.S. Plates, outer coating, conveying upto the site, tools, tackles, machineries, labours for carrying out the work for cutting, bending, welding all the taxes, duties, octroi, hydraulic and material tests etc. complete as directed by the Engineer-in-charge.

DTS No. 3

Excavation for pipeline trenches including all safety provision (barricadding, fencing etc.) using site rails with shoring, strutting and stacking the excavated stuff upto 90.00 mt. Cleaning the site etc. complete for lift and strata s specified. The excavation shall be carried out in stable slope for which no extra payment will be made. Rate is inclusive of backfilling the trenches with available excavated earth (excluding rock) in layer including ramming, watering, consolidating the same etc. complete as directed by the Engineer-in-charge..

- (a) In all sorts of soil, soft murrum, hard murrum, soft rock, etc.**
- 0 to 1.5 mt. Depth**
 - 1.5 mt. to 3.0 mt. Depth**
 - Above 3.0 mt. Depth**

The trench for laying the pipes shall be excavated true to lines, levels and grades as shown on the drawings or directed by the Engineer with the help of boning rods.

The depth shall be such that the pipe shall have a clear cover of at least 1.2 m. The trench shall be excavated through all strata met with. When it is necessary and ordered by the Engineer in writing, the sides shall be shored or sloped, otherwise they shall be as vertical as possible. The rates shall include shoring and provision of slopes.

Various materials excavated shall be separated and stacked beyond one meter or more from the edge as may be necessary in the opinion of the Engineer to avoid provision of slopes.

The bed shall be even and to the correct grade and line in all cases.

The trench shall be barricaded and warning board fixed, Red lights shall be hung at night time at sufficiently close intervals to indicate the danger and a chowkidar employed to see that the lights are properly burning. The contractor shall be solely responsible for any accidents, due to any default in barricading, sign posting or red lights and shall bear the consequences.

At all road crossing, the trench shall be excavated only for half the width of the road and pipe laid. The other half shall be excavated only after backfilling over the laid pipe and making it suitable for the traffic. At all road crossings, the pipes shall be sufficiently laid below the crust of the road.

All pipes, gas gline, cables service lines etc. met with during the excavation shall be carefully protected and supported. Any damage done shall be made good by the contractor at his own cost. For making end connection or branch connection it shall be the responsibility of the contractor to excavate the trench in such manner so as to enable the fitter to make the connections conveniently. At crossing of cross drains, sewer mains, old water main, drain connection, electric cable etc. it shall be to such a depth as to enable the fitter to take the pipe from, below above or through the cross drain or the cable etc as the case may be and as directed by the Hydraulic Engineer. No extra payment shall be made in above cases of excavation. In case contractor has laid the pipeline in the trench excavated less than above specified depth, contractor may be asked to lay the line after making proper depth as directed by the Hydraulic Engineer or his Authorised representative on site. The extra labour involved in such cases will have to borne by the contractor. If contractor, fails to carry out such direction, Hydraulic Engineer may give the reduced rates for portion of pipe line laid in the trench as he thinks fit or relay the line at the risk and cost of contractor as deemed fit, no measurement will be taken for joints pits as the same included in the item of lead jointing.

The contractor shall have to keep chowkidar and red lights (of a proper size) during night on open trenches during the progress of the work and until the trench or pit is completely refilled. Red flags road closing board etc. and such other precautionary measures shall have to taken by the contractor. If the contractor fails carry out the above precautionary measures, Hydraulic Engineer shall engage, even without giving a notice to the contractor wherever the situation demands quick action for the chowkidar, places, necessary red lights and manage to guard the trenches all the expenditures so incurred shall be recovered from the contractor from his bill or deposit. The contractor will have no right to dispute the action taken by the Hydraulic Engineer.

Excavated earth shall be used for refilling of trenches however, surplus excavated stuff will be the property of Contractor and Contractor may disposed off or stock the same at their own risk and cost. NO PAYMENT FOR THE CARTING OF SURPLUS EXCAVATED STUFF WILL BE MADE.

The earth to be used for filling shall be free from salts, organic or other foreign matter. All clods of earth shall be broken. As soon as the work in foundation has been completed and measured the site of foundation shall be cleared of all debris, brick bats, mortar dropping and filled with earth in layers not exceeding 20 cms. Layers shall be adequately, watered, rammed and consolidated before the succeeding layer is laid. The earth shall be rammed with iron rammers where feasible and with the butt ends of crowbars where rammer cannot be used.

After compaction and consolidation, If any short fall of excavated stuff is found, than Contractor has to bring the soil of the required quantity in order to meet short fall at his own cost. Moreover, if any settlement of road after reinstatement or after first monsoon or during watering, contractor shall be fully responsible for the settlement of trenches. Patches / depression / settlement shall be repaired with chhara or soil at his own cost. Surplus excavated stuff shall be disposed off in such a way that it does not create any nuisance to the public or SMC's road surface.

Mode of measurement and payment:-

The depth of excavation shall be counted from the bottom of the base course of metal or asphalt road surface.

Payment shall be made on cubic meter basis.

DTS No. 4

Backfilling the trenches with available excavated earth (excluding rock) in layer including ramming, watering, consolidating the same etc. complete as directed by the Engineer-in-charge. Rate also includes refilling the pipeline trenches incl. ramming, watering, consolidating disposal of surplus stuff as directed within a radius of 3 km.

Detailed Specification is as per DTS No. 3

Mode of measurement and payment:-

The payment shall be made on Cubic.meter. basis

DTS No. 5

Excavation of asphalt pavement of any thickness etc. complete with tacking the material as directed by the Engineer-in-charge (only carpet thickness shall be considered for calculation of quantity)

Item includes breaking and removing of the road surface upto the bottom of asphalt surface item also include stacking of useful material upto lead of 90 meters.

Mode of measurement and payment:-

Payment shall be made on cubic meter basis.

DTS No. 6

Inner Lining

Providing and applying inner coating of approved brand of non toxic anticorrosive Epoxy paint of food grade quality with 406 micron thickness including necessary scaling of corrosion and cleaning of the inner surface with required tools and tackles as directed by the engineer in charge at inner surface of M.S. pipe

Specification for Solvent free food grade liquid epoxy inlining Providing & applying internal coating to MS pipe with solvent free food grade epoxy having dry film thickness of 40microns including scrapping the surface of the pipe.

General

Buried steel pipeline shall be coated internally, with a single coat two part solvent free high build liquid epoxy lining as per AWWA C210-07 suitable for potable water application and shall be approved by NSF International Standard NSF/ANSI-61 2004 or by water regulations advisory scheme (WRAS), UK or Central food research Institute, Mysore as per standards BS 6920 UK. The Contractor shall perform all work in accordance with these specifications and the latest pipeline coating practices, and shall complete the work in all respects to the full satisfaction of the Owner / Owner's Representative. The entire coating operation starting from cleaning and surface preparation till coating shall be performed under the supervision of skilled

personnel who are well conversant with the work. Pipes which have been cleaned and primed, or cleaned, primed and coated, without having been inspected and approved shall be rejected.

This specification is not intended to be all inclusive and the use of guidelines set forth here does not relieve the Contractor of his responsibility for the quality and performance of the applied coating system, and to supply coating material capable of performing its intended service.

All steel special sections, connections fittings and field joints to be used for underground steel pipeline shall be internally coated with same liquid epoxy.

Reference Standards

The following standards (latest revision) referenced below are a part of this specification. In case of conflict between this specification and the referenced standards, this specification shall apply

- i. ANSI/AWWA C210 - Standard for Liquid Epoxy Coating Systems for the Interior & Exterior of Steel Water Pipelines.
- ii. NSF/ANSI 61 – Standard for Drinking Water System Components- Health Effects.
- iii. ANSI /ASTM D149 - Standard Test Method for Dielectric Breakdown Voltage and Dielectric Strength of Solid Electrical Insulating Materials at Commercial Power Frequencies.
- iv. ANSI/ASTM D3359 - Standard Test Method for Measuring Adhesion by Tape Test.
- v. ANSI/ASTM D3363 - Standard Test Method for Film Hardness by Pencil Test.
- vi. ANSI/ASTM D4417 - Standard Test Method for Field Measurement of Surface Profile of Blast Cleaned Steel.
- vii. ANSI/ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
- viii. ANSI/ASTM D2240 – Standard Test Method for Rubber Property – Durometer Hardness
- ix. ANSI/ASTM D5000 - Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser
- x. SSPC-PA 2 - Measurement of Dry Paint Thickness with Magnetic Gauges
- xi. SSPC-SP 1 - Solvent Cleaning
- xii. SSPC-SP 6/NACE No. 3 - Commercial Blast Cleaning

General

Protective lining shall consist of a coating system consisting of 100% solids epoxy comprising of resin & hardener mixed in a proportion as recommended by the manufacturer.

The mixed epoxy shall be applied to abrasive blasted steel surface in the coating plant using plural hot airless spray machine with extended boom to apply the lining to a smooth finish without any drip or sag. The epoxy shall also be capable of application by spray/brush at field joint locations and repair of damages to the spray/brush applied epoxy.

D.8.1 Internal Lining System

The internal epoxy lining shall consist of chemically cured resin (epoxy) & hardener (curing agent), mixed in the ratio as recommended by the manufacturer and applied to a dry film thickness (DFT) of minimum 406μ. Physical properties of the internal lining shall be as follows.

Table : Physical Property of Internal Lining

Property	Requirement	Test Method / Reference
Long term contact with potable water	No effects for human consumption as certified by NSF International	NSF / ANSI -61
Thickness (applied min)	406μ	SSPC-PA 2
Thickness deviation (min)	- 0 / + 200μ	SSPC-PA 2
Dielectric strength (min)	450 V/mil (15 V/μm)	ASTM D149
Hardness Shore D	85 (min)	ASTM D2240
Adhesion to Steel (min)	800 psi	ASTM D4541
Tabor Abrasion	1560 cycles / mil	ASTM D4060
Compressive strength	70 MPa	ASTM C109

Coating Application

General

All internal epoxy lining work for main pipeline shall be done in coating plant using two component airless plural spray machine. For internals of bends, short section of pipes, tees, fittings etc., internal epoxy will be manually spray applied either in the coating plant or in the field using suitable two component airless plural spray machine.

Internal field joint coating shall be spray/ brush applied. The internal epoxy lining shall be applied only on blasted steel surface.

Pipe preparation

Metal surface condition

Internal surface of the pipe shall be free from mud, mill scale, mill lacquer, wax, oil, grease, or any other foreign material. Before blast cleaning, surfaces shall be inspected and pre-cleaned according to SSPC-SP 1 to remove oil, grease, and loosely adhering deposits. Visible oil and grease spots shall be removed using a solvent. Only solvents that do not leave a residue shall be used. Preheating to remove oil, grease, and mill scale may be used provided that all pipe is preheated in a uniform manner to avoid distortion.

After drying and removing all loosely adhering foreign materials, the pipe surface shall be cleaned by blasting with grit or steel shots to achieve a surface preparation at least equal to SA 2.5 that specified in BS 7079/ISO 8501-1:2007. The blast anchor pattern or profile depth shall be 2 mils to 3 mils (50 μm to 75 μm) measured in

accordance with ASTM D-4417 and/or ISO 8503-4.

For consistent surface finish, a stabilized working mix shall be maintained in abrasive recycling blasting machines by frequent small additions of new grit, shot infrequent large additions shall be avoided. The abrasive working mix, abrasive recycling blasting machines shall be maintained clean of contaminants by continuous effective operation of blasting machine scalping and air-wash separators.

The cleaned interior pipe surface shall be inspected for adequate surface preparation. Surface imperfections, such as slivers, scabs, burrs, weld spatter, and gouges, shall be removed by hand filing or grinding if necessary to prevent holidays.

Blast-cleaned pipe surfaces shall be protected from conditions of high humidity, rainfall, or surface moisture. No pipe shall be allowed to flash rust before coating. To ensure a dry pipe surface at the time of liquid epoxy application, the minimum steel substrate temperature shall be 10°C and at least 3°C above the dew point.

Coating Application

- **Main Pipe Line –**

- a. Application temperature**

The temperature of the mixed coating material and of the pipe at the time of application shall be not lower than 10°C. Preheating of the coating material by using in line heaters to heat the coating material may be used to facilitate the application. Heating shall conform to the recommendations of the epoxy coating manufacturer.

- b. Application of epoxy**

The epoxy shall be applied directly to the abrasive roughened steel surface pipe using a hot plural component airless spray equipment, with all necessary ancillary equipment like spraying boom etc, in accordance with the epoxy coating manufacturer's recommendations. Pipe will be rotated at a suitable speed and the boom of the spray machine carrying the spray gun will travel inside the pipe at a pre- determined speed to ensure that thickness of minimum 406 microns is achieved in one single spray application. Alternatively, fixed boom & spray machine with moving pipe with predetermined speed to achieve minimum thickness of 406 micron in a single spray is also accepted.

- c. Curing**

After application of epoxy, curing of the epoxy shall be natural air convection. Typical dry time of the epoxy at ambient temperature of 25-40°C shall be between one hour to three hours. Shore D hardness of the epoxy after 10 hours shall be > 65.

- d. Internal coating cutback**

Internal coating cutback on either side of the pipe shall be 75 mm +/- 25 mm.

Internal Coating of Field Joints

After the main pipes have been welded in the trench, internal epoxy coating shall be applied on the inside of the pipeline at the girth welds using brush/spray application. Internal epoxy for field joint coating shall be supplied by the same manufacturer and shall be NSF approved. The epoxy shall be supplied in small cans of appropriate size required per joint with applicator pad.

The internal surface of the field joint shall be inspected and weld spatter or slag shall be removed by grinding.

The internal surface shall then be manually blasted to remove rust / contamination etc. The resin & hardener will be mixed and the coating applied to a minimum thickness of 406 μ . The internal field joint coating shall overlap the factory applied main line internal coating by 50mm on either side.

Material acceptance, inspection and testing

Material acceptance

Proposed internal epoxy lining materials shall be approved by the Owner / Owner's representative. Test certificate from independent third party test laboratory shall be submitted conforming compliance to the physical properties as listed in Table 3.1 (Clause no 3.8.4) No deviation to the physical properties shall be acceptable.

When the material is supplied, acceptance of the material shall be based on submission of certificate of conformance of the internal epoxy to this specification along with manufacturing acceptance test certificates for various lots as per manufacturer's quality assurance and quality control requirements.

