

Tender No. 110290/WGI/GAIL GAS/06-R0

DATED: 19.11.2009

| Sr. No. | Section / Clause No.        | Tender Doc. Page No. | Clause Description  | Clarification Required  | Clarifications   |
|---------|-----------------------------|----------------------|---|---|--|
| 1.      | Annexure -1 to IFB Cl.2.2.1 | Page 5 of 211        | <p><b>For Sonipat City</b><br/>Minimum 20Km of 8" dia or higher, to Qualify for Sonipat City</p> <p><b>For Kota City</b><br/>Minimum 19Km of 8" dia or higher, to Qualify for Kota City</p> <p><b>For Dewas City</b><br/>Minimum 15Km of 8" dia or higher, to Qualify for Dewas City</p> <p><b>For Meerut City</b><br/>Minimum 22Km of 8" dia or higher, to Qualify for Meerut City</p> <p>In case bidder Quote for more than one city, the qualification requirement shall be <b>Cumulative</b> basis for the Quoted Cities.</p> | <p>We would very humbly like to suggest that if the Bidder is meeting the qualification of more than one city <u>separately</u> then the Bidder may be allowed to bid for more than one city with the <b>Condition</b> that if the Bidder is <b>L1</b> in <u>more than one city</u> then the Bidder will be awarded <b>Only</b> one city of his choice in which the Bidder is L1.</p> <p><u>For example</u><br/>If a Bidder has single work order of 22 km of 8" Dia then the Bidder may be allowed to <u>quote for all the cities</u> as the Bidder is qualifying for all the above mentioned cities <u>separately</u>. But if the bidder is <b>L1</b> in <u>more than one city</u> then the Bidder will be awarded <b>Only</b> one city of his choice in which the bidder is L1</p> | <p>Regarding BEC, Refer Corrigendum – 1</p> <p>Regarding Evaluation Methodology, refer Corrigendum-1</p> |
| 2.      |                             |                      |   | <p>This is further to the above subject; we are keen to participate in above said Bid for maximum cities. But we are unable to do so as we are qualifying only for Dewas City because of stiff technical criteria . However we are qualifying for all four cities as per the financial criteria. It seems that technical qualifying criteria are on the higher side and there is a little room for relaxation to make it align with financial criteria and for more participation. Therefore we sincerely request you to kindly give some relaxation in technical criteria (in Kms) so that we can participate</p>  | <p>Refer S.NO. 1 above</p>   |

|    |  |  |  |   |   |
|----|--|--|--|---|---|
|    |  |  |  | in some more cities if not all. We believe that, this move will create more participation and hence healthy competition.  |   |
| 3. |  |  |  | <p>Shall we qualify for the above referred tender with the experience mentioned below?</p> <p>a) Laying of 23 KM 10" pipeline from Jawaharlal Nehru Port Trust (JNPT) to Vashi, Mumbai. For IOCL; Date of completion : 28-02-2002</p>   | Please refer IFB Annexure-1.Bid Evaluation Criteria of tender document. |
| 4. |  |  |  | <p>Shall we qualify for the above mentioned tender with our experience as a sub contractor in the work mentioned below:</p> <p>a)Fabrication and laying of 750 NB and 400 NB cross country pipelines for single point mooring and connected facilities for BPCL-Kochi Refinery,Main contractor-IVRCL(6.454 Km).</p> <p>b) 30" Dia HDD pipe string at Vallarpadam and Bolghaty and onshore section at Bolghaty – KRL – SPM Project of BPCL-Kochi Refinery, Cochin; Main Contractor – Punj Lloyd (5 Km.); Completion date – July 2007</p> | Please refer S.No 3 above.  |
| 5. |  |  |  | Please clarify the mode of payment for EMD; shall we submit EMD as Bank Guarantee?  | Refer Clause 14.3 of ITB Page 13 of 211                                 |

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| <b>Sr. No.</b> | <b>Section / Clause No.</b>                 | <b>Tender Doc. Page No.</b> | <b>Clause Description</b>   | <b>Added / Modified / Deleted</b>   |
|----------------|---|-----------------------------|---|---|
| 1.             | IFB<br>1.2.6                                | 2 of 211                    | Last date and time for submission of bid                            | Extended up to "03.12.2009 at 14:00 Hrs" from "23.11.2009 at 14:00 Hrs"   |
| 2.             | IFB<br>1.2.7                                | 2 of 211                    | Date and time of opening of Un-priced Bids at WGI office, New Delhi | Extended up to "03.12.2009 at 14:30 Hrs" from "23.11.2009 at 14:30 Hrs"   |
| 3.             | Section I,<br>Annexure-1 to<br>IFB/ 2.2.1.2 | 5 of 211                    | Technical Criteria  | <p>This clause is modified as follows:<br/> "The bidder should have completed at least one hydrocarbon Pipeline project involving installation , testing , pre-commissioning /commissioning and construction management of buried Natural gas / Hydrocarbon Pipeline of diameter and length in single stretch as given below against single Order ,in last 7 (seven) years reckoned from the bid due date.</p> <p><b>For Sonipat City</b><br/> Minimum 10 Kms of 8" dia or higher, to qualify for Sonipat city.</p> <p><b>For Kota City</b><br/> Minimum 10 Kms of 8" dia or higher, to qualify for Kota city.</p> <p><b>For Dewas City</b><br/> Minimum 8 Kms of 8" dia or higher, to qualify for Dewas city.</p> <p><b>For Meerut City</b><br/> Minimum 11 Kms of 8" dia or higher, to qualify for Meerut city.</p> <p>In case bidder quotes for more than one city, the qualification requirement shall be on cumulative basis for the quoted cities."</p> |
| 4.             | Section I,<br>Annexure-1 to<br>IFB/ 2.2.2.3 | 5 of 211                    | Financial   | This clause stands deleted  |
| 5.             | Vol I<br>ITB<br>Clause – 31                 | 19 of 211                   | Evaluation and Comparison of Bids                                   | <p>Clause 31.3 stands modified as follows:</p> <p>31.3.1 The bidder may quote for one or more than one city, however, the job will be awarded based on BEC criteria.</p> <p>31.3.2 If a bidder happens to be lowest (L1) bidder for more number of cities, but meet BEC for lesser number of cities then the city /</p>   |

|     |  |            |   |  |
|-----|--|------------|---|--|
|     |  |            |   | <p>cities shall be awarded in a way to result in “least cost to owner.”</p> <p>31.3.3 After awarding the city/cities on least cost to Owner basis to the lowest bidder, the city / cities which can not be awarded due to not meeting the qualifying criteria, shall be awarded based on the following methodology: The L2, L3 and so on bidders in order of their inter-se ranking shall be asked to match the lowest evaluated price for that city for placement of order and award shall be done based on the matched lowest evaluated price. In case L2, L3 and so on bidders don’t match the lowest evaluated price, such city/cities shall be re-tendered.</p> |
| 6.  | Vol I<br>ITB<br>Clause – 35                    | 20 of 211  | Quantity Variation                        | This clause stands deleted   |
| 7.  | Vol I<br>SCC - 42.1.1,<br>5 <sup>th</sup> Line | 114 of 211 | Extended Stay<br>Compensation             | “ Month” shall be read as “week”   |
| 8.  | Vol I<br>SCC – 32.0                            | 110 of 211 | Labour Rates                              | “Labour Rates” is attached as Annexure – 1   |
| 9.  | Vol I<br>SCC – 32.0                            | 110 of 211 | Hiring / Recovery Rate for<br>Equipments  | “Hiring / Recovery Rate for Equipments” is attached as Annexure – 2  |
| 10. | Vol I<br>SCC – 68.1                            | 121 of 211 | Insurance for Free Issue<br>Material      | Kota – Rs. 8 Crore<br>Dewas – Rs. 8 Crore<br>Sonipat – Rs. 8 Crore<br>Meerut – Rs. 8 Crore   |
| 11. | Vol I<br>Forms &<br>Formats –                  | 169 of 211 | Form – 3B                                 | Sl no. 6 stands deleted “ Return on Equity (PBT/NW) x 100”   |
| 12. |  |            | Alignment Sheets and<br>Crossing Drawings | Alignment Sheets and Crossing drawings of Dewas( 37.850 kms),Meerut( 36.324 kms),Kota( 31.0 kms) and Sonipat(48.0 kms) attached as Annexure-3.Actual execution to be carried out as per directions of Engineer in Charge   |



**CITY GAS DISTRIBUTION PROJECT  
TENDER FOR PIPE LAYING AND ASSOCIATED WORKS  
CORRIGENDUM – 1**



|     |   |                    |                                   |   |
|-----|---|--------------------|-----------------------------------|---|
| 13. | Vol. II,<br>Piping Material<br>Specifications(<br>11-0290-02-08-<br>02-001)Rev0 | Page 385 of<br>775 | Piping Material<br>Specifications | Revised PMS Rev-1 ,attached as Annexure -4  |
| 14. | Vol II<br>Scope of<br>work/SOR  | Page 148 of<br>211 | Warning Mat                       | Warning Mat shall be of anti rodent type (non<br>toxic). The dimensions shall be:<br>Width: 300 mm<br>Thickness- 1 mm |
| 15. | Vol II<br>Page 773 –<br>775   | Vendor List        |                                   | Revised vendor list Attached as Annexure – 5  |

**Corrigendum-1 is to be treated as part of the original Tender document and while submitting your offer; Corrigendum-1 shall also be signed, stamped and submitted along with Tender Document.**

**ANNEXURE – 1**

**LABOUR RATES**

1. The Labour rates are "all inclusive". These rates include but are not limited to all payroll costs and allowances, payroll taxes, fringe benefits, protective and/or special clothing, construction supplies required for work of a nature included in this contract, overhead, profit, insurance, transportation and travel time.

