BHAGYANAGAR GAS LIMITED
(A JOINT VENTURE OF HPCL & GAIL)

BID DOCUMENT FOR

PROCUREMENT OF TWIN STREAM MRS CAPACITY OF 750 SCMH WITH SINGLE GAS METERING, SINGLE EVC WITH AMR, DOUBLE FILTER AND REGULATOR.

UNDER OPEN DOMESTIC COMPETITIVE BIDDING

Bid Document No. BGL/618/2024-25

Volume II of II

TABLE OF CONTENTS

1. OVERVIE ……..3
2. SPECIAL CONDITION OF CONTRACT(SCC)…….13
3. SCOPE OF WORK AND SUPPLY……..21
4. DELIVERY SCHEDULE…… ……..26
5. MATERIAL DATA & SPECIFICATIONS…… ….27

1. OVERVIEW

BGL is planning to supply natural gas to automobile, industrial, commercial and domestic consumers including CNG stations in various Geographical Areas as per authorization from PNGRB.

The intent of this specification is to establish minimum requirements for manufacturing and supply of twin stream Pressure Regulating and metering station with Modules having integrated Filter, PRV, SSV, CRV and NRV, Valves, Vents and flow meter etc. Pressure Regulating and metering station shall be suitable for aboveground installation.

The scope will include manufacturing, supply, inspection, testing, marking, packaging, handling, dispatch and AMC of twin stream Pressure regulating and metering station with module having integrated Filter, PRV, SSV, CRV and NRV, Valves and flow meter.

DEFINITIONS

In the Bid / Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires.

APPOINTING AUTHORITY:	Shall mean DIRECTOR or any other person so designated by the COMPANY for the purpose of arbitration.
APPROVED:	Shall mean approved in writing including subsequent written confirmation of previous verbal approval and "APPROVAL" means approval in writing including as aforesaid.
BID:	Shall mean the Bid submitted by the Bidder for acceptance by the BHAGYANAGAR GAS LIMTED
BIDDER:	Shall mean vendor responding to this tender, the supplier / sub- contractor approved by BHAGYANAGAR GAS LIMTED

COMMISSIONING:	Shall means pressing into service of the system including the plant, equipment(s), vessel(s), pipeline, machinery, or any other section or sub -section of installation (s) pertaining to the work of the Bidder after successful testing and trial runs of the same. "COMMISSIONING" can be either for a completed system or a part of system of a combination of systems or sub-systems and can be performed in any sequence as desired by EMPLOYER and in a manner established to be made suited according to availability of pre- requisites. Any such readjustments made by EMPLOYER in performance of "COMMISSIONING" activity will not be construed to be violating CONTRACT provisions and CONTRACTOR shall be deemed to have provided for the same.
COMPANY:	Shall mean BHAGYANAGAR GAS LIMTED hereinafter mentioned as ""
COMPLETION CERTIFICATE:	Shall mean the certificate to be issued by the ENGINEER-IN-CHARGE when the works have been completed entirely in accordance with CONTRACT DOCUMENT to his satisfaction.
CONSTRUCTION EQUIPMENT:	Shall means all appliances / equipment and things of what so ever nature for the use in or for the execution, operation, or maintenance of the work or temporary works but does not include materials or other things intended to form or to be incorporated into the WORK, or camping facilities.
CONTRACT DOCUMENTS:	Shall mean collectively the Tender Documents, Designs, Drawings, Specification, Schedule of Quantities and Rates, Letter of Acceptance and agreed variations if any, and such other documents constituting the tender and acceptance thereof.
CONTRACT:	Shall mean the agreement and all other documents between the company and the Bidder for providing the services mentioned herein including therein all contract documents.

DEFECT LIABLITY PERIOD:	In relation to a work means the specified period from the date of COMPLETION CERTIFICATE up to the date of issue of FINAL CERTIFICATE during which the CONTRACTOR stands responsible for rectifying all defects that may appear in the works executed by the CONTRACTOR in pursuance of the CONTRACT and includes warranties against Manufacturing/Fabrication/Erection/Construction defects covering all materials plants, equipment, components, and the like supplied by the CONTRACTOR, works executed against workmanship defects.
DRAWINGS:	Shall include maps, plans, tracings, prints & sketches thereof with any modification s approved in writing by the Engineer - In-charge and such other drawing as may from time to time, be furnished or approved in writing by the Engineer - In-Charge.
EIC:	Shall mean the “Engineer-In-Charge" or "Representative" shall mean the person designated from time to time by the and shall include those who are expressly authorized by him to act for and on his behalf for operation of this CONTRACT.
OEM:	Shall mean Original Equipment manufacturer.
OWNER/BUYER:	Shall mean Bhagyanagar Gas Limited () (CIN U40200TG2003PLC041566), a Joint Venture of M/s GAIL (India) Ltd. and M/s Hindustan Petroleum Corporation Ltd..
SITE:	Shall mean the locations viz. land, buildings, water and other places on, under, in or through which the Permanent Works are to be carried out for the purpose of contract together with any other places designated in the Contract as forming a part of the site.
SPECIFICATIONS:	Shall mean all directions, the various technical specifications, provisions attached and referred to in the Bid documents which pertain to the method and manner of performing the work or works to the quantities and qualities of the work or works and the materials to be furnished under the contract or works as may be amplified or modified by the COMPANY during the performance of Contract in order to provide the unforeseen conditions or in the best interests of the work or works. It shall also include the latest edition of relevant standard specifications including all addenda / corrigenda published before entering into the contract.
STORES:	Shall mean the various locations where the Company's free issue material is stored within the area of the operation of BHAGYANAGAR GAS LIMTED
	Shall mean the person deployed by the Bidder for control & supervision of the work of his work force, as per the Scope of

SUPERVISOR:	work mentioned and to receive instructions from Engineer-In-Charge or his representative.
TENDER:	Shall mean the proposal along with supporting documents submitted by the CONTRACTOR for consideration by the COMPANY.
TPI:	"Third Party Inspection Agency" appointed by Manufacturer and approved by Purchaser/Owner.
	The person or persons, firm or Company who's Bid has been accepted by BHAGYANAGAR GAS LIMTED and includes the Vendor's legal representatives, his successors and permitted assigns. Shall also mean Supplier or Manufacturer engaged by "OWNER" to execute the job.

REFERENCE CODES AND STANDARDS

PNGRB Regulations

EN 14382	– Slam Shut off Valve
EN 334	– Pressure Regulators up to 10bar
API 520	– Pressure Reliving Devices
ASME Sec VIII Division I	– For Pressure Vessel
ASME Sec IX	– Welder Qualifications
ASME Sec V	– NDE Test

ABBREVIATIONS

- PNGRB – Petroleum and Natural gas Regulatory Board of India
- CGD – City Gas Distribution
- CNG – Compressed Natural Gas
- GA – Geographical Area (allotted to for Gas distribution)
- MRS – Metering & Regulating Station
- P&ID – Piping and Instrumentation Diagram

- GA – Geographical Area
- PRS – Pressure Regulation skid
- DBS – Daughter Booster station
- MRB – Manufacturing Record Book

This specification covers the requirements of design, material requirement, manufacturing, construction features, inspection, testing and commissioning of a "Twin Stream MRS Skid" including all packing, preservation and transportation to 's sites in Hyderabad GA. The inlet pressure to the MRS shall be 2-6 bar (g) and the outlet pressure shall be 0.5 – 1.5 bar

(g). Unless otherwise specified, all the pressures indicated in this specification are gauge pressures. The purpose of the skid is for regulating the pressure & metering of Natural gas for supplying the gas to industrial/commercial customers

DESIGN PROCESS PARAMETERS FOR DRS

Following typical Natural Gas composition shall be considered for design and engineering of MRS:

General Gas Composition	
Component	**Mole %**
CH4	92.66%
Nitrogen	0.42%
C2H6	6.32%
C3H8	0.49%
i-C4H150#	0.05%
n-C4H150#	0.06%

Process Data:

The MRS shall be designed for the following conditions:

Piping/Filter Standard	: ASME B 31.8, ASME Sec - VIII with (latest addenda)
Functional Requirements	: PNGRB and as per agreed MANUFACTURER's Recommendation

Class Location	: Location Class Four (4) as per PNGRB Standard
Medium	: Natural Gas
Differential pressure drops	: 0.8 bar (Max)

GENERAL SPECIFICATIONS

- The installation should be designed to pass the maximum designed gas flow rate at the lowest expected inlet pressure.
- Suitable for the use with natural gas of specific gravity 0.6 – 0.7
- Gas velocities in pipe work must not exceed 30 meters / second (MRS Design Velocity should be 15-20m/s), when the maximum flow rate occurs at the lowest expected inlet pressure. The allowable sound pressure values should not be exceeded, and materials selected should be suitable to prevent erosion at such high velocities.
- Technical literature (in English language only), P&ID, dimensional details of the equipment & general assembly drawing shall be submitted along with the technical bid.
- Any deviation from the specified technical specification should be submitted in prescribed format enclosed in Tender document and vendor may also quote advanced / latest models (with all the details) to reduce overall cost as an alternate. However, the acceptance of the same shall be at the sole discretion of BGL.
- The data sheet should be filled up completely and should be enclosed along with the Technical Bid.
- Compliance with Technical Specification will be taken for granted if deviations are not specifically mentioned.
- All pipe work and equipment must be capable of withstanding the maximum pressure & Min & Max temp resulting from a fault condition.
  Design Velocity:

  - Filter Upstream - Designing of pipeline size before filter, velocity to be considered 15m/s.
  - Filter Downstream & Before Regulators - Velocity to be consider 20 m/s
  - After Regulator - Velocity to be consider 20 m/s

Environment Specifications:

All equipment shall be designed for operation, storage & transportation under the following environmental conditions.

Max. /Min. temperature	: 50 / 0°C
Design Temperature	: 0°C to 65°C
Relative Humidity	: 100%
Hazardous Area classification	: Zone 1, Gas group IIA / IIB, Temp. Class T3

PROCESS ENGINEERING FOR MRS

The MRS consist of following and as per enclosed P & IDs. Each stream shall contain the following:

Module

- Active and Monitor PRV – Pilot Operated (Pressure Regulating Valve).
- Filters with Filter element
- Differential pressure gauges, along with all Accessories and valves.
- Globe Type SSV (Slam shut off Valve)
- Creep Relief Valves
- Pressure Gauge at inlet & outlet, PT, TT, DPT
- Check Valve
- Gas Detector with Siran Indicator
- DCP Cylinder with fire sprinkler (Automatic Fire Extinguisher)
- USM/Coriolis/RPD Meter With EVC
- AMR Device
- Gas Venting Pipe up to 3mtrs.
- Ball Valves
- Globe Valves

Skid Process:

- The systems are for Continuous operation
- The skid can be basically considered to be in 3 sections:
- Gas Filtration: Filtration of Gas up to 5 µ by Filter with 99% efficiency
- Pressure Regulation: Variable pressure at inlet of the skid will be regulated to required pressure at outlet.
- Metering: Meters are required to be installed as follows as per specifications.

Skid Sections

➢ Gas Filtration:

The system is having twin stream Filter arrangement for single-stage filtration (Each MRS Stream with one single stage Filter). The Filter is designed/ provided with 5-micron SS wire mesh. Filter Capacity shall be equal to or higher than regulator flow capacity.

Design and construction shall meet the requirements as per ASME Boiler & Pressure Vessel (BPV) Code, Section VIII: 2010. The filters shall be of vertical or horizontal design. Differential pressure indicator (clogging indicator) should be provided. The filters shall have purge, vent and drain connections with valve (with positive blind arrangement), should be suitably located and sized to ensure a safe blow down.

The drain line shall incorporate 2 valves (ball valve and globe valve) with enough gap between the valves to allow for safe drain operations. The drain valves shall be placed in such a manner that it is easier to access and operate them. Quick opening covers, but which cannot be removed while under pressure should be incorporated. All welded joints should be radio graphically examined and acceptance criteria should comply with ASME BPV Codes.

- Pressure Regulation:

The skid shall have two streams, each stream consisting of Pressure Regulating valves in active monitor configuration with Slam Shut off valve. The set pressures of PRVs, SSVs & safety valves, are adjusted as per the requirement. Pressure gauges are used at inlet & outlet of the skid for pressure indication.

Automatic switch over from active stream to the hot stand by stream should take place in the event of shut down of the active stream for any abnormal reason. Regulator should be proved as satisfactory pressure vessels by hydrostatic and pneumatic tests and test certificates should be provided by manufacturers / Third party Inspection agency appointed by BGL.

Pressure shut-off device should be provided to protect against excess downstream pressure at each stage of pressure regulation. Accuracy of slam shut operation should be as per the requirements of EN 14382: 2009 or better.

Relief valve should be provided to protect against downstream over pressure at low flows or in the event of seat malfunction. Creep relief valves shall not have a capacity larger than 1% of stream fault capacity.

The burst pressure of a diaphragm should be at least three times the maximum working differential pressure.

The regulator shall be marked with the details of Sr. No., Type, year of manufacture, flow range & flow at set outlet pressure, inlet pressure range, outlet

pressure range and set point, over pressure shut off range and set point, Lock-up pressures of each regulator, under pressure shut off range and set point, relief pressure range and set point, and orifice size. The details of Trips shall be submitted along with the Regulator and relief valve data sheets for approval from BGL before going ahead for assembling.

All pipe work and equipment must be capable of withstanding the maximum pressure & Min & Max temp resulting from a fault condition.

- Instrumentation and Control systems:

At MRS Inlet and Outlet, we are proposing to install the Pressure and Temperature transmitters and Slam shut off valve open and close condition proximity sensors, All Pressure and Temperature transmitters and SSV Limit switches shall have the Ex-d, PESO/CCOE, and ATEX Certification. Flow meter with Flow computer Shall dedicated communication either TCP/IP (or) RS-485 to RTU/SCADA.

Pipe work, Fittings & General Construction

MRS skid construction / fabrication, reinforcement pads, etc. shall meet the requirements of codes ASME B31.8: latest edition and or ASME BPV Code, Section VIII: latest edition. The design and assembly of all the equipment shall be such that there is no difficulty in the operation and maintenance of the same. The pipe size used in each pressure ranges of the MRS shall meet the minimum criteria of wall-thickness requirement and corrosion allowance corresponding to their pressure classes. The design calculations of the same shall be submitted for approval to BGL prior to commencing fabrication of the skid.

Pipe work and fittings shall be of seamless type and as per ASTM A106 Gr B: latest edition / API 5L Gr B: latest edition and ASTM A 234 Gr WPB: latest edition & ASTM A105: latest edition. All branch connections should be of weldolet type up to d\D ratio less than 0.3 and sweepolet type up to d\D ratio less than 0.6. All valves for pressure / vent, pressure gauge and bleed should have positive blind arrangement.

Welders and welding procedures have to be qualified in accordance with ASME BPV Code Section IX: 2010 / API 1104: latest edition. All the welded joints should be radio graphically examined and acceptance criteria should comply with ASME BPV Code, Section VIII: latest edition / API 1150#4: latest edition.

The direction of flow of gas in the piping system of the skid shall be indicated on the pipes on both the streams.

Painting shall be carried out by application of one coat (DFT 35-50 microns) of zinc phosphate primer followed by two coats (DFT 60 microns each) of chloro-rubber high build paint of color canary yellow. Before painting, surfaces shall be thoroughly cleaned by applying mechanical methods.

Tests

- Hydrostatic test: Hydrostatic test should be carried out up to the test pressure as detailed in the specific requirements. Wherever necessary, regulators, relief valves and similar components that have been tested independently should be removed from the line. Blind flanges or double flange pipes should be installed temporarily in their place. All small-bore connections and impulse lines should be disconnected and suitable plugs or blank flanges should be installed.
- Leakage Testing: Pneumatic testing using air or an inert gas should be undertaken on all installations and should include all equipment and associated small bore pipe work. Care must be taken to disconnect equipment, which might get damaged at the testing pressure. All joints, flanges and glands on valves and fittings should be tested for leakage with a suitable foaming fluid.
- Test Certificates: A record of all hydrostatic testing and pneumatic testing carried out should be prepared for every installation. A material test certificate for all components of BGL should be furnished at the time of inspection by third party / BGL representative. reserves the right to witness all the tests.

2. SPECIAL CONDITION OF CONTRACT (SCC)

GENERAL

- Special Conditions of Contract shall be read in Conjunction with the General Conditions of Contract, Specification of work, Drawing and any other documents forming part of this Contract wherever the context so requires.
- Notwithstanding the sub-division of the documents into these separate sections and volumes ever part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with in the Contract so far as it may be practicable to do so.
- Where any portion of the General Conditions of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, unless a different intention appears, the provisions of the Special Conditions of Contract of Contract shall be deemed to over-ride the provisions of the General Conditions of Contract and shall be the extent of such repugnancy, or variations, prevail.
- Wherever it is mentioned in the specification that the Contractor shall perform certain work or provide certain facilities, it is understood that the Contractor shall do so at his cost and the Value of Contract shall be deemed to have included cost of such performance and provisions, so mentioned.
- The materials, design, and workmanship shall satisfy the relevant Indian Standard, the Job Specifications contained herein and Codes referred to where the job specification stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied.
- In Conditions of Contract, Special Conditions of Contract, Specification, Drawings or Schedule of Rates, the following shall prevail to the extent of such irreconcilable conflict in order of precedence: case of an irreconcilable conflict between Indian or other applicable standards, General

i) Letter of Acceptance/ FOI along with Statement of Agreed Variations.
ii) Schedule of Rates as enclosures to Letter of Acceptance
iii) Special Conditions of Contract
iv) Drawings
v) Technical/ Material Specifications
vi) Instruction to Bidder
vii) General Conditions of Contract
viii) Indian Standards
ix) Other applicable standards

It will be the Contractor's responsibility to bring to the notice of Engineer-in-chargeany irreconcilable conflict in the contract documents before starting the work(s) or making the supply with reference which the conflict exists.