Coating application inspection

The entire internal lining operation by the Contractor will be supervised by qualified experts from the manufacturer. The credentials of the manufacturer's expert shall be approved by the Owner / Owner's representative. All coating work will be done in the presence of the Owner / Owner's representative.

Thickness

Thickness of the coating system shall be checked in accordance with SSPC-PA 2. Thickness shall be in accordance with the values given in the Table. Out of 25 Nos. of pipes, one pipe shall be tested for the thickness at two selected places.

Holiday testing:

The completed pipe shall be subjected to holiday detection tests which shall be carried out to the satisfaction of the Engineer In-charge. The applied voltage shall be those appropriate to the coating under test as recommended by the coating material manufacturer.

Pull Off Adhesion

The pull off adhesion of the internal epoxy lining to steel shall be checked in accordance with ASTM D-4541. The average value below the limits stated in the Table shall constitute a failure of the system to meet the adhesion requirement. Out of 25 Nos. of pipes, one pipe shall be tested for the pull off adhesion test at two selected places.

Field procedures

At all times during construction of the pipeline, the Contractor shall use caution to prevent damage to the internal lining on the inside of the pipe. No metal tools or heavy objects shall be permitted to unnecessarily contact the finished coating. Workmen shall not be permitted to walk on the internal coating except when necessary. In these cases, they shall wear shoes with rubber or composition soles and heels or other suitable footwear that will not damage the coating. Any damage to the pipe or the protective coating from any cause during the installation of the pipeline shall be repaired.

Coating repair in field

All holidays visually or electrically discovered either at the coating plant or in the field shall be repaired by applying the same liquid epoxy coating using brush. The minimum over-lap at the damaged area shall be 100 mm all around. The repaired area shall be tested with a holiday detector as per specifications after the repair is completed. The thickness of the coating at the repair area shall be minimum 406 μ .

Epoxy Coating for Internal Surface of Pipes and Specials

The epoxy coating shall be solvent-less, liquid epoxy coating of at least 406 microns thickness, for the interior surface of steel pipe lines & conforming to IS-3589 and/or IS-5504. Epoxy paint to be used for this work shall be suitable to local environmental conditions / ambient conditions.

General

All steel pipes and fittings outside the pumping station shall be internally lined with a spray applied solvent free epoxy approved for contact with potable water under the United Kingdom Water Regulations Advisory Scheme authorized for use under Regulation 31 (4)(a) of the water supply (Water Quality) Regulations 2000 for contact with potable water. The applicable specifications for the coating system shall be suitable to potable water at elevated ambient / air temperature tested as per BS – 6920. AWWA C210 is referred standard for coating application as per Sec. 4.4. Surface preparation application condition, post treatment of coated surface to be as per manufacturer's specifications.

Paint – NSF standard 61 – NACE RP – 01 – 75. paint should be suitable for long time storing or potable water in the pipeline.

Materials & Workmanship

The coating system shall be factory lined and the lining shall be suitable for application in an environment with black bulb temperature up to 85°C.

All steel pipes shall be lined at the factory. Pipes welded on site shall be lined on site to the same standards as for pipes.

Pipe ends – coating shall be held back in from the ends of pipe sections to be jointed by field welding.

Detailed proposals of the lining method, materials and apparatus to be used for both

factory and site application shall be submitted to and approved by the Engineer In-charge before work starts. Storage and application shall be accordance with recommendations of the coating manufacturer, but as a minimum:

- a. A visual examination of the surface to be coated shall be carried out and any slivers or similar deposits removed.
- b. Prior to blasting all oil and grease shall be removed from the surface to be coated.
- c. Preparation of steel surfaces for both factory and site application shall be to a minimum of SA 2.5 in accordance with BS 7079/ ISO 8501-1:2007 specifications /or as per client specifications and roughness should 50-75 micron.
- d. The surface to be coated shall be dry, clean and free from foreign material and coating shall take place before any surface rusting and at least within 4 hours of blasting.
- e. Surface preparation and coating shall not be carried out when the relative humidity exceeds 85% or when the surface to be coated is less than 3 deg C above the dew point.
- f. The coating shall have a minimum mean dry film thickness of 406 microns. g. Coatings shall be used within the pot life specified by the manufacturer.
- h. The materials to be used for the work of each batch, test certificate shall be reviewed.
- i. Paint shall be applied by brush / air-less or conventional spray method.

Pipe linings shall be inspected on site and damaged, defective or otherwise unsatisfactory linings may be condemned. All defective areas shall be made good to the satisfaction of the Engineer In-charge.

Inspection and Testing:

It will be detailed in the contractor's Quality Plan and will be undertaken as minimum to the following:

- a. Visual Inspection of blasted profile on every pipe to be coated.
- b. Visual inspection of finished coating on every pipe.
- c. Measurement of coating thickness at four points on each pipe.
- d. The completed pipe shall be subjected to holiday detection tests which shall be carried out to the satisfaction of the Engineer In-charge. The applied voltage shall be those appropriate to the coating under test as recommended by the coating material manufacturer.
- e. The adhesion test as per clause no. 5.1.6 of AWWA-C-210.07 shall be carried out on one pipe per lot of every 10 pipes. Two parallel knife cuts about 100 mm long and 20 mm apart shall be made through the coating. If necessary, the test knife may be heated to make the cut. The painted surface between two cuts shall be lifted off the pipe with a stiff blade. If the paint film does not pill-off, more than the width of the cut, the bond shall be deemed to be satisfactory. If the width of the peel exceeds the width of the cut, two additional tests shall be made on the same pipe at two different locations. The painted surface shall be accepted if both the tests are satisfactory. If the results of either of the tests are un-satisfactory, the painting work of pipeline shall be rejected. Adhesion test shall be performed on 1 pipe out of 10 pipes. If the adhesion test fails for one pipe, then this test shall be performed on all the remaining 9 pipes of that particular lot.
- f. Prior to acceptance and application of the material, the Epoxy coating material shall be submitted by the contractor & shall be tested in an independent third party / vendor's test laboratory designated by the purchaser,

in presence of client / consultant and the results shall be in accordance with the specified standards. The frequency of the test shall be minimum 1 sample in every 10000 litres or per batch of the coating material. Tests like: Specific Gravity, Hardness (shore – D), Adhesion to steel, Tabor abrasion, pull-off adhesion tests, will be carried out. Rejection: If the sample of coating material does not comply with the standard, the coating material represented by such a sample shall be rejected.

- g. The pull-off adhesion of the internal epoxy lining to steel shall be checked in accordance with the ASTM D – 4541.
- h. All holidays visually or electrically discovered either at the coating plant or in the field shall be repaired by applying the same liquid epoxy coating using the brush. The minimum over-lap at the damaged area shall be 100 mm all around. The repaired area shall be tested with a holiday detector as per specification after the repair is completed. The thickness of the coating at the repair area shall be minimum 406 micron.

Preservation, Marking and Shipping Preservation

Preservation

The bare ends of each pipe shall be painted outside with a removable varnish as temporary corrosion protection during transportation.

Contractor to ensure proper protection at bevel ends of each pipe.

Marking

In addition to the marking required by API 5L, the specification MO1 “Steel Pipes for Mainlines and other applicable project specifications”, the Pipe Coating Contractor’s unique coating number shall be marked to the internal surface or the pipe with synthetic resin paint.

Further marking details like colour coding etc. shall be agreed upon with the Engineer In-charge. The marking shall have at least a distance of 150mm to the pipe end.

Shipping

Shipping and Loading preparation shall be in accordance with API Specification 5L or otherwise stated in the contract documents.

Documentation

Pre-Production Documentation

The Contractor shall submit the following documents to the Engineer In-charge for approval prior to commencing pipe coating work. Work shall not commence until these procedures have been reviewed and approved by the Engineer In-charge.

- a. The manufacturer’s trade name and data sheets for all proposed coating materials. This includes cleaning and abrasive blasting consumables.
- b. Procedure for identifying or maintaining the identification of each coated item.
- c. Handling procedure.
- d. Stacking procedure.
- e. Materials control and traceability procedure for the batches of coating

- materials.
- f. Materials control and traceability procedure (pipe and coating materials).
- g. Procedure for steel surface preparation including materials, cleaning, inspection, verification of cleanliness and surface profile.
- h. Coating application procedures.
- i. The results of the batch tests for batches to be used for pre-qualification tests.
- j. Details of testing methods including instrument types and copies or current calibration certificates.
- k. Details of inspection methods for bare and coated pipe.
- l. Full test results from the coating Procedure Qualification Test (PQT).
- m. Repair procedure and results or tests on demonstration of repairs.
- n. Project specific Quality Plan.

Production Records

A daily log containing the following data shall be maintained and be available for inspection by the Engineer In-charge during and/or after production. Data shall be recorded against the pipe unique identification number.

- a. Bare pipe inspection data
- b. Ambient temperature (every 4 hours)
- c. Humidity (every 4 hours)
- d. Coating progress (no. of items coated. Including item serial numbers)
- e. Blast pipe surface amplitude
- f. Tests for cleanliness of blast surface
- g. Test for cleanliness or blast medium
- h. Film thickness measurements
- i. Average, maximum and minimum coating thickness during each shift
- j. Details of any coating repairs
- k. The unique identification number of all items that are stripped for recoating – ‘RP’
- l. Pipe coating test results

This log shall be available to the Engineer In-charge throughout all coating operations

Release Documentation

The Contractor shall submit to the Engineer In-charge the following documentation in hard copy and softcopy (format to be agreed upon with the Engineer In-charge) with each batch of pipes released:

- a. Mill certificates for line pipe
- b. Unique pipe identification numbers
- c. Unique coating identification number (if different)
- d. Pipe length
- e. Length of the coated portion of each pipe and total coated lengths of all pipes.
- f. Reductions in length due to use in tests, damage or repairs, recorded against pipe unique identification number
- g. Date of coating
- h. Batch numbers of coating materials used

This shall be followed within two weeks by the following:

- a. Manufacturer's certificates for each batch of coating materials
- b. Certification / calibration certificates for all testing and coating equipment
- c. Inspection and test records, results, and other documentation of all materials and coating tests

All reports shall be signed by the Pipe Coating Contractor to signify compliance with the requirements of this specification.

MODE OF MEASUREMENT AND PAYMENT.

The payment shall be made on Sq.Mt. basis.

DTS No. 7

Providing and applying outer coating of approved brand non toxic anticorrosive Epoxy paint with Zinc rich primer of approved make as specified in specification with 250 to 325 micron thickness as directed by the engineer in charge.

- (1) Outer surface of the pipes shall be prepared for the application of paint by first cleaning the surface with wire brush shall be carried out in the presence of an authorized representative of SMC and as per the provisions of IS:1477 Part (I). All the mill scale and rust must be perfectly removed and inner bare metal surface of the pipe should appear neat, clean and fresh so that the paint applied afterwards should adhere it perfectly. Any trace of grease shall be removed carefully. Such clean, rough (roughness should be within 20 microns) bare metal surface will allow proper adhesion of the lining to the pipe. The Engineer-in-charge may exercise the right to examine the blast cleaned surface before application of priming coat. If the surface is rejected as not meeting the specification requirements, the contractor will be required to perform at his expense, such work as will be necessary to prepare the surface to the satisfaction of the Engineer-in-charge.

The compressed air used for blast cleaning shall be sufficiently free from oil or water contamination to ensure that preparation is not impaired. Adequate separators, traps and filters shall be provided which shall be cleaned and maintained regularly.

- (2) Outer surface prepared as mentioned in (1) above shall immediately in no case beyond four hours be followed by an application of Zinc rich primer as specified and approved by the Engineer-in-charge. The primer shall be applied by spray or brush. The application of the primer shall be as per the recommendation of the manufacturer.

The technical specifications of the primer shall be as under.

A two component heavy duty prefabricated primer based on Zinc Dust and epoxy resins shall be Di-ethelene glycol of Bisphenol A and hardner shall be Adduct Hardner of Basic Liquid resin and acromatic amine. The primer shall be non-phenolic. The preparation of paint shall be carried out as below.

Part By Weight

Base : 100
 Hardner/Hardners : 50
 Mixed paint (primer) shall have properties:-
 (a) Viscosity : 50
 (b) Specific Gravity : 1.70 + 3%
 (c) Pot Life mixture : 2 to 4 hours.

- at 30 Degree.
- (d) Zinc dust content : 92 +/- 3%
on D.F.T base.
 - (e) Finish : Smooth and matt.
 - (f) Shade : Grey.
 - (g) Drying Time. Surface dry within 5 minutes and
Hard dry within 1 hour. Overcoating can
be done after 24 hours.
 - (h) D.F.T. : 25-30 microns.
 - (i) Compatibility : Compatible with all systems of paints
like Bituminous, conventional and epoxy
paints.
 - (j) Toxicity : Non-toxic.
 - (k) Coverage : 10 Sq.mt./kg. at 25 microns.
- (3) Non-toxic anticorrosive Epoxy paint shall match the following requirement.
- (a) Dry time : Surface dry not more than 4 hours, Hard
dry not more than 18 hours.
 - (b) Covering capacity : 2-2.5 Sq.mt./Kg.
 - (c) Toxicity : Non-toxic
 - (d) Thickness : 300 micron (100 micron per coat).
- Preparation may be carried out as under
- | <u>Parts by weight</u> | |
|------------------------|---------------|
| Base | 100 |
| Hardner | 60 (45 + 15) |

In order to obtain satisfactory adhesion between subsequent coats, the previous coat may be lightly abraded with fine sand paper, if it is already set hard. The paint may preferably be applied with brush.

Approximate lengths of 0.50 mt. at both the ends of pipe shall be left uncovered with paint application as these ends are to be field welded. After laying the pipe in the trench and properly completing the welding joint, painting work left earlier should be completed in the manner stated as above.

The mode of application and materials shall conform to the following I.S. Standards.