2. The rates are inclusive of providing hand tools, machinery such as welding machine, grinding machine, gas/welding cutting set and consumables such as fuel, lubricants, electrodes, filler wire, gases, grinding wheels where the concerned category of labour is expected to use in execution of the job but exclusive of all major equipment and machinery like cranes.

3. The normal time labour rates shall apply for all hours worked upto eight (8) hours in a day and overtime rates shall apply for all hours worked in excess of eight (8) hours in one working day, Sunday and Public Holidays. The payment for part of the day shall be made on prorata basis.

| <b>SL. NO.</b> | <b>CATEGORIES</b>               | <b>RATE PER DAY OF NORMAL HOURS (IN RS.)</b> | <b>RATE PER HOUR FOR OT, SUNDAY AND HOLIDAY (IN RS.)</b> |
|----------------|---------------------------------|--|--|
| 1              | Foreman                         | 1950   | 430  |
| 2              | Supervisor                      | 1950   | 430  |
| 3              | Un skilled Worker               | 300  | 65   |
| 4              | Engineer                        | 2600   | 650  |
| 5              | Gas Cutter                      | 910  | 170  |
| 6              | Grinder                         | 910  | 170  |
| 7              | Brick Mason                     | 520  | 120  |
| 8              | Stone Mason                     | 520  | 120  |
| 9              | Structural welder               | 1300   | 260  |
| 10             | Qualified Arc welder –CS manual | 1560   | 260  |
| 11             | Welder helper                   | 300  | 120  |
| 12             | Pipe Fitter                     | 650  | 150  |
| 13             | Structural Fitter               | 520  | 120  |
| 14             | Pipeline Fitter                 | 780  | 190  |
| 15             | Mill Wright Fitter              | 780  | 190  |
| 16             | Coater                          | 520  | 120  |
| 17             | Mechanic                        | 520  | 120  |
| 18             | Site Equipment Operator         | 520  | 120  |
| 19             | Electrician                     | 650  | 150  |
| 20             | Fabricator                      | 650  | 150  |
| 21             | Carpenter                       | 600  | 130  |
| 22             | Plumber                         | 520  | 120  |
| 23             | Painter                         | 520  | 120  |
| 24             | Cable Jointer                   | 780  | 190  |
| 25             | Instrumentation Technician      | 780  | 190  |
| 26             | Insulator                       | 520  | 120  |
| 27             | Rigger                          | 450  | 110  |
| 28             | Bhisti (water man)              | 250  | 60   |
| 29             | Heavy duty driver               | 720  | 170  |



CITY GAS DISTRIBUTION PROJECT  
TENDER FOR PIPE LAYING AND ASSOCIATED WORKS  
CORRIGENDUM – 1



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|    |                   |     |     |
|----|-------------------|-----|-----|
| 30 | Light duty driver | 520 | 120 |
| 31 | Sand Blaster      | 580 | 130 |

**SIGNATURE OF THE BIDDER:** \_\_\_\_\_

**NAME OF THE BIDDER** : \_\_\_\_\_

**ANNEXURE – 2**

**HIRING / RECOVERY RATE FOR EQUIPMENTS**

| <b>S.No</b> | <b>Equipment Details (Operator Included)</b>                        | <b>Hiring/ Recovery Rate (in INR) Rate / Day</b> |
|-------------|---|--|
| 1           | Pipe Layer/Side Boom – 40T & above Capacity                         | 6000   |
| 2           | Pipe Bending Machine – 10"  | 10000  |
| 3           | Dozer with Ripper – D8 or Equivalent                                | 6000   |
| 4           | Dozer – D7/D6 or Equivalent   | 3400   |
| 5           | Excavator / Back Hoe-Ex 200/300/Equivalent                          | 3200   |
| 6           | Horizontal Auger Boring Machine (Carrier 10") with Rock Breaking TC | 3000   |
| 7           | Bevel Cutting Machine – 10" Manual                                  | 600  |
| 8           | Bevel Cutting Machine – 10" Auto                                    | 1500   |
| 9           | Pipe Clamp (Pneumatic/Hydraulic) – Internal 10"                     | 500  |
| 10          | Automatic Welding Set [ (1 + 5) Welding Units – Per Set ]           | 1,25,000   |
| 11          | Semi Auto Welding Machines (For Tie-ins & Crossings)                | 3000   |
| 12          | Grader  | 4400   |
| 13          | Tyre Mounted Cranes (20 TON)  | 2500   |
| 14          | Hydra (8 – 10 TON)  | 2500   |
| 15          | AUT Machine   | 90,000   |
| 16          | HDD Rig with All Equipments & Accessories (Min. Cap. 100T)          | 50,000   |
| 17          | Air Compressor – (300-600 CFM)                                      | 1100   |
| 18          | Air Compressor – (1000-1500 CFM)                                    | 1850   |
| 19          | D.G. Sets : 125 KVA to 200 KVA                                      | 1600   |
| 20          | Induction / Resistance Heating Equipment                            | 600  |
| 21          | DG Welding Machines   | 200  |
| 22          | Blast Cleaning Machine  | 200  |
| 23          | X-Ray M/C – Internal Crawler  | 2500   |
| 24          | X-Ray M/C – External  | 1800   |
| 25          | Gamma Source  | 600  |
| 26          | Pipe Clamp – External 10"   | 40   |
| 27          | Manual UT Machine   | 50   |
| 28          | Rock Breaking Machine with Excavator                                | 4600   |



**CITY GAS DISTRIBUTION PROJECT  
TENDER FOR PIPE LAYING AND ASSOCIATED WORKS  
CORRIGENDUM – 1**



|    |  |      |
|----|--|------|
| 29 | Pneumatic Drill (Tractor mounted for blasting) with Compressor | 3000 |
| 30 | Water Lifting / Filling Pumps (400 TO 1000 M3 /HR)             | 400  |
| 31 | Pressurization Pump – Motorized                                | 500  |
| 32 | Dewatering Pump  | 400  |
| 33 | Holiday Detector Unit  | 400  |
| 34 | Dozing Pump  | 200  |
| 35 | Dead WT Tester   | 200  |
| 36 | Mobile Workshop  | 600  |
| 37 | Pipe Trailers for Coated Line Pipes (FB)                       | 1350 |
| 38 | F.B. / Semi Low Bed Trailer                                    | 1350 |
| 39 | Trucks   | 750  |
| 40 | Dumper / Tippers   | 900  |

**Note**

1. The above rates shall be inclusive of operator and POL.

**SIGNATURE OF THE BIDDER:** \_\_\_\_\_

**NAME OF THE BIDDER** : \_\_\_\_\_



**GAIL GAS LIMITED  
CITY GAS DISTRIBUTION PROJECT**



**PIPING MATERIAL SPECIFICATION**

**CLIENT JOB NO.**

-

**TOTAL SHEETS**

18

**DOCUMENT NO**

11

0290

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**ANNEXURE-IV**

| REV | DATE     | DESCRIPTION            | PREP | CHK | APPR |
|-----|----------|------------------------|------|-----|------|
| 1   | 10/11/09 | ISSUED FOR CORRIGENDUM | GV   | DDS | PKS  |
| 0   | 16/10/09 | ISSUED FOR TENDER      | GV   | DDS | PKS  |
| B   | 10/08/09 | ISSUED FOR APPROVAL    | GV   | DDS | PKS  |
| A   | 07/08/09 | ISSUED FOR IDC         | GV   | DDS | PKS  |

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**JP KENNY**



**PIPING MATERIAL SPECIFICATION**

**Document No.**

**11-0290-02-08-02-001**

**Rev**

**1**

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## 1.0 GENERAL NOTES

This specification describes the minimum requirements for the design, furnishing of materials, fabrication, and inspection and testing of pipes, fittings and valves.

All material shall conform to ASTM, API or BS standards. Design and fabrication shall conform to ASME for pressure piping, ASME B 31.3 – Chemical Plant and petroleum Refinery Piping, and ASME B 31.8 – Gas transmission and Distribution piping system.

## 2.0 DEFINITIONS

Shall : This verbal form indicates requirements strictly to be followed in order to confirm to the standards and from which no deviation is permitted.

Should : This verbal form indicates that among several possibilities one is particularly suitable without mentioning or excluding others or that a certain course of action is preferred but not necessarily required.

May : This verbal form indicates a course of action permissible within the limits of this standard.

Can : This verbal form is used for statements of possibility & capability, whether material, physical or casual.