In the absence of any Specifications covering any material, design of work(s) the same shall be performed/ supplies/ executed in accordance with Standard Engineering Practice as per the instructions/ directions of the Engineer-in-charge, which will be binding on the Contractor.

GENERAL CONDITIONS

- VENDOR shall design a skid in such a way that all equipment's of the assembly shall be easily.
- VENDOR shall arrange the N_2 gas cylinder for SAT and commissioning of Pressure Regulating Skid at site in line with BGL approved Procedure. The Nitrogen supplied by the vendor for the SAT shall have a purity of minimum 98% or better.
- Functional testing of the skid shall be carried out as per the BGL approved functional testing procedure.
- Site acceptance test (SAT) shall be carried out by the VENDOR post completion of the fabrication work by the BGL pipeline laying contractor.
- VENDOR shall provide additional items that are used at the time of commissioning if required and same will be considered as a part of order and no additional cost will be paid by BGL.
- Sound pressure levels shall be limited to the values prescribed by Environmental Authorities but in no case it shall exceed 75 dbA when measured 1 meter from the equipment. VENDOR shall provide noise suppression treatment to limit the noise level.
- Any soft material used shall be able to retain its functional properties for minimum period of 18 months.
- VENDOR shall submit activity wise completion schedule (Bar Chart), within two week of award of order.
- VENDOR shall adopt standard operating policy for fabrication of the skid.
- All fasteners including washers to be used shall be hot dip galvanized.
- Hole tight / leak tight should not be used on threaded / flange joints. Stud nuts only are to be provided on flange joints. Stud/bolts shall be visually examined before installation to assure they are free from defects such as corrosion, damage threads etc. Nut-bolts with damaged threads should not be used. Check the length of the stud or bolt to avoid short bolting and excessive threads. Below mentioned table shall be followed for proper selection of stud length and bolt size. At least 4 threads of each stud shall be visible at either ends after proper tightening of the flanges.

Nominal Pipe Size	150 LB. Flanges			300 LB. Flanges		
	# Bolts or Studs	Dia of Bolts or Studs (inch)	Length of Stud (inch)	# Bolts or Studs	Dia of Bolts or Studs (inch)	Length of Stud (inch)
½	4	0.50	2 1/4	4	1/2	2 ½
¾	4	0.50	2 1/2	4	5/8	3

1	4	0.50	2 1/2	4	5/8	3
1 ¼	4	0.50	2 3/4	4	5/8	3 ¼
1 ½	4	0.50	2 3/4	4	3/4	3 ½
2	4	0.63	3 1/4	8	5/8	3 ½
2 ½	4	0.63	3 1/2	8	3/4	4
3	4	0.63	3 1/2	8	3/4	4 1/4
3 ½	8	0.63	3 1/2	8	3/4	4 ¼
4	8	0.63	3 1/2	8	3/4	4 1/2

- **VENDOR shall provide Copper jumper plate at all flange joints of the skid as per the dimensions given below-**

Nominal Pipe Size (mm/Inch)	150 Class Flange			300 Class Flange		
	Copper Strip length (mm)	Copper Strip Width (mm)	Copper Strip Thickness (mm)	Copper Strip length (mm)	Copper Strip Width (mm)	Copper Strip Thickness (mm)
15 (1/2")	115	25	3	125	25	3
20 (3/4")	120	25	3	145	25	3
25 (1")	120	25	3	145	25	3
40 (1 ½")	125	25	3	165	25	3
50 (2")	135	40	3	170	40	3
80 (3")	155	40	3	180	40	3
100 (4")	155	40	3	195	40	3
150 (6")	160	40	3	215	40	3
200 (8")	175	40	3	235	40	3
250 (10")	180	40	3	250	40	3
300 (12")	185	40	3	270	40	3

- **VENDOR shall provide 02 No's earthing provision at Base frame of the skids.**
- **VENDOR shall provide 02 No's earthing from flange to base frame each at inlet and outlet.**
- **VENDOR shall provide proper packing of all equipment, piping, appurtenances and styrene packing to safeguard all components of the skid**

during transportation.

- **Supply of Vent assembly for MRS is in VENDOR scope.**
- **The regulator shall be marked with the details of Sr. No., Type, year of manufacture, flow range flow at set outlet pressure, inlet pressure range, outlet pressure range and set point, over pressure shut off range and set point, Lock-up pressures of each regulator, under pressure shut off range and set point, relief pressure range and set point. The details of Trips shall be submitted along with the Regulator and relief valve data sheets for approval from BGL before going ahead for assembling.**
- The filters shall have purge, vent and drain connections with valve (with positive blind arrangement), should be suitably located and sized to ensure a safe blow down. The drain line shall incorporate 2 valves (ball valve and globe valve) with enough gap between the valves to allow for safe drain operations. The drain valves shall be placed in such a manner that it is easier to access and operate them.
- Vent assembly shall be supplied separately as per the attached typical drawing. Installation of tubing & connection with vent assembly in case of underground module is in VENDOR scope.
- In underground MRS vent assembly and MRS shall be connected with tubing.
- **Above ground MRS shall be supplied along with vent assembly, Transition Fitting, Inlet Valve, Outlet Valve, NRV at Outlet and canopy. In above ground MRS vent assembly and MRS shall be connected with piping.**
- **The above-mentioned data shall be scrutinized and evaluated by BGL during technical bid evaluation and the bidders who passes the above-mentioned criteria only will be processed further.**

The following performance characteristic curves should be

furnished: Outlet pressure v/s flow (for various inlet

pressures).

Inlet pressure v/s flow (for various outlet pressures).

➢ TERMS OF PAYMENTS

The Payment shall be made in the following manner subject to completion of all contractual requirements as per tender document.

The following shall be read in conjunction with Clauses of GCC (Goods)

- 100 % (Hundred percent) payment of the supplied portion along with freight including taxes & duties will be paid on receipt & acceptance of goods at FOT site after adjustment of PRS, if any along with submission of following documents: -
  i) Original Invoice in triplicate in compliance with GST law in force
  ii) Inspection Release note by Owner or his appointed or approved agency.

iii) Original GR / LR
iv) Packing List
v) Insurance cover note covering transit insurance
vi) Performance Bank Guarantee(s) of 10% of Contract Value. If already submitted, a copy of the same.
vii) Document related to Input Tax Credit (ITC) to be claimed by owner, if applicable.

- For FINAL BILL, following documents are to be provided:
  v) No Claim & No due Certificate
  vi) Statement of Completion
  vii) Extended BG period, in case supply is delayed beyond contractual time period

Note: Documents related to point no. v & vi shall be submitted in company letter head duly signed and stamped.

➢ **MODE OF PAYMENT**

All payments payable in Indian rupees against the contract shall be released by Owner Through online /RTGS/NEFT.

➢ **DEDUCTION AT SOURCE**

Purchaser will release the payment to the Seller after effecting deductions as per applicable law in force.
Purchaser will release payments by F&A Dept, BGL to the Contractor after offsetting all dues to the Purchaser payable by the Contractor under the Contract.

COMPENSATION FOR DELAY (PRICE REDUCTION /LIQUIDATED DAMAGES)

In case of delay in delivery of materials beyond contractually agreed delivery schedule, price reduction schedule will be applicable @0.5% of material value for the unsupplied portion per week of delay or part here of, subject to ceiling of 5% (FIVE PERCENT) of the total order value. For details, please refer relevant clause of GCC-Goods.

The value referred in PRS clause is excluding taxes & duties.

➢ **PERFORMANCE BANK GUARANTEE SECURITY DEPOSIT:**

Vendor shall submit SD / CPBG @ 10% of Contract/Order value within 30 days of award or Initial deposit of SD / CPBG @ 5% of Contract/Order value within 30 days of award and balance to be deducted against each RA bills till balance 5% is deducted/for supply, it is to be deducted from the invoice. This deducted amount can be released/deduction can be stopped against submission of bank guarantee of equivalent amount. The contract performance bank guarantee shall be valid 03(three) months beyond the expiry of Warrantee/Guarantee period. The Performance Guarantee shall be in form of either Demand Draft or Banker's Cheque or irrevocable Bank Guarantee and shall be in the currency of Contract (issued by any Indian Scheduled bank or a branch of an International

Bank situated in India and registered with Reserve Bank of India as Scheduled Foreign Bank).

However, in case of Bank Guarantee from banks other than the Nationalized Indian bank, the bank must be a commercial bank having net worth in excess of Rs. 100 Crores or equivalent US Dollars and a declaration to this effect should be made by such commercial bank either in the bank guarantee itself or separately on its letterhead.

BGL shall not be liable to pay any bank charges, commission or interest on the same.

Failure of the successful bidder to comply with the requirement of this clause shall constitute a breach of contract, cause for annulment of the award, forfeiture of the bid security and any such remedy the Owner may take under the Contract pursuant to GCC-Goods.

There is no exemption to MSEs including SSI units from submission of Security Deposit/ Contract Performance Bank Guarantee (CPBG).

- **REPEAT ORDER**

BGL reserves the right to place a repeat order within Six (12) months from date of purchase order for up to 50% of order quantities on same rate, terms and conditions.

- **PACKING, MARKING AND SHIPMENT**

The Seller, wherever applicable shall after proper painting, pack and crate all goods for sea/ air/ road/ rail transportation in a manner suitable to tropical humid climatic region in accordance with the internationally accepted practices and in such a manner so as to protect it from damage and deterioration, in transit by sea or air or road or rail and during storage at the storehouse. The Seller shall be held responsible for all damages due to improper packing. The Seller shall ensure sizing or packing of all oversized consignments in such a way that availability of carrier and/or road/rail route is properly taken into consideration.

- **INDEPENDENT SELLER**

It is expressly understood and agreed that Seller is an independent party and that neither the Seller/ its personnel are servants, agents or employees of Purchaser nor the Seller has any kind of interest in other sellers.

- **LIEN**

Seller shall ensure that the Scope of Supply supplied under the Agreement shall be free from any claims of title/ liens from any third party. In the event of such claims by any party, Seller shall at his own cost defend, indemnify and hold harmless Purchaser or its authorised representative from such disputes of title/ liens, costs, consequences etc.

- **LIMITATION OF LIABILITY**

Not with standing anything contrary contained herein, the aggregate total liability of Supplier under the Contract or otherwise shall be limited to 100% of contract value. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.

- **GOVERNING LAW**

Laws of India will govern the Agreement and Hyderabad courts will have exclusive jurisdiction on all Matters related to Agreement.

- **OWNER'S RIGHTS AND REMEDIES**

Without prejudice to Owner's right and remedies under Agreement, if SUPPLIER fails to commence delivery as per agreed schedule and/ or in reasonable opinion of the OWNER, CONTRACTOR is not in a position to make up the delay to meet the intended purpose, the OWNER may terminate the AGREEMENT in full or part at SUPPLIER's default and may get supplies from other sources at SUPPLIER's risk and cost.

- **Clause no. 16.0 of GCC shall be appended with the following :**

Bidder shall arrange Transit Insurance and the cost of which shall be borne by bidder. Quoted price shall be inclusive of the same.

- **FAILURE & TERMINATION CLAUSE**

Time and date of delivery shall be the essence of the contract. If the vendor/contractor fails to deliver the entire quantity of materials ordered/ complete the work or a part thereof within the contractual delivery/ completion period agreed to for such part or total quantity as per the delivery / time schedule or at any time repudiates the contract before the expiry of such period, BGL may without prejudice to any other right or remedy available to it recover damages for breach of the contract in any manner stipulated hereunder:-

(a) Recover from the vendor/ contractor an agreed amount to wards Price Reduction Schedule and not by way of penalty as um equivalent to1/2%(half percent) of the contract price of the whole unit per week for such delay or part thereof (this is a genuine pre-estimate of damages duly agreed by the parties) which the vendor/ contractor has failed to deliver within the period fixed for delivery in the schedule, where delivery thereof is accepted after expiry of the aforesaid period.

It may be noted that such recovery of PRS may be up to 5% of the contract price / of the total quantity of items of materials / equipment which the contractor has failed to deliver within the period fixed for delivery; or

(b) Purchase or authorise the purchase elsewhere on the account and at the risk of the contractor, of the materials not so delivered or others of a similar description, by serving prior notice to the contractor / supplier without cancelling the contract introspect of the instalment not yet due for delivery;

or

(c) Cancel the contract or a portion thereof by serving prior notice to the contractor and if so desired, purchase or authorise the purchase of the materials not so delivered or others of a similar description (where such materials exactly complying with particulars are not, in the opinion of the purchaser, which shall be final, readily procurable) at the risk and cost of the contractor. If the contractor had defaulted in the performance of the original contract, the purchaser shall have the right to ignore

his tender for risk purchases even through the lowest. Where the contract is terminated at the risk and cost of the firm under the provisions of this clause, if shall be solely upto the purchaser to exercise his discretion to collect or not, the security deposit from the firm, on whom the contract is placed, at the risk and expense of the defaulting firm.

(d) Where action is taken under sub-clause (b) or sub-clause(c) above, the contractor shall be liable for any loss which the purchaser may sustain on that account, provided the purchase or if there is an agreement to purchase, such agreement is made, in case of failure to deliver the materials within six months from the date of such failure and in case repudiation of the contract within six months from the date of cancellation of contract. The contractor shall not be entitled to any gain on such purchase and the manner and method of such purchase shall be at the entire discretion of the purchaser. It shall be necessary for the purchaser to give a notice of such purchase on the contractor.

(e) It may further be noted that clause (a) above provides for recovery of PRS on the cost of contact price of delayed supplies (whole unit) at the rate of 1/2% (half per cent) of the contract price of the whole unit per week for such delay or part thereof up to a ceiling of 5% of the contract price of delayed supplies thus accrued will be recovered by the paying authorities of the purchaser specified in the supply order, from the bill for payment of the cost of the material submitted by the vendor/ contractor in accordance with terms of supply order, or otherwise.

(f) Notwithstanding anything stated above equipment and materials will be deemed to have been delivered only when all its components, parts are also delivered. If certain components are not delivered in time the equipment and material will be considered as delayed until such time all the missing parts are also delivered.

- **PACKING:**

Packing size to be mentioned to ensure uniformity in delivery condition of the material being procured. Bidder shall submit the packaging details during QAP and also compiled with at the time delivery.

3. SCOPE OF WORK AND SUPPLY

- Installation of MRS supplied from the VENDOR is in BGL scope.
- Installation of PE Valves, Transition fitting, insulating joint and interconnection with the MRS is in BGL scope and will be installed at site by the pipeline laying contractor.
- Installation of Vent assembly for underground MRS is in BGL scope and will be installed at site by the pipeline laying contractor. Interconnection of Vent assembly with MRS is in VENDOR scope.
- Civil work of MRS ~~scope~~ is in BGL Scope.

QUALITY ASSURANCE

The VENDOR shall submit below tabulated documents after getting firm order from Owner for review and approval as per the requirement mentioned in the table. VENDOR shall be responsible for submitting of all drawings and technical documents including QAP to BGL for approval within 1 week after placement of order.