- (a) IS:1477 : Code of practice for painting.
 - (b) IS:6049 : Code of practice for temporary corrosion preventives.
 - (c) IS:9197 : Code of practice for Epoxy resin and
Hardner.
- (4) Unless otherwise specified herein, the concerned Indian Standards shall be followed to its latest revision or amendments.
 - (5) In general, the requirements of IS:1477 "Code of practice for painting of Ferrous metals in buildings and allied products" (Part-I & II) and IS:6049 "Code of practice for application of temporary corrosion preventives" shall be met in carrying out the painting and/or preparatory work.
 - (6) The storage, mixing and application of paints shall strictly be carried out in accordance with the paint manufacturer's printed recommendations very strictly, this is in addition to the fulfilling the specifications of this tender. Make of the paints/ primer shall be Berger, Ciba-Geigy, Shalimar or Asian Paints or its equivalent companies only.
 - (7) The thinning of all coatings shall only be carried out when absolutely necessary, and then only in accordance with the paint manufacturer's instructions.
 - (8) The painted surface shall be allowed to dry and cure in accordance with the paint manufacturer's recommendation. All coatings shall be used within the manufacturer's Open

- Pot Life' period and the required drying time between coats allowed in all cases. Under no circumstances shall the 'Pot Life' be extended by the addition of new paint or other media.
- (9) The Consultant/Engineer-in-charge reserves the right to inspect the surface prepared and painting operations at any stage and to require any unsatisfactory workmanship to be remedied at the contractor's expenses.
 - (10) Inadequate dry film thickness will necessitate the application of a further coat or coats of paint to provide the full minimum dry film thickness specified.
 - (11) An elcometer or similar instrument shall be used to determine dry film thickness. On micaceous iron oxide coatings and on non-magnetic substrata, a non-magnetic measuring instrument shall be used.
 - (12) If the quality of the protective coating is impaired by excess dry film thickness showing wrinkling, cracking, or softness, the contractor shall remove the defective coating and repaint the affected area to the satisfaction of the Engineer-in-charge.
 - (13) Pipes when painted shall not be handled, stacked, or exposed to condensation, or rain, until the last applied coat is completely dry and in the case of two pack materials the coating has thoroughly cured.
 - (14) The contractor shall furnish and install the necessary scaffolding, runways etc. required to complete the work include in this specification.
 - (15) The painting shall be carried out against welding parts of piping after it is confirmed that all tests for piping have passed.
 - (16) All paints in a particular paint system shall be from one paint manufacturer unless agreed otherwise.
 - (17) Damaged areas shall be cleaned down and retouched with compatible primer before overpainting.
 - (18) No surface preparation or painting shall be carried out in climatic condition which will result in inferior protection to metal surface. The paint must be applied to dry surfaces in a dust-free atmosphere. Preparation and painting shall not take place in open during rain or fog or when condensation is likely to affect the paint film before it is dry.

* Anticorrosive epoxy paint (food grade quality) for Inner & outer coating of (Innerdia) M.S. Pipe, M.S. Pipe and for M.S. Specials shall be of non-toxic anticorrosive epoxy paint of food grade quality with primer of approved make. Contractor shall have to approved first the quality of epoxy paint (food grade quality) to the Competent Authority. Contractor can use this paint after approval of the Engineer-in-charge. Food grade quality anticorrosive epoxy paint shall be a brand of the Registered Company and shall comply with I.S.I. Mark. Contractor shall have to produced the complete prospectus about the anticorrosive food grade material. S.M.C. will give permission to use the same on the pipe surface after checking the quality of paint. S.M.C. will reserves the right to reject the quality of the said paint which produced by contractor for approval.

SAFETY :

1. All safety regulations and requirements in force at the job site shall be adhered to by the contractor. Prior permission to proceed with the painting shall be obtained from the Consultant/ Engineer-in-charge for coating areas in which painting work will be done.
2. Any spillage of volatiles shall be wiped up immediately, oily or solvent rags and waste shall not be allowed to accumulate, anywhere within the job site and shall be kept in closed containers and in minimum quantity.
3. No painting shall be done adjacent to fire hazard, such as welding, open flame or spark metal fabrication. No smoking shall be allowed within the plant premises.
4. Materials shall be stored in a location approved by the Consultant/Engineer-in-charge. Storage space shall be kept clean and free from fire hazards.

Mode of Measurement:-

The payment shall be made for each size of completed item per square meter of outer surface area of pipes.

DTS No. 8

Providing and applying with mechanical arrangement in 1:2 proportion cement, sand guniting to MS pipe surface under 2.1 kg/sq.cm. to 2.80 kg/sq.cm. pressure including removing the loose materials as directed by the Engineer-in-charge and including scrapping the surface with wire brushes, degreasing, cleaning by compressed air and providing, fixing BRC fabric No. 14 as reinforcement, curing for 21 days, disposing off the rebound materials with in a lead of 50 m etc. complete as directed by the E.I.C.

(a) 25 mm thick

The item includes outercoating to the external surface of the pipes laid in trench at joints and at the damaged portions, if any.

Water shall conform to M-1. Cement shall conform to M-3. sand shall conform to M-5. The cement mortar of proportion 1:2 shall conform to M-8.

At the time of application of the mortar, the surface of pipe shall be clean. Loose rust, loose millscale, dirt, debris, oil, grease and other detrimental materials shall be removed by manual or mechanical means.

The spacing of wire mesh shall be 150mm C/C bothways. Anchoring of ends and splices in the wire shall be by welding. The wire reinforcement may be given a tension of 50 to 75 Mpa while wrapping on the shell before the coating is applied.

Minimum 150 mm from both the pipe ends shall be left uncoated for easy insert and welding. The left out uncoated portion shall be coated later on site after welding the pipe. Coating of pipe and curing to guniting shall be done properly as per IS. The quality of wire mesh, cover, welding with pipe etc. shall be as per the IS:1916:1989.

The coating of the pipe shall be smooth, dense and hard. The coating shall be free from excessive laitance and surface irregularities. Projection exceeding 3 mm measured from the general surface of the coating shall be removed either by trowelling before the coating has set, or by grinding after curing of the coating.

The coating shall be applied under pressure by guniting. In case of coating applied under pressure by guniting the surface may not have smooth finish.

Defect shall be deemed to include voids, sand & clay pockets, blisters, areas that are thin or drummy or excessively cracked or not in contact with the surface of the pipe and cracks into which a flat gauge 0.8 mm thick can be inserted to a depth of half the thickness of coating at intervals along the cracks shall be deemed not to be defects.

Defects shall be repaired as soon as practicable. Unless otherwise specified, defects shall be repaired to the full thickness by hand trowelling.

The clear cover to the reinforcement cage shall not be less than 12 mm for coating. The reinforcement shall be wire, wound spirally. The coating shall be applied before any rusting occurs to the reinforcement.

The mortar for coating shall be mixed in mechanical mixers. Mixing shall be continued until there is a uniform distribution of the materials and the mass is uniform in colour and consistency but in no case shall the mixing be done for less than two minutes.

After completion, the mortar shall be kept wet by any suitable means such as immersion in water, covering by wet gunny bags or by mechanical sprinklers for a period of not less than 14 days.

The coating shall be carried out at site of work. S.M.C. will not provide any space for coating.

Mode of measurement :

Payments shall be made on per Squaremeter basis. Completed item inclusive of guniting at pipe joints, all materials, tools, equipments, testing, labour etc. complete.

DTS No. 9

Providing and applying sand blasting on external surface of M.S. pipes in such a manner that surface should adhere the outer coating as directed by the Engineer-in-charge.

- 1.1 The item includes the surface preparation and pretreatment to be provided to the external surface of M.S. pipes having one end plain and one end swelled to make the pipe ready for the application of outercoating of cement mortar guniting. It includes removal of all dirt, dust, oil, grease, swarf etc. from the surface of pipe. The sand blasting shall be carried out strictly as per the process lay down in IS:1477:1971 (Part-I). The sand blasting shall be carried out upto such extent that the surface of pipe shall have light greyish colour with minor impression of blasting. It should be carried out in such away that the surface of pipe shall be free from visible mill scale, rust, corrosion, red oxide or paint, if any and other foreign materials.
- 1.2 As the pipes are to be stacked along the alignment of laying site, the sand blasting shall be carried out on site. The contractor has to make arrangement of barricading with the use of partition made of wooden posts and G.I. sheets or other suitable material to safeguard the tress passers/vehicles as & when required. The barricading should be made in such a manner that it should not create any inconvenience/hinderances to the paddastral/vehicular traffic.
- 1.3 The contractor has to make his own arrangement to shift/roll/adjust the pipes convenience of sand blasting on site.
- 1.4 S.M.C. may order the contractor to execute the item in full or in part as per the requirement. Payment shall be made for the pipes completed with sand blasting.
- 1.5 The sand Blasting shall be carried out in the presence of an authorised representative of S.M.C. The Engineer-in-charge may exercise the right to examine the sand blast cleaned surface before application of cement mortar guniting. If the surface is not meeting to the specifications, it is liable for rejection and the contractor shall have to perform the same repeatedly at his expense to the satisfaction of Engineer-in-charge.
- 1.6 **MODE OF MEASUREMENT AND PAYMENT.**
The item includes sand blasting, shifting and rolling the pipes. The payment shall be made on Sq.Mt. base for the pipes upon which the sand blasting is carried out.

DTS No. 10

Conveying, lowering and laying in position sleeve/swaged ended outercoated spiral welded pipes as of size mentioned below with specials in correct line and level upon levelled trenches. The rate includes conveyance from store to site of work, loading,

unloading, hoisting, marginal cutting wherever required, assembling and welding and hydraulic testing etc. complete as directed by the Engineer-in- charge.

- (i) 168.30 mm dia(OD of Steel Tube) 4.5 mm thickness**
- (ii) 219.10 mm dia(OD of Steel Tube) 6.3 mm thickness**
- (iii) 508 mm dia(OD of Steel Tube) 6.3 mm thickness**
- (iv) 610 mm dia(OD of Steel Tube) 6.3 mm thickness**
- (v) 711 mm dia(OD of Steel Tube) 7.1 mm thickness**
- (vi) 813 mm dia(OD of Steel Tube) 7.1 mm thickness**
- (vii) 1019 mm dia(OD of Steel Tube) 10 mm thickness**
- (viii) 1219 mm dia(OD of Steel Tube) 10 mm thickness**

Lowering, laying and welding for M.S. Pipe.

The pipes and specials shall be transported and laid by using timber sticks. Peddy shall be provided by the laying contractor between coated pipes and timber sticks to avoid damage to the coating maintain the diameter.

If due to certain site conditions, it is not possible to use the standard specials as provided in the tender, and if the faces of the pipes or specials have to be suitably cut, the same shall be done with permission of the Engineer. Such cutting shall not be paid extra.

The contractor shall be required to maintain sufficient stocks all along the alignment so that his work may not suffer.

Loading, unloading, lowering and laying of pipes and specials shall be done by the crane only. Rubber packing, slink of canvas or non-abrassive material or any such protective material should invariably be used during the handling activity in order to protect the outer coating and edges of pipes and specials. Any damage or deformation or defect occurred during these activities shall be rectified and made good by the contractor at his own cost.

The pipes and specials shall be stacked with help of cranes and along the site in a manner as shall be directed by the Engineer from time to time. Pipes and Specials shall not be stacked under any circumstances in manner as would cause inconvenience or damage or injury to traffic or pedestrians. Pipes and specials, when stacked in places where light is insufficient at night, shall be painted with white lime so that they are better seen by the vehicular traffic. In case any claims for damage or injury to any person or property on account of the stacked pipes or specials are received, the tenderers shall be held responsible for the same.

The pipes and specials before laying shall be brushed internally throughout the length to remove any rubbish, soil or stones that may have accumulated therein.

LOWERING PIPES IN TRENCHES & ASSEMBLING THEM :

The pipes shall be lowered into the trench gently by removing one or two struts at a time only. It shall be seen that no part of the shoring is disturbed or damaged during this operation. It will also be necessary to see that the outercoating if any is not damaged in any way. Care should also be taken to see that the shape of the pipe does not change even momentarily, and to maintain a rigid circular shape, spiders shall be provided at both faces if necessary. After the pipe is lowered in the trench, it shall be laid in correct line and level by the use of levelling instruments, sight rails, theodolites etc. In the case of steel pipes and specials, care shall be taken to see that the longitudinal joints of two consecutive pipes at each joints shall be staggered by 90 degrees so that no two consecutive strakes have coincident longitudinal joints. No extra payment will be made for any difficulty encountered at particular points in the alignment.

While assembling the pipes, the ends shall have to be brought close enough so as to allow proper jointing either by welding for steel pipes, spun yarn and lead for C.I.pipes. There shall be lateral displacement between the pipe faces to be jointed. If necessary, spiders from inside and tightening rings from outside shall be used to bring the two pipe ends in perfect contact and alignment. Circumferential cutting of the face of the pipe without any extra cost to the Corporation may be permitted in special cases by the Engineer, provided that the work is executed by experienced cutters capable of taking straight and uniform cuts when the pipe is properly assembled and checked for correct line and level, it shall be supported on wooden wedges, firmly so as not to get disturbed subsequently. Some earth filling in the middle of the pipe may also be carried out at this site so as to avoid the pipe losing its alignment.

Reference bench mark at least two per kilometer shall be fixed before the work of laying the pipelines is started. These bench marks should be fixed a little away from the field works and should be securely fixed in cement concrete.

The pipes and specials shall be inspected before laying and defects noticed if any such as protrusions, grows, dents, notches etc. shall be rectified. Repairs by hammering with or without heating shall not be permitted. Any damage to the coating shall also be carefully examined and rectified. The pipes and specials shall be handled carefully to avoid damage at all stages and in such a manner as not to distort their circularity or not to cause any damage to the inner lining or outer coating. Pipes shall not be thrown down from the trucks nor shall they be drained or rolled along hard surface. Slinks of canvas or equally non abrasive material of suitable width or special attachment, shaped to fit the pipes ends shall be used to lift and lower the pipes and specials. Before alignment, assembling and welding, the pipe faces shall be cleaned by scraping, using wire brushes or any other method as directed by the Engineer.

STRAPS & DISTANT PIECES :

Where work is done from two faces and the connection has to be made, straps may have to be introduced. Such straps shall be fabricated in the field by cutting pipes, slitting them longitudinally and slipping them over the ends to be connected in the form of a collar with make-up piece inserted to increase the circumference. Minimum lap of 3" on either end of the pipe shall be kept. Filter welds shall be run externally along the circumference of the strap and the joints of the make-up piece shall be of butt weld type.

Cutting of such straps shall not be paid for separately but shall be treated as part of the pipeline, the two ends of which are to be connected.

If any distance pieces (i.e.pieces shorter than a full pipe length) are required to be used in conjunction with straps or elsewhere, they shall also be treated as part of the pipeline and no extra payment shall be made for cutting them to the required length out of a full pipe, and for any other work involved in laying and jointing them.