## 3.0 CODES AND STANDARDS

The latest revision of the following shall be considered as part of this specification.

|              |  |
|--------------|--|
| ASME B 16.5  | Steel Pipe Flanges and Flanged Fittings                                |
| ASME B 16.9  | Factory made Wrought Steel Buttwelding Fittings                        |
| ASME B 16.10 | Face to Face/ End to End dimension of valves.                          |
| ASME B 16.11 | Forged Steel Fittings, Socket Welding and Threaded.                    |
| ASME B 16.20 | Metallic Gaskets for Pipe Flanges.                                     |
| ASME B 16.21 | Non-Metallic Flat Gasket for Pipe Flanges                              |
| ASME B 16.47 | Large Diameter Steel Flanges (26" thru 60")                            |
| ASME B 31.3  | Process Piping   |
| ASME B 31.4  | Pipeline Transportation system for Liquid hydrocarbons & other Liquids |
| ASME B 31.8  | Gas Transmissions and Distribution Piping System                       |
| ASME B 36.10 | Welded and Seamless Wrought Steel Pipe                                 |
| ASME B 46.1  | Surface Texture  |
| API 5L       | Line Pipe  |



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|            |  |
|------------|--|
| API 6D     | Pipeline Valves  |
| API 590    | Steel Line Blank   |
| API 600    | Steel Gate Valves Flanges and Buttwelding Ends   |
| API 602    | Compact Steel Gate Valves  |
| MSS SP 44  | Steel Pipe line Flanges  |
| MSS SP 75  | Specification for High Test Wrought Butt Welding Fittings  |
| MSS SP 97  | Integrally Reinforced Forged Branch Outlet Fitting – Socket Welding, Threaded and Buttwelding Ends                   |
| ASTM A 105 | Forging, Carbon Steel for Piping Components  |
| ASTM A 193 | Alloy Steel and Stainless Steel bolting Materials for High temp Service.   |
| ASTM A 194 | Carbon and Alloy Steel Nuts for Bolts for High Pressure and High Temperature Service                                 |
| ASTM A 320 | Standard Specification for Alloy Steel and Stainless Steel Bolting Materials   |
| ASTM A 216 | Steel Casting, Carbon, Suitable for Fusion Welding, for High Temperature Service.                                    |
| ASTM A 234 | Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and Elevated Temperature                        |
| ASTM A 694 | Forging, Carbon and Alloy Steel, for Pipe Flanges, Fitting, Valves and Parts for High Pressure Transmission Service. |
| ASTM A 333 | Low temperature service seamless pipe.   |
| ASTM A 350 | Forged Carbon and Low Alloy Steel requiring Notch Toughness Testing for Piping Components                            |
| ASTM A 420 | Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service.                                 |
| ASTM A 860 | Standard Specification for Wrought High Strength Low Alloy Steel Butt Welding Fittings                               |

#### 4.0 ABBREVIATIONS

##### 4.1 Flange Facing

|     |   |                 |
|-----|---|-----------------|
| RTJ | - | Ring Type Joint |
| FF  | - | Flat Face       |
| RF  | - | Raised Face     |



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#### 4.2 Fittings

|     |   |                   |
|-----|---|-------------------|
| PE  | - | Plain End         |
| BE  | - | Bevel End         |
| BW  | - | Butt Weld         |
| PBE | - | Plain Both End    |
| POE | - | Plain One End     |
| TBE | - | Threaded Both End |
| TOE | - | Threaded One End  |
| LR  | - | Long Radius       |
| SR  | - | Short Radius      |

#### 4.3 Connections

|      |   |             |
|------|---|-------------|
| BW   | - | Butt-Weld   |
| FLGD | - | Flanged     |
| SCRD | - | Screwed     |
| SO   | - | Slip-On     |
| SW   | - | Socket Weld |
| THRD | - | Threaded    |
| WN   | - | Weld Neck   |

#### 4.4 Wall Thickness

|     |   |   |
|-----|---|---|
| SCH | - | Schedule in accordance with ASME B 36.10 or B 36.19 |
| STD | - | Standard Weight Wall Thickness                      |
| XS  | - | Extra Strong Wall Thickness                         |
| XXS | - | Double Extra Strong Wall Thickness                  |

#### 4.5 Valve Description

|      |   |                                     |
|------|---|-------------------------------------|
| BC   | - | Bolted Cap                          |
| BB   | - | Bolted Bonnet                       |
| ES   | - | Extension Stem                      |
| FB   | - | Full Bore                           |
| MO   | - | Motor Operated                      |
| GO   | - | Gear Operated                       |
| NRS  | - | Non-Rising Stem (with inside screw) |
| OS&Y | - | Outside Screw and Yoke              |
| RB   | - | Reducer Bore                        |
| RS   | - | Rising Stem                         |
| SC   | - | Screwed Cap                         |
| UB   | - | Union Bonnet                        |
| UC   | - | Union Cap                           |
| WB   | - | Welded Bonnet                       |

#### 4.6 Pipes Description

|     |   |                            |
|-----|---|----------------------------|
| BE  | - | Beveled End                |
| CS  | - | Carbon Steel               |
| ERW | - | Electric Resistance Welded |
| EFW | - | Electric Fusion Welded     |
| FS  | - | Forged Steel               |
| HFI | - | High Frequency Induction   |
| KCS | - | Killed Carbon Steel        |
| KFS | - | Killed Forged Steel        |



OH - Open Hearth  
 SAW - Submerged Arc Welded  
 SMLS - Seamless

**5.0 PIPING CLASSES DESCRIPTION**

Piping Classes assigned for the project are based on the following 2-digit system.

**First Digit**

Numerical, denoting the basic system rating or flange class

i.e.            1        = ASME Class 150  
                   3        = ASME Class 300  
                   6        = ASME Class 600  
                   9        = ASME Class 900

**Second Digit**

Letter, denoting the material

A - Carbon Steel  
 C - Stainless Steel  
 F - Fiberglass Reinforced plastic/epoxy (FRP)  
 G - Galvanized  
 P - Plastic (PEHD)  
 S - Stainless Steel  
 V - PVC

**Third Digit**

Sequential number to differentiate two or more piping classes of the same rating and same material but presenting some difference related to the handled fluid.