S.No.	Document	Requirement
Engineering		
1	P&I Diagram	BGL Approval
2	GA Drawing	BGL Approval
3	Skid Sizing Calculation Sheet for Inlet, Intermediate & Outlet	BGL Approval
4	Bill of Material	BGL Approval
5	Painting Specification	BGL Approval
6	WPS/PQR	TPI Approval
7	Operation & Control Philosophy	BGL Information
8	Operation, Installation & Maintenance Manual	BGL Information
Quality		
1	Quality Assurance Plan	BGL Approval
2	Factory Acceptance Test Procedure	BGL Approval
3	Functional Test Procedure	BGL Approval
4	Site Acceptance Test Procedure	BGL Approval
5	Hydro test Procedure	BGL Approval
Valves & Equipment's		
1	Screwed/SW Ball Valve data sheet (Below 2")	BGL Approval
2	Screwed/SW Globe Valve data sheet (Below 2")	BGL Approval
3	Ball Valve datasheet 2" & 3"	BGL Approval
4	Ball Valve datasheet for 4" and above	BGL Approval

5	Check Valve datasheet	BGL Approval
6	PRV (Monitor) + SSV datasheet	BGL Approval
7	PRV (Monitor) + SSV design calculation	BGL Approval
8	PRV (Active) datasheet	BGL Approval
9	PRV (Active) design calculation	BGL Approval
10	CRV datasheet	BGL Approval
11	CRV design calculation	BGL Approval
12	Filter datasheet	BGL Approval
13	Filter drawing	TPI Approval
14	Filter Mechanical design Calculation	TPI Approval
15	Differential Pressure Gauge datasheet	BGL Approval
16	Pressure Gauge datasheet	BGL Approval
17	Tubing datasheet	BGL Approval
18	Set pressure of each regulator, CRV and SRV	BGL Approval
19	Pressure Transmitter datasheet	BGL Approval
20	Temperature Transmitter data sheet	BGL Approval
21	Temperature Element and Thermo well Data Sheet	BGL Approval
22	Flow Meter data sheet	BGL Approval
23	EVC data sheet	BGL Approval
Civil & Structural		
1	Detail of Base Frame including size	BGL Approval
2	Civil Foundation drawing	BGL Approval
3	Name Plate	BGL Approval
4	Canopy Drawing & Specification	BGL Approval

- Prior dispatching of materials, VENDOR shall offer material lot to BGL representative for final acceptance test as per BGL approved QAP at their premise following for review of BGL representative at the time of final inspection at VENDOR premise AND only after receiving dispatch clearance from BGL, VENDOR shall dispatch the materials.

- The manufacturer is entirely responsible for the quality of the skid manufactured by them.

- All control checks prescribed in the BGL specifications do not relieve him of his responsibility.
- VENDOR shall submit below copies unless noted otherwise of each of the following:
- Inspection & test reports for all mandatory tests duly certified by BGL authorized TPI/representative after review/witness as per the applicable code as well as test reports for any supplementary tests, in nicely bound volumes.
- Material test certificates (physical property, chemical composition, make, heat

treatment report, etc.) as applicable for items in nicely bound volumes.

- Statutory test certificates, as applicable.
- Summary report which includes all the test as per QAP, TC/Report number, Observed values of tests.
- Two no's of dossier documents to BGL and 1 No along with MRS at site.
- Two no's of soft copy shall be forwarded to BGL with all details.
- VENDOR shall provide all testing report as mentioned in Quality Assurance Plan (QAP) for review during FAT. Also, all tests to be certified out during FAT shall be witnessed by TPI/ representative.
- VENDOR shall provide WPS & PQR before commencement of fabrication job for approval.
- VENDOR shall provide Purchase orders of bought out items along with all TCs.
- VENDOR shall procure bought-out items from approved VENDORs of BGL. If VENDORs of some of the bought-out items are not present in the approved list, then all their credentials and quality documents shall be submitted to BGL for approval prior to procurement.
- **Third Party Inspection Agency (TPIA) for document review/approval and inspection / witness at VENDOR premises is in Vendor scope. VENDOR shall issue inspection notifications to the BGL.**
  for all tests mentioned in the approved ITP/Approved by BGL. For any control test or examination required under the supervision of TPI/ representative, VENDOR shall be informed in writing 10 working days in advance to BGL for inspection date & place , Inspection agency along with production schedule.

MAINTENANCE DURING WARRANTY PERIOD

- VENDOR shall carry out free preventive maintenance activities during warranty periods. Periodicity shall be maintained as per BGL annual operation and maintenance plan during the warranty period.
- VENDOR shall carry out all activities at no cost to BGL, for preventive maintenance as per the standard procedure of BGL for planned maintenance of MRS.WARRANTY periods are defined as 12 Months from the date of commissioning of MRS (or) 18 months from the date of delivery of MRS, whichever is earlier.

Note:

- No additional charge will be paid during warranty period for free preventive maintenance services.
- Non-compliance to the periodicity mentioned against scheduled maintenance during warranty period AMC will be liable for penalty as per applicable penalty

terms.

- EIC/Representative shall give planning through written communication (e-mail) for preventive maintenance of MRS under warranty period well in advance. Preventive maintenance to be carried out within 15 days from the due date of preventive maintenance. In case there is delay in executing the maintenance, penalty of 10,000 INR will be levied by BGL. Any further delay of 7 days beyond 15 days is liable for additional penalty of 500 INR/day.

- Procedure for planned maintenance of MRS is available with site EIC.

SPARES MANAGEMENT

- Supply and installation of All (Electrical, Mechanical, Instrumentation, etc.) Spares and Consumables required for Routine, non-routine, breakdown & Emergency Operations of MRS along with related Accessories.
- Service Provider has to submit the list of spares which they are consuming for each scheduled Routine.
- Operation and service provider shall follow the schedule replacements irrespective of the condition of equipment. Payment shall be made after every service.
- Service provider shall change all the identified spares, Replacement of spares will be performed as per the OEM manual at the frequency mentioned in the OEM manual.
- Service provider shall carry all the required preventive, proactive and breakdown maintenances including supply of spares, repair kits, etc. at no extra cost to OWNER.
- Service provider need to define the replacement frequency of Spares as per OEM recommendation specified in O&M Manual in coordination with BGL and service provider need to continue to follow the replacement/maintenance frequency irrespective of the condition,
- Service provider shall Identify and maintain the Inventory required to operate the station Round the clock i.e. 24x7.
- Service provider shall Keep proper records for the spare parts and other consumables utilized during the O&M activities on daily/monthly /yearly basis and submit the details to BGL as and when required.
- The Service Provider shall advise Owner promptly if any correspondence/ warranty claim may be taken up with the supplier of any of the equipment installed in the Plant or a claim may be made under any warranty claim.
- The Service Provider shall be solely responsible for procuring and maintaining consumables spares for routine and preventive maintenance viz. Electric heater coils,

Water bath controllers, gas filters, grease, O-rings for filters etc. to be available on round the clock basis at site.

- During the execution of the contract service provider must allow BGL to verify the availability of Spares required for Planned & Breakdown Job.

- Inventory: Service provider has to submit the list of Inventory which they have been maintaining with in the location to maintain the machines as per Service Level Agreement uptime.

SPARES LIST

- The spare parts required in the warranty period should be supplied free of cost. Also, a separate detailed list in addition to the spare parts mentioned below for the requirement of spare parts after the warranty period should be submitted along with the rates. However, BGL may or may not or defer the purchase of spare parts.

Following are the minimum spare parts required but not limited to;

- **Regulators: Standard spare kit containing diaphragms springs, 'O' rings and gaskets.**
- **Slam shut valve: Standard spare kit containing diaphragms, springs, 'O' rings and gaskets.**
- **Relief valve: Standard spare kit containing diaphragms springs, 'O' rings and gaskets**

10% of the overall contract value or cumulative invoice value whichever is lower. The penalties deducted in excess of 10% of cumulative final bill/invoice value shall be adjusted & reimbursed to the contractor along with the final bill.

Note: Any noncompliance to applicable statutory and legal requirements may lead to termination of services or contract subject to discretion of BGL.

DOCUMENTATION REQUIRED (MINIMUM 3 SETS)

Vendor shall furnish the complete set of documents in hard copy.

- Performance specification and test certificate.
- Construction drawings, material specifications and technical data sheets. (In English language only)
- Instructions and recommendations regarding installation, operation, and maintenance of all the components of the unit.
- Parts list.
- Material test certificate for all the pipe and fittings material.

- Hydrostatic & pneumatic test certificate.
- Confirmation of weight of the skid.

PERFORMANCE AND INSPECTION

Adequate data on capacity, rangeability, lock-up, minimum and maximum operating pressure differentials, dynamic performance characteristics and predicted noise level emissions, set points of slam-shut valve, relief valve, active and monitor regulators, etc., should be given by the manufacturer in order to determine the performance of the regulators under various operating conditions. Results of such tests carried out by the manufacturer to determine operational performance and thereby confirm these design data.

Manufacturing Test Certificates (MTC) for all components / parts, NDT results, Welding Procedure Specification (WPS), Welder's Performance Qualification Record (WPQR), Welding Procedure Qualification Record (PQR), etc., should be made available prior to offering the complete skid for witnessing the performance testing by BGL / Third party Inspection agency appointed by BGL.

The final performance test of complete skid shall be carried out in presence of BGL third party inspecting agency / BGL representative before accepting the skid and giving clearance for dispatch. Inspection shall be carried out by VENDOR appointed TPI & charges shall be borne by VENDOR. Inspection is to be carried out as per the inspection plan stated below.

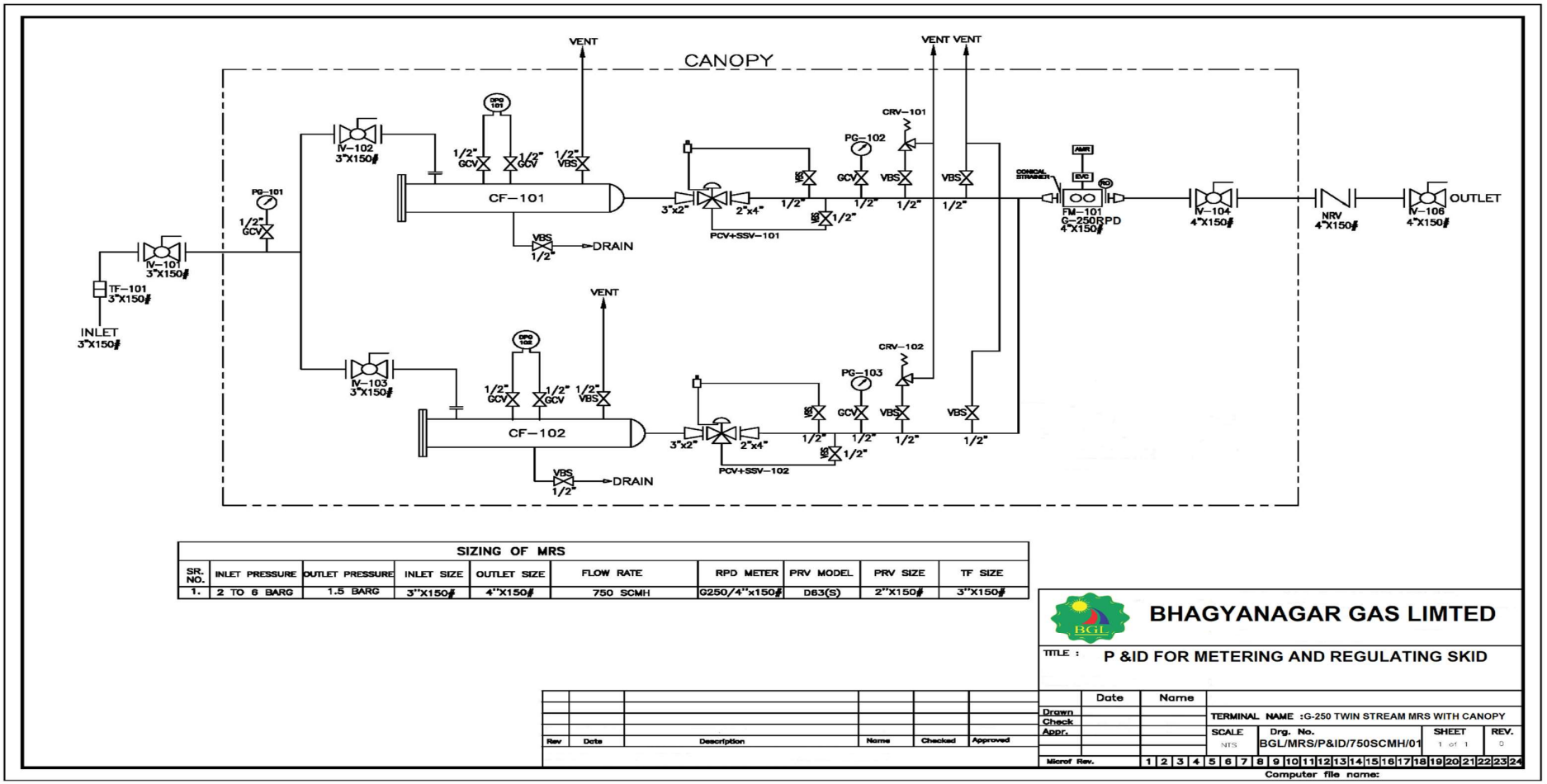
4. DELIVERY SCHEDULE

The delivery of the items location wise is as per the Material Requisition. The Vendor to arrange transportation of these materials from the vendor shop to designated locations of BGL yard in respective cities. No extra payment shall be made for the transportation and deemed to be included in the quoted price. Bidder to deliver the material sat all locations as per the quantity estimated.

Delivery of the MRS will be done within 60-90 days from the date of Fax of Acceptance (FOA)/ Purchase Order (PO) as mentioned in Time Schedule.

5.TECHNICAL DATA & SPECIFICATIONS

Annexure -1 : Typical MRS P&ID
Annexure -2 : MRS QAP
Annexure -3 : Technical specifications for RPD meter
Annexure -4 : Data sheet for PG & TG
Annexure -5 : Data sheet for PT & TT
Annexure -6 : Technical notes for valves
Annexure -7 : Data sheet for flanges and fittings
Annexure -8 : Technical Specification and Data Sheet for Valves
Annexure -9 : Data sheet for Swing Check Valve
Annexure -10 : Data sheet for Pressure Regulating Valve
Annexure -11 : Data sheet for Slam Shut Valve
Annexure -13 : Data sheet for Pressure Safety Valve
Annexure -14 : Data sheet for Creep Relief Valve
Annexure -15 : Data Sheet for Filter
Annexure -16 Stud, Nut : Piping Material Specification for Steel Pipeline, Valve, Fittings, Flange, Gasket,
Annexure -17 : Data Sheet for Painting
Annexure -18 : Technical specifications of Point type IR Gas Detectors
Annexure -19 : Factory Acceptance Test Procedure for Natural Gas Metering & Pressure Reduction Skid
Annexure -20 : Site Acceptance Test Procedure for Natural Gas Metering & Pressure Reduction Skid
Annexure -21 : Hydrotest Procedure for Natural Gas Metering & Pressure Reduction Skid
Annexure -22 : Technical Specification for CRCA Canopy for MRS Skid
Annexure -23 : Contractor Scope of Work for Planned Maintenance of MRS
Annexure -24 : Approved Vendor List



SIZING OF MRS

SR. NO.	INLET PRESSURE	OUTLET PRESSURE	INLET SIZE	OUTLET SIZE	FLOW RATE	RPD METER	PRV MODEL	PRV SIZE	TF SIZE
1.	2 TO 6 BARG	1.5 BARG	3"X150#	4"X150#	750 SCMH	G250/4"x150#	D83(S)	2"X150#	3"X150#

		Quality Assurance Plan (Metering & Regulating Station)						Doc No: Rev: 00 Date: CLIENT: BHAGYANAGAR GAS LIMTED			
SR No	Component & Stage	Characteristic	Type of Check	Quantum of Check	Reference Standard / Documents	Acceptance Standard / Documents	Format of Records	Inspection By			Remarks
								M	TPI		
1	**Drawings & Calculations**										
1.1	P & ID, GAD, Canopy Drawing BOM, QAP, Equipment Data Sheet, Mchanical Datasheets, Instruments Datasheet, Hydrotest Procedure, FAT, Name Plate	Complete Skid	Submittals	100%	Technical Spec. and Datasheets	Approved Datasheet	Mfrs Format	P	RF	A	--
1.2	Filter Data Sheet and Design Documents	Design and calculations	Submittals	100%	Technical Spec. and Datasheets	Approved Documents	Mfrs Format	P	A	V	--
2	**Incoming Material Identification of Brought out Items**										
2.1	Ball valves, Globe Valves & Check Valve	Material TC for valves	Chemical Test	Per Heat No.	ASTM A370	Approved Data Sheet	Inspection Report 3.1	P	R	R	--
			Physical Test (Tensile, Yeild, Elongation, Hardness Test)	Per Heat No.							
			Impact Test	Per Heat No.							
		Dimension- Size, Rating	Visual, Measurement	100%	Approved Datasheet	Approved Data Sheet	Inspection Report 3.1	P	R	R	--
		Radiography (For casting)	Test	100%	ASME B16.34 Appendix I	ASME B16.34 Appendix I	Inspection Report	P	R	R	--
		UT (For Forging)	Test	100%	ASME B16.34 Appendix I	ASME B16.34 Appendix I	Inspection Report	P	R	R	--
		Hydro Body Test	Leak Test	100%	Approved datasheet / API6D / API 598	1.5 X Design Pressure For 800# = 207 kg/cm2 For 150# = 28.5 kg/cm2 For 150# = 73.5 kg/cm2 Holding Time shall be as per thestandard	Inspection Report 3.1	P	R	R	--
		Hydro Seat Test	Leak Test	100%	Approved datasheet / API6D / API 598	1.1 X Design Pressure For 800# = 151.8 kg/cm2 For 150# = 20.9 kg/cm2 For 150# = 53.9 kg/cm2 Holding Time shall be as per the standard	Inspection Report 3.1	P	R	R	--
		High Pressure closer seat test	Leak Test	100%	Approved datasheet / API6D / API 598	Approved datasheet / API6D /API 598	Inspection Report 3.1	P	R	R	--