SPECIALS :

Specials such as bends, single or composite, tappers shall be laid in the same way as the pipes

MAKING BRANCH & TEE CONNECTIONS :

This provides for interconnections at existing mains running parallel or near by with new mains. This includes cutting of the existing mains, fixing branch tees and collars in position, dewatering the trenches by means of heavy duty pumps. It is likely that the water supply

may be hampered while carrying out the branch connections with the existing mains. It should therefore, be specifically noted that the contractor will be required to carry out the work day and night, so that the water supply may be restored as soon as practicable. The branch connection work will be carried out one by one after the pipeline is laid, tested and perfectly ready to be charged with water. If the branch connection works will be carried out with the express permission in writing of Engineer-in-charge and as directed by him. The payment for the same shall be made on the basis of running feet of the respective sizes. The length of the specials shall be measured along the centre line.

The item also includes cutting of pipes and specials for accommodating specials, valves etc. in correct positions and also includes conveying, lowering and fixing in position M.S./C.I. specials like tee, collars, tapper, bends, etc. including cutting the pipe line, dewatering the trench by means of pumping for making branch and end connection on existing pipeline etc. complete without any extra cost to the Corporation. If the Contractor fails to complete the work of connecting head line with existing ones within a period of one month after having instructed to do so. The same will be carried out by the departments at the risk and cost of the contractor.

Welding of joints of the pipes:

The welding of joints of the pipes in the field shall comply with I.S.816-1965 or its latest amendments.

The welds shall be run in three runs of welding. Out of three weld two weld shall be run outside the pipe and one weld shall be run inside the pipe. The welding and testing of the weld shall also be done as per the procedure laid down in I.S.S. 823-1964 or its latest amendments. Experienced welders whose performance shall be tested from time to time, shall only be permitted to carry out the welding work. No apprentices or helpers shall be allowed to do any welding whatsoever. If any unauthorised person is found to do welding work, he shall be removed from the work and the work carried out by him will have to be redone after gauging out the same. The following points shall be borne in mind by the contractors.

ELECTRODES :

The contractors shall use standard electrodes its number (i.e.type) depending on the thickness of plate and the type of joint. They shall also use standard current and voltages required for the machine in use. Electrodes shall conform to I.S.814-1974, and I.S.815-1966. Electrodes used must be of ESAB-INDIA, ADVANI and D&H only.

TESTING OF WELDED JOINTS :

(i) GENERAL :

The welded joints shall be tested in accordance with Indian Standard Specifications I.S.823-1964 and I.S.3600-1973 or to its latest amendments. The test pieces shall be taken out from the pipes pointed out by the Engineer without any delay. They shall be immediately delivered at the Engineer's Office for being numbered, machined and tested. The shape of the test pieces removed from the pipes shall be such that it will give a specimen of the required dimension and at the same time leave a hole in the pipe with rounded corners. This hole shall be closed up by patch plating from the outside so as to have over lap of 3" on all sides of the opening. Great care shall be taken in preparing these plates so as to get a good lap weld. The cost of providing the required M.S. Plates for this, is included in the item.

After the jointing is completed, all protruding portions shall be chipped off, and the portion of the pipeline near the field joint shall be thoroughly scrapped and cleaned to receive the guinite.

(ii) DETAILS OF TEST:

The following test shall be made.

TENSILE TEST :

The test specimen taken perpendicularly across the weld shall be shaped in accordance with the I.S.S.No.1663-1962. The specimen shall be taken from the end of the pipe or at any joint in the pipe as directed by the Engineer and shall be cut with the weld approximately in the middle of the specimen. The tension test specimen shall be machined. The protruding welding portions from both inside and outside shall be removed by machining or grinding before the specimen is tested.

At least one field joint out of every 100 shall be subjected to test by taking out a specimen. If a test specimen shows defective machining or develops flaws not associated with welding, it may be discarded and another specimen substituted.

The weld joint shall show a strength not less than the minimum tensile strength specified for the plate.

BEND TEST :

The bend test specimen shall be prepared in the same way as for tensile test and tested in the presence of the Engineer. The specimen shall be taken from the same pipe selected for tensile test. The specimen shall stand being bent cold through 180 degrees around a pin, the diameter of which is equal 4 1/2 times the thickness of the plate without developing cracks. In making the bend test, the side of the specimen representing the inside of the pipe shall be placed next to the pin.

(iii) PROCEDURE IN CASE OF FAILURE OF THE TESTS :

A failure of the joint will indicate that the operator is not careful as other factors such as current, voltage, electrodes, etc. are already determined. For the first failure, the operator shall be warned and if a second failure takes place, he will be removed from the work and another suitable operator substituted. Joints or the portion thereof shall be gauged and repaired to the satisfaction of the Engineer. In order to maintain a good standard in welding welder shall be tested before they are entrusted with the job.

A record shall be maintained showing names of welders and operators who have worked on each individual joint. The work should preferably be carried out by a pair of welders so that, by observing proper sequence, distortion can be avoided. A joint entrusted to a particular individual or pair shall be as far as possible be completed by them in all respects, including, sealing run. No helper or other unauthorised welder shall be permitted to carry out any welding work whatsoever. In case of infringement of above, the person concerned shall be removed as directed by the Engineer.

(iv) RE-TEST :

If the results of tensile or bend test or any test do not conform to the requirement specified, retest of two additional lengths from the same section shall be made, each of which shall conform to the required specification. In case of failure of one or both, extensive gauging and repairing shall be carried out as directed by the Engineer before the section can be accepted.

(v) EXPENSES FOR TESTING :

All expenses in connection with taking out test samples machining and testing them in a laboratory, transporting etc. shall be borne by the contractor. The tensile and bend test shall be carried out in some Government or Semi-Government institute by paying the necessary fees. This will be arranged by the Municipality at the contractor's cost.

ARREARS OF WELDING WORK :

It is necessary for the contractor to see that the welding work is done systematically leaving no arrears to be done subsequently. The contractors shall provide sufficient number of plants for this purpose including stand by and shall have enough personnel on the welding job, so as to maintain steady progress. A proper sequence of operation is very necessary in the pipe laying work and the contractor shall see that the work as per schedule is carried out from day to day. Unless this is done, the Engineer may suspend pipe laying operation until arrears have been tackled to his satisfaction. No compensation for extension of time shall be given for any stoppage of work owing to such causes.

Where the work is to be done in roads and thorough fare, long trenches should not be always left open under any circumstances. It is, therefore, incumbent upon the contractors to follow a planned procedure of work so as not to leave any arrears of work. The daily progress of excavation work for preparing trenches shall meet with the refilling of the trenches in the completed portion.

Outer coating on the welded joints:-

The outside exposed welded steel surface shall be covered by providing outer coating of Corrosion & Chloride resistant treatment of "Corocretin TE" (which is thixotropic two component resin system with modified amine hardner). as specified in I.No.(4) of tender. The outer coating work at joints is to be carried out in situ at the site of laying by supporting the pipes temporarily on timber props. Care shall be taken to see that the pipes remains perfectly circular while welding and outer coating is being given. This shall be done by providing adequate number of spiders. These spiders shall not be allowed to deslodge until the pipeline is laid in position in the trench and jointed.

The outer coating shall be provided after testing the pipe at specified pressure.

The item includes all the tools, machineries, materials, labour etc. complete for providing outer coating.

The item includes cutting of sleeve/ swaged end of pipe of necessary for making lap joint perfect for welding of joint. when required.

This item also includes marginal cutting of the edge of the pipe or special circumferentially, making the ends bevelled to suit perfect butt joint with the adjacent edge/end of the or special.

The item includes conveyance of pipes from store to site of work loading, unloading, hosting marginal cutting wherever required, assembling welding and hydraulic testing. The required equipment, water and labour shall be provided by contractor at his cost.

Mode of measurement & payment:-

The payment shall be made on per Running meter basis for the completed item.

DTS No. 11

Labour work for fabrication and supplying at site MS Specials in the following sizes suitable for field welding at site having thickness 7 to 12 mm th. Plate. The size and dimensions shall be confirming to IS : 7322 as directed by Engineer in Charge. The item includes conveyance from, store to site of work loading unloading, hosting marginal cutting wherever required, assembling & welding & hydraulic testing etc. complete as directed by Engineer -in -Charge.

Detail Specification as per below.

Ends of the specials shall be made properly which shall be suitable for field welding along with the adjacent pipe.

Outer coating/ inner coating shall be as per DTS No.6 and 7 of this tender.

Pipes/specials not conforming to the specifications and not serviceable in the opinion of the Engineer-in-charge, shall have to be remanufactured and to be provided at the site by the Contractor at his own cost.

In case of difference of opinion between the contractor and the Engineer-in-charge, the decision of the City Engineer or equivalent shall be considered final and binding to the contractor.

The welding shall be done by using the approved electrodes as instructed by the Engineer-in-charge.

Manufacturing of the specials shall be done at the own premises/factory of the Contractor at Surat only. Surat Municipal Corporation will not allot any space for the same. Alternatively, contractor may manufacture the specials at site in such a manner that it does not obstruct the vehicular traffic or pedestrians on road.

Electrodes and Welding:

Electrodes to be used welding work shall conform to IS:814 & 815 and welding shall conform to IS 816:822 & 823. The electrodes must be of make "ESAB-INDIA", "Advani", and "D&H" only.

The steel core shall be formed by shaping and welding together steel plates of specified thickness. But welding shall be adopted for all longitudinal and circumferential welds. All welds shall be made down hand by the welding process. Welding shall be done so that there shall be thorough fusion and complete penetration. Prior to welding the plates shall be fitted closely and during welding they shall be held firmly. The metal arc welding shall be done as per I.S.816/1969 code of practice for use of metal ARC welding for general construction in mild steel and I.S. 823-1964 code of procedure for manual metal arc welding of mild steel.

Mode of measurement :

The payment shall be made on the per Kg. basis

DTS No. 12

Extra Cutting of Spirally welded pipes having wall thickness up to 12 mm thick for making it of suitable length or making the existing edge true vertical to have perfect square joints including all material equipments and labour required for cutting the pipes excluding cutting of pipe for M.S. Specials.

- (a) Above 5 mm to 10 mm thick.
- (b) Above 10 mm thick.

The item includes cutting of 711 to 1626 mm dia. M.S. pipes for making it into suitable lengths or making existing edges true vertical or exactly matching to the side of the adjacent pipe and/or edge of the M.S. Special to have perfect square joints. The item includes all materials, equipments and labours required for cutting the pipes. The pipes should be cut with due care to have true vertical or required shaped edges. If due to any reason, the pipes are not cut as required, the cost of the damaged portion shall be recovered from the contractor and more over he shall have to again cut the pipes as per the requirement without claiming any extra cost. It shall be seen that for re-cutting the pipes, the minimum length of the pipes shall be wasted as the pipes are too costly. The pipes shall be cut using standard cutting machines and materials which shall be in accordance to relevant Indian Standard. If required, the pipes shall have to be properly shaped before cutting for which no extra payments shall be made.

The quantity shown in the tender is very approximate and the work shall have to be carried out at the quoted rates for the quantity required to be executed according to the exigency during the progress of the work.

Mode of measurement :-

Payment shall be made per Rmt. basis of the end of pipe cut by the contractor

DTS No. 13

Extra field welding in all position with required number runs, for M.S. pipes internally and/or externally including gauging wherever necessary, fixing appurtenances and other accessories in connection with pipe laying work as per specification.

The welding and joints of the pipes in the field shall comply with I.S.816-1965 or its latest amendments.

The welds shall be run in three runs of welding. Out of three weld two weld shall be run outside the pipe and one weld shall be run inside the pipe. The welding and testing of the weld shall also be done as per the procedure laid down in I.S.S. 823-1964 or its latest amendments. Experienced welders whose performance shall be tested from time to time, shall only be permitted to carry out the welding work. No apprentices or helpers shall be allowed to do any welding whatsoever. If any unauthorised person is found to do welding work, he shall be removed from the work and the work carried out by him will have to be redone after gauging out the same. The following points shall be borne in mind by the contractors.

ELECTRODES :

The contractors shall use standard electrodes its number (i.e.type) depending on the thickness of plate and the type of joint. They shall also use standard current and voltages

required for the machine in use. Electrodes shall conform to I.S.814-1974, and I.S.815-1966. Electrodes used must be of ESAB-INDIA, ADVANI and D&H only.

TESTING OF WELDED JOINTS :

(i) GENERAL :

The welded joints shall be tested in accordance with Indian Standard Specifications I.S.823-1964 and I.S.3600-1973 or to its latest amendments. The test pieces shall be taken out from the pipes pointed out by the Engineer without any delay. They shall be immediately delivered at the Engineer's Office for being numbered, machined and tested. The shape of the test pieces removed from the pipes shall be such that it will give a specimen of the required dimension and at the same time leave a hole in the pipe with rounded corners. This hole shall be closed up by patch plating from the outside so as to have over lap of 3" on all sides of the opening. Great care shall be taken in preparing these plates so as to get a good lap weld. The cost of providing the required M.S. Plates for this, is included in the item. After the jointing is completed, all protruding portions shall be chipped off, and the portion of the pipeline near the field joint shall be thoroughly scrapped and cleaned to receive the guinite.

(ii) DETAILS OF TESTS

The following test shall be made.

TENSILE TEST :

The test specimen taken perpendicularly across the weld shall be shaped in accordance with the I.S.S.No.1663-1962. The specimen shall be taken from the end of the pipe or at any joint in the pipe as directed by the Engineer and shall be cut with the weld approximately in the middle of the specimen. The tension test specimen shall be machined. The protruding welding portions from both inside and outside shall be removed by machining or grinding before the specimen is tested.

At least one field joint out of every 100 shall be subjected to test by taking out a specimen. If a test specimen shows defective machining or develops flaws not associated with welding, it may be discarded and another specimen substituted.

The weld joint shall show a strength not less than the minimum tensile strength specified for the plate.

BEND TEST :

The bend test specimen shall be prepared in the same way as for tensile test and tested in the presence of the Engineer. The specimen shall be taken from the same pipe selected for tensile test. The specimen shall stand being bent cold through 180 degrees around a pin, the diameter of which is equal 4 1/2 times the thickness of the plate without developing cracks. In making the bend test, the side of the specimen representing the inside of the pipe shall be placed next to the pin.