**Fourth Digit**


Letter, denoting the aboveground and underground


U = Underground



|                      |     |
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| PIPING SPECIFICATION  |            |                                      | GAIL GAS LIMITED |                      |                    |                      | RATING                | 150#        |
|---|------------|--------------------------------------|------------------|----------------------|--------------------|----------------------|-----------------------|-------------|
| 1A1   |            |                                      |                  |                      |                    |                      | CODE                  | ANSI B 31.8 |
| TEMPERATURE ( 0 TO 60 °C)   |            |                                      |                  |                      |                    |                      | BASIC MATERIAL        |             |
| PRESSURE (18.75 bar g)  |            |                                      |                  |                      |                    |                      | CORROSION ALL. 0.5 mm |             |
| ITEM  | SHORT CODE | SIZE FROM-THRU                       | DESCRIPTION      | RATING AND/OR SCHED. | DIMENSION STANDARD | MATERIAL             | REMARKS               |             |
| PIPELINE  | PL         | 4"-8"                                | BE               | 6.4 mm               | API 5L             | API 5L Gr. X42       | 4"-6" :Seamless       |             |
|   |            | 10"                                  | BE               | 6.4 mm               | API 5L             | API 5L Gr. X52       | 8" :Electric Welded   |             |
| PIPES   | P          | 0.50" - 1.50"                        | PE, SEAMLESS     | S160                 | ASME B36-10        | ASTM A 106 Gr.B      |                       |             |
|   |            | 2"                                   | BE, SEAMLESS     | XS                   | ASME B36-10        | ASTM A 106 Gr.B      |                       |             |
|   |            | 3" - 16"                             | BE, SEAMLESS     | S40                  | ASME B36-10        | ASTM A 106 Gr.B      |                       |             |
| ELBOWS 90 LR  | E          | 0.50" - 1.50"                        | SW               | 3000#                | ASME B16.11        | ASTM A105            |                       |             |
|   |            | 2" - 16"                             | BW, 1.5D, 3D     | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                       |             |
| ELBOWS 45 LR  | E45        | 0.50" - 1.50"                        | SW               | 3000#                | ASME B16.11        | ASTM A105            |                       |             |
|   |            | 2" - 16"                             | BW, 1.5D, 3D     | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                       |             |
| LR Bends 90°  | LR B       | 4-16"                                | BW, 3D           | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                       |             |
| LR Bends 45°  | LR B 45    | 4-16"                                | BW, 3D           | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                       |             |
| REDUCERS CONCENTRIC   | RC         | 2" - 16"                             | BW - ASME B16-25 | M X M                | ASME B16-9         | ASTM A 234 Gr WPB    |                       |             |
| REDUCERS ECCENTRIC  | RE         | 2" - 16"                             | BW - ASME B16-25 | M X M                | ASME B16-9         | ASTM A 234 Gr WPB    |                       |             |
| TEES EQUAL  | T          | 0.50" - 1.50"                        | SW               | 3000#                | ASME B16.11        | ASTM A105            |                       |             |
|   |            | 2" - 16"                             | BW               | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                       |             |
| TEES RED  | TR         | 0.50" - 1.50"                        | SW               | 3000#                | ASME B16.11        | ASTM A105            |                       |             |
|   |            | 2" - 16"                             | BW               | M X M                | ASME B16.9         | ASTM A 234 Gr WPB    |                       |             |
| SOCKOLET  | S          | 0.50" - 1.50"                        | SW               | 3000#                | MSS-SP 75          | ASTM A105            |                       |             |
| WELDOLETS   | W          | 2" - 16"                             | BW - ASME B16-25 | M X M                | MSS-SP 75          | ASTM A105            |                       |             |
| CAPS  | C          | 0.50" - 1.50"                        | SCRF             | 3000#                | ASME B16.11        | ASTM A105            |                       |             |
|   |            | 2" - 16"                             | BW               | M                    | ASME B16-9         | ASTM A 234 Gr WPB    |                       |             |
| NIPPLES FULL COUPLINGS  | NA         | 0.50" - 1.50"                        | PBE, SEAMLESS    | M                    | ASME B36-10        | ASTM A 106 Gr.B      |                       |             |
| COUPLINGS   | FC         | 0.50" - 1.50"                        | SW               | 3000#                | ASME B16-11        | ASTM A105            |                       |             |
| HALF COUPLINGS  | HC         | 0.50" - 1.50"                        | SW               | 3000#                | ASME B16-11        | ASTM A105            |                       |             |
| <b>NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS</b>                               |            |                                      |                  |                      |                    |                      |                       |             |
|  |            | <b>PIPING MATERIAL SPECIFICATION</b> |                  |                      |                    | Document No.         |                       | Rev         |
|   |            |                                      |                  |                      |                    | 11-0290-02-08-02-001 |                       | 1           |
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| PIPING SPECIFICATION  |            |                               | GAIL GAS LIMITED        |                      |                         |   | RATING                     | 150#        |
|---|------------|-------------------------------|-------------------------|----------------------|-------------------------|---|----------------------------|-------------|
| 1A1   |            |                               |                         |                      |                         |   | CODE                       | ANSI B 31.8 |
| TEMPERATURE( 0 TO 60 °C)  |            |                               |                         |                      |                         |   | BASIC MATERIAL             |             |
| PRESSURE (18.75 bar g)  |            |                               |                         |                      |                         |   | CORROSION ALLOWANCE 0.5 mm |             |
| ITEM  | SHORT CODE | SIZE FROM-THRU                | DESCRIPTION             | RATING AND/OR SCHED. | DIMENSION STANDARD      | MATERIAL  | REMARKS                    |             |
| WN FLANGES  | FW         | 0.50"-16"                     | RF,125 AARH             | 150#                 | ASME B16-5              | ASTM A105   |                            |             |
| BLIND FLANGE  | FB         | 0.50"-16"                     | RF,125 AARH             | 150#                 | ASMEB16-5               | ASTM A105   |                            |             |
| FLANGES FIG 8   | FF         | 0.5" - 16"                    | RF,125 AARH             | 150#                 | ASME B16-48             | ASTM A105   |                            |             |
| SPCR & BLND   | FSB        | 16"                           | RF,125 AARH             | 150#                 | ASME B16-48             | ASTM A105   |                            |             |
| STUD BOLTS  | B          | 0.5" - 16"                    |                         |                      | ASME B18-2              | Bolt: A193 B7<br>Nut: A194 Gr.2H                      |                            |             |
| GASKETS SPIRAL WOUND  | G          | 0.5" - 16"                    |                         | 150#, SPIRAL         | B-16.20 -<br>ASME B16.5 | SP. WND metallic with Graphite Filler<br>(5 mm thick) |                            |             |
| GATE VALVE  | VG         | 0.50 - 1.50                   | SW , B16.11             | 800#                 | API 602                 | ASTM A105   |                            |             |
|   |            | 2"-16"                        | FLG, B16.5, RF/125 AARH | 150#                 | API 600                 | ASTM A 216 Gr WCB                                     |                            |             |
| PLUG VALVE  | PV         | 0.50 - 1.50                   | SW,BS-5353              | 800#                 | ASME B16.10             | ASTM A105   |                            |             |
|   |            | 2"-16"                        | FLG/BW,API6D            | 150#                 | ASME B16.10             | ASTM A 216 Gr WCB                                     |                            |             |
| NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS                                      |            |                               |                         |                      |                         |   |                            |             |
|  |            | PIPING MATERIAL SPECIFICATION |                         |                      |                         | Document No.  |                            | Rev.        |
|   |            |                               |                         |                      |                         | 11-0290-02-08-02-001                                  |                            | 1           |
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| PIPING SPECIFICATION  |            |                               | GAIL GAS LIMITED      |                      |                    |  | RATING   |      |                |  |
|---|------------|-------------------------------|-----------------------|----------------------|--------------------|--|--|------|----------------|--|
| 1A1   |            |                               |                       |                      |                    |  | CODE   |      | 150#           |  |
| TEMPERATURE ( 0 TO 60 °C)   |            |                               |                       |                      |                    |  | ANSI B 31.8  |      | BASIC MATERIAL |  |
| PRESSURE (18.75 bar g)  |            |                               |                       |                      |                    |  | CORROSION ALLOWANCE  |      | 0.5 mm         |  |
| ITEM  | SHORT CODE | SIZE FROM-THRU                | DESCRIPTION           | RATING AND/OR SCHED. | DIMENSION STANDARD | MATERIAL   | REMARKS  |      |                |  |
| BALL VALVES   | VBA        | 0.50" - 1.50"                 | SW:ASME B16-11        | 800#                 | ASME B16-10        | BODY:<br>ASTM A105<br>BALL:<br>SS 316                                  | FULL BORE<br>FIRE SAFE<br>WRENCH OPERATED.                       |      |                |  |
|   |            | 2"-3"                         | BW:ASME B16-5         | 150#                 | ASME B16-10        | BODY:<br>ASTM A216 Gr. WCB<br>BALL:<br>(A 216 Gr. WCB)<br>+ 0.003" ENP | FULL BORE<br>FIRE SAFE<br>WRENCH OPERATED.                       |      |                |  |
|   |            | 4"-16"                        | BW:ASME B16-5         | 150 #                | ASME B16-10        | BODY:<br>ASTM A216 Gr. WCB<br>BALL:<br>(A 216 Gr. WCB)<br>+ 0.003" ENP | FULL BORE<br>FIRE SAFE<br>GEAR OPERATED.                         |      |                |  |
| GLOBE VALVES  | VGL        | 0.50" - 1.50"                 | SW<br>ASME B16-11     | 800#                 | ASME B16-10        | BODY:<br>ASTM A 105<br>TRIM:<br>ASTM A182 F6                           | HANDWHEEL<br>FIRE SAFE   |      |                |  |
|   |            | 2" - 16"                      | FLGD RF<br>ASME B16-5 | 150#                 | ASME B16-10        | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                   | HANDWHEEL<br>FIRE SAFE   |      |                |  |
| LIFT CHECK VALVES   | VCH        | 0.50" - 1.50"                 | SW<br>ASME B16-11     | 800#                 | ASME B16-10        | BODY:<br>ASTM A 105<br>TRIM:<br>ASTM A182 F6                           | HORIZONTAL INSTALLATION  |      |                |  |
| SWING CHECK VALVE   |            | 2"-16"                        | FLGD RF<br>ASME B16-5 | 150#                 | ASME B16-10        | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                   | HORIZONTAL INSTALLATION<br>VERTICAL INSTALLATION FLOW<br>UPWARDS |      |                |  |
| NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS                                      |            |                               |                       |                      |                    |  |  |      |                |  |
|  |            | PIPING MATERIAL SPECIFICATION |                       |                      |                    | Document No.   |  | Rev. |                |  |
|   |            |                               |                       |                      |                    | 11-0290-02-08-02-001   |  | 1    |                |  |
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|                                  |                         |                       |                    |
|----------------------------------|-------------------------|-----------------------|--------------------|
| <b>PIPING SPECIFICATION</b>      | <b>GAIL GAS LIMITED</b> | <b>RATING</b>         | <b>150#</b>        |
| <b>1A1</b>                       |                         | <b>CODE</b>           | <b>ANSI B 31.8</b> |
| <b>TEMPERATURE ( 0 TO 60 °C)</b> |                         | <b>BASIC MATERIAL</b> |                    |
| <b>PRESSURE (18.75 bar g)</b>    |                         | <b>CORROSION ALW</b>  | <b>0.5 mm</b>      |

**BRANCH TABLE**


|  |        | B R A N C H S I Z E |      |    |        |    |    |    |    |    |     |     |     |     |  |  |
|--|--------|---------------------|------|----|--------|----|----|----|----|----|-----|-----|-----|-----|--|--|
|  |        | 1/2"                | 3/4" | 1" | 1.1/2" | 2" | 3" | 4" | 6" | 8" | 10" | 12" | 14" | 16" |  |  |
| <b>H<br/>E<br/>A<br/>D<br/>E<br/>R<br/>S<br/>I<br/>Z<br/>E</b> | 1/2"   | T                   |      |    |        |    |    |    |    |    |     |     |     |     |  |  |
|  | 3/4"   | T                   | T    |    |        |    |    |    |    |    |     |     |     |     |  |  |
|  | 1"     | T                   | T    | T  |        |    |    |    |    |    |     |     |     |     |  |  |
|  | 1.1/2" | T                   | T    | T  | T      |    |    |    |    |    |     |     |     |     |  |  |
|  | 2"     | S                   | T    | T  | T      | T  |    |    |    |    |     |     |     |     |  |  |
|  | 3"     | S                   | S    | S  | S      | T  | T  |    |    |    |     |     |     |     |  |  |
|  | 4"     | S                   | S    | S  | S      | T  | T  | T  |    |    |     |     |     |     |  |  |
|  | 6"     | S                   | S    | S  | S      | W  | T  | T  | T  |    |     |     |     |     |  |  |
|  | 8"     | S                   | S    | S  | S      | W  | W  | T  | T  | T  |     |     |     |     |  |  |
|  | 10"    | S                   | S    | S  | S      | W  | W  | T  | T  | T  | T   |     |     |     |  |  |
|  | 12"    | S                   | S    | S  | S      | W  | W  | W  | T  | T  | T   | T   |     |     |  |  |
|  | 14"    | S                   | S    | S  | S      | W  | W  | W  | T  | T  | T   | T   | T   |     |  |  |
|  | 16"    | S                   | S    | S  | S      | W  | W  | W  | T  | T  | T   | T   | T   | T   |  |  |
|  |        |                     |      |    |        |    |    |    |    |    |     |     |     |     |  |  |
|  |        |                     |      |    |        |    |    |    |    |    |     |     |     |     |  |  |