		Low Pressure (Air) closer (seat) test at 7 Kg/cm2	Leak Test	100%	Approved datasheet / API6D / API 598	at 7 Kg/cm2 pressure, holding time shall be as per the standard	Inspection Report 3.1	P	R	R	--
		Back seat test	Leak Test	100%	Approved datasheet / API6D / API 598	Approved datasheet / API6D / API 598	Inspection Report 3.1	P	R	R	Not Applicable for Check Valves
2.1	Ball valves, Globe Valves & Check Valve	High Pressure Pneumatic Shell Test	Leak Test	100%	Approved datasheet / API6D / API 598	1.1 X Design Pressure For 800# = 151.8 kg/cm2 For 150# = 20.9 kg/cm2 For 150# = 53.9 kg/cm2 Holding Time shall be as per the standard	Inspection Report 3.1	P	R	R	--
		External Leak test at 7 kg/cm2	Leak Test	100%	Approved datasheet / API6D / API 598	at 7 Kg/cm2 pressure , Holding time shall be as per the standard	Inspection Report 3.1	P	R	R	--
		Fire Safe Test	Type Test	100%	Approved datasheet / API6D / API 598 / API 6FA	Approved datasheet / API6D / API 598 / API 6FA	Inspection Report 3.1	P	R	R	--
		Double Block & Bleed Test for 4" and above	----	100%	Approved datasheet / API6D / API 598	Approved datasheet / API6D /API 598	Inspection Report 3.1	P	R	R	--
		Anti Static Test (as Applicable)	----	100%	Approved datasheet / API6D / API 598	Direct current <12V and resistance on dry valves shall not exceed 150# ohms	Inspection Report 3.1	P	R	R	--
		Operational Torque Test (As applicable)	----	100%	Approved datasheet / API6D / API 598	Breakaway torque or thrust shall not exceed 360 N (80 lbf)	Inspection Report 3.1	P	R	R	--
		Functional (Open/Close operation for flange end valves)	Minimum 150# cycles	100%	ASME B16.34 / API 598	ASME B16.34 / API 598	Inspection Report	P	W	V	--
2.2	Pipe, Pipe Fitting, Flanges for Interconnecting Piping & Fastners	Material TC, Size & Dimension	Chemical Test	Per Heat No.	Data Sheet, ASTM A370, ASME B16.5 & B16.20, ASTM A320 & ASTM A193 B7 & ASTM A194 2H	Pipe: ASTM A150#6 Gr. B Flanges: ASTM A150#5 Pipe Fittings: ASTM A234 WPB Fastners: ASTM A193 B7 & ASTM A194 2H	Inspection Report 3.1	P	R	R	--
			Physical Test (Tensile, Yeild, Elongation, Hardness Test)	Per Heat No.							
			Impact Test	Per Heat No.							
2.3	Pipe Fittings and Flages NDT	Test Certificates	UT (Surface)	100%	ASME SEC V	SEC. VIII DIV. 2	Inspection Report 3.1	P	R	R	
			MPT (Bevel Ends)	100%				P	R	R	
			DPT (Bevel End for 50 mm. width)	100%				P	R	R	
2.4	Pressure Gauges , Differential Pressure Gauge	Calibration, Accuracy, Range, Size, End connection	Visual, Measurement checks	100%	As per BGL Datasheet	As per BGL Datasheet	Inspection Report 3.1	P	R	R	--
		Material TC	Chemical & Physical Test	Per Heat No.							

2.5	Gaskets	Size & Dimension	Visual Measurement	100%	As per BGL data sheet / Specification, ASME B16.20	As per drawing and data sheet, ASME B16.20	Inspection Report 3.1	P	R	R	--
3	**Equipments**										
3.1	Filter	Raw Material -Material TC, Size & Dimension	Chemical Test	Per Heat No.	ASTM A370	As per Filter Data Sheet	Inspection Report 3.1	P	R	R	--
			Physical Test (Tensile, Yeild, Elongation, Hardness Test)	Per Heat No.							
			Impact Test	Per Heat No.							
3.2		WPS & PQR	Welders Qualification & Welding	150#0%	As per ASME Sec. IX,Article II, Follow QW 200.1, QW 482 for WPS & QW 483 (PQR) or API 1150#4	As per ASME SEC. IX	WPS / PQR from Record	P	R	R	--
3.3		In Process Inspection	Fit Up	150#0%	Approved Drawing	Approved Drawing and Standards	Internal Reports	P	R	R	--
3.4	Filter	DP test on Fillet Welds	Surface Defects	100%	As per ASME SEC. V	As per ASME SEC. VIII Div: 1	Inspection Report	P	R	R	--
3.5		Radiography after Final Weld	Soundness of weld joints	100%	As per ASME SEC. V	As per ASME SEC. VIII Div: 1	Inspection Report	P	R	R	--
3.6		Visual & Dimensional Check of Filter & Fiter Element	Surface finish & Dimensions	100%	Approved Drawing	Approved Drawing	Inspection Report	P	W	R	--
3.7		Hydro Test (4 hours Holding time)	Strength of weld joints	100%	Approved Procedure, 1.5 times of Design Pressure for 04 Hrs. / ASME Sec VIII, Div. I, UG 99.	Approved Procedure, 1.5 times of Design Pressure for 04 Hrs. / ASME Sec VIII, Div. I, UG 99.	Inspection Report	P	W	V	--
4	**Welding, NDT & Testing for Interconnecting Piping**										
4.1	WPS / PQR	Welders Qualification & Welding	Welders Qualification & Welding	100%	ASME Section IX,Article II, Follow QW 200.1, QW 482 for WPS & QW 483 (PQR) or API 1150#4	As per ASME Sec. IX / ASME Sec B31.8	WPS / PQR from Record	P	R	R	--
4.2	In Process Inspection	Fit Up	Fit Up	100%	Approved Drawing	Approved Drawing and Standards	Internal Reports	P	R	R	--
4.3	Liquid Penetrant Examination (DPT / LPT)	On Fillet Welds	Surface weld defects	100%	ASME Sec V	ASME Sec. B 31.3	Inspection Report	P	R	R	--
4.4	Radiography Test of Butt Weld Joints	To identify internal surface defects	Soundness of weld	100%	ASME Sec V	ASME Sec. B 31.3	Interpretation Report - Review of Report	R	R	R	--
4.5	Hydro Testing of Interconnecting Piping	Hydro Test of weld joints	Strength of weld joints	100%	Approved Procedure, At 1.5 times of Design Pressure for 04 Hrs.	Approved Procedure, At 1.5 times of Design Pressure for 04Hrs.	Inspection Report	P	W	V	--
5	**Mfg. Of MPCV+SSV , APCV & CRV**										
5.1		Material TC for Body & Trim	Chemical Analysis & Physical Test	100%			MFR's TC	P	R	R	--

5.2	MPCV+SSV , APCV & CRV	Dimension - Size, Rating, End Connections	Visual Measurement	100%	Approved Data Sheet	Approved Data Sheet	MFR's TC & Reports	P	W	R	--
5.3		Body Hydro Test as per Standard	Leak Test	100%			Reports / MFR's TC	P	W	R	--
5.4		Set Point	Visual Measurement	100%			Reports / MFR's TC	P	W	R	--
5.5		Seat Leak Test	Visual Measurement	100%			Reports / MFR's TC	P	W	R	--
6	**Final Inspection test / Final Acceptance (FAT) of Skid Assembly**											
6.1	Final Dimensional / Visual Inspection	Complete Skid	Visual Inspection	100%	Approved P&ID & GAD, Drawing of Canopy	Approved Drawings	Inspection Report	P	W	V	--
6.2	Painting of complete Skid	1) Surface preperation: as per SA 2.5 2)Galvanizing as per ASTM A153	Visual	100%	Surface Preparation	Surface Preperation & Hot dip galvanized as per approved Painting Procedure	Inspection Reports	R	R	R	--
		3)Check total DFT at Random location	Final DFT Measurement & Visiual Color Code Verification Approved Vendor		Visual Color Code Verification & DFT check as per Approved Painting Spec.	Painting as per BGL Approved painting procedure		P	W	V	--
6.4	Verification of material from approved vendor of equipments	Each Material (Valves, Pipes, Pipe fittings, Flanges, Filter, Gasket, Fastners etc.)		100%	Approved vendor list of	Approved vendor list of	Inspection	P	V	V	--
6.6	Factory Acceptance Test	Pneumatic Test	No leakage from bolted & Screwed joints	150#0%	Approved FAT Procedure	Pneumatic Test @ 7 Kg/cm2, Holding time 30 minutes	FAT Report	P	W	V	--
7	**Final Documentation**											
7.1	Design & Calculation, Material Compliance Report as per EN 150#204 3.1, Calibration certificate, GAD and P&ID, Final FAT report, NDT Reports, Hydro & Pneumatic Test reports	History Docket	Verification of Records	150#0%	Approved Specifications	As per Approved Specifications	History Docket	P	R	R	--

Prepared By	Checked By	Verified By	Approved By

M : Manufacturer, P : Performer, R : Review, Rf : Reference, A : Approval, RW : Random Witness, V - Verification, W – Witness

TECHNICAL SPECIFICATIONS FOR RPD METER

1. *GENERAL*

BHAGYANAGAR GAS LIMTED (BGL) is in business of distributing natural gas to industrial, domestic, commercial and CNG stations in various cities across India. The intent of this specification is to establish minimum requirements to manufacture and supply of Commercial meters for supplying natural gas to commercial customers.

This document covers the technical specification for the procurement of RPD meter, EVC with GSM modem and other accessories used for accurate measurement of natural gas for distribution systems. It describes the general requirements, controls, tests, QA/QC examination and final acceptance criteria which needs to be fulfilled.

All codes and standards for manufacture, testing, inspection etc. shall be of latest edition.

Owner reserves the right to delete or order additional quantities during execution of order, based on unit rates and other terms & conditions in the original order.

2. ***SCOPE***

For this specification the following definitions shall apply:

OWNER/ CLIENT:	BHAGYANAGAR GAS LIMTED (BGL)
VENDOR/BIDDER:	The person(s), firm, company, organization from whom Client / Contractor procures materials
TPIA:	Third Party Inspection Agency to be appointed by Vendor/ Contractor for inspection of brought out items
EIC:	Engineer – in – charge
EVC	Electronic Volume Corrector
GSM	Global system for Management

3. *MATERIAL*

The material used for the manufacturing of EVC shall be of polycarbonate type and non-corrosive in nature.

4. *SERVICE LEVEL AGREEMENT*

In case Vendor has to repair EVC in their premise or OEM, they should ensure repairing is completed within 03 months and put it back in operation

5. *INVENTORY*

For ensuring continuity in metering with immediate replacement in minimum inventory of 1 Nos. of EVC or 5% of total commissioned EVC, whichever is higher should be available with Vendor all the time for immediate replacement. Bidder should submit the monthly report on the inventory to BGL giving the status on inventory. reserves the right to check the inventory at any point of time.

6. Quality Assurance

The Contractor/Manufacturer /Vendor shall submit QAP after getting firm order from Owner for their review and approval. Prior to dispatching of materials, vendor shall offer material lot to TPIA/Owner for final acceptance test as per approved QAP at their premise following for review of TPIA / EIC at the time of final inspection at vendor premise prior to dispatch of materials

7. *INSPECTION / DOCUMENTS*

Inspection shall be carried out as per Owner Technical Specification/Approved QAP at the works of manufacturer.

Owner Representative/EIC/TPIA shall carry out final inspection at vendor premise before dispatching of materials.

Manufacture / Vendor shall furnish all the material test certificates, proof of approval / license from specified authority as per specified standard, if relevant, internal test / inspection reports as per Owner Tech. Spec. & specified code for 100% material, at the time of final inspection of each supply lot of material. All the codes / documents shall be made available for reference of TPIA at the time of inspection.

Review of calibration certificates for all the measuring instruments at the time of inspection i.e. used for checking & testing along with the master calibration certificate of the measuring instruments from which the instruments is calibrated.

For any control, test or examination required under the supervision of TPIA/Owner/Owner's representative, latter shall be informed in writing one (1) week in advance by vendor about inspection date and place along with production schedule.

Manufacturer / Vendor shall hire TPIA from approved TPIA list of BGL for production witnessing and testing as per approved QAP of BGL.

Even after third party inspection, Owner reserves the right to select a sample of meters randomly from each manufacturing batch & have these independently tested. Should the results of these tests fall outside the limits specified in Owner technical specification, then Owner reserves the right to reject all production supplied from the batch.

8. *DOCUMENTS OF PRECEDENCE*

In case of conflict between the requirements of this specification and that of the referred codes, standards and specifications, the requirements of the referred codes, standards and specifications shall govern.

9. DATA SHEET FOR RPD METER

S.No.	Description	Specifications
1	Material	The material used for the manufacturing of RPD meters should be aluminium or any other compatible material which can cater the load of designed pressure and protect the corrosion. *Note: Ductile Iron is not acceptable as material of construction for meter.
2	Spare Parts	Vendor shall provide the list of spares all required for the maintenance and repair of the meter
3	Design Pressure	Meter shall be manufactured in line with the below given pressure requirements: 1. Max 19 Bar (g)- 150# (ANSI 150) 2. Max 49 Bar (g)- 300# (ANSI 300) 3. Max 99 Bar (g)- 600# (ANSI 600)
4	Operating pressure range	1. 0.5 to 16 bar (g) for 150# 2. 17 to 40 bar (g) for 300# 3. 41 to 75 bar (g) for 600#
5	Pressure Test	Pressure test shall be carried out as per the design pressure of meter in line with the relevant standard and vendor shall submit the pressure test certificate for the same. Owner representative/Third party inspection Agency shall witness finish goods testing as per the approved QAP.

<table>
<tr><td>6</td><td>Accuracy of meter</td><td>Meter shall be designed with accuracy class # 1, in line with EN12480
as detailed in table below:
<table>
<tr><th>Q(m3/h)</th><th>Permissible error</th></tr>
<tr><td>Qmln <= Q <Qt</td><td>(+/-) 2%</td></tr>
<tr><td>Qt<= Q<Qmax</td><td>(+/-) 1%</td></tr>
</table></td></tr>
<tr><td>7</td><td>Rangeability</td><td>Meter shall have minimum Rangeability as described in table below:
<table>
<tr><th>G- size</th><th>Rangeability</th><th>Q_{min} (ACMH)</th><th>Q_{max} (ACMH)</th></tr>
<tr><td>RPD G16</td><td>1:100</td><td>0.25</td><td>25</td></tr>
<tr><td>RPD G25</td><td>1:100</td><td>0.40</td><td>40</td></tr>
<tr><td>RPD G40</td><td>1:100</td><td>0.65</td><td>65</td></tr>
<tr><td>RPD G65</td><td>1:100</td><td>1.00</td><td>100</td></tr>
<tr><td>RPD G100</td><td>1:100</td><td>1.60</td><td>160</td></tr>
<tr><td>RPD G160</td><td>1:100</td><td>2.50</td><td>250</td></tr>
<tr><td>RPD G250</td><td>1:160</td><td>2.50</td><td>400</td></tr>
<tr><td>G400</td><td>1:160</td><td>4.06</td><td>650</td></tr>
<tr><td>G650</td><td>1:160</td><td>6.25</td><td>1000</td></tr>
</table></td></tr>
<tr><td>8</td><td>Flange to flange connection</td><td>In general flange to flange distance for individual G-size meter shall be
as per table below:</td></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>G-Size of meter</th><th>Q_{max} (ACMH)</th><th>DN Size</th><th>Flange to flange size</th></tr>
<tr><td>G16</td><td>25</td><td>50</td><td rowspan="5">171mm</td></tr>
<tr><td>G25</td><td>40</td><td>50</td></tr>
<tr><td>G40</td><td>65</td><td>50</td></tr>
<tr><td>G65</td><td>100</td><td>50</td></tr>
<tr><td>G100</td><td>160</td><td>80</td></tr>
<tr><td>G160</td><td>250</td><td>80</td><td rowspan="3">241 mm</td></tr>
<tr><td>G250</td><td>400</td><td>100</td></tr>
<tr><td>G400</td><td>650</td><td>100</td></tr>
<tr><td>G650</td><td>1000</td><td>150</td><td>*450mm</td></tr>
</table>
* In case of any other sizes, vendor to furnish the same.</td></tr>
<tr><td>9</td><td>Facing and Finish</td><td>150# / 300 # /600# RF Finish/ANSI</td></tr>
</table>

150#	Marking	Each meter shall have name plate placed with below details. Vendor shall ensure that marking are as per CCC/MID/CN 124000. Name plate should not be affected by external factors like corrosion 1. Make 2. Model 3. Serial No. 4. Pressure Range 5. Temperature Range 6. Flow Range 7. Qmin,Qmax,Qt 8. Manufacturing year 9. Flow direction 10. Class 11. Size 12. Impulse rate or K factor 13. Compliance to standard 14. Cyclic volume
11	Gas Type	Natural Gas
12	Applicable standard	EN12480
13	Area Specification	IEC , Zone 1, Gr. IIA, 11B, T3 Vendor to provide the certification for the same
14	Pressure drop across meter	Vendor to furnish calculation for pressure drop. The pressure drop calculation shall be approved by
15	Differential pressure at Max flow	Vendor to furnish
16	Temperature range	-20 to 55 deg C (as per EN 12480)
17	F low Range	Vendor to furnish
18	Typical start flow	Vendor to furnish
19	Indication accuracy	Accuracy Class #1
20	Linearity	(+/- 0.5%)
21	Repeatability	(+/-0.1 %)
22	Compressibility factor	2.09-0.99