(iii) PROCEDURE IN CASE OF FAILURE OF THE TESTS :

A failure of the joint will indicate that the operator is not careful as other factors such as current, voltage, electrodes, etc. are already determined. For the first failure, the operator shall be warned and if a second failure takes place, he will be removed from the work and another suitable operator substituted. Joints or the portion thereof shall be gauged

and repaired to the satisfaction of the Engineer. In order to maintain a good standard in welding welder shall be tested before they are entrusted with the job.

A record shall be maintained showing names of welders and operators who have worked on each individual joint. The work should preferably be carried out by a pair of welders so that, by observing proper sequence, distortion can be avoided. A joint entrusted to a particular individual or pair shall be as far as possible be completed by them in all respects, including, sealing run. No helper or other unauthorised welder shall be permitted to carry out any welding work whatsoever. In case of infringement of above, the person concerned shall be removed as directed by the Engineer.

(iv) RE-TEST :

If the results of tensile or bend test or any test do not conform to the requirement specified, retest of two additional lengths from the same section shall be made, each of which shall conform to the required specification. In case of failure of one or both, extensive gauging and repairing shall be carried out as directed by the Engineer before the section can be accepted.

(v) EXPENSES FOR TESTING :

All expenses in connection with taking out test samples machining and testing them in a laboratory, transporting etc. shall be borne by the contractor. The tensile and bend test shall be carried out in some Government or Semi-Government institute by paying the necessary fees. This will be arranged by the Municipality at the contractor's cost.

(D) ARREARS OF WELDING WORK :

It is necessary for the contractor to see that the welding work is done systematically leaving no arrears to be done subsequently. The contractors shall provide sufficient number of plants for this purpose including stand by and shall have enough personnel on the welding job, so as to maintain steady progress. A proper sequence of operation is very necessary in the pipe laying work and the contractor shall see that the work as per schedule is carried out from day to day. Unless this is done, the Engineer may suspend pipe laying operation until arrears have been tackled to his satisfaction. No compensation for extension of time shall be given for any stoppage of work owing to such causes.

Where the work is to be done in roads and thorough fare, long trenches should not be always left open number any circumstances. It is, therefore, incumbent upon the contractors to follow a planned procedure of work so as not to leave any arrears of work. The daily progress of excavation work for preparing trenches shall met with the refilling of the trenches in the completed portion.

(E) Outer coating on the welded joints:-

The outside exposed welded steel surface shall be covered by providing outer coating of Corrosion & Chloride resistant treatment of "Corocrete TE" (which is thixotropic two component resin system with modified amine hardner). as specified in I.No.(4) of tender. The outer coating work at joints is to be carried out in situ at the site of laying by supporting the pipes temporarily on timber props. Care shall be taken to see that the pipes remains perfectly circular while welding and outer coating is being given. This shall be done by providing adequate number of spiders. These spiders shall not be allowed to deslodged until the pipeline is laid in position in the trench and jointed.

The outer coating shall be provided after testing the pipe at specified pressure.
The item includes all the tools, machineries, materials, labour etc. complete for providing outer coating.

This item also includes marginal cutting of the edge of the pipe or special circumferentially, making the ends bevelled to suit perfect but joint with the adjacent edge/end of the or special.

Mode of Measurement:-

The rate shall be as per Running meter basis and includes all materials and labour required for welding the joints, outer coating at joints etc. complete.

DTS No. 14

Lowering, laying and jointing in position following Sluice valves / BF valves, Electrically operated valve, Resilience seated SV including of all labour

- (a) 250 mm dia SCV
- (b) 500 mm dia B/F
- (c) 600 mm dia B/F
- (d) 750 mm dia B/F
- (e) 1000 mm dia B/F Valve PN-1.0
- (f) 1200 mm dia B/F Valve PN-1.0

Valves shall be lowered and fixed in proper position and right to the plump and flange joints with the sets of tail pieces shall be carried out perfectly water tight. Nut bolts, rubber inseration etc. required for jointing shall be provided by the Contractor.

Mode of the measurement and payment:-

The rate shall be for unit of one number.

DTS No. 15

Demolition/Dismantalling RCC work or masonry work in any part of nearby concrete structure including stacking of serviceable/useful material and disposal of unserviceable material with all lead and lift.

WORKMANSHIP:

The demolition shall consist of demolition of one or more parts of the building as specified. Demolition implies taking up or down or breaking up. This shall consist of demolishing whole or part of work including all relevant item as specified and as directed by the Engineer-in-charge.

The demolition shall always be planned before hand and shall be done in reverse order of the one in which the structure was constructed. This scheme shall be got approved from the Engineer-in-charge before starting the work. This however will not absolve the contractor from the responsibility of proper and safe demolition.

Necessary dropping, shorting and under pinning shall be provided for the safety of the adjoining work or property, which is to be left intact, before dismantling and demolishing is taken up and the work shall be carried out in such a way that no damage is caused to the adjoining property.

Wherever required, temporary enclosures or partitions shall also be provided. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary.

Dismantling shall be commenced in a systematic manner. All materials which are likely to be damaged by dropping from a height or demolishing roof, masonry etc. shall be carefully dismantled first. The dismantled articles shall be properly stacked as directed.

All materials obtained from demolition shall be the property of Surat Municipal Corporation unless otherwise specified and shall be kept in safe custody until handed over to the Engineer-in-charge.

Any serviceable materials, obtained during dismantling or shall be separated out and stacked property as directed with all lead and lift. All unserviceable materials, etc. shall be stacked and disposed as directed by the Engineer-in-charge.

On completion of work, the site shall be cleared of all debris rubbish and cleaned as directed.

MODE OF PAYMENT:

Measurement of all work except hidden work shall be taken before demolition or dismantling and no allowance for increase in bulk shall be allowed. The demolition of lime concrete shall be measured under this item. Specification for deduction for voids, openings etc. shall be on same basis as that employed for construction of work.

All work shall be measured in decimal system as fixed in its subject to the following limits, unless otherwise stated hereinafter: (a) Dimensions shall be measures to the nearest 0.01mt. (b) Area shall be worked out to the nearest 0.01sq.mt. (c) Cubical connection shall be worked out to the nearest 0.01 Cu.m.

The rate shall include cost of all labour involved and tools used in demolishing and dismantling including scaffolding. The rate shall also include the charges for separating out and stacking the serviceable materials property and disposing the unserviceable materials with all lead and lift. The rate also includes for temporary storing for the safety of the portion not required to be pulled down or of adjoining property and providing temporary enclosures or partition where considered necessary. The rate shall be for a unit of one cubic metre..

DTS No. 16

Providing & laying Cement Concrete 1:3:6 (1 Cement, 3 Course sand, 6 graded stone aggregate 40 mm. Nominal size) with ramming, curing etc. complete including cost of form work

- (a) For Pipe Encasing**
- (b) For foundation and plinth.**
- (c) For Thrust Block**

1. Item shall be carried out in general and shall be as per IS 456:1984 or revised from time to time shall be followed.
- 1.1 The materials like cement, sand, coarse aggregates shall be as per the general specification of the materials and as per relevant IS.

2. Concrete Mix :

In ordinary concrete, the proportion of cement to fine aggregate to coarse aggregates shall be 1:3:6 i.e. one part of cement and three parts of sand and six parts of coarse aggregates. The volume of cement is considered to be 1.20 cft.

The crushing strength of 6 "square cube shall be as per Table No.1, I.S.456 i.e. for 7 days 105.5 Kg/cm² (1500 lb/Sq.In) and for 28 days 158.2 Kg/Cm² (2250 lbs/Sq.in).

3. Water Contents :

The water contents for an ordinary concrete mix should generally be equal to 27 to 35 litres per bag. Allowance for surface water present in aggregates shall be made when computing the water content.

4. General :

The form work shall conform to shape, lines and dimensions as shown on plan and be so constructed as to remain sufficiently rigid during the placing and compacting of concrete and shall be sufficiently tight to prevent loss of liquid from the concrete.

For form work constructions of plywood or steel plates will be used except for small junction and crossing.

Clearing of forms :

All rubbish, chipping shaving and saw dust shall be removed from the interior of forms before the concrete is placed and form work in contact with concrete shall be cleaned thoroughly wetted or treated with the approved composition.

Stripping time :

The frame shall be struck after expiry of following period.

- (a) Vertical sides of beams and columns, columns footing -48 Hours
- (b) Bottom of slabs upto 4.6 M.Span. - 7 Days
- (c) Bottom of slabs above 4.6 M.to 6.0 M.Span. -14 Days
- (d) Removal of props under beam upto 6 M. Span. -14 Days
- (e) Removal of props under beam above 6 M.Span. -21 Days

Procedure when removing the form work :

All form work shall be removed without such shock on vibration as would damage the reinforced concrete. The concrete should be sufficiently hardened before the so fits and props are removed proper precautions shall be taken in cold weather.

5. Centering:

The centering to be provided shall get approved from the Engineer-in-charge. It shall be sufficiently strong to ensure safety of the form work and concrete work before, during and after pouring concrete, watch shall be kept to see the behaviour of centering and form work satisfactory during the concreting. Erection shall also be such that it would allow the removal of forms in proper without damaging either concrete or forms to be removed.

The props of centering should be provided in on firm foundations or base of sufficient strength to carry the load without settlement. The props shall be strong durable and not less than 3" dia. If wooden pulling are used. In case of centering of slabs, the props shall be of 3" dia c/c for beams and shall be placed not more than 2 to 2'-3" c/c.

The cross horizontal struts shall be provided at every 8" to 10" height of props. The centering and form work will be inspected and approved by the Engineer-in-charge before concreting. But this will not relieve the contractor of responsibility for strength and safety of the form works and centering. If there is failure of form work or centering, contractor shall be responsible for any damage to work, or injury to life and property.

6. Scaffolding :

All scaffolding and hoisting arrangements ladders etc., required for the concreting shall be provided and removed, on completion of the work by contractor at his own expense. The scaffolding, hoisting arrangements, ladders etc. shall be strong to withstand all the live, dead, and impact, load, expected to act and shall be subject to approval of the Engineer-in-charge. However the contractor shall be completely responsible for the work and workman etc.

7. Workmanship :

The quantity of cement shall be assumed to be per bag having volume 1.2 cft. The quantity of fine and coarse aggregates shall be measured in volumetric basis i.e. steel phromes of 0.30 x 0.30 x 0.38 high.

8. Mixing :

Concrete shall be mixed in a mechanical mixer. Mixing shall be continued until there is a uniform distribution of the materials and mass is uniform in colour and consistency.

The case of failure of the machinery, hand mixing shall be permitted but in such cases, 10% extra cement shall have to be used without any extra cost to the Corporation.

9. Transporting :

Concrete shall be handled from the place of mixing to the place of final deposit at rigidly, as practicable by methods which will prevent the segregation or loss in gradients. During hot or cold weather, concrete shall be transported in deep containers.

10. Placing and compacting :

Concrete shall be carried out continuously upto construction joints, the position and arrangements shall be determined by the department. When the work has to be resumed on the surface which are hardened such surface shall be roughened on before the new concrete is laid.

11. Compacting :

Concrete shall be thoroughly compacted during the operation of placing and thoroughly worked around the reinforcement and into corner of form work by means of mechanical vibrator and wooden screeds, so that whole mass becomes compact and homogenous and there is no air bubble or honey combing. At the time of concreting, proper care shall be taken, so that honey combing formation is minimum.

After the form work is removed, if any such honey combing etc. work is found, it shall be immediately finished with the cement mortar 1:1, so that the crevices are properly filled and no reinforcement is exposed. If however, the honey combing is found of any severe nature

and is found through out the surface of concreting, exposing the reinforcement. The concrete work shall be rejected and redone without any extra cost.

12. The concrete shall be covered with a layer of stacking canvas hession or similar absoement materials and kept constant wet for 20 days from the date of placing of concrete for R.C.C. slab cement or lime mortar cykes 7 c.m. to 10 c.m.height shall be filled with water. If proper curing arrangement is not done by contractor the same shall be done by department at risk and cost of the contractor and the contractor shall be fully responsibility for the same.

13. Testing :
The work test concrete shall be carried out as per Appendix 'E' of I.S.456. The size of cubes shall be 15 cm x 15 cm x 15 cm. The mould for test specimen shall be made of steel plated. They shall not vary from the std. dimension by more than one percent. The moulds shall be so constructed that there will not be leakage of water from the test specimen during moulding.

More samples of concrete consisting six cubes sizes 150 mm x 150 mm x 150 mm shall be taken for every 45 cms. or part there of concrete work. The contractor may taken his own arrangement for taking samples and testing of the samples in Government laboratores at his own cost. A register shall be maintained at site of the work.

Results of the test shall be as per requirements as per I.S. If the results are found slightly below the prescribed limit and within permissible range. The work shall be accepted by the Engineer-in-charge as a special case if deemed proper otherwise the work shall be rejected.

14. Finishing :
After removing the centering all exposed R.C.C.members shall be tightly chiselled to have proper key with mortar plastering work and shall be finished with cm 1:3 cement plastered of required thickness of 1/2" to bring the work in line and level including cement finishing etc.

Item includes all materials, labours, tools plants and machinery required for the satisfactory completion of item in cluding forms, centering, scaffolding and carrying out necessary test as per I.S.516:1959 including finishing etc. complete.

Rates :

The item shall be measured and paid on cubic meter basis.

DTS No. 17

Providing & laying ordinary cement concrete in C.C.1:1.5:3 (1-Cement, 1.5-Coarse sand & 3- coarse aggregate 20 mm Nominal Size)

- (a) For RCC Slab in C.C.1:1.5:3 for valve chamber
- (b) For RCC Encasing
- (c) For Thrust Block

1. Materials :-
Water shall conform to M-1, Cement shall conform to M-3. Sand shall conform to M-5. Grit shall conform to M-6. Graded stone aggregate 20 mm nominal size shall conform to M-9.
2. General :-

- 2.1 The concrete mix is not required to be designed by preliminary tests. The proportion of the concrete mix shall be 1:1 1/2:3
[1 cement:1 1/2 coarse sand:3 graded stone aggregate 20 mm nominal size] by volume. Concrete work shall have exposed concrete surface or as specified in the item.
- 2.2 The designation ordinary M-100, M-150, M-200, M-250 specified as per I.S. corresponding approximately to 1:3:6 1:2:4, 1:1:1, 1:1 1/2: 3 and 1:1:2 nominal mix of ordinary concrete by volume respectively with conforming to IS:456.
- 2.3 The ingredients required for ordinary work, containing one bag of cement of 50 kg. by weight [0.0342 cu.m.] for different proportion of mix shall be as under.