**LEGEND**

T : TEE

S: SOCKOLET - SW


W : WELDOLET - BW


|   |                                      |                      |             |
|---|--------------------------------------|----------------------|-------------|
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| PIPING SPECIFICATION  |            |                               | GAIL GAS LIMITED |                      |                    |                      | RATING                     | 300#        |  |  |
|---|------------|-------------------------------|------------------|----------------------|--------------------|----------------------|----------------------------|-------------|--|--|
| 3A1   |            |                               |                  |                      |                    |                      | CODE                       | ANSI B 31.8 |  |  |
| TEMPERATURE ( 0 TO 60 °C)   |            |                               |                  |                      |                    |                      | BASIC MATERIAL             |             |  |  |
| PRESSURE (49 bar g)   |            |                               |                  |                      |                    |                      | CORROSION ALLOWANCE 0.5 mm |             |  |  |
| ITEM  | SHORT CODE | SIZE FROM-THRU                | DESCRIPTION      | RATING AND/OR SCHED. | DIMENSION STANDARD | MATERIAL             | REMARKS                    |             |  |  |
| PIPELINE  | PL         | 4"-8"                         | BE               | 6.4 mm               | API 5L             | API 5L Gr. X42       | 4"-6" :Seamless            |             |  |  |
|   |            | 10"                           | BE               | 6.4 mm               | API 5L             | API 5L Gr. X52       | 8" :Electric Welded        |             |  |  |
| PIPES   | P          | 0.50" - 1."                   | PE, SEAMLESS     | XXS                  | ASME B36-10        | ASTM A 106 Gr.B      | Electric Welded            |             |  |  |
|   |            | 1.5"                          | PE, SEAMLESS     | XS                   | ASME B36-10        | ASTM A 106 Gr.B      |                            |             |  |  |
|   |            | 2"                            | BE, SEAMLESS     | XS                   | ASME B36-10        | ASTM A 106 Gr.B      |                            |             |  |  |
|   |            | 3" - 16"                      | BE, SEAMLESS     | S40                  | ASME B36-10        | ASTM A 106 Gr.B      |                            |             |  |  |
| ELBOWS 90 LR  | E          | 0.50" - 1.50"                 | SW               | 3000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW, 1.5D, 3D     | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| ELBOWS 45 LR  | E45        | 0.50" - 1.50"                 | SW               | 3000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW, 1.5D, 3D     | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| LR Bends 90°  | LR B       | 4-16"                         | BW, 3D           | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| LR Bends 45°  | LR B 45    | 4-16"                         | BW, 3D           | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| REDUCERS CONCENTRIC   | RC         | 2" - 16"                      | BW - ASME B16-25 | M X M                | ASME B16-9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| REDUCERS ECCENTRIC  | RE         | 2" - 16"                      | BW - ASME B16-25 | M X M                | ASME B16-9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| TEES EQUAL  | T          | 0.50" - 1.50"                 | SW               | 3000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW               | M X M                | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| TEES RED  | TR         | 0.50" - 1.50"                 | SW               | 3000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW               | M X M                | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| SOCKOLET  | S          | 0.50" - 1.50"                 | SW               | 3000#                | MSS-SP 75          | ASTM A105            |                            |             |  |  |
| WELDOLETS   | W          | 2" - 16"                      | BW - ASME B16-25 | M X M                | MSS-SP 75          | ASTM A105            |                            |             |  |  |
| CAPS  | C          | 2" - 16"                      | BW               | M                    | ASME B16-9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| NIPPLES   | NA         | 0.50" - 1.50"                 | PBE, SEAMLESS    | M                    | ASME B36-10        | ASTM A 106 Gr.B      |                            |             |  |  |
| FULL COUPLINGS  | FC         | 0.50" - 1.50"                 | SW               | 3000#                | ASME B16-11        | ASTM A105            |                            |             |  |  |
| HALF COUPLINGS  | HC         | 0.50" - 1.50"                 | SW               | 3000#                | ASME B16-11        | ASTM A105            |                            |             |  |  |
| NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS                                      |            |                               |                  |                      |                    |                      |                            |             |  |  |
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| PIPING SPECIFICATION     |            |                | GAIL GAS LIMITED             |                      |                         |   | RATING              | 300#        |
|--------------------------|------------|----------------|------------------------------|----------------------|-------------------------|---|---------------------|-------------|
| 3A1                      |            |                |                              |                      |                         |   | CODE                | ANSI B 31.8 |
| TEMPERATURE (0 TO 60 °C) |            |                |                              |                      |                         |   | BASIC MATERIAL      |             |
| PRESSURE (49 bar g)      |            |                |                              |                      |                         |   | CORROSION ALLOWANCE |             |
| ITEM                     | SHORT CODE | SIZE FROM-THRU | DESCRIPTION                  | RATING AND/OR SCHED. | DIMENSION STANDARD      | MATERIAL  | REMARKS             |             |
| WN FLANGES               | FW         | 2"-16"         | RF, 125 AARH                 | 300#                 | ASME B16-5              | ASTM A105   |                     |             |
| FLG SW                   | FS         | 0.50 - 1.50    | RF, 125 AARH                 | 300#                 | ASME B16-5              | ASTM A105   |                     |             |
| BLIND FLANGE             | FB         | 0.50"-16"      | RF, 125 AARH                 | 300#                 | ASME B16-5              | ASTM A105   |                     |             |
| FLANGES FIG 8            | FF         | 0.5" - 16"     | FF, 125 AARH                 | 300#                 | ASME B16-48             | ASTM A105   |                     |             |
| SPCR & BLND              | FSB        | 16"            | FF, 125 AARH                 | 300#                 | ASME B16-48             | ASTM A105   |                     |             |
| STUD BOLTS               | B          | 0.50" - 16"    |                              |                      | ASME B18-2              | Bolt: A193 B7<br>Nut: A194 Gr.2H                                |                     |             |
| GASKETS SPIRAL WOUND     | G          | 0.5" - 16"     |                              | SPIRAL, 300#         | B-16.20 -<br>ASME B16.5 | SP. WND<br>metallic with<br>Graphite Filler<br><br>(5 mm thick) |                     |             |
| GATE VALVE               | VG         | 0.50 - 1.50    | SW<br>B16.11                 | 800#                 | API 602                 | ASTM A105   |                     |             |
|                          |            | 2" - 16"       | FLGD, B-16.5,<br>RF/125 AARH | 300#                 | API 600                 | ASTM A 216 Gr WCB   |                     |             |
| PLUG VALVE               | VP         | 0.50" - 1.50"  | SW, BS -5353                 | 800#                 | ASME B16-10             | ASTM A105   |                     |             |
|                          |            | 2" - 16"       | FLG/ BW, API 6D              | 300#                 | ASME B16-10             | ASTM A 216 Gr WCB   |                     |             |

NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS

|   |                                      |                      |      |
|---|--------------------------------------|----------------------|------|
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| PIPING SPECIFICATION  |            |                               | GAIL GAS LIMITED                        |                      |                        |  | RATING   | 300#        |
|---|------------|-------------------------------|---|----------------------|------------------------|--|--|-------------|
| 3A1   |            |                               |   |                      |                        |  | CODE   | ANSI B 31.8 |
| TEMPERATURE ( 0 TO 60 °C)   |            |                               |   |                      |                        |  | BASIC MATERIAL   |             |
| PRESSURE (49 bar g)   |            |                               |   |                      |                        |  | CORROSION ALLOWANCE  |             |
| ITEM  | SHORT CODE | SIZE FROM-THRU                | DESCRIPTION                             | RATING AND/OR SCHED. | DIMENSION STANDARD     | MATERIAL   | REMARKS  |             |
| BALL VALVES   | VBA        | 0.50 - 1.50                   | SW, ASME B16-11                         | 300#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A105<br>BALL:SS 316<br>BODY SEAT: RPTFE                                      | FULL BORE<br>FIRE SAFE<br>WRENCH OPERATED.                           |             |
|   |            | 2"                            | FLGD RF:ASME B16-5<br>or BW :ASME B16-5 | 300#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A216 Gr. WCB<br>BALL:<br>(A 216 Gr. WCB)<br>+ 0.003" ENP<br>BODY SEAT: RPTFE | FULL BORE, FIRE SAFE, WRENCH OPERATED                                |             |
|   |            | 3" - 4"                       | FLGD RF:ASME B16-5<br>or BW :ASME B16-5 | 300#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A216 Gr. WCB<br>(A 216 Gr. WCB)<br>+ 0.003" ENP<br>BODY SEAT: RPTFE          | DOUBLE BLOCK AND BLEED<br>FULL BORE<br>FIRE SAFE<br>WRENCH OPERATED. |             |
|   |            | 6"-16"                        | FLGD RF:ASME B16-5<br>or BW :ASME B16-5 | 300#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A216 Gr. WCB<br>(A 216 Gr. WCB)<br>+ 0.003" ENP<br>BODY SEAT: RPTFE          | DOUBLE BLOCK AND BLEED<br>FULL BORE<br>FIRE SAFE<br>GEAR OPERATED.   |             |
| GLOBE VALVES  | VGL        | 0.50 - 1.50                   | SW, ASME B16-11                         | 300#                 | ASME B16-10<br>BS 5352 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | HANDWHEEL<br>FIRE SAFE   |             |
|   |            | 2" - 4"                       | FLGD RF:ASME B16-5                      | 300#                 | ASME B16-10<br>BS 1873 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | HANDWHEEL<br>FIRE SAFE   |             |
|   |            | 6" - 16"                      | FLGD RF:ASME B16-5                      | 300#                 | ASME B16-10<br>BS 1873 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | GEAR OPERATED<br>FIRE SAFE   |             |
| LIFT CHECK VALVES   | VCH        | 0.50 - 1.50                   | SW, ASME B16-11                         | 300#                 | ASME B16-10<br>BS 5352 | BODY:<br>ASTM A 105<br>TRIM:<br>ASTM A182 F6   | HORIZONTAL INSTALLATION  |             |
| SWING CHECK VALVE   |            | 2"-16"                        | FLGD RF:ASME B16-5                      | 300#                 | ASME B16-10<br>BS 1868 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | HORIZONTAL INSTALLATION<br>VERTICAL INSTALLATION FLOW UPWARDS        |             |
| NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS                                      |            |                               |   |                      |                        |  |  |             |
|  |            | PIPING MATERIAL SPECIFICATION |   |                      |                        | Document No.   | Rev.   |             |
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|                           |                         |                |             |
|---------------------------|-------------------------|----------------|-------------|
| PIPING SPECIFICATION      | <b>GAIL GAS LIMITED</b> | RATING         | 300#        |
| <b>3A1</b>                |                         | CODE           | ANSI B 31.8 |
| TEMPERATURE ( 0 TO 60 °C) |                         | BASIC MATERIAL |             |
| PRESSURE (49 bar g)       |                         | CORROSION ALW  | 0.5 mm      |


**BRANCH TABLE**

**B R A N C H   S I Z E**

|   | 1/2"   | 3/4" | 1" | 1.1/2" | 2" | 3" | 4" | 6" | 8" | 10" | 12" | 14" | 16" |   |  |  |  |  |  |
|---|--------|------|----|--------|----|----|----|----|----|-----|-----|-----|-----|---|--|--|--|--|--|
| <b>H<br/>E<br/>A<br/>D<br/>E<br/>R<br/><br/>S<br/>I<br/>Z<br/>E</b> | 1/2"   | T    |    |        |    |    |    |    |    |     |     |     |     |   |  |  |  |  |  |
|   | 3/4"   | T    | T  |        |    |    |    |    |    |     |     |     |     |   |  |  |  |  |  |
|   | 1"     | T    | T  | T      |    |    |    |    |    |     |     |     |     |   |  |  |  |  |  |
|   | 1.1/2" | T    | T  | T      | T  |    |    |    |    |     |     |     |     |   |  |  |  |  |  |
|   | 2"     | S    | T  | T      | T  | T  |    |    |    |     |     |     |     |   |  |  |  |  |  |
|   | 3"     | S    | S  | S      | S  | T  | T  |    |    |     |     |     |     |   |  |  |  |  |  |
|   | 4"     | S    | S  | S      | S  | T  | T  | T  |    |     |     |     |     |   |  |  |  |  |  |
|   | 6"     | S    | S  | S      | S  | W  | T  | T  | T  |     |     |     |     |   |  |  |  |  |  |
|   | 8"     | S    | S  | S      | S  | W  | W  | T  | T  | T   |     |     |     |   |  |  |  |  |  |
|   | 10"    | S    | S  | S      | S  | W  | W  | T  | T  | T   | T   |     |     |   |  |  |  |  |  |
|   | 12"    | S    | S  | S      | S  | W  | W  | W  | T  | T   | T   | T   |     |   |  |  |  |  |  |
|   | 14"    | S    | S  | S      | S  | W  | W  | W  | T  | T   | T   | T   | T   |   |  |  |  |  |  |
|   | 16"    | S    | S  | S      | S  | W  | W  | W  | T  | T   | T   | T   | T   | T |  |  |  |  |  |


**LEGEND**  
T : TEE  
S: SOCKOLET -SW  
W : WELDOLET- BW


|   |                                      |                      |      |
|---|--------------------------------------|----------------------|------|
|  | <b>PIPING MATERIAL SPECIFICATION</b> | Document No.         | Rev. |
|   |                                      | 11-0290-02-08-02-001 | 1    |
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| PIPING SPECIFICATION  |            |                               | GAIL GAS LIMITED |                      |                    |                      | RATING                     | 600#        |  |  |
|---|------------|-------------------------------|------------------|----------------------|--------------------|----------------------|----------------------------|-------------|--|--|
| 6A1   |            |                               |                  |                      |                    |                      | CODE                       | ANSI B 31.8 |  |  |
| TEMPERATURE ( 0 TO 60 °C)   |            |                               |                  |                      |                    |                      | BASIC MATERIAL             |             |  |  |
| PRESSURE (98 bar g)   |            |                               |                  |                      |                    |                      | CORROSION ALLOWANCE 0.5 mm |             |  |  |
| ITEM  | SHORT CODE | SIZE FROM-THRU                | DESCRIPTION      | RATING AND/OR SCHED. | DIMENSION STANDARD | MATERIAL             | REMARKS                    |             |  |  |
| PIPELINE  | PL         | 4"-8"                         | BE               | 6.4 mm               | API 5L             | API 5L Gr. X42       | 4"-6" :Seamless            |             |  |  |
|   |            | 10"                           | BE               | 6.4 mm               | API 5L             | API 5L Gr. X52       | 8" :Electric Welded        |             |  |  |
| PIPES   | P          | 0.50" - 1.5"                  | PE, SEAMLESS     | XXS                  | ASME B36-10        | ASTM A 106 Gr.B      | Electric Welded            |             |  |  |
|   |            | 2" - 10"                      | BE, SEAMLESS     | XS                   | ASME B36-10        | ASTM A 106 Gr.B      |                            |             |  |  |
|   |            | 12" - 16"                     | BE, SEAMLESS     | S60                  | ASME B36-10        | ASTM A 106 Gr.B      |                            |             |  |  |
| ELBOWS 90 LR  | E          | 0.50" - 1.50"                 | SW               | 6000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW, 1.5D, 3D     | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| ELBOWS 45 LR  | E45        | 0.50" - 1.50"                 | SW               | 6000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW, 1.5D, 3D     | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| LR Bends 90°  | LR B       | 4-16"                         | BW, 3D           | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| LR Bends 45°  | LR B 45    | 4-16"                         | BW, 3D           | M                    | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| REDUCERS CONCENTRIC   | RC         | 2" - 16"                      | BW - ASME B16-25 | M X M                | ASME B16-9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| REDUCERS ECCENTRIC  | RE         | 2" - 16"                      | BW - ASME B16-25 | M X M                | ASME B16-9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| TEES EQUAL  | T          | 0.50" - 1.50"                 | SW               | 6000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW               | M X M                | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| TEES RED  | TR         | 0.50" - 1.50"                 | SW               | 6000#                | ASME B16.11        | ASTM A105            |                            |             |  |  |
|   |            | 2" - 16"                      | BW               | M X M                | ASME B16.9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| SOCKOLET  | S          | 0.50" - 1.50"                 | SW               | 6000#                | MSS-SP 97          | ASTM A105            |                            |             |  |  |
| WELDOLETS   | W          | 2" - 16"                      | BW - ASME B16-25 | M X M                | MSS-SP 97          | ASTM A105            |                            |             |  |  |
| CAPS  | C          | 2" - 16"                      | BW               | M                    | ASME B16-9         | ASTM A 234 Gr WPB    |                            |             |  |  |
| NIPPLES   | NA         | 0.50" - 1.50"                 | PBE, SEAMLESS    | M                    | ASME B36-10        | ASTM A 106 Gr.B      |                            |             |  |  |
| FULL COUPLINGS  | FC         | 0.50" - 1.50"                 | SW               | 6000#                | ASME B16-11        | ASTM A105            |                            |             |  |  |
| HALF COUPLINGS  | HC         | 0.50" - 1.50"                 | SW               | 6000#                | ASME B16-11        | ASTM A105            |                            |             |  |  |
| NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS                                      |            |                               |                  |                      |                    |                      |                            |             |  |  |
|  |            | PIPING MATERIAL SPECIFICATION |                  |                      |                    | Document No.         |                            | Rev.        |  |  |
|   |            |                               |                  |                      |                    | 11-0290-02-08-02-001 |                            | 1           |  |  |
|   |            |                               |                  |                      |                    | Sheet 15 of 18       |                            |             |  |  |