23	Over ran ge protection	Meter shall have over range protection of at least 120% maximum flow. Suitable flow restrictor should be provided to limit the gas velocity flowing thru the meter and preventing the meter damage in case of excessive flow
24	Calibration Certificate	Vendor shall ensure the meter is calibrated with air at atmospheric condition and meets the rangeability, linearity and repeatability requirement. Master shall have been calibrated at flow rates as defined below : Qmin, 0.25 Qmax, 0.5 Qmax, 0.75 Qmax, Qmax (5 Point Calibration)
25	Calibration requirements	Vendor shall provide the details for calibration requirements of the meter: 1. Recommended periodicity for the calibration 2. Volume based frequency If any recommended by OEM
26	Model No. of Meter and Pulsar	Vendor to furnish
27	Pulsar	Vendor to furnish details for both HF and LF pulsar Vendor shall ensure that RPD meter is compatible with any make EVC via LF/HF pulsar Necessary cables with connector to be provided with meter to connect EVC with meter Meter should be compatible to give correct pulses (no excess/ short pulses) to be conveyed to EVC. Pulse values shall normally be expressed in the form of "1 IMP = _ m3" (*as per EN12480)
28	Enclosure	IP 66 or better
29	Cable Entry	½" NPTF
30	Installation	Horizontal/Vertical (*vendor to quote both the alternative)
31	Corrosion control	Vendor shall ensure that the meter internals/externals are Non-corrosive and field proven in respect to design, material and Application

32	Impeller and Impeller shaft	High grade Alloy steel, Synthetic Elastomer or Extruded Aluminium Alloy
33	O-Rings / Gaskets	Synthetic Elastomer
34	Magnetic coupling	Hard Ferrite Ceramic Magnet
35	Timing and reduction Gears	Steel Alloy/Steel
36	Rotor	Aluminium
37	Bearing	SS 316/ High Carbon Steel
38	Other wetted Parts	SS 316
39	Studs/Bolt	To be provided by bidder
Power, Counter and Others		
40	Power Supply	From battery operated EVC/Volume correctors
41	Cable Entry	½" NPTF
42	Output	Pulses
43	Enclosure	NEMA 4 & 7 or any equivalent standard
44	Sealing	Meter shall have proper manufacturing / calibration seal on index head and meter body. The meter body shall have suitable provision for wire sealing with an objective to ensure meter internals are not accessible without tampering / breaking of wire seal. Mechanical counter to be made intact with meter body through wire seal
45	Security	Meter Counter/index head shall have facility to provide the output to EVC/Modem in case of the un-authorized opening of counter. Detailed specification shall be provided by vendor.
46	Intrinsically safe	Vendor to furnish the certification
47	Counter Mounting	Inside of Meter

48	Local Mechanical Counter	Local mechanical counter should indicate the volume of the measured gas in cubic meters at metering conditions without any formula or correction. It shall have minimum 8 digits & unit of measure should be m3 and marked on index plate. The meter index should be weather proof to IP 66 and UV protection certificate should be available
49	Index of meter	Oriented as per EN12480 or relevant standard with IP 66 or better rating. The meter index should be flexible for orientation for the purpose of ease in meter reading
50	Cover of index	UV resistant (number plate should be fixed inside the counter)
51	Pressure Tap	¼" NPT. Inbuilt in meter(*As per EN 12480)
52	Temperature Tap	Inbuilt in meter(*As per EN 12480} Tapping dimensions shall be according to ISO 228-1, G1/2 *Vendor shall provide the thermo well with meter
53	Lubricator with accessories	500 ml of suitable oil with each meter and all necessary accessories. Bidder shall provide the specification of oil. Oil indicator should be available on meter body for both mounting option (Vertical and horizontal)
54	Meter coating	Coating & painting of the body (*as per EN 12480)
55	Flow restrictor	Vendor to furnish the detail
56	Adherence certificate	Meter shall have valid type test certificate or MID certificate complying to EN 12480 issued by DVGW, NMI, PTB, LNE, FCRI or other certifying/approving bodies notified by European Commission Meter shall have valid certificate of approval issued by department of legal metrology (Government of India)
57	Other Documents	Manufacturer's calibration certificate, warranty certificate, Operation & maintenance Manual, product Brochure(with each meter), Legal Metrology Certificate
58	Protection against RF/FM Interference	The meter shall have proper protection against RF/FM interference

59	Warranty	All meter parts shall be warranted for 18 months from supply or 12 months from commissioning date whichever is earlier.
60	Others	Meter testing should comply to Annexure A,B and C of EN12480 Manufacturer shall furnish Cv values, Torque data, weight and selected meter model along with GA drawing and QAP for approval of before commencing supplies.
61	Packaging	Appropriate material and method shall be used for packing to protect the material from damage during transportation. All necessary markings like normal position, handle with care etc shall be mentioned on package

10. *DATA SHEET FOR GSM*

S.No.	Description	Proposed specification
1. General Specification		
		5 V to 15 V (DC}; 400mA average@ 5 V, 1A peak@ 5 V
		Antenna connection type : SMA Jack
1.1	Power Requirements	Serial connector: RS232 SUB
		Power connector: 2.5 mm miniature power jack
		SIM receptacle: Vendor to specify SIM slot as Macro/Micro/Nano
1.2	Operating temperature and Range	0 to 60 Deg C (Earlier it was 150# to 50 deg C)
1.3	Material	Polycarbonate
1.4	Certifications	ATEX approval , for hazardous installation
		Intrinsically safe
		CE mark
		EMC : FCC part 2, 15, 22, 24, EN 55055 & EN 55024
		Safety: UL 60950, EN 60950
1.5	Make	Vendor to Furnish
1.6	Model	Vendor to Furnish
2. Electrical Characteristics		
2.1	Switching GSM modem	The device is permanently powered (when connected to the external

		ON/OFF power supply)
2.2	Over & Under Voltage	Vendor shall specify the guaranteed working parameters
2.3	LED Indicators	TD, RD, CD, LS, TR and PWR for different functions and any other additional functions shall be provided.
2.4	Standards	Dual band extended GSM 900MHz Class 4(2 W) and GSM 1800/1900MHz Class 1(1 W), GPRS support
2.5	Interface	Serial Interface RS232 V.24/V.28 autobauding function, At command set based on V.25 ter and GSM 07.05 & 07.07
2.6	Data	Asynchronous 2400, 4800, 9600 and 14400 bps.
		Data transparent and non-transparent mode
		In non-transparent mode only: 300, 1200/75 baud rates are available.
		Mode 3.1 KHz(PSTN) and V1150#(ISDN)
3. GSM Housing & other accessories		
3.1	GSM Housing	IP 66 and better
3.2	Power Supply	External power supply
4. Others		
4.1	Security	GSM shall be configurable for the signal from EVC/Mechanical counter for SMS /Event output. SMS alert shall be configurable up to 03 persons
4.2	Spates & Services	Vendor shall furnish certificate that the offered product shall be
		supported with spares and services for at least 150# years post order
4.3	Connectivity	GSM should be able to communicate with any make of EVC

Data Sheet for Power supply Unit and Voltage Stabilizer		
S.No.	**Description**	**Specification**
General Specifications Power Supply:		
1	Make	Vendor to furnish
2	Model	**Vendor** to furnish
3	Input Range	230 V AC+/- 150#%
4	Output Range	8 to 15 V DC, At peak voltage current is 400 mA
5	Current Rating	2Amp
6	Ambient Temperature	0 Deg C to 50 Deg C
7	In closure	IP65 and Above
8	Certification	Intrinsically safe IA, for zone/safe area installation
9	Dimension	Vendor to furnish and should fit into box
150#	Off load voltage	Vendor to furnish
11	On load voltage	Vendor to furnish
12	Current limiting	Vendor to furnish
13	Frequency	50 Hz (+/-3%)
14	Protection	Fuse protection tor Over and Under voltage protection Short circuit protection
General Specifications for Digital Voltage Stabilizer:		
1	Make	Vendor to furnish
2	Capacity	0.5 KVA
3	Input Voltage range	180 V to 295 V AC
4	Output Voltage	220 V +/-10%(220 to 240 V)
5	Cooling	Air Cooled
6	Winding	Copper Wound
7	Duty Cycle	Continuous
8	Frequency	47-53 Hz
9	Ambient Temperature	Oto 50 Deg C

150#	Protection	Over Voltage Under Voltage Spike Filtration up to 5 KV EMI/RFI protection Input Fuse for over voltage & Under voltage protection

Test certificate shall be provided for the same.

DATASHEET OF PRESSURE GAUGE AND TEMPERATURE GAUGE

DATASHEET OF PRESSURE GAUGE

Sr. No.	Technical Description	Specifications
General		
1	Type	Direct
2	Mounting	Local
3	Dial Size	100mm
4	Standard	As per IS 3624 / EN 837
5	Design	Solid Baffle wall and blow out back as per EN 837 -1, Glycerine Filled
6	Colour	Aluminum dial with black engraving
7	Case material	SS304
8	Bazel Ring	Vendor to Furnish
Construction		
9	Window material	Shatterproof Glass
10	Enclosure	IP 67
11	Pressure Element	C Type Bourdon Tube
12	Element Material	SS316
13	Socket material	SS316
14	Accuracy	±1% FSD
15	Connection	1/2"NPT(M)
16	Connection Location	Bottom
17	Movement	SS 316
18	Over-range Protection	130%
19	Blow Out Protection	Required
Make		
20	Make	Vendor to Furnish
21	Model	Vendor to indicate.
22	Design Temp	6o· c
23	Fluid	Natural Gas
26		
27	• Pressure Gauge Range	0- 10 Barg
	• Design Pressure	16 Barg
	• Operating Pressure	0 - 10 Barg
Note:		
1.0	**Vendor shall provide calibration certificates**	

DATASHEET OF TEMPERATURE GAUGE

Sr. No.	Technical Description	Specifications
General		
1	Type	Vendor to Furnish
2	Well	Required
3	Mounting	Upstream
4	Dial Size	100mm
5	Colour	White with Black Marking
6	Connection Location	Bottom
7	Accuracy	+/ - 1% of FSD
8	Enclosure	Weather Pro o f
9	Ingress Protection	IP 67/NEMA4
10	Zero Adjustment Screw	Micro pointer (Internal)
11	Fill Fluid	Glycerine Filled
12	Gauge Range	0-100 ·c
13	Design Temperature	0-60·c
14	Design Pressure	49 Barg
15	Over Range Protection	130% of the Range
Material		
16	SENSOR	Bimetal
17	Case Material	Die Cast Aluminium/Pressed AISI SS 304
18	Window Material	Shatter Proof Glass
19	Stem	SS 316 - Adjustable Union
20	Stem Type	Rigid
21	Movement	SS 304
22	Case	SS 304
23	Bezel	SS 304
24	Pointer	Black Aluminium
25	Bezel Ring	Bayonet Proof
26	Stem OD	Vendor to Furnish
27	End Connect ion	1/2" NPT- M
Thermo Well Details		
28	Material	SS 316
29	Type	Bar Stock Drilled
30	ID	Vendor to Furnish
31	OD	Vendor to Furnish
32	Flange Material	ASTM A105
32	Instrument Connection	1/2" NPT-F

DATASHEET OF PRESSURE TRANSMITTER AND TEMPERATURE TRANSMITTER

Technical Specifications of Gauge Pressure Transmitters		
Sr.No	Item Description	Specification
1	Type	Smart digital smart Gauge Pressure Transmitter
2	Measurement type	Gauge pressure for Natural Gas application
3	Pressure range	Mentioned in Respective SOR
4	Electrical certification	FM & CSA,
5	Output:	4-20 mA linear, with digital signal based on HART protocol configurable
6	Material of construction	Process flange type: Flange material: ANSI 316L SS
7	Diaphragm material	ANSI 316L SS, O-ring: Gas filled PTFE, Sensor fill fluid:Silicone oil
8	Housing material	Polyurethane covered aluminium / aluminium alloy
9	Mounting bracket	flange SS bracket for pipe, Bolts: SS
10	Product certification	Explosion proof approved for use with Natural Gas application.Class 1 Division1, Groups B, C, D, SIL2/SIL3 safety certification to IEC 61508 with the full 4-20 mA & HART protocol
11	Display and Interface	Digital LCD integral display or better
12	Special configuration (Hardwired)	Zero and span hardwired adjustments with soft configuration
13	Flange adapters	½ inch NPT F
14	Electrical connection	½ inch NPF F
15	Accuracy	Including linearity, hysteresis & repeatability: +/- 0.075 % of calibrated span or better
16	Operating Temperature Limit	0 to 60 deg C
17	Transmitter Power Supply	10.5 - 30 VDC or better
18	Service	Pressure Measurements in Air,Water and Gas Fluids
19	Turn Down Ratio	10 : 1 or better
20	Enclosure Class	NEMA 4X / TYPE 4X
21	Cable Entry	1/2 " NPT (F)
22	Range of Pressure Transmitters	Zero and span calibration Range is Adjustable
23	Over-range Protection	150% or better
24	Certifications	All Certifications Required
25	Manifold	Two Way Manifold

Technical Specifications of Temperature Transmitters		
Sr.NO	Item Description	Specification
1	Type	Universal Head mounted type temperature transmitter Intrinsically safe certified with RTD and 150# class flanged SS thermowell.
2	Input	Duplex RTD,3 wire PT 100 , DIN43760, CLASS A, mineral insulated, dia=6mm, length =450mm.
3	Input Sensor	Head-mounted simplex, class A, Pt100 RTD.
4	Output	4-20 mA linear, with digital signal based on HART protocol configurable.
5	Product certification	Explosion proof approved for use with Natural Gas application.Class 1 Division1, Groups B, C, D, SIL2/SIL3 safety certification to IEC 61508 with the full 4-20 mA & HART protocol.
6	Transmitter Power Supply	11 - 40 VDC or better
7	Housing material	Universal head (junction box) Aluminium alloy
8	Mounting bracket	½ inch NPT(F) with SS extended adjustable nipple (150#0mm)for thermo well direct mount & bracket for pipe, Bolts: ss
9	Software configuration	Standard with temperature units degree centigrade
10	Calibration certificate	Five Points calibration with certificate required.
11	Safety certification	SIL2/3 safety certification to IEC 61508 with 4-20 mA & HART
12	Display and Interface	Digital LCD integral display with detachable option
13	Electrical connection	½ inch NPT(F) for cable entry
14	Accuracy	Reference Accuracy including linearity, hysteresis & repeatability: +/- 0.1 % of span or better
15	Atmospheric Temperature Limit	0 to 60 deg C
16	Thermowell	SS316, RF Flanged,1.5 inches, 150# class, U=280mm,Total legth=340mm, ½" NPTF head for RTD and lock nut, bore dia=6.6mm
17	Service	Temperature Measurements
18	Enclosure Class	NEMA 4X, IP66/IP 68
19	Certifications	All Certifications Required

TECHNICAL NOTES FOR VALVES

TECHNICAL NOTES FOR VALVES

1.GENERAL

1.1Vendor shall supply valves in accordance with the valve specification sheets along with auxiliaries, if any, such as gear operator, bypasses, drains etc. wherever specified in the specification sheets, subject notes and other enclosures to the material requisition (MR).

1.2Vendor shall quote in strict accordance with the valve data / specification sheets, subject technical notes and all other enclosures to the MR. Deviations to the specification I data sheets, subject technical notes and other enclosures of the MR, if any, shall be asked as explained in clause 2.0.

1.3All codes and standards for manufacture, testing, inspection, etc. shall be of latest editions.

2 DOCUMENTATION

2.1 Vendor shall submit the following with the offer:

2.1.11 Manufacturer's complete descriptive and illustrative catalogue / literature.
2.1.12 Detailed dimensioned cross section drawing with parts/material lists, weight etc. for the ball valves, plug valves, globe valves, check valves, diaphragm valves and valves to manufacturer's standard.
2.1.13 Drawings for valves with accessories like gear operator, hydraulic / pneumatic operator, motor, extension bonnet, extended stems with stands, bypass etc. giving major salient dimensions.
2.1.14 One copy of the valve specification sheets signed as "Accepted" by the manufacturer with all deviations marked clearly.
2.1.15 If the valve is regretted or has no deviation, the manufacturer shall write clearly on valve specification sheets as "Regret" or "No Deviation".
2.1.16 For subject notes, if there is any deviation, the same shall be listed clause wise. Even clauses which are acceptable shall be cc1iegoricaity confirmed as "Accepted".
2.1.17 On failure to submit documents as specified in clauses 2.1.1 to 2.1 .6 above, the offer is likely to be rejected.