Grade of concrete	Total quantity of dry aggregate by volume per 50 kg. of cement to be taken as the sum of individual volume of fine and coarse aggregate maximum	Proportion of fine aggregate to coarse aggregate	Quantity of water per 50 kg. of cement maximum
M-100 [1:3:6]	300 Litres	Generally 1:2 for fine aggregate to	34 litres
M-150 [1:2:4]	220 "	Coarse aggregate by volume but subject	32 "
M-200 [1:1.5:3]	160 "	to and upper limit of 1:1 1/2 & lower	30 "
M-250 [1:1:2]	100 "	limit 1:3	27 "

- 2.4 The water cement ratios shall not be more than those specified in the table. The cement content of the mix specified in the table shall be increased if the quantity of water in a mix has to be increased to overcome the difficulties of placement and compaction so that the water cement ratio specified in the table is not exceeded.
- 2.5 Workability of the concrete shall be controlled by maintaining a water cement ratio that is found to give a concrete mix which is just sufficiently wet to be placed and compacted without difficulty with the means available.
- 2.6 The maximum size of coarse aggregate shall be as large as possible within the limits specified but in no case greater than one fourth of the minimum thickness of the member, provided that the concrete can be placed without difficulty so as to surround all reinforcement thoroughly and to fill the corners of the form.
- 2.7 For reinforced concrete work, coarse aggregates having a nominal size of 20 mm are generally considered satisfactory.
- 2.8 For heavily reinforced concrete members as in the case of the ribs of main beams the nominal maximum size of coarse aggregate should usually be restricted to 5 mm, less than the minimum clear distance between the main bars, or 5 mm, less than the minimum cover to the reinforcement whichever is smaller.
- 2.9 Where the reinforcement is widely spaced as in solid slabs, limitations of size of the aggregate may not be so important and the nominal maximum size may sometimes be as great as or greater than the minimum cover.

- 2.10 Admixture may be used in concrete only with approval of Engineer-in-charge based upon the evidence that with the passage of time; neither the compressive strength of concrete is reduced nor are other requisite qualities of concrete and steel impaired by the use of such admixtures.

3. WORKMANSHIP:

- 3.1 General :- The bars shall be kept in position by the following method:

In case of beam and slab construction, sufficient number of precast cover blocks in cement mortar 1:2 [1 cement 2 coarse sand] about 4 x 4 cms. section of thickness equal to the specified cover shall be placed between the bars and shuttering as to secure and maintain the requisite cover of concrete over the reinforcement.

In case of cantilevered or doubly reinforced beams or slabs, the main reinforcing bars shall be held in position by introducing chair spacers or supports bars at 1.0 to 1.2 metres centres.

In case of columns and wall, the vertical bars shall be kept in position by means of timber templates with slots accurately cut in them, the templates shall be removed after concreting has been done below it. The bars may also be suitably tied by means of annealed steel wires to the shuttering to maintain their position during concreting.

All bars projecting from pillars, columns, beams, slabs etc. to which other bars and concrete are to be attached or bounded to later on, shall be protected with a coat of thin neat cement grout, if the bars are not likely to be incorporated with succeeding mass of concrete within the following 10 days. This coat of thin neat cement shall be removed before concreting.

- 3.2 Proportioning :-

Proportioning shall be done by volume, except cement which shall be measured in terms of bags of 50 kg. weight. The volume of one such bag being taken as 0.0342 cu. meter. Boxes of suitable sizes shall be used for measuring sand and aggregate. The size of the boxes [internal] shall be 35x25 cms. and 40 cms. deep. While measuring the aggregate and sand, the boxes shall be filled without shaking, ramming or hammering.

The proportioning of sand shall be on the basis of its dry volume and in case of damp sand, allowances for bulkage shall be made.

- 3.3 Mixing :-

- 3.3.1 For all work, concrete shall be mixed in a mechanical mixer which along with other accessories shall be kept in first class working condition and so maintained throughout the construction. Measured quantity of aggregate, sand and cement required for each batch shall be poured into the drum of the mechanical mixer while it is continuously running. After about half a minute of dry mixing measured quantity of water required for each batch of concrete mix shall be added gradually and mixing continued for another one and half minute. Mixing shall be continued till materials are uniformly distributed and uniform colour of the entire mass is obtained and each individual particle of the coarse aggregate shown complete coating of mortar containing its proportionate amount of cement. In no case shall the mixing be done for less than two minutes after all ingredients have been put into the mixer.

- 3.3.2 When hand mixing is permitted by the Engineer-in-charge for small jobs or for certain other reasons, it shall be done on the smooth watertight platform large enough to allow efficient turning over the ingredients of concrete before and after adding water. Mixing

platform shall be so arranged that no foreign material gets mixed with concrete nor the mixing water flow out. Cement in required number of bags shall be placed in a uniform layer on top of the measured quantity of fine and coarse aggregate, which shall also be spread in a layer of uniform thickness on the mixing platform. Dry coarse and fine aggregate and cement shall then be mixed thoroughly by turning over to get a mixture of uniform colour. Specified quantity of water shall then be added gradually through a rose can and the mass turned over till a mix of required consistency is obtained. In hand mixing, quantity of cement shall be increased by 10 percent above that specified.

- 3.3.3 Mixer which have been out of use for more than 30 minutes shall be thoroughly cleaned before putting in a new batch, unless otherwise agreed to by the Engineer-in-charge. The first batch of concrete from the mixture shall contain only two thirds of normal quantity of coarse aggregate. Mixing plant shall be thoroughly cleaned before changing from one type of cement concrete to another.

- 3.4 Consistency :
The degree of consistency which shall depend upon the nature of the work and methods of vibration of concrete, shall be determined by regular slump test in accordance with I.S. 1199 : 1959. The slump of 10 mm to 25 mm shall be adopted when vibrators are used and 80 mm when vibrators are not used.

- 3.5 Inspection :

- 3.5.1 Contractor shall give the Engineer-in-charge due notice before placing any concrete in the forms to permit to inspect and accept the false work and forms as to their strength, alignment and general fitness but such inspection shall not relieve the contractor of his responsibility for the safety of men, machinery, materials and for results obtained. Immediately before concreting, all forms shall be thoroughly cleaned.

- 3.5.2 Centring design and its erection shall be got approved from the Engineer-in-charge. One carpenter with helper shall invariably be kept present throughout the period of concreting. Movement of labour and other persons shall be totally prohibited for reinforcement laid in position. For access to different parts suitable mobile platform shall be provided so that steel reinforcement in position is not disturbed. For ensuring proper cover, mortar blocks of suitable size shall be cast and tied to the reinforcement. Timber, kapachi or metal pieces shall not be used for this purpose.

- 3.6 Transporting and laying :-

- 3.6.1 The method of transporting and placing concrete shall as approved. Concrete shall be so transported and placed that no contamination segregation or loss of its constituent material takes place.

- 3.6.2 All form work shall be cleaned and made free from standing water dust snow or ice immediately before placing of concrete. No concrete shall be placed in any part of structure until the approval of Engineer-in-charge.

- 3.6.3 Concreting shall proceed continuously over the area between construction joints. Fresh concrete shall not be placed against concrete which has been in position for more than 30 minutes unless a proper construction joint is formed. Concrete shall be compacted in its final position within 30 minutes of its discharge from the mixer. Except where otherwise agreed to by the Engineer-in-charge concrete shall be deposited in horizontal layers to a compacted depth of not more than 0.45 metre when internal vibrators are used and not exceeding 0.30 metre in all other cases.

- 3.6.4 Unless otherwise agreed to by the Engineer-in-charge, concrete shall not be dropped into place from a height exceeding 2 meters.
- 3.6.5 When trunking or chutes are used they shall be kept close and used in such a way as to avoid segregation. When concreting has to be resumed on a surface which has hardened, it shall be roughened, swept clean, thoroughly wetted, and covered with a 13 mm thick layer of mortar composed of cement and sand in the same ratio as in the concrete mix itself, this 13 mm layers of mortar shall be freshly mixed and placed immediately before placing of new concrete. Where concrete has not fully hardened, all laitance shall be removed by scrubbing the wet surface with wire or bristle brushes, care being taken to avoid dislodgement of any particles, of coarse aggregate. The surface shall then be thoroughly wetted, all free water removed, and then coated with neat cement grout, The first layers of concrete to be placed on this surface shall not exceed 150 mm in thickness and shall be well rammed against old work, particular attention being given to corners and close spot.
- 3.6.6 All concrete shall be compacted to produce a dense homogeneous mass with the assistance of vibrators, unless otherwise permitted by the Engineer - in - charge for exceptional cases such as concreting under water where vibrators cannot be used. Sufficient vibrators in serviceable condition shall be kept at site so that spare equipment is always available in the event of breakdowns.
- 3.6.7 Concrete shall be judged to be compacted when the mortar fills the spaces between the coarse aggregate and begins to cream upto form an even surface. Compaction shall be completed before the initial setting starts i.e. within 30minutes of addition of water to dry mixture. During compaction. It shall be observed that needle vibrators are not applied on reinforcement which is likely to destroy the bond between concrete and reinforcement.
- 3.7 Curing :-
Immediately after compaction, concrete, weather including rain, running water, shocks, vibration, traffic, rapid temperature changes frost and drying out process it shall be covered with wet sacking, hessian or other similar absorbant material approved, soon after the initial set and shall be kept continuously wet for a period of not less than 14 days from the date of placement. Masonary work over foundation concrete may be started after 48 hours of its laying but curing of concrete shall be continued for a minimum period of 14 days.
- 3.8 Sampling and Testing of concrete :-
- 3.8.1 Samples from fresh concrete shall be taken as per IS 1199:1959 and cubes shall be made, cured and tested at 7 days and 28 days as per requirements in accordance with IS 516:1959. A random sampling procedure shall be adopted to ensure that each concrete batch shall have a resonable chance of being tested i.e. the sampling should be spread over the entire period of concreting and cover all mixing units. The minimum frequency of sampling of concrete of each grade shall be in accordance with following.
- 3.8.2
- | Quantity of concrete in the work | No. of samples |
|----------------------------------|------------------|
| 1-5 Cmt. | 1 |
| 6-15 Cmt. | 2 |
| 16-30 Cmt. | 3 |
| 31-50 Cmt. | 4 |
| 51-and above | 4+one additional |
| sample for each | |
| additional 50 cmt. | |
| or part thereof. | |

Note:- At least one sample shall be taken from shift. The test specimens shall be made from each sample, five for testing at 7 days and the remaining five at 28 days. The samples of concrete shall be taken on each day of the concreting as per above frequency. The number of specimens may be suitably increased as deemed necessary by the Engineer-in-charge when procedure of tests given above reveals a poor quality of concrete and in other special cases.

- 3.8.3 The average strength of the group of cubes cast for each day shall not be less than the specified cube strength of 150 kg/cm² at 28 days. 20% of the cubes cast for each day may have value less than the specified strength provided the lowest value is not less than 85% of the specified strength. If the concrete made in accordance with the proportion given for a particular grade does not yield the specified strength such concrete shall be classified as belonging to the appropriate lower grade. Concrete made in accordance with the proportions given for a particular grade shall not, however, be placed in a higher grade on the ground that the test strength are higher than the minimum specified.

3.9 Stripping :

- 3.9.1 The Engineer-in-charge shall be informed in advance by the contractor of his intention to struck the form work. While fixing the time for removal of form work, due consideration shall be given to local conditions, character of the structure, the weather & other conditions that influence the setting of concrete and of the materials used in the mix. In normal circumstances [generally where temperatures are above 20°C] and where ordinary concrete is used forms may be struck after expiry of period specified in the Item No.4 for respective item of form work.
- 3.9.2 All form work shall be removed without causing any shock or vibration as would damage the concrete. Before the soffit are removed, the concrete surface shall be exposed, where necessary in order to ascertain that the concrete has sufficiently hardened. Centring shall be gradually and uniformly lowered in such a manner as to permit the concrete to take stresses due to its own weight uniformly and gradually. Where internal metal ties are permitted they or their removeable parts shall be extracted without causing any damage to the concrete and remaining holes filled with mortar. No permanently embedded metal part shall have less than 25 mm. Cover to the finished concrete surface. Where it is intended to re-use the form work, it shall be cleaned and made good to the satisfaction of the Engineer-in-charge. After removal of form work and shuttering, the Executive Engineer shall inspect the work and satisfy by random checks that concrete produced is of good quality.
- 3.9.3 Immediately after the removal of forms all exposed bolts etc. Passing through the cement member and used for shuttering or any other purpose shall be cut inside the cement concrete member to a depth of at least 25 mm. below the surface of the concrete and, the resulting hole be filled by cement mortar. All fins caused by form joints, all cavities produced by the removal of form ties and all other holes and depression, honeycomb spots, broken edges or corners and other defects, shall be thoroughly cleaned, saturated with water and carefully pointed and rendered true with mortar of cement and fine aggregate mixed in the proportions used in the grade of concrete that is being finished and so as dry consistency as is possible to use. Considerable pressure shall be applied in filling and pointing to ensure thorough filling in all voids. Surfaces which are pointed shall be kept moist for a period of 24 hours.
- 3.9.4 If rock pockets/honeycombs in the opinion of the Engineer-in-charge are of such an extent or character as to effect the strength of the structure materially or to endanger the life of the steel reinforcement, he may declare portions of the structure affected.

4.0 Mode of measurement and payment :

4.1 The consolidated cubical contents of concrete work as specified in item shall be measured. The concrete laid in excess of section shown on drawings or as directed shall not be measured. No deductions shall be made for.

[a] Ends of dissimilar materials such as joints, beams, posts, girders, rafters, purline, trusses, corbels and steps etc. upto 500 sq.cm. in section.

[b] Opening upto 0.1 sq.m.

[c] The volume occupied by reinforcement shall not be deducted from R.C.C. work.

4.2 The rate includes cost of all materials labour, tools and plant required for mixing, placing in position vibrating and compacting, finishing as directed, curing and all other incidental expenses for producing concrete of specified strength. The rate excludes the cost of form work.

1.3 The rate shall be for a unit of one cubic metre.

DTS No. 18

Providing & fixing T.M.T Fe-500 Bar reinforcement for RCC work including, bending, binding and placing in position etc. complete.