| PIPING SPECIFICATION     |            |                | GAIL GAS LIMITED             |                      |                         |   | RATING              | 600#        |
|--------------------------|------------|----------------|------------------------------|----------------------|-------------------------|---|---------------------|-------------|
| 6A1                      |            |                |                              |                      |                         |   | CODE                | ANSI B 31.8 |
| TEMPERATURE (0 TO 60 °C) |            |                |                              |                      |                         |   | BASIC MATERIAL      |             |
| PRESSURE (98 bar g)      |            |                |                              |                      |                         |   | CORROSION ALLOWANCE |             |
| ITEM                     | SHORT CODE | SIZE FROM-THRU | DESCRIPTION                  | RATING AND/OR SCHED. | DIMENSION STANDARD      | MATERIAL  | REMARKS             |             |
| WN FLANGES               | FW         | 2"-16"         | RF, 125 AARH                 | 600#                 | ASME B16-5              | ASTM A105   |                     |             |
| FLG SW                   | FS         | 0.50 - 1.50    | RF, 125 AARH                 | 600#                 | ASME B16-5              | ASTM A105   |                     |             |
| BLIND FLANGE             | FB         | 0.50"-16"      | RF, 125 AARH                 | 600#                 | ASME B16-5              | ASTM A105   |                     |             |
| FLANGES FIG 8            | FF         | 0.5" - 16"     | FF, 125 AARH                 | 600#                 | ASME B16-48             | ASTM A105   |                     |             |
| SPCR & BLND              | FSB        | 16"            | FF, 125 AARH                 | 600#                 | ASME B16-48             | ASTM A105   |                     |             |
| STUD BOLTS               | B          | 0.50" - 16"    |                              |                      | ASME B18-2              | Bolt: A193 B7<br>Nut: A194 Gr.2H                                |                     |             |
| GASKETS SPIRAL WOUND     | G          | 0.5" - 16"     |                              | SPIRAL, 600#         | B-16.20 -<br>ASME B16.5 | SP. WND<br>metallic with<br>Graphite Filler<br><br>(5 mm thick) |                     |             |
| GATE VALVE               | VG         | 0.50 - 1.50    | SW<br>B16.11                 | 800#                 | API 602                 | ASTM A105   |                     |             |
|                          |            | 2" - 16"       | FLGD, B-16.5,<br>RF/125 AARH | 600#                 | API 600                 | ASTM A 216 Gr WCB   |                     |             |
| PLUG VALVE               | VP         | 0.50" - 1.50"  | SW, BS -5353                 | 800#                 | ASME B16-10             | ASTM A105   |                     |             |
|                          |            | 2" - 16"       | FLG/ BW, API 6D              | 600#                 | ASME B16-10             | ASTM A 216 Gr WCB   |                     |             |

NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS

|   |                                      |                      |      |
|---|--------------------------------------|----------------------|------|
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| PIPING SPECIFICATION  |            |                               | GAIL GAS LIMITED                        |                      |                        |  | RATING   | 600#        |  |  |
|---|------------|-------------------------------|---|----------------------|------------------------|--|--|-------------|--|--|
| 6A1   |            |                               |   |                      |                        |  | CODE   | ANSI B 31.8 |  |  |
| TEMPERATURE ( 0 TO 60 °C)   |            |                               |   |                      |                        |  | BASIC MATERIAL   |             |  |  |
| PRESSURE (98 bar g)   |            |                               |   |                      |                        |  | CORROSION ALLOWANCE 0.5 mm   |             |  |  |
| ITEM  | SHORT CODE | SIZE FROM-THRU                | DESCRIPTION                             | RATING AND/OR SCHED. | DIMENSION STANDARD     | MATERIAL   | REMARKS  |             |  |  |
| BALL VALVES   | VBA        | 0.50 - 1.50                   | SW, ASME B16-11                         | 600#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A105<br>BALL:SS 316<br>BODY SEAT: RPTFE                                      | FULL BORE<br>FIRE SAFE<br>WRENCH OPERATED.                           |             |  |  |
|   |            | 2"                            | FLGD RF:ASME B16-5<br>or BW :ASME B16-5 | 600#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A216 Gr. WCB<br>BALL:<br>(A 216 Gr. WCB)<br>+ 0.003" ENP<br>BODY SEAT: RPTFE | FULL BORE, FIRE SAFE, WRENCH OPERATED                                |             |  |  |
|   |            | 3" - 4"                       | FLGD RF:ASME B16-5<br>or BW :ASME B16-5 | 600#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A216 Gr. WCB<br>(A 216 Gr. WCB)<br>+ 0.003" ENP<br>BODY SEAT: RPTFE          | DOUBLE BLOCK AND BLEED<br>FULL BORE<br>FIRE SAFE<br>WRENCH OPERATED. |             |  |  |
|   |            | 6"-16"                        | FLGD RF:ASME B16-5<br>or BW :ASME B16-5 | 600#                 | ASME B16-10<br>BS 5351 | BODY:<br>ASTM A216 Gr. WCB<br>(A 216 Gr. WCB)<br>+ 0.003" ENP<br>BODY SEAT: RPTFE          | DOUBLE BLOCK AND BLEED<br>FULL BORE<br>FIRE SAFE<br>GEAR OPERATED.   |             |  |  |
| GLOBE VALVES  | VGL        | 0.50 - 1.50                   | SW, ASME B16-11                         | 600#                 | ASME B16-10<br>BS 5352 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | HANDWHEEL<br>FIRE SAFE   |             |  |  |
|   |            | 2" - 4"                       | FLGD RF:ASME B16-5                      | 600#                 | ASME B16-10<br>BS 1873 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | HANDWHEEL<br>FIRE SAFE   |             |  |  |
|   |            | 6" - 16"                      | FLGD RF:ASME B16-5                      | 600#                 | ASME B16-10<br>BS 1873 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | GEAR OPERATED<br>FIRE SAFE   |             |  |  |
| LIFT CHECK VALVES   | VCH        | 0.50 - 1.50                   | SW, ASME B16-11                         | 600#                 | ASME B16-10<br>BS 5352 | BODY:<br>ASTM A 105<br>TRIM:<br>ASTM A182 F6   | HORIZONTAL INSTALLATION  |             |  |  |
| SWING CHECK VALVE   |            | 2"-16"                        | FLGD RF:ASME B16-5                      | 600#                 | ASME B16-10<br>BS 1868 | BODY:<br>ASTM A 216 Gr. WCB<br>TRIM:<br>ASTM A182 F6                                       | HORIZONTAL INSTALLATION<br>VERTICAL INSTALLATION FLOW UPWARDS        |             |  |  |
| NOTE: M=THICKNESS TO MATCH PIPE WALL THICKNESS                                      |            |                               |   |                      |                        |  |  |             |  |  |
|  |            | PIPING MATERIAL SPECIFICATION |   |                      |                        | Document No.   | Rev.   |             |  |  |
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|                           |                         |                |             |
|---------------------------|-------------------------|----------------|-------------|
| PIPING SPECIFICATION      | <b>GAIL GAS LIMITED</b> | RATING         | 600#        |
| <b>6A1</b>                |                         | CODE           | ANSI B 31.8 |
| TEMPERATURE ( 0 TO 60 °C) |                         | BASIC MATERIAL |             |
| PRESSURE (98 bar g)       |                         | CORROSION ALW  | 0.5 mm      |

**BRANCH TABLE**

**B R A N C H S I Z E**

|  | 1/2"   | 3/4" | 1" | 1.1/2" | 2" | 3" | 4" | 6" | 8" | 10" | 12" | 14" | 16" |   |  |  |  |  |  |  |
|--|--------|------|----|--------|----|----|----|----|----|-----|-----|-----|-----|---|--|--|--|--|--|--|
| H<br>E<br>A<br>D<br>E<br>R<br><br>S<br>I<br>Z<br>E | 1/2"   | T    |    |        |    |    |    |    |    |     |     |     |     |   |  |  |  |  |  |  |
|  | 3/4"   | T    | T  |        |    |    |    |    |    |     |     |     |     |   |  |  |  |  |  |  |
|  | 1"     | T    | T  | T      |    |    |    |    |    |     |     |     |     |   |  |  |  |  |  |  |
|  | 1.1/2" | T    | T  | T      | T  |    |    |    |    |     |     |     |     |   |  |  |  |  |  |  |
|  | 2"     | S    | T  | T      | T  | T  |    |    |    |     |     |     |     |   |  |  |  |  |  |  |
|  | 3"     | S    | S  | S      | S  | T  | T  |    |    |     |     |     |     |   |  |  |  |  |  |  |
|  | 4"     | S    | S  | S      | S  | T  | T  | T  |    |     |     |     |     |   |  |  |  |  |  |  |
|  | 6"     | S    | S  | S      | S  | W  | T  | T  | T  |     |     |     |     |   |  |  |  |  |  |  |
|  | 8"     | S    | S  | S      | S  | W  | W  | T  | T  | T   |     |     |     |   |  |  |  |  |  |  |
|  | 10"    | S    | S  | S      | S  | W  | W  | T  | T  | T   | T   |     |     |   |  |  |  |  |  |  |
|  | 12"    | S    | S  | S      | S  | W  | W  | W  | T  | T   | T   | T   |     |   |  |  |  |  |  |  |
|  | 14"    | S    | S  | S      | S  | W  | W  | W  | T  | T   | T   | T   | T   |   |  |  |  |  |  |  |
|  | 16"    | S    | S  | S      | S  | W  | W  | W  | T  | T   | T   | T   | T   | T |  |  |  |  |  |  |