2.2 The following documents shall be submitted after placement of the order:

2.2.1 Vendor shall submit for approval drawings mentioned in clauses 2.1.2 & 2.1.3 before start of manufacturing. No other drawing shall be submitted for approval.

2.2.2 Test report shall he supplied for all mandatory tests as per the applicable code. Test reports shall also be furnished for any supplementary tests as specified in clauses 3.13, 3.14 & 3.15.

2.2.3 Material test certificates (physical properties, chemical composition & heat - treatment report) of the pressure containing parts shall he furnished for the valves supplied. Material test certificates for the other parts shall also be furnished for verification during inspection.

3.DESIGN AND CONSTRUCTION

3.1 Valve shall be designed, manufactured, tested, inspected and marked as per the manufacturing standards, design codes and standards (latest editions) indicated in the respective valve specification sheets. Any conflict between the requisition, enclosures, specification sheets and referred standard codes shall be brought to the notice of the purchaser for clarifications. But generally, specification sheets and enclosures of the requisition including subject notes shall govern. After issue of the Purchase Requisition (PR) no deviation to specification/standards shall be permitted through vendor drawing approval. Approval of drawings shall be valid only for design / constructional features.

3.2 All flanged valves shall have flanges integral (except forged valves) with the valve body. Flange face finish sha be normally specified in the valve specification sheet as serrated finish, 125 AARH etc. The interpretation for range of face finish shall be as follows:

Stock finish 1000 u in AARH max

Serrated finish / smooth finish / 125 AARH serrations with 125 to 250 um in AARH Extra Smooth Finish/ 63 AARH 32 to 63 u in AARH

3.3All weld end valves with bevel end as per ASME B16.25. The contour of bevel shall be as follows:

Material	Wall Thickness	Weld Contour
Carbon Steel (Except low Temp. Carbon Steel	Up to 22 mm	Figure 2 Type A
	>22 mm	Figure 3 Type A
Alloy Steel. Stainless Steel & Low temp. Carbon Steel	Up to 150#mm	Figure 4
	> 150#mm & Up to 25 mm	Figure 5 Type A
	>25 mm	Figure 6 Type A

3.4 Following requirements for check valves shall be met over and above the valve spec sheet requirements:

3.4.1 Unless specified otherwise in the data sheet all check valves 3" & above (except in 900#, 1500# & 2500# rating) shall have a drain boss at location "G" (Refer Fig. No. 1 of ASME B16.34). A tapped drain hole with plug shall be provided as per ASME B16.34. Threads shall be as per ASME B1.20.1 (Taper) NPT

3.4.2 Wherever check valve disc assembly is supported from the cover of the check valves the following shall be ascertained

i) Positive location / positioning of cover must be provided to ensure correct alignment of the valve disc.
ii) Hinge pin design must permit accurate alignment of the disc and valve seat.

3.4.3 Lifting lugs are required for all Valves with weight 50 kg and above.

3.5 If an overlay weld-deposit is used for the body seat ring seating surface, the corrosion resistance of the seat ring base material shall be at least equal to the corrosion resistance of the material of the shell.

3.6 Following valve bypass requirements shall be met

3.6.1 The by-pass piping arrangement shall be such that clearance between main valve body and by-pass assembly shall be the minimum possible for layout reasons.
3.6.2 By-pass valve shall be a globe valve. The sizes shall be as under
On main valve <=4": 1/2 " or more
On main valve > 4" but < 1O": 3/4" or more
On main valve >= 1O" : 1" or more

3.6.3Vendor shall supply the by-pass valve duly tested and fitted to the main valve.

3.6.4 Valves with by-pass shall have the direction of flow marked on the main valve. Bypass attachment to the main valve body shall not be screwed. All fillet welds for bypass installation shall be 150#0% examined by DP/MP test.

3.7 Valve body / bonnet shall be forged / cast as specified. Forgings are acceptable in place of casting but not vice-versa.

3.8 Material of construction of yoke shall be minimum equivalent to body/ bonnet material.

3.9 Stem shall be forged or machined from forged I rolled bar. No casting is permitted. However, integral stem of cast stainless steel ball valve is acceptable.
3.10 Stelliting / hard facing by deposition shall be minimum 1.6 mm. Renewable seat rings shall be seal welded.

3.11 Valves under "NACE" category shall meet the requirements specified in MR-01-7 5 unless otherwise specified.

3.12 For all austenitic stainless-steel valves Inter Granular Corrosion (IGC) test shall be conducted as per the following:

3.13.1 ASTM A262 Practice "B" with acceptance criteria of "60 mils/year (max" for all materials - forged, rolled, wrought and casting.

Or

ASTM A262 Practice "E" with acceptance criteria of "No cracks as observed from 20X magnification" for all materials other than castings. "Microscopic structure to be observed from 250 X magnification" in addition.

3.13.2 When specifically asked for in MR for high temperature application of some grades of austenitic stainless steel (e.g. SS309, 315, 316, 316H etc.) ASTM A262 Practice 7 "C" with acceptance criteria of "15 mils/year (max.)" shall he conducted.

3.13.3 For the IGC test as described in Clauses 3.12.1 & 3.12.2, two sets of samples shall be drawn from each solution annealing lot. One set shall correspond to the highest Carbon content and the other to the highest-pressure rating. When testing is conducted as per practice "E", photograph of the microscopic structure shall be submitted for record.

3.14 All types of 321 or 347 stainless steel valves shall be in a stabilized heat-treated condition. Stabilizing heat treatment shall be carried out subsequent to the normal solution annealing. Soaking temperature and holding time for stabilizing heat treatment shall be 900°C and 4 hours respectively.

3.15 Spiral wound bonnet gaskets are to be provided with inner/outer ring except when encapsulated gaskets type body-bonnet joints are employed. Outer ring may be avoided in case of non-circular spiral wound gasket used in 150# valve provided the outermost layer of spiral touches the bolts ascertaining the centering.

3.14 Ball / Plug

3.16.1All ball valves shall be forged type for 1 ½" & below.

3.16.2 As a prequalification fire safe test as per API 607 / API 6FA / BS 6755 Part II shall be carried out on soft seated ball, and also on lubricated plug valves. The test shall be witnessed and certified by a third party inspection agencies Approved by GSPC Gas. The vendor has to submit test certificate for the particular design of the valve offered.

3.16.3 Each valve shall be supplied with a lever / wrench except the gear operated I motor operated valves.

3.16.4 Soft-seated valves in service lines are not permitted. All trunion-mounted ball valves shall be provided with spring loaded seat rings.

3.16.5 Soft-seated BW / SW end ball valves if allowed in special cases shall have a 100 mm long seamless pipe nipple welded to each end of the valve. Nipples are to be welded if allowed as special cases prior to assembling Teflon seats I seals. Specifications of the nipples shall be as indicated in the MR.

3.16.6 The ball of ball valve shall not protrude outside the end flanges of valve.

3.16.7 Ball valves shall be of floating ball/ trunnion mounted type as per following:

Class	Size	Type
150#	Up to 3"	Floating
	4"and above	Trunion Mounted
300#	Up to 3"	Floating
	4" and Above	Trunion Mounted
600#	Below 2"	Floating
	2" and Above	Trunion Mounted

3.16.8 Unless otherwise specified in the data sheets, bore of all reduced bore ball valves sha be limited to one size lower than the nominal bore for valves up to DN 300 (NPS 12) and two size lower than the nominal bore for DN 350 (NPS 14) and above up to DN 600 (NPS 24).

3.17 The MOVs are to be installed in an open area and the actuators shall be suitable for all weather conditions. The testing of complete assemblies of MOVs along with the actuators shall be done by the supplier at his works. Torque details for MOVs shall be furnished by the bidder/supplier.

4. OPERATION

4.1 Generally, the valves are hand wheel or lever operated. Gear operation shall be provided as under

Valve Type	**Class**	**Size Requiring Gear Operated**
Globe Valve	300, 600 & 900#	6" and Larger
	1500, 2500 #	3" and Larger
Ball Valve	150, 300#	6" and Larger
	600#	4" and Larger
	900#	3" and Larger

4.2 For sizes lower than these ranges, hand wheel / lever / wrench shall be provided. For pressure balance plug valves manufacturer's recommendation shall be acceptable provided the requirements specified in clause 4.6 are met.

4.3 Gear operator shall be as under with position indicators for open /close positions and with limit stops. (Limit stops are not applicable for gate and globe valves).

For Globe Valve	Totally enclosed bevel gear in grease case with grease nipples / Plugs
For Ball Valve	Totally enclosed helical worm or combination of Helical worm and spur gear in grease case with Grease nipples/ Plugs

4.4 Where gear operator is not called for as per Clause 4.1 but vendor recommends a gear operator, he shall highlight such case(s).

4.5 Gear operator shall be so designed as to operate effectively with the differential pressure across the closed valve equal to the cold non-shock pressure rating.

4.6 Ball and plug valves, even with wrench or lever operators shall have "Open" position indicators with limit stops.

4.7 Hand wheel diameter shall not exceed 750mm and level length shall not exceed 500mm on either side. Effort to operate shall not exceed 35 Kg at hand wheel periphery. However, failing to meet the above requirements, vendor shall offer gear operated valve and quote as per clause 4.3.

5 INSPECTION AND TESTING

5.0 Every valve shall be subjected to all the mandatory tests and checks called in the respective codes
I data sheet by any third party as approved by the purchaser

5.1 Every valve, its components and auxiliaries must be subjected to all the mandatory tests and checks called for in the respective codes, data sheets etc. by the manufacturer

5.2 In case of third party inspection, the inspection plan shall be approved by the purchaser.

Forged Valves:
1. Visual and dimensional inspection.
2. Review of material test certificates.
3. Any mandatory or supplementary test.
4. Hydrostatic test on 100% valves selected on random basis.
5. Strip check is required for 1 % of total ordered quantity of valves (min. 1 No.) against each sheet no.

Cast Steel Vales:
1. Visual and dimensional inspection.
2. Review of material test certificates.
3. Review of radiographs/ radiographic reports or any other NOT tests wherever applicable as per data sheet.
4. Any mandatory or supplementary test.

5. Hydrostatic test 100% for body, 10% other test.
6. Strip check is required for 1% of total ordered quantity of valves (min. 1 No.) against each sheet no. Samples for strip check shall be selectedat random and shall generally be in the highest size in the lot.

5.3 In case of motor operated or actuator operated valves, functional I operational checks as per the requirements of the specifications shall be made on each valve.

5.4 Positive Material Identification (PMI) shall be performed as per the scope and procedures as defined in the 'Specification for Positive Material Identification (PMI) at Vendor's Works'.

6.RADIOGRAPHY OF CAST VALVES

6.1 Steel casting of valves shall be 150#0% radio graphed irrespective of rating and size.

6.2 Radiography procedure, areas of casting to be radio graphed shall be as per ASME B16.34 and acceptance criteria shall be as per ASME B16.34 Annexure-8. However for areas of casting to be radio graphed for types of valves not covered in ASME B 16.34, vendor shall enclose details of areas to be radio graphed in line with ASME B16.34.

6.3 For random radiography wherever specified in individual data sheets, the sampling shall be per size of the quantity ordered for each foundry.

6.4 Radiography wherever specified in the data sheets or as per clause 6.1 shall be done by X-ray/gamma- ray to get the required sensitivity with proper safety.

7.IBR CERTIFICATION

7.1 For valves described "IBR", valves shall be in accordance with the latest IBR (Indian Boiler Regulation) including the requirements specified in the specification.

7.2 For SW/ SW end carbon steel valves under IBR, the chemical composition shall conform to the following
Carbon (Max) 0.25%
Others (S, P, Mn): As per I8R regulations
The above composition is not valid for non-lBR valves.

7.3 Valves coming under the purview of "IBR" (Indian Boiler Regulations) shall each be individually accompanied by IBR certificate original in Form III-C duly approved by IBR authority / local authority empowered by the Central Boiler Board of India. Photocopy of original certificate duly attested by the local boiler inspector where the supplier is located is the minimum requirement for acceptance. All "IBR" valves shall be painted red in body-bonnet/ body-cover joint.

8. MARKING

8.0 Valve markings, symbols, abbreviations etc. shall be in accordance with MSS-SP-25 or the standard referred in specification sheet as applicable. Vendor's name, valve rating, material designation, nominal size, direction of flow (if any) etc. shall be integral on the body. Each valve shall have a corrosion resistant tag giving size, valve tag / code no., securely attached to the valve body.

8.1 Paint or ink for marking shall not contain any harmful metal or metal salts such as Zinc, lead or copper which cause corrosive attack on heating.

8.2 Carbon Steel I Alloy Steel valves shall be painted with one coat of inorganic zinc silicate (minimum DFT 65 to 75 microns). For the valves to be installed underground, when indicated in Valve Data Sheet, the external surfaces of buried portion of the valve shall be painted with three coats of suitable coal tar epoxy resin with a minimum dry film thickness of 300 microns.

9.DESPATCH

9.0 Valve shall be dry, clean and free from moisture, dirt and loose foreign materials of any kind.

9.1 Valves shall be protected from rust, corrosion and any mechanical damage during transportation, shipment and storage.

9.2 Rust preventive on machined surfaces to be welded shall be easily removable with a petroleum solvent or shall not be harmful to welding.

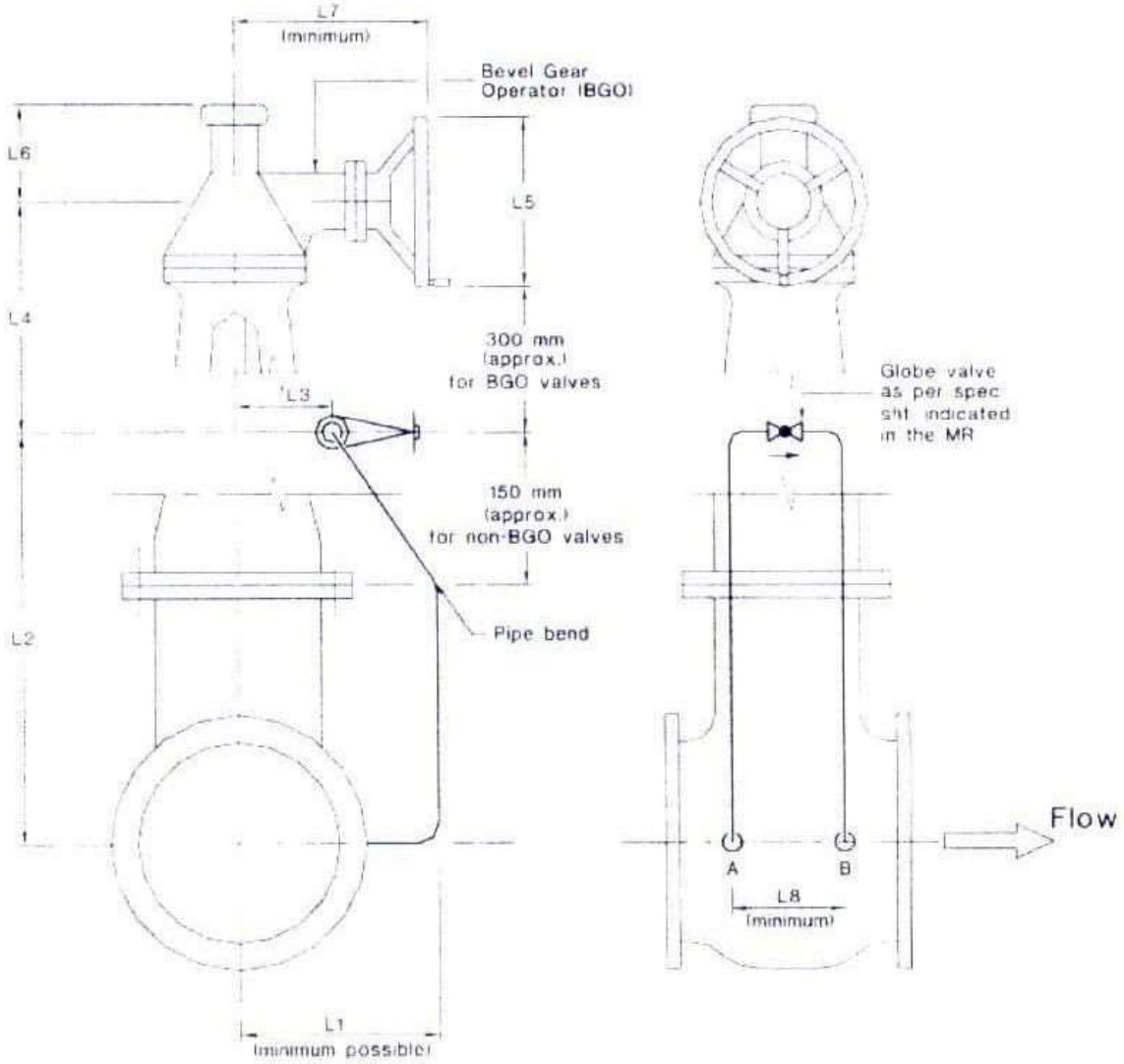
9.3 Each end of valve shall be protected with the following materials Flange Face : Wood or Plastic Cover
Beveled End : Wood or Plastic Cover
SW & SCRD : End Plastic Cap

9.4 End protectors of wood/plastic to be used on flange faces shall be attached by at least three bolts and shall not be smaller than the outside diameter of the flange. However plastic caps for SW & SCRD, end valves shall be press fit type.