(a) For Valve Chamber

(b) For RCC Encasing

(c) For Thrust Block

1.0 MATERIALS

1.1 Mild steel bars shall conform to M-14 TMT bar shall conform to M-15, Mild steel binding wires shall conform to M-17.

2.0 WORKMANSHIP

2.1 The work shall consist of furnishing and placing reinforcement to the shape and dimensions shown as on the drawings or as directed.

2.2 Steel shall be clean and free from rust and loose mill scale at the time of fixing in position and subsequent concreting.

2.3 Reinforcing steel shall conform accurately to the dimensions given in the bar bending schedules shown on relevant drawings.

Bars shall be bent cold to specified shape and dimensions or as directed, using a proper bar bender, operated by hand or power to attain proper radius of bends. Bars shall not be bent or straightened in a manner that will injure the material.

Bars bent during transportation or handling shall be straightened before being used on the work. They shall not be heated to facilitate bending. Unless otherwise specified for mild steel a "U" type hook at the end of each bar shall invariably be provided to main reinforcement. The radius of the bend shall not be less than twice the diameter of the round bar and the length of the straight part of the bar beyond the end of the curve shall be at least four times the diameter of the bar. In case of bars which are not round and in case of deformed bars, the diameter shall be taken as the diameter of the circle having an equivalent effective area.

The hooks shall be suitably encased to prevent any splitting of the concrete. The cold twisted steel bars shall be used without hooks at the ends. Deformed bars without hooks shall, however, comply with relevant anchorage requirements.

- 2.4 All the reinforcement bars shall be accurately placed in exactly the same position as shown on the drawings, and shall be securely held in position during placing of concrete by annealed binding wire not less than 1 mm. in size, and by using stay blocks or metal chair spacers, metal hangers, supporting wires or other approved devices at sufficiently close intervals. Bars shall not be allowed to sag between supports nor displaced during concreting or any other operations of the work. All devices used for positioning shall be of non-corrodible material. Wooden and metal supports shall not extend to the surface of the concrete, except where shown on the drawings. Placing bars on layers of freshly laid concrete as the work progresses for adjusting bar spacing shall not be allowed. Pieces of broken stone or brick wooden blocks shall not be used. Layers of bars shall be separated by spacer bars, precast mortar blocks or other approved devices.

Reinforcement after being placed in position shall be maintained in a clean condition until completely embedded in concrete. Special care shall be exercised to prevent any displacement of reinforcement in concrete already placed. To prevent reinforcement from corrosion, concrete cover shall be provided as indicated on drawings. All the bars are to be spliced and which are likely to be exceeding 10 days shall be protected by a thick coat of neat cement grout.

- 2.5 Bars crossing each other where required shall be secured by binding wires (annealed) of size not less than 1 mm. in such a manner that they do not slip over each other at the time of fixing and concreting.
- 2.6 As far as possible, bars of full length shall be used, in case this is not possible, overlapping of bars shall be done as directed. When practicable, overlapping bars shall not touch each other, but be kept apart by 25 mm. or 1.25 times the maximum size of the coarse aggregate whichever is greater between them. Where not feasible, overlapping bars shall be bound with annealed wires, not less than 1 mm. thick twisted tight. The overlaps shall be staggered for different bars and located at points, along the span where neither shear nor bending moment is maximum.
- 2.7 Wherever indicated on the drawings or desired by the Engineer-in-charge bars shall be joined by couplings which shall have a cross section sufficient to transmit the full stresses of bars. The ends of the bars that are joined by coupling shall be upset for sufficient length so that the effective cross section at the base of threads is not less than the normal cross section of the bar. Threads shall be standard threads. Steel for coupling shall conform to I.S-226.
- 2.8 When permitted or specified on the drawings, joints of reinforcement bars shall butt-welded so as to transmit their full stresses. Welded joints shall preferably be located at points when steel will not be subjected to more than 75% of the maximum permissible stresses and welds so staggered that at any one section not more than 20% of the rods are welded. Only electric welding using a process which excludes air from molten and conforms to any or all other special provisions for the work shall be accepted.

Suitable means shall be provided for holding bars securely in position during welding. It shall be ensured that no voids are left in welding and when welding is done in two or three stages, previous surface shall be cleaned properly. Ends of the bars shall be cleaned of all loose scale, rust, grease, paint and other foreign matter before welding. Only competent welders shall be employed on the work. The M.S. electrodes used for welding shall conform to I.S.814. Welded pieces of reinforcement shall be

tested. Specimen shall be taken from the actual site and their number and frequency of test shall be as directed.

3.0 MODE OF MEASUREMENT & PAYMENT

- 3.1 For the purpose of calculating consumption, wastage shall not be permitted beyond 7.5%. Excess consumption over 7.5% will be charged at penal rate as per special condition of contract.
- 3.2 Reinforcement shall be measured in length including overlaps, separately for different diameters as actually used in the work. Where welding or coupling is resorted to, in place of lap joints, such joints shall be measured for payment as equivalent length of overlap as per design requirement. From the length so measured, the weight of reinforcement shall be calculated in tonnes on the same basis of as per M-14 even though steel is supplied to the contractor by the department on actual weight. Length shall include hooks at the ends. Wastage and annealed steel wire for binding shall not be measured and the cost of these items shall be deemed to be included in the rate for reinforcement.
- 3.3 The rate for reinforcement includes cost of steel binding wires, its transporting from departmental store to work site cutting, bending, placing and fixing in position as shown on the drawings and as directed. It shall also include all devices for keeping reinforcement in approved position, cost of joining as per approved method and all wastage.
- 3.4 The rate shall be for unit of one MT.
Note :-Read M.S.Binding wire instead of G.I. binding wire when and where specified

DTS No. 19

**Providing & constructing brick work using Fly ash building bricks confirming to IS:13757, IS:5454, IS:3495 having crushing strength not less than 35 kg/sqcm brick masonry as per the detailed drawing using brick of approved quality in foundation and plinth incl. racking out joints, watering etc. as directed in CM (1:6) (1 cement : 6 fine sand)
Conventional**

1.0 MATERIALS

Water shall conform to M-1, Cement shall conform to M-3, Sand shall conform to M-5, Flyash Flyash building bricks shall conform to M-12, Cement mortar shall conform to M-8.

2.0 WORKMANSHIP

- 2.1 Proportion : The proportion of cement mortar shall be 1:6 (1 cement, 6 fine sand) by volume.
- 2.2 Wetting of Flyash building bricks : The Flyash building bricks required for masonry work shall be thoroughly wetted with clean water for about two hours before use or as directed. The cessation of bubbles, when the Flyash building bricks are wetted with water, is an indication of thorough wetting of Flyash building bricks.
- 2.3 Laying : Flyash building bricks shall be laid in English bond unless directed otherwise. Half or cut Flyash building bricks shall not be used except when necessary to complete the bond. Closures in such case shall be cut to required size and used near the ends of the walls.

A layer of mortar shall be spread on full width for suitable length of the lower course. Each Flyash building bricks shall first be properly bedded and set home by gently tapping with handle of trowel or wooden mallet. Its inside face shall be flushed

with mortar before the next Flyash building bricks is laid and pressed against it. On completion of course, the vertical joints shall be fully filled from the top with mortar.

The walls shall be taken up truly in plumb. All courses shall be truly horizontal and all vertical joint shall be truly vertical. Vertical joints in alternate course shall generally be directly one over the other. The thickness of Flyash building bricks course shall be kept in uniform.

The Flyash building bricks shall be laid with frogs up wards. A set of tools comprising of wooden straight edges, manson's spirit level, square half metre rub, and pins, string and plumb shall be kept on the site of work for frequent checking during the progress of work.

Both the faces of walls of thickness greater than 23 cms. shall be kept in proper place. All the connected Flyash building bricks work shall be kept not more than one metre over the rest of the work. Where this is not possible, the work shall beraked back according to bond (and not left toothed) at an angle not steeper than 45 degrees. All fixtures, pipes, outlet of water, hold fasts of doors and windows etc. which are required to be built in wall shall be embedded in cement mortar.

- 2.4 Joints : Flyash building bricks shall be so laid that all joints are quite flush with mortar. Thickness of joints shall not exposed 12 mm. The face joints shall be raked out as directed by raking tool daily during the progress of work, when the mortar is still green so as to provide key for plaster or pointing to done.

The face of Flyash building bricks shall be cleaned the very day on which the Flyash Building brick work is laid and all mortar dropping removed.

- 2.5 Curing : Green work shall be protected from rain suitably.
Masonry work shall be kept moist on all the faces for a period of seven days. The top of masonry work shall be kept well wetted at the close of the day.

- 2.6 Preparation of Foundation Bed : If the foundation is to be laid, directly on the excavated bed, the bed shall be levelled, cleared of all loose materials, cleaned and wetted before starting masonry.

If masonry is to be laid on concrete footing the top of concrete shall be cleaned and moistened. The contractor shall obtain the engineer's approval for the foundation bed, before foundation masonry is started. When pucca flooring is to be provided flush with the top to plinth, the inside plinth offset shall be kept lower than the outside plinth top by the thickness of the flooring.

- 2.7 Fixtures - The frames of doors, windows, cup-boards etc. shall be housed into the Flyash building bricks work at the correct location and level as directed. The heavy steel doors, window frames etc. shall be built in with Flyash building bricks work, but for ordinary steel doors and windows required opening for frames, hold-fasts etc. shall be left in the wall and frames embeded later on in order to avoid damage to the frames.
- 2.8 Scaffolding - Necessary scaffolding shall be provided. The supports of the scaffolding shall be sound and strong tied together with horizontal pieces, over which the scaffolding plunks shall be fixed. Simple scaffolding shall be allowed normally. In this case scaffolding hole shall rest in hole header horizontal course only. Minimum number of holes shall be left in Flyash building bricks work for supporting horizontal scaffolding poles. The contractor is responsible for providing and maintaining sufficiently strong scaffolding so as to withstand all loads likely to come upon it.

- 2.9 Packing out of Joints - For the face of Flyash building bricks work, where plastering is to be done, joints shall be raked out to a depth not less than thickness of joints. The face of Flyash building bricks work shall be cleaned and mortar dropping removed on very same day that Flyash Flyash building bricks work is laid.
- 3.0 MODE OF MEASUREMENTS & PAYMENT :
- 3.1 The measurements of this item shall be taken in cubic meter and for the Flyash building bricks masonry fully completed for limiting dimensions not exceeding those shown on the plans or as directed shall be final.
- 3.2 No deductions shall be made from quantity of Flyash building bricks work. No extra payment will be made for embedding in masonry holes in respect of the following items -
- i] Ends of joints, beams, posts, girders, rafters, purlins trusses corbel, steps etc. where cross sectional area does not exceed 500 Sq.Cm.
 - ii] Opening not exceeding 1000 Sq.Cm.
 - iii] Wall plate sand bed plates, bearing of slab, chajjas, and like whose thickness does not exceed 10 Cms. and the bearing does not extend the full thickness of wall.
 - iv] Drainage holes and recesses for cement concrete blocks to embed hold fasts for doors, windows etc.
 - v] Iron fixtures; pipes upto 300 mm. dia. hold fasts of doors and windows built into masonry and pipes etc. for concealed wiring.
 - vi] Forming charges of section not exceeding 350 Sq.Cm. in masonry.
 - vii] Apertures for fire places, shall not be deducted nor shall extra labour required to make splaying of jams, throating and making arches over the aperture be paid for separately.
- 3.3 The rate shall be for a unit of one cubic metre.

DTS No. 20

Providing and applying 10 mm thick cement plaster in single coat on brick / concrete walls similar surface for plastering and finished even and smooth with a floating coat of neat cement slurry mixed with admixture of lime or neeru required proportion etc. complete in C.M. 1:3 (1 cement : 3 sand) as directed by the Engineer-in-charge.

- 1.0 MATERIALS
Water shall conform to M-1. The cement mortar of proportion 1:3 shall conform to M-8.
- 2.0 WORKMANSHIP
- 2.1 Scaffolding - Wooden ballies, bamboos, planks, treatles and other scaffolding shall be sound. These shall be properly examined before erection and use. Stage scaffolding shall be provided for ceiling plaster which shall be independent of the walls.
- 2.2 Preparation of Background - The surface shall be cleaned of all dust, loose mortar droppings, traces of algae, efflorescence and other foreign matter by water or by brushing. Smooth surface be roughened by wire brushing if it is not hard and hacking

if it is hard. In case of concrete surface, if a chemical retarder has been applied to the form work, the surface shall be roughened by wire brushing and all the resulting dust and loose particles cleaned off and care shall be taken that none of the retarders is left on the surface. Trimming of projections on brick/concrete surfaces where necessary shall be carried out to get an even surface. Raking of joints in case of masonry work where necessary, shall be allowed to dry out for sufficient period before carrying out the plaster work.

The work shall not be soaked but only damped evenly before applying the plaster. If the surface becomes dry, such areas shall be moistened again.

For external plaster, the plastering operation shall be started from top floor and carried downwards. For internal plaster, the plastering operations may be started wherever the building frame and cladding work are ready and the temporary supports of the ceiling resting on the wall of the floor have been removed. Ceiling plaster shall be completed before starting plaster to walls.

2.3 APPLICATION OF PLASTER

The plaster about 15 x 15 Cms. shall be first applied horizontally and vertically at not more than 2 metres intervals over the entire surface to serve as gauge. The surface gauges shall be truly in place of the finished plastered surface. The mortar shall then be applied in uniform surface slightly more than the specified thickness then brought to a true surface by working a wooden straight edge reaching across the gauges with small upward and sideways movements at a time. Finally, the surface shall be finished off true with a trowel of wooden flat according as a smooth or a sandy granular texture is required. Excessive trowelling or overworking the float shall be avoided. All corners, arises, angles and junctions shall be truly vertical or horizontal as the case may be and shall be carefully finished Rounding or chamfering, corners, junctions etc. shall be carried out with proper templates to the size required.

Cement plaster shall be used within half an hour after addition of water. Any mortar or plaster which is partially set shall be rejected and removed forthwith from the site. In suspending the work at the end of the day, the plaster shall be left out clean to the line both horizontally and vertically. When recommencing the plaster, the edges of the old work shall be scrapped clean and wetted with cement putty before plaster is applied to the adjacent areas to enable the two to properly join together. Plastering work shall be closed at the end of the day on the body of the wall and nearer than 15 cms. to any corners or arises. It shall not be closed on the body of features such as plaster bands and cornices not at the corners or arrises. Horizontal points in plaster work shall not also occur on parapet tops and copings as those invariably lead to leakage. No portion of the surface shall be left out initially to be packed up later on.