**LEGEND**  
T : TEE  
S: SOCKOLET -SW  
W : WELDOLET- BW

|   |                                      |                      |      |
|---|--------------------------------------|----------------------|------|
|  | <b>PIPING MATERIAL SPECIFICATION</b> | Document No.         | Rev. |
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## Vendor List ANNEXURE - 5

| S. No.                     | Vendor Name  | Address   | Remarks |
|----------------------------|--|---|---------|
| <b>Main Line Valves</b>    |  |   |         |
| 1                          | L&T Limited<br>(Audco India Ltd.)                          | 32, Shivaji Marg<br>New Delhi – 110 015   |         |
| 2                          | HawaValves (I) Pvt. Ltd.                                   | R - 16 TTC INDUSTRIAL AREA , RABALE , NAVI<br>MUMBAI , MAHARASHTRA - 400701                           |         |
| 3                          | Micro Finsh Valves Ltd                                     | SF 015-017 3RD FLOOR, K - 89, FORTUNE<br>ARCADE, SECTOR-18, NOIDA - 201301                            |         |
| 4                          | Virgo Enginners  | 7 / 39, 2ND FLOOR, VIKRAM VIHAR, LAJPAT<br>NAGAR, PHASE - IV, NEW DELHI - 110024                      |         |
| 5                          | OSWAL INDUSTRIES LTD.                                      | BLOCK NO - 258, VILLAGE - OLA,<br>AHMEDABAD, MEHSANA EXP HIGHWAY<br>GUJRAT, PIN - 382729              |         |
| 6                          | Flow Chem Industries                                       | 10, Navdurga Indl. Estate Opp. Forge Blower,<br>Naroda Road Ahmedabad – 25                            |         |
| 7                          | BDK Engineering  | SF(015-017),3RD Floor,K-89,<br>Ansal Fortune Arcade,<br>Sector-18,Noida-201301                        |         |
| 8                          | GURU Valves  | GURU HOUSE , W - 101 (D), TIC,MIDC,<br>KHAIRANE VILLAGE , NAVI MUMBAI,THANE,<br>MAHARASHTRA - 400710  |         |
| 9                          | SHAYBURG VALVES PRIVATE LTD.                               | PLOT NO A/4,MIDC ROAD 1, WAGLE<br>INDUSTRIAL ESTATE, THANE, MUMBAI                                    |         |
| <b>Cathodic Protection</b> |  |   |         |
| 1                          | Corrttech International Pvt. Ltd                           | 22,Dhara Centre, Vijay CharRasta, Navrangpura,<br>Ahmedabad.Gujarat 380009                            |         |
| 2                          | Raychem RPG Limited  | 510,511 Ansal Bhawan, Kasturba Gandhi Marg,<br>New Delhi 110001                                       |         |
| 3                          | Corrosion Control Services (Bombay) Pvt.<br>Ltd.           | 405, Arun Chambers, Tardeo Road, Mumbai<br>400034   |         |
| 4                          | Central Electronics Limited                                | 4,Industrial Area, Sahibabad (U.P.) 201010  |         |
| 5                          | AFCON  | AFCON HOUSE<br>16 SHAAH INDL EST, VEERA DESAI ROAD<br>ANDHERI (W), MUMBAI – 400053                    |         |
| 6                          | CONSULTECH CATHODIC PROTECTION<br>ENGINEERS                | 878/1,G.I.D.C ESTATE, MAKARPURA<br>BARODA - 390 010, GUJRAT   |         |
| 7                          | MITCORR CATHODICPROTECTION<br>PVT.LTD.,                    | No.18,19,20 Pratibha Complex, First Floor,<br>Arunachal Samata Road,<br>Subhanpura, Vadodara – 390023 |         |
| 8                          | UNDT<br>(Underground Pipeline and NDT Services<br>Pvt.Ltd) | 17-A, B 9/8, Sector - 62, Noida<br>0120 - 2400934 / 0120 2401247                                      |         |

## Vendor List ANNEXURE - 5

| S. No.                        | Vendor Name   | Address   | Remarks |
|-------------------------------|---|---|---------|
| <b>OFC</b>                    |   |   |         |
| 1                             | Aksh Optifibre Ltd.                                   | 1/1, B-1 Extension, Mohan Co-operative Industrial Estate,<br>Mathura Road, New Delhi -110 044,E53                             |         |
| 2                             | Vindhya Telelink Ltd / Birla Ericsson Optical Limited | 4th Floor, UCO Bank Building<br>Parliament Street, New Delhi - 110 001  |         |
| 3                             | Finolex Cables Ltd                                    | 26-27, Mumbai - Pune Road,<br>Pimpri,Pune 411 018   |         |
| 4                             | RPG Cables Ltd.                                       | Zensar Business Center,Pratap Bulding N-83,1st<br>Floor,Cannaught Place<br>New Delhi - 100 001                                |         |
| 5                             | UM Cables Limited                                     | 168, C.S.T. Road, Agarwal Industrial Estate,<br>Kalina, Santacruz East Mumbai - 400 098<br>Maharashtra, India                 |         |
| 6                             | Himanchal Futuristic Communication Ltd                | 8, Commercial Complex, Masjid Moth, Greater<br>Kailash-II, New Delhi-110001   |         |
| 7                             | ARM Ltd.  | Cable Division 605,Tolstoy House, Tolstoy Marg,<br>New Dlehi-110001   |         |
| 8                             | Uniflex Cable Ltd.                                    | 12 & 13, Jyoti Wire House,<br>1st floor, 23 A Shah Industrial Estate<br>Off Veera Desai Road, Andheri (W)<br>Mumbai - 400 053 |         |
| 9                             | Sterlite Optical Technologies Ltd                     | 604, Tolstoy House, Tolstoy Marg, New Delhi-<br>110001  |         |
| 10                            | Tamilnadu Telecommunication Ltd.                      | E-18 B-24, CMDA Industrial Complex,<br>Maraimalai Nagar 603209  |         |
| <b>Flanges &amp; Fittings</b> |   |   |         |
| 1                             | ECHJAY Forgings Ltd.                                  | Kanjur Village Road , Kunjan Marg east<br>MUMBAI - 400 042  |         |
| 2                             | Choudhary Hammer Works                                | PO Box 20, Near Hapur Road Opp.<br>Power House, GHAZIABAD   |         |
| 3                             | Metal Forgings (P) Ltd.                               | B-1, Mayapuri Indl. Area PH-I<br>NEW DELHI - 110 064  |         |
| 4                             | Punjab Steel Works                                    | 38B, Mayapuri, Indl.Area Phase-I<br>NEW DELHI - 110 064   |         |
| 5                             | Amforge Industries                                    | 16/A, Modi Compond, Ist Ghorupdeo, Cross<br>Road, Reay Road, Mumbai- 400 010  |         |
| 6                             | C D Engineering Co.                                   | C-199, Bulandshahar Road Industrial<br>Area , GHAZIABAD   |         |
| 7                             | Aditya Forging Ltd.                                   | 496/1, GIDC, Makarpura<br>BARODA - 390 004  |         |
| 8                             | J K Forgings  | B-83, Mayapuri Industrial Area, Phase-1,<br>New Delhi-64  |         |
| 9                             | Golden Iron and Steel Co                              | 7/19, Industrial Area Kirti Nagar,<br>New Delhi-110015  |         |
| 10                            | Sawan Engineers                                       | 213, Alakhnanda complex,<br>Opp. Bharat Petrol pump,Akota – Munjmuda<br>Road,Vadodara – 390003, Gujarat (India).              |         |
| 11                            | Tube Products   | TUBE PRODUCTS INCORPORATE<br>748/7, GIDC ESTATE, MAKARPURA,<br>VADODARA, GUJRAT - 390010                                      |         |

**Vendor List  
ANNEXURE - 5**

| <b>S. No.</b>      | <b>Vendor Name</b>           | <b>Address</b>   | <b>Remarks</b> |
|--------------------|------------------------------|--|----------------|
| 12                 | GUJARAT INFRAPIPES Pvt. Ltd. | 89-GIDC Industrial Estate.,<br>POR - 391 243,DIST. - Vadodara<br>State - Gujarat, India. |                |
| 13                 | Pipe Fit Engineers           | 496/1, G.I.D.C MAKARPURA,<br>VADODARA - 390010, GUJARAT, INDIA                           |                |
| 14                 | SIDHARTH & GAUTAM ENGINEERS  | Faridabad, haryana   |                |
| <b>WARNING MAT</b> |                              |  |                |
| 1                  | Sparco Multiplast Pvt Ltd.   |  |                |
| 2                  | Jain Irrigation Pvt.Ltd.     |  |                |