9.5 End protectors to be used on beveled end shall be securely and tightly attached

9.6 For special service valves additional requirement of dispatch shall be prescribed in data sheet.

BYPASS PIPING ARRANGEMENT



Note:

1. **The orientation & location of hand wheel of bevel gear operator & the bypass arrangement shall be strictly as per this sketch.**
2. **The bypass pipe ends shall be socket/ butt welded to the body wall of the main valve.**
3. **The bypass arrangement shall he properly clamped to & supported by the body of the main valve.**
4. **Basic design of bypass shall he to MSS-SP-45 & ASME B16.34**
5. **Material of bypass pipe & 90° elbows shall be same or equivalent to the body material.**
6. **This sketch is applicable for both BGO & NON-BGO Valves.**
7. **Vendor shall furnish dimensions L1 to L8.**

DATA SHEET FOR FLANGES AND FITTINGS

Sr. No.	Description	Specification
GENERAL		
1	Size	0.5" to 24" NPS
2	Pressure Rating	150#,300#,600#
3	Design Standard	ASME B 16.5/ASME B 16.47/ ASME B 16.48
4	Corrosion allowance	1.5MM
5	Design Factor	0.4
SERVICE CONDITIONS		
6	Service Fluid	Natural Gas
7	Design Pressure	19 barg / 49 barg / 98 barg
8	Design Temperature	1. 150# = 0 to 65 °c 2. 300#,600#= -10 to 65 °c
9	Operating Pressure(Maximum)	19 barg / 42 barg / 90 barg
10	Operating t emp.	1. 150# = 0 to 50 °c 2. 300#,600#= -10 to 50 °C
CONSTRUCTION DESIGN		
11	Allowable Stress	ASME B 31.8
12	Flange Type	WNRF/BLRF/ SORF / BLIND
13	Flange Facing	Raised face (125 AARH)
14	Bevel End & Bevel Angle for WNRF	ASME B 31 .8
MATERIAL SPECIFICATION		
	Part	**Specified Material**
15	Material of Construct ion	1. 150# and 150#= ASTM A 105 2. 300# = ASTM A 350 Gr. LF2, MSS SP 44 Gr.F52 3. 600# = ASTM A 350 Gr. LF2, MSS SP 44 Gr.F52, MSS SP 44 Gr.F65 4. The carbon content is greater than 0.12% in product analysis, the CE (IIW) shall not exceed 0.40% and if the carbon content is less than 0.12% in product analysis, the CE (Pcm) shall not exceed 0.20%.
TESTING & INSPECTION		
16	Charpy Impact Test	As per Material of construction standard In case Charpy test value not specified in relevant codes and standards than charpy shall be carried out at O °C and absorbed energy value shall be average 35 j and minimum 28 j respectively.

17	Hardness test	• ASTM A 105 - 137 to 187 HB. • ASTM A 350 Gr. LF2- 197HBWmax • MSS SP 44- 235 BHN max In case hardness value not given in MOC then hardness value shall not exceed 235 HBN
18	Tensile test	As per relevant code and standard
19	Yield Strength	As per relevant code and standard
20	Elongation	As per relevant code and standard
21	UT	100% Surface
22	MPT	100% at Bevel Ends
23	DPT	100% bevel end for 50 mm width
24	Marking	MSS SP 25 and BGL Specification
NOTE:-		
1. Bidder shall clearly mention deviation, if any.		
2. Inspection and Testing shall be as per this Data Sheet, BGL Specification. Inspection shall be carried out by TPI at Manufacture's work as per QAP approved by BGL		
3. Vendor to submit QAP for approval prior to commencement of manufacturing		

DAT SHEET FOR SEAMLESS FITTINGS

Sr. No.	Description	Specification
GENERAL		
1	Size	0.5 to 24" NB
2	Schedule no./ Pressure Rating	
a)	Butt-welded fittings/ Weld-o-let	STD/XS/ XXS SCH.40, SCH 80, SCH 160
b)	Socket welded fittings, sock-o- let	3000#,6000#
3	Design Standard	ASME B 16.9/ASME 816.11/MSS SP 75/ MSS-SP 97/ ASME 81.20.1/ ASME B 16.48
4	Corrosion allowance	1.5MM
5	Design Factor	0.4
!SERVICE CONDITIONS		
6	Service Fluid	Natural Gas
7	Design Pressure	19 Bar-g /49 Bar-g/98 Bar-g
8	Design Temperature	1. 150#: 0 to 65°C 2. 300# & 600# : -10 to 65°C
9	Operating Pressure(Maximum)	1. 150# = 16 Bar-g 2. 300# = 42 Bar-g 3. 600# = 90 Bar-g
10	Operating temp.	1. 150# = 0 to 50 °c 2. 300#,600# = -10 to 50 °c
!CON STRUCTION DESIGN		
11	Bevel angle	ASME B 31.8
MATERIAL SPECIFICATION		
	Part	**Specified Material**
12	Material of Construction	1. 150# and 150# = ASTM A 234 WPB, MSS SP 75 WPHY 52 2. 600# = ASTM A 350 Gr. LF2, ASTM A 420 Gr. WPL6, MSS SP 75 WPHY 52, MSS SP 75 WPHY 65 3. The carbon content is greater than 0.12% in product analysis, the CE (IIW) shall not exceed 0.40% and if the carbon content is less than 0.12% in product analysis, the CE (Pcm) shall not exceed 0.20%.

TESTING & INSPECTION

Technical Specification for Supply of API 6D Valves

1.0 SCOPE

This specification provides minimum requirement for design, manufacturing, inspection, testing and documentation of Carbon Steel Ball Valves covering sizes ½" NB(DN 15) through 24" NB(DN 900) for ASME rating class 150# through 900# to be used in cross country Gas pipeline(onshore) and City Gas distribution for handling non-sour hydrocarbon in liquid or gaseous phase.

2.0 DEFINITIONS

For this specification the following definitions shall apply:

APPOINTING AUTHORITY:	Shall mean MANAGING DIRECTOR or any other person so designated by the COMPANY for the purpose of arbitration.
APPROVED:	Shall mean approved in writing including subsequent written confirmation of previous verbal approval and "APPROVAL" means approval in writing including as aforesaid.
BID:	Shall mean the Bid submitted by the Bidder for acceptance by the BHAGYANAGAR GAS LIMTED
BIDDER:	Shall mean vendor responding to this tender, the supplier / sub-contractor approved by BHAGYANAGAR GAS LIMTED
CAN:	This verbal form used for statements of possibility & capability, whether material, physical or casual
CHANGE ORDER:	Shall mean an order given in writing by the ENGINEER-IN-CHARGE to effect additions to or deletion from and alteration in the works.
COMPANY:	Shall mean BHAGYANAGAR GAS LIMTED hereinafter mentioned as ""
CONTRACT DOCUMENTS:	Shall mean collectively the Tender Documents, Designs, Drawings, Specification, Schedule of Quantities and Rates, Letter of Acceptance and agreed variations if any, and such other documents constituting the tender and acceptance thereof.
CONTRACT:	Shall mean the agreement and all other documents between the company and the Bidder for providing the services mentioned herein including therein all contract documents.
DEFECT-LIABLITY PERIOD:	In relation to a work means the specified period from the date of COMPLETION CERTIFICATE up to the date of issue of FINAL CERTIFICATE during which the CONTRACTOR stands responsible for rectifying all defects that may appear in the works executed by the CONTRACTOR in pursuance of the CONTRACT and includes warranties against Manufacturing/Fabrication/Erection/Construction defects covering all materials plants, equipment, components, and the like supplied by the CONTRACTOR, works executed against workmanship defects.

GUARANTEE:	Shall means the period and other condition s governing the warranty/ guarantee in respect of the work as detailed in section hereunder.
MAY:	This verbal form indicates a course of action permissible within the limits of this standard.
METRIC SYSTEM:	All technical documents regarding the construction of works are given in the metric system and all work in the project should be carried out according to the metric system. All documents concerning the work shall also be maintained in the metric system.
OEM:	Shall mean Original Equipment manufacturer.
OWNER/BUYER:	Shall mean BHAGYANAGAR GAS LIMTED Joint Venture of Gail India Limited & Hindustan Petroleum Corporation Limited
SHALL:	This verbal form indicates requirements strictly to be followed in order to confirm to the standards and form in 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.
SPECIFICATIONS:	Shall mean all directions, the various technical specifications, provisions attached and referred to in the Bid documents which pertain to the method and manner of performing the work or works to the quantities and qualities of the work or works and the materials to be furnished under the contract or works as may be amplified or modified by the COMPANY during the performance of Contract in order to provide the unforeseen conditions or in the best interests of the work or works. It shall also include the latest edition of relevant standard specifications including all addenda / corrigenda published before entering into the contract.
STORES:	Shall mean the various locations where the Company's free issue material is stored within the area of the operation of BHAGYANAGAR GAS LIMTED
TENDER:	Shall mean the proposal along with supporting documents submitted by the CONTRACTOR for consideration by the COMPANY.
TPI:	“Third Party Inspection Agency” appointed by Manufacturer and approved by Buyer/Owner.

VENDOR/SELLER:	The person or persons, firm or Company who's Bid has been accepted by BHAGYANAGAR GAS LIMTED and includes the Vendor's legal representatives, his successors and permitted assigns. Shall also mean Supplier or Manufacturer engaged by "OWNER" to execute the job.
WEEK:	"WEEK" means a period of any consecutive seven days.
WORK:	The "WORK" shall mean and include all items and things to be supplied/ done and services and activities to be performed by the CONTRACTOR in pursuant to and in accordance with CONTRACT or part thereof as the case may be and shall include all extra, additional, altered or substituted works as required for purpose of the CONTRACT.
WORKING DAY:	Shall mean any day which is not declared to be holiday or rest day by the EMPLOYER.

3.0 REFERENCE DOCUMENTS

CODES AND STANDARDS

Reference has also been made to the latest edition of the following standards, codes and specifications.

API 6D Specification for Pipeline Valves.
PNGRB Petroleum and Natural Gas Regulatory Board (Technical Standards and Specifications for City and Local Natural Gas Distribution Network) Regulations, 2008
OISD 130 Inspection of Piping System
API 6FA Inspection of Piping System Specification for Fire Test for valve Specification for Line Pipe
API 598 Valve Inspection and Testing
ASME 16.150#Face to Face and End to End Dimensions of Valves
ASME 16.20 Metallic gasket for pipe flanges - Ring joint or spiral wounds and jacketed
ASME 16.21 Non Metallic Gaskets for Pipe Flanges
ASME B 16.5 Steel Pipe Flanges and Flanged Fittings ASME B 16.34 Valves - Flanged, Threaded and Welding Ends
ASME B 16.47 Large Diameter steel Flanges NPS 26 through NPS 60
ASME SecVIII Boiler and Pressure Vessel Code - Rules for Construction of Pressure Vessels
ASTM B 733 Auto catalytic Nickel Phosphorous Coating on Metals
BS 6755-1 Testing of Valves. Specification for production pressure testing requirements ASME B 31.3 Process Piping.
ASME B 31.8 Gas Transmission and Distribution Piping Systems
EN 150#04511 Metallic products: Charpy Impact test - test methods (U & V Notches)

BS 5351 Steel Ball Valves for Petroleum, petrochemical and allied industries
BS EN 331 Manually Operated Ball Valves and Closed Taper Plug Valves for Gas Installations.
BS 6755-2 Testing of Valves. Specification for fire type-testing requirement. EN 150#204 Metallic Materials - Types of Inspection Documents MSS-SP-44 Steel Pipeline Flanges.
MSS-SP-53 Quality Std for Steel Casting & Forgings for Valves, Flanges & Fittings & Other Piping Components - Magnetic Particle Examination Method.
MSS-SP-55 Quality Standard for Steel casting of valves, Flanges, Fittings & other Piping components (Visual Method)
MSS-SP-72 Ball Valves with Flanged or Butt welding ends for General Service.

ISO 5208 Industrial Valves - Pressure Testing of Valves ISO 150#497
Testing of Valves - fire type testing requirements.
ISO 13623 Petroleum & Natural Gas Industry- Pipeline Transportation System.
ISO 14313 Petroleum & Natural Gas Industry. Pipeline Transportation System - Pipeline Valves
SSPC-VIS-1 Steel Structures Painting Council Visual Standard.
NACE TM0177 Standard test method. Laboratory testing of metals for resistance to Specific forms of environmental cracking in H2S environments

In the case of codes indicated without the year of publication, the latest edition of the code shall be taken into consideration.

4.0 INSTRUCTIONS TO BIDDER:
4.0 Manufacturer to supply ball valves meeting the requirements of this specification for the fluid/service specified by the Buyer on Valve Data Sheet.
4.1 Eventual Interpretations and deviations to this specification by the manufacturer shall be requested in writing in his offer with detailed justification and shall be approved by the Buyer or Buyer's representative before the eventual order to the manufacturer
4.2 The manufacturer shall list all probable Sub-Contractors (such as forging plant, casting plant, and fabrication unit etc.) and also mention the specification of steel used, in his offer. No changes of any kind shall be accepted thereafter. However, if under the conditions justifiable the requested changes shall be supported by a legitimate technical document submitted to the Buyer/Buyer's representative for approval.
4.3 The manufacturer shall provide technical document describing the manufacturing methods that might influence the quality of material.
4.4 The Buyer/Buyer's representative reserves the right to audit the manufacturer’s and sub- contractor's manufacturing and quality control methods.
4.5 The Buyer/ Buyer's representative shall reserve any time free access to all parts of the manufacturer’s facilities and to all his sub-contractors involved in the order manufacturing.
4.6 A copy of ISO 9001 Certificate shall be included in the offer.
4.7 An approval of documents can never be considered as acceptance of deviations or relaxation to requirements. A deviation is only possible after specific request to Buyer and Buyer's representative.

4.8 The manufacturer shall be responsible for complying with all of the applicable requirements of this specification. It shall be permissible for the Buyer to make any investigation necessary in order to be assured of compliance by the manufacturer and to reject material that does not comply by this specification.

5.0 MATERIALS

5.1 Material for major components of the valves shall be as indicated in Valve Data Sheet. In addition, the material shall also meet the requirements specified herein. Other components shall be as per Manufacturer's standard (suitable for service conditions as indicated in valve data sheet), which shall be subjected to approval by Buyer/ Buyer's representative.

5.2 Carbon steel used for the manufacture of valves shall be fully killed.

5.3 The chemical composition of carbon steel shall be as per API 6D. If the Carbon Content is greater than 0.12 %, then Carbon Equivalent (IIW) shall not exceed 0.40 for each heat of steel used, as calculated the following formula:

CE = C + Mn + (Cr + Mo+ V) + (Ni + Cu) 6 5 15

5.4 If carbon content is less than 0.12% in product analysis; the CE (Pcm) shall not exceed 0.20%.

5.5 $$CE(Pcm) = C + \frac{Ni}{60} + \frac{SI}{30} + \frac{(Mn + Cu + Cr)}{20} + \frac{Mo}{15} + \frac{V + 5B}{150\#}$$

5.6 For Ball made of S.S material ENP is not mandatory. The hardness of plating shall be minimum 50 RC.

5.7 For valves specified to be used for Gas service or High Vapor Pressure (HVP) liquid service; Charpy V-Notch test on each heat of base material shall be conducted as per API 6D, clause

8.5 for all pressure containing parts such as body, end flanges and welding ends as well as bolting material for pressure containing parts. Charpy V- notch test Absorbed Energy shall be as per standard to which MOC comply. Unless specified otherwise, the Charpy impact test shall be conducted at 0o C. The Charpy impact test specimen shall be taken in the direction of principal grain flow and notched perpendicular to the original surface of plate or forging.

The minimum average absorbed energy per set of three specimens shall be 35 J with an individual minimum per specimen of 28 J. No Specimen shall exhibit less than 80 percent shear area.

5.8 Valves shall be subjected to hardness test on base material for each heat for pressure containing parts. The maximum hardness shall not exceed the values mentioned in standard to which MOC comply.

5.9 The material of gear box housing, where applicable, shall be nodular cast iron, or material equivalent to the valve body material.

5.10 The manufacturer shall list the material specifications for all valve parts.

5.11 Hand wheels shall not be made from plate material.

6.0 DESIGN AND CONSTRUCTION

• Valve shall be designed as per API 6D and ASME B 16. 34 suitable for the process conditions indicated in the Data Sheet. Allowable stress requirements shall comply with the provisions of ASME B31.3 and B31.8. In addition, corrosion allowance indicated in Valve Data Sheet shall be considered in valve design. However, the minimum wall thickness shall not be less than the minimum requirement of ASME B16.34.

• Valves, flanges, fittings made of cast iron /ductile iron as per ASTM A 395 shall not be used.
• Valves used in service lines of size NPS 2 and below shall conform to BS EN 331.
• All studs bolts and nuts used shall be hot dipped galvanized as per ASTM A 153.
• The manufacturer shall have valid license to use API monogram on valves manufactured as per API 6D.