Each coat shall be kept damp continuously till the next coat is applied for a minimum period of 7 days. Moistening shall commence as soon as plaster is hardened sufficiently. Soaking or walls shall be avoided and only as much water as can be readily absorbed shall be used, excessive evaporation on the sunny or windward side of building in hot air to dry weather shall be prevented by hanging mattings or gunny bags on the outside of the plaster and keeping them wet.

3. MODE OF MEASUREMENTS & PAYMENT

- 3.1 The rate shall include the cost of all materials, labour and scaffolding etc. involved in the operations described under workmanship.
- 3.2 All plastering shall be measured in square metres unless otherwise specified. Length, breadth or height shall be measured correct to a centimetre.

- 3.3 Thickness of the plaster shall be exclusive of the thickness of the key i.e. grooves or open joints in brick work, stone work etc. or space between laths. Thickness of plaster shall be average thickness with minimum 10 mm. at any point on this surface.
- 3.4 This item includes plastering at any level.
- 3.5 For jambs, soffits, sills etc. for openings not exceeding 0.5 Sq.Mts. each in area for ends of joints, beams, posts, girders, step etc. not exceeding 0.5 Sq.Mts. each in area for and for openings exceeding 0.5 Sq. Mts. and not exceeding 3 Sq.Mts. in each area deductions and additions shall be made in the following manner ---
- a] No deductions shall be made for ends of joints, beams, posts etc. and openings not exceeding 0.5 Sq. Mts. each and no addition shall be made for reveals, jambs, soffits, sills etc. of these openings for finish to plaster around ends of joints, beams, posts etc.
 - b] Deduction for openings exceeding 0.5 Sq. Mts. but not exceeding 3 Sq. Mts. each shall be made as follows and no additions shall be made for reveals, jambs, soffits sills etc. of these openings.
 - i] When both faces of all wall are plastered with same plaster, deduction shall be made for one face only.
 - ii] When two faces of wall are plastered with different types of plaster or if one face is plastered and the other pointed, deductions shall be made from the plaster or pointing on the side of frame for doors, windows etc. on which width of reveals is less than that on the other side but no deduction shall be made on the other side. Where width of reveals on both faces of all are equal, deductions of 50% of area of opening on each face shall be made from areas of plaster and/or pointing as the case may be.
- 3.6 The rate shall be for a unit of one Sq.Mts.

DTS No. 21

Providing & fixing M.S. manhole frame and cover of 0.6 x 0.45 mt.size and approx. 50 kg weight with prime coat of red oxide and two coats of oil paint having plate thickness of 12 mm or 0.60 mt. x 0.60 mt. size having plate thickness of 16 mm etc. complete as directed by Engineer in charge.

MATERIAL:

The structural steel shall conform to M-18

WORKMANSHIP:

The Manhole framme shall be fabricate and fixed as per the drawing and in good workmanship as directed by Engineer in charge.

All items include one coat of red oxide and two coats of oil paint.

MODE OF MEASUREMENT AND PAYMENT:

No payment shall be made for weight of screws, bolts and nuts etc.

The rate shall be paid on kg. basis

DTS No. 22

Providing & fixing C.I.Steps of Size 500 mm x 150 mm x 22.5 mm.painted with a coat of primer and two coats of oil paint etc. complete as directed by Engineer in charge.

- 1 During the construction of masonry wall of the manhole the cement mortar of required proportion shall be used for embedding the Poly propylene steps in the wall masonry. The spacing of steps in the masonry shall be 300 mm centre to centre in the staggered position in the vertical direction with two staggered raws at 385 mm centre to centre in the horizontal direction the top of the manhole shall not be more than 300 mm above the benching and the centre line of two staggered raws shall be the centre line of the shorter side of manhole frame in the roof of chamber.

The detailed specifications for the "Poly propylene steps as below:

The Polypropylene conforming to an ASTM D-4101, injection molded around a 12 mm dia. IS 1786 grade Fe-415 steel reinforcing bar and should meet the load required 225 Kg. as per IS-5455. The measurement should be as per attached drawing. The tolerance in the length and width is +/- 5 mm and +/- 1 mm in thickness. The weight of the steps should not be less than 0.900 Kg.

- 2 Unchequered portion of the step shall be inserted with the risk cement mortar during the couse of masonry work so constructed around the steps as to keep the step on its right position. The non-slip grap chequered portion of the steps shall be well kept outside the masonry.
- 3 During fixing of the steps, the shall not be damaged and shall not vibrate or shall not shake during ascents and decents otherwise they shall have to be refixed correctly as per the drawings or as mentioned above.

Providing and fixing C.I.Steps...

C.I. steps of 500 x 150 x 22.5 mm size shall be of best quality.

Painting material for anti-corrosive shall be of best quality.

C.I.Steps shall be fixed as and where directed. The steps shall be ambwedded firming in masonary wall and fixing in horizontal space between two steps shall will be as directed by the Engineer-in-charge.

The rate includes cost of all labours and materials required for completion of this item.

Mode of measurement:-

The rate shall be for a unit of one number.

DTS No. 23

Making New connection to existing pipeline. Item includes cutting of MS pipeline, bending, welding, jointing, positioning and making leak proof joint.

The work shall be carried out as directed by Engineering in Charge

The payment shall be made on number basis.

DTS No. 24

Preparation of as built drawings of pipeline laid under this work by showing location of each and every pipe in two dimension - horizontal and vertical with respect to the existing near by property and/or permanant structure along with invert level of pipeline.

The work shall be carried out as directed by Engineering in Charge

The payment shall be made on Kilometer basis.

DTS No. 25

Taking photographs of work in progress and submit with each R.A.Bill. Photographs shall cover details of locations of the activity of work in progress. The contractor shall submit photographs with Album in a set comprising 3(three) copies (size of photograph is 4" x 6") and a soft copy of the same. Work shall be carried out as per the instruction of the Engineer-in-charge.

The work shall be carried out as directed by Engineering in Charge
The payment shall be made on Set basis.

DTS No. 26

Conveying, carting, lowering and installing in position C.I.Double Flange Sluice (Scour) Valve and Air Valve of size as mentioned below true in plumb including flanged joints, tightening and fixing nuts, bolts, washers with perfectly water tight including

- (a) 150 mm dia.Kinetic type Double Acting Air Valve with isolating sluice Valve
- (b) 200 mm dia.Kinetic type Double Acting Air Valve with isolating sluice Valve

Valves shall be lowered and fixed in proper position and right to the plump and flange joints with the sets of tail pieces shall be carried out perfectly water tight. Nut bolts,rubber inseration etc.required for jointing shall be provided by the Contractor.

Mode of the measurement and payment:-

The rate shall be for unit of one number.

DTS No. 27

Removing of Existing pipeline including reomoving of Specials jointing materials including carting of staking material from site to department store as per dierected excluding exacavation and refilling.

The work shall be carried out as directed by Engineering in Charge

Mode of the measurement and payment:-

The rate shall be for unit of per Running meter

DTS No. 28

Providing & fixing R.C.C. Precast Manhole Frame with Cover in M:35 as per drawing for Manhole suitable for 450 X 600 mm opening including cost of reinforcement, M.S. Angles, Flats, mould work, curing etc. complete.

The work shall be carried out as directed by Engineering in Charge

Mode of the measurement and payment:-

The rate shall be for unit of One Number.

**HYDRAULIC ENGINEER
SURAT MUNICIPAL CORPORATION**

SIGNATURE AND SEAL OF THE CONTRACTOR:-

NAME AND ADDRESS:-

DATE:-

10.0 GENERAL PERFORMANCE DATA

THE TENDERERS SHALL SUBMIT ALL DETAILS ASKED IN THIS SECTION

IF NEEDED, MORE PAGES CAN BE USED BUT THE FORMAT GIVEN SHALL BE STRICTLY FOLLOWED

ATTACH ALL NECESSARY SUPPORTING DOCUMENTS AS ASKED FOR IN VARIOUS SECTIONS AND SUBSECTIONS OF THE TENDER DOCUMENT

10.1 DECLARATION BY THE TENDERER

I/We hereby declare that I /We have examined the site : **Providing, Manufacturing, Supplying, Conveying, Lowering & Laying and Conversation of CI/DI TO MS LINE at Various locations of ESR and Leakage spot as per Requirement in East Zone-A (Varachha) of Surat Municipal Corporation.(2nd Attempt)** and persued in detail and examined closely the specifications and its intents and contents of the tender documents before quoting my / our rates.

I/We agree to be bound by and comply with all articles of the tender and the contract documents that shall be executed with The Surat Municipal Corporation.

I/We have also inspected the site location and satisfied myself / ourselves regarding the quality, quantity, availability and transport facilities for construction materials such as earth, stone, sand, cement, and equipments etc. through the network of available roads and path ways required for the work.

HYDRAULIC ENGIENER,
SURAT MUNICIPAL CORPORATION

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

10.2 TENDERER'S / CONTRACTOR'S CERTIFICATE / UNDERTAKING

I/We hereby declare that I/We have persued in detail and examined closely the specifications / general terms and conditions / special terms/important instructions/notes described in the tender documents. I/We hereby agree to be bound by and comply with all such specifications/terms, conditions, etc.

I/We also certify that I/We have visited the site and inspected the location of the proposed work and have collected all information required before quoting my / our rates.

HYDRAULIC ENGIENER,
SURAT MUNICIPAL CORPORATION

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

10.3 DETAILS OF PROPRIETOR / PARTNERS OF THE FIRM

[1]

Affix passport Size Photograph here

Specimen signature of the Contractor
Name and address

[2]

1	2	3	4
AFFIX LATEST PASSPORT SIZE PHOTOGRAPH OF ALL PARTNERS IN CASE OF PARTNERSHIP AGENCY			

Specimen signature, name and addresses of all the partners in case of partnership agency.

- | | 1 | 2 | 3 | 4 |
|-----|--|---|---|---|
| [3] | Submit certified copy of registered partnership deed in case of Partnership Firm. | | | |
| [4] | Submit certified copy of the power of Attorney of the signing authority. | | | |
| [5] | Attach complete organizational chart of the firm. | | | |
| [6] | In case of Government royalty applicable to Tenderer, it is compulsory to submit a receipt of royalty payment with tender. | | | |
| [7] | The Photograph and specimen signature of Contractor will be cross-checked, whenever Contractor receives payment in account section of The Surat Municipal Corporation. | | | |
| [8] | The specimen signature of Contractor will be cross checked by Account Department of the State Municipal Corporation in case of representative of Contractor along with letter of authority of person who signed an agreement receives payment. | | | |
| [9] | In case of octroi applicable to the goods of supplier / Tenderer, the Tenderer / supplier has to submit attested copies of all octroi receipts. | | | |

HYDRAULIC ENGINEER
SURAT MUNICIPAL CORPORATION
SURAT.

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

10.4 DETAILS OF TECHNICAL PERSONNEL WHO SHALL BE IMMEDIATELY DEPUTED FOR THIS WORK

Name of Tenderer:

Sr. No	Designation	Name	Length of Service in the firm	Qualifications	Professional experience and details of work carried out*	Remarks
1	2	3	4	5	6	7
1	Project Manager					
2	Senior Site Engineers(Civil)					
3	Assistant Site Engineers (Civil)					
4	Clerk of Works					
5	Others					

Signature of Tenderer

Name and address

Date

- Indicate here in details like, the name of the project, the capacity on which the individual worked and for what length of time, etc.

10.5 TENDERER'S PROPOSED COMPLETION SCHEDULE IN THE FORM OF BAR/PERT/CPM CHART OR ANY OTHER METHOD AS APPROVED BY THE SURAT MUNICIPAL CORPORATION.

HYDRAULIC ENGINEER,
SURAT MUNICIPAL CORPORATION

SIGNATURE AND SEAL OF THE CONTRACTOR:

NAME AND ADDRESS:

DATE:

10.6 REQUEST FOR REFUND OF EMD

Date:

To
Municipal Commissioner
Surat Municipal Corporation
Surat

Sir,

I/We have tendered for the work of _____

_____ and have paid Earnest Money Deposit

Amounting to Rs. _____ drawn by _____

.The receipt No. _____ Dated _____ issued

by the Corporation is attached herewith.

In case my / our tender is not accepted, kindly arrange to refund the amount of Earnest Money Deposit paid by me / us as per the details referred above.

Advance stamped Receipt duly signed on Revenue Stamp of Rs. 1.00 is also enclosed herewith.

Signature of Contractor

Address

Encl: As Sated.

10.7 ADVANCE STAMP RECEIPT

Received with thanks the sum of Rs. _____ (In words _____)
_____ Only from The Surat Municipal Corporation being the refund
of Earnest Money Deposit placed by me / us vide SMC's Receipt No. _____ dated
_____ along with the tender paper for the

Date:

(Revenue Stamp)

(Signature of the Tenderer)

f.w.c. in the Accountant

2. For remarks whether the _____ deposit amounting to Rs. _____ placed on
_____ by Shri /M/s. _____ in connection with the work
of _____ stands in full in the name of the aforesaid
party (R.No. _____ Dated _____)

HYDRAULIC ENGINEER
Surat Municipal Corporation

F.W.Cs.to HYDRAULIC ENGINEER

To deposit of Rs. _____ Place on _____ by Shri / M/s.
_____ stands in full in the name of the aforesaid party.

Accountant

Submitted,

For favour of sanction of refund Rs. _____ being the amount of
_____ deposit placed on _____ vide Receipt No.
_____ by Shri _____ / Ms. _____
_____ in connection with the work of _____
_____ as the tender of the above
party has been accepted / had not been accepted and the concerned Contractor has paid security
deposit of Rs. _____
for the above referred work on dated _____. The party has also executed an agreement
for the above work. The above deposit stands in full in the name of the said party as certified by the
Accountant on _____. The expenditure will be debited on B.H.G. Tender Deposit
Account.

Sanctioned Accordingly,

Assistant Engineer / Jr. Engineer

Dy. Engineer,

Hydraulic Engineer,

Dy. Muni. Commissioner.

11.0 Drawings

11.1 Alignment of pipeline