6.1 Fully welded valves shall be used for main line aboveground/underground services. Other above ground valves may be of welded or bolted type with 2 piece/3 piece construction. Threaded body joints shall not be accepted.
6.2 Ball shall be of single piece, solid type construction.
6.3 Full bore valves shall be suitable for the passage of all types of pipeline scraper and inspection pigs on regular basis without causing damage to either the valve component or the pig. The full bore valve shall provide an unobstructed profile for pigging operations in either direction. Full bore valves shall be designed to minimize accumulation of debris in the seat ring region to ensure that valve movement is not impeded.
6.4 Reduced bore valves shall be provided if specifically mentioned in data sheet. Valve body shall be manufactured by casting or forging.
6.5 For class 150 # and 300#, 4"NB and above size valves shall be trunnion mounting type and Valves below 4" shall be floating type unless specifically mentioned in data sheet otherwise. For 600#, all valves of size 2" and above shall be trunnion mounted.
6.6 Valve seats shall be with primary metal to metal contact. O - Rings or other seals if used for drip tight sealing shall be encased in a suitable groove in such a manner that it cannot be removed from seat ring and there is no extrusion during opening or closing operation at maximum differential pressure. The seat rings shall be designed so as to ensure sealing at low as well as high differential pressures.
6.7 Soft seated valves in service line are not permitted as per PNGRB Regulation 2008.
6.8 Valves 4" and above shall be fitted double block and bleed (DBB) facility. For 600#, 2" and above shall be fitted with double block and bleed facility.
6.9 Valves shall be designed to withstand a sustained internal vacuum of at least 1 (one) milli-bar in both open and closed positions.
6.10 All valves of nominal valve size DN 100 (4") NPS & above shall have provision for secondary sealant injection under full line pressure for seat and stem seals. All sealant injection connections shall be provided with an internal Non-return valve. Valve design shall have a provision to replace the sealant injection fitting under full line pressure.
6.11 All valves shall be provided with a vent and drain connection. These connections shall be welded type as per Fig. 6.11 A/B. Body vent and drain shall be provided with valves (Ball or Plug type). All these vents & drain connection shall be provided with isolation ball valve as shown in Fig A/B. The end connection of vent & drain line to valve body or isolation valves shall be welded type at underground location and threaded type for above ground location.

6.12 Valve design shall ensure repair of stem seals/packing under full line pressure.
6.13 a) Valve ends shall be either flanged/or butt welded or one end flanged and one end butt welded as indicated in the Valve Data Sheet. Flanges of the flanged end cast/forged body valves shall be integrally cast/ forged with the body of the valve. Face to face/end to end dimensions shall conform to API 6D.
6.14 The length of butt welding ends shall be sufficient to allow welding and heat treatment without damage of the internal parts of the valves.

6.15 Flanged end valves shall be as per API 6D with Flanges confirming to ASME B 16.5.
6.16 Butt welding end preparation shall confirm to ASME B 16.25. In case of difference in thickness of valve body & mating pipelines, the bevel end of valve shall be as per ASME B31.8 or ASME B 31.4 as applicable.
6.17 The temperature and pressure rating of the valves shall be in accordance with API 60D/ ASME B 16.34.
6.18 Wall thickness of parts used for the welding connection with the line pipe shall meet the following requirements:

- The maximum allowable stress in the material of butt-welds connection for butt welding shall be equal to 50% of the minimum yield strength guaranteed by the specification of steel used.
- The minimum wall thickness for butt welding connection must be greater than or equal to the largest value of either the calculated minimum thickness of butt welding connections or the nominal thickness of pipe as indicated on data sheet.
- If the butt welding connections has a yield strength lower than the yield strength of the pipe to which it is intended to be welded, the wall thickness in each zone of the butt welding connection is at least equal to the specified pipe wall thickness times the ratio of minimum yield strength guaranteed by the specification of the steel of the pipe to minimum yield strength guaranteed by the specification of the steel of the butt welding connection.
- The specified pipe wall thickness and grade with which the valve is intended to be used is specified in the data sheet.
- All valves under this specification shall be designed to withstand a field hydrostatic test pressure with non-corrosive water. Test pressure shall be in accordance to API 60 and/or PNGRB Regulation 2008.

6.19 Valve shall be provided with ball position indicator and stops of rugged construction at the fully open and fully closed positions.
6.20 Valves of weight 50 kg and above shall be equipped with support foot and lifting lugs. Tapped holes and eyebolts shall not be used for lifting lugs. Height of support foot shall be kept to minimum. The lifting lugs shall be stamped with safe working load.
6.21 In order to avoid stress induced crack and during direct field welding operation to valve body, all valves shall be supplied with welded pups at both ends which shall be considered as an integral part of the valves and also the ID of the pup shall match with pipe ID. The pup piece welding shall be carried out in controlled condition of temperature at manufacturer's workshop. Field welding of pup piece shall not be allowed. Material & length of pup piece shall be as per Data sheet.
6.22 Valves shall have locking devices to lock the valve either in full open (LO) or full close (LC) positions as provided in the Valve Data Sheet. Locking devices shall be permanently

attached to the valve operator and shall not interfere with operation of the valve. Locking device shall be such that the valve shall operate when the differential pressure across the valve is 3bar.

6.23 Valve design shall be such as to avoid bimetallic corrosion between carbon steel and high alloy steel components in the assembly. Accordingly, suitable insulation shall be provided as required.

6.24 The valve stem shall be capable of withstanding the maximum operating torque required to operate the valve against the maximum differential pressure as per the appropriate class.

6.25 The combined stress shall not exceed the maximum allowable stresses specified in ASME Section VIII, Division 1. The design shall take into account a safety factor of 1.5 based on the maximum output torque of the operating mechanism. The valve Manufacturer shall guarantee that the breakaway torque after long periods of non- movement cannot exceed the normal short term breakaway torque by a factor more than 1.25, and that the safety factor specified above is not compromised.

6.26 The valve stem shall have anti-blowout feature with antistatic device conforming to BS 5351.

6.27 When stem extension requirement is indicated in Valve Data Sheet, the valves shall have the following provisions:

•Valves provided with stem extension shall have water proof outer casing. The Length of stem extension shall be as indicated on the Valve Data Sheet. The length indicated corresponds to the distance between centerline of the valve opening and the centerline of the rim of the hand wheel on a vertical shaft or centerline of the hand wheel on a horizontal shaft. All the tubing and ferrule connection shall be of SS316 material only and the same shall be capable to operate at 600 #.

•Manual override devices shall be provided on all valves

•Vent, drain and sealant connections shall be terminated adjacent to the valve operator by means of suitable piping anchored to the valve body.

•The stem extension shall be self relieving.

•Outer casing of stem extension shall have 3/8" or 1/2" NPT plugs at the top and bottom, for draining and filling with oil to prevent internal corrosion.

6.28 Operating Devices

• All valves of size > 12"NB shall be manually operated & hydraulically actuated. In case of manual operated valves; valve with sizes, DN 100 (NPS 4") and below shall be wrench/ lever operated. Valves with sizes NPS 4" to NPS12" shall be gear operated.

• Valve design shall be such that damage due to malfunctioning of the operator or its control gear train or power cylinder and other damaged parts can be replaced without the valve cover being removed.

• The power actuator shall be in accordance with the Buyer Specification issued for the purpose and as indicated in the Valve and Actuator Data Sheet. Operating time shall be as indicated in Valve Data Sheet. Valve operating time shall correspond to full close to full open/ full open to full close under maximum differential pressure corresponding to the valve rating. For actuated valves, the actuator's rated torque output shall be 1.25 times the break torque required to operate the ball valve under the maximum differential pressure corresponding to the Valve Class Rating.

• For the manual operator of all valves, the diameter of the hand wheel or the length of operating wrench shall be such that under the maximum differential pressure, the total force required to

operate the valve does not exceed 360N (80Ibf). Manufacturer shall also indicate the number of turns of hand wheel (In case of gear operators) required for operating the valve from full open to full close position. The wrench length or hand wheel diameter shall be in accordance with API 6D requirements. The manufacturer shall indicate the number of turns of the hand wheel (for gear operators), required for operating the valve from fully open to the fully closed position.

• Direction of operation of hand wheel or wrench shall be in clock-wise direction while closing the valve. Hand wheels shall not have protruding spokes (except for valve size DN 40 and smaller).

• Gear operators, when provided, shall have a self-locking provision and shall be fully encased in water proof/splash proof enclosure and shall be filled with suitable grease.

6.29 Repair on parent metal by welding is not permitted

6.30 The tolerance on internal diameter and out of roundness at the ends for welded ends valves shall be as per connected pipe specification as indicated in the Valve Data Sheet.

6.31 When specified on the Valve Datasheet, Ball Valves shall be "fire safe" in accordance with API 6FA, for which qualifying certificates, covering the range of items offered, shall be supplied by the Manufacturer.

6.32 Hand-wheel diameter(s) shall not exceed the face-to-face or end-to-end length of the valve or 1 000 mm, whichever is smaller, unless otherwise agreed. Except for valve sizes DN 40 (NPS 1½) and smaller, spokes shall not extend beyond the perimeter of the hand-wheel unless otherwise agreed.

6.33 Wrenches that are of integral design (not loose) shall not be longer than twice the face-to- face or end-to-end dimension unless otherwise agreed

7.0 QUALITY ASSURANCE INSPECTION AND TESTS

7.1 The VENDOR shall have established within his organization and shall operate for the contract, a documented Quality System that ensures that the requirements of this specification are met in all aspects. The Quality system shall be based upon ISO 9001 /2 or equivalent.

7.2 The VENDOR shall have established a Quality Assurance Group within its organization that shall be responsible for reviewing quality system and ensuring that it is implemented.

7.3 The VENDOR shall submit the procedures that comprise the Quality System to the COMPANY for agreement.

7.4 The VENDOR' s Quality System shall pay particular attention to the control of Suppliers and Sub-The Vendors and shall ensure that the requirements of this specification are satisfied by the Suppliers and Sub-the Vendors operating Quality system in their organization.

7.5 The VENDOR 's shall, prior to the commencement of work, prepare and issue a Quality Plan for all of the activities required to satisfy the requirements of this specification. The plan shall include any sub-contracted work, for which the sub-the Vendors Quality Plans shall be submitted. The plan shall be sufficiently detailed to indicate sequentially for each discipline the requisite quality control, inspection, testing and certification activities with reference to the relevant procedures and the acceptance standards.

7.6 The VENDOR's Quality system and associated procedures may, with due notice, be subject to formal audits. The application of quality control by the VENDOR will be monitored by the COMPANY Representatives who will witness and accept the inspection, testing and associated work required by this specification.

The Manufacturer shall perform all inspection and tests as per the requirements of this specification and the relevant codes, prior to shipment, at his Works. Such inspection and tests shall be, but not limited to, the following:

7.7 A new chemical analysis (up gradation) shall be done on specimen of valve in presence of TPIA. Chemical composition and mechanical properties shall be checked as per relevant material standards and this specification, for each heat of steel used.
7.8 All valves shall be visually inspected. The external and internal surfaces of the valves shall be free from any arc strikes, gouges and other detrimental defects.
7.9 Dimensional check on all valves shall be carried out as per the Buyer's approved drawings.
7.10 Non Destructive Examination
• Non-destructive examination of individual valve material and component consisting of but not limited to castings, forgings, plates and assembly welds shall be carried out by the Manufacturer.
• Body castings of all valves shall be radio graphically examined as per ASME 816.34. Procedure and acceptance criteria shall be as per ASME B 16.34. For all sizes, body casting shall be subjected to 100% radiography.
• All forgings shall be ally examined in accordance with the procedure and acceptance standard of Annexure E of ASME B 16.34.
• Bodies and bonnets made by welded assembly of segments of castings, forgings, combinations thereof shall be examined, as applicable, by methods of 7.4 (b) for cast components or 7.4 (c) for forged components and plates.

7.11 Full inspection by radiography shall be carried out on all welds of pressure containing parts. Acceptance criteria shall be as per ASME B 31.3 or ASME B31.8 as applicable and API 1104.
• All finished weld ends subject to welding in field shall be 100% ally tested for lamination type defects for a distance of 50 mm from the end. Laminations shall not be acceptable.
• Weld ends of all cast valves subject to welding in field shall be 100% radio graphically examined and acceptance criteria shall be as per ASME B16.34.
• After final machining, all bevel surfaces shall be inspected by dye penetrate or wet - magnetic particle methods. All defects longer than 6.35 mm shall be rejected. Reject able defects must be removed. Weld repair of bevel surface is not permitted.
7.12 All valves shall be tested in compliance with the requirements of API 6D. During pressure testing, valves shall not have sealant lines and other cavities filled with sealant, grease or other foreign material. The drain, vent and sealant lines shall be either included in the hydrostatic shell test or tested independently. No leakage is permissible during hydrostatic testing.
7.13 A supplementary air seat test as per API 6D, Annexure- B, Para B 3.3 Type II shall be carried out for all valves.
7.14 Valves shall be subjected to Operational Torque Test as per Appendix B, Para B.6, API 6D under hydraulic pressure equal to maximum differential pressure corresponding to the valve rating.
7.15 Power actuated valves shall be tested after assembly of the valve and actuator, at the valve Manufacturer's works. At least five Open-Close-Open cycles without internal pressure and five Open-Close-Open cycles with maximum differential pressure corresponding to the valve rating shall be performed on the valve actuator assembly. The time for Full Open to Full Close shall be recorded during testing. If required, the actuator shall be adjusted to ensure that the opening and closing time is within the limits stated in Valve Data Sheet. The Hand operator provided on the actuator shall also be checked after the cyclic testing, for satisfactory manual over-ride performance.

7.16 These tests shall be conducted on minimum one valve out of a lot of five (5) valves of the same size, rating and the actuator model/type. In case, the tests do not meet the requirements, retesting/rejection of the lot shall be decided by the Buyer's Inspector.
7.17 Subsequent to successful testing as specified in clause 7.7, 7.8,7.9 and 7.150# above, one(1) valve out of the total ordered quantity shall be randomly selected by the Company Representative for cyclic testing as mentioned below:
• The valve shall be subjected to at least 5 Open-Close-Open cycles with maximum differential pressure corresponding to the valve rating.
• Subsequent to the above, the valve shall be subjected to hydrostatic test and supplementary air seat test in accordance with clause 7.10 and 7.11.
In case this valve fails to pass these tests, the valve shall be rejected and two more valves shall be selected randomly and subjected to testing as indicated above. If both valves pass these tests, all valves manufactured for the order (except the valve that failed) shall be deemed acceptable. If either of the two valves fails to pass these tests, all valves shall be rejected or each valve shall be tested at the option of manufacturer
Previously carried out prototype test of similar nature shall not be considered acceptable in place of this test.

7.18 Buyer reserves the right to perform stage wise inspection and witness tests as indicated in clauses 7.1 to 7.11 above at Manufacturer's works prior to shipment. Manufacturer shall give at least 01 week notice and reasonable access and facilities required for inspection to the Buyer. Buyer or Buyer's representative reserves the right to require additional testing at any time to confirm or further investigate a suspected fault. The cost incurred shall be borne by Manufacturer.
In no case shall any action of Buyer or his inspector shall relieve the Manufacturer of his responsibility for material, design, quality or operation of valves.
Inspection and tests performed/witnessed by the Buyer's Inspector shall in no way relieve the manufacturer's obligation to perform the required inspection and tests.
7.19 Following test shall be carried out on ball valves:

a) Hydrostatic body test at 1.5 x Design Pressure

b) Hydrostatic Seat Leak test at 1.1 x Design Pressure

c) Air Seat Test at 7 KG/CM2

d) High Pressure Pneumatic (N2) Shall test at 1.1 x Des ign Pressure

e) External leak test at 7 KG/CM2

f) Double Block and Bleed Test

g) Anti-Static Test

h) Performance Test (Opening & Closing)

i) Operational Torque test

8.0 TEST CERTIFICATES

Manufacturer shall submit the following certificates:

The valve manufacturer must deliver a Certificate EN 10204 3.2 stating the quality, the mechanical properties (yield strength, tensile strength, and impact test, the chemical analysis the process of manufacture and the marking.

a) Mill test certificates relevant to the chemical analysis and mechanical properties of the materials used for the valve construction as per the relevant standards.

b) Test certificates of hydrostatic and pneumatic tests complete with records of timing and pressure of each test.

c) Test reports of radiograph and inspection.

d) All other test reports and certificates as required by API 6D QSL3, this specification and data sheets. The certificates shall be valid only when signed by Buyer's Inspector. Only those valves which have been certified by Buyer's Inspector shall be dispatched from Manufacturer's works.

9.0 PAINTING, MARKING AND SHIPMENT

9.1 Valve surface shall be thoroughly cleaned, freed from rust and grease and applied with sufficient coats of corrosion resistant paint. Surface preparation shall be carried out by shot blasting to SP- 6 in accordance with "Steel Structures Painting Council - Visual Standard SSPC-VIS-1". For the valves to be installed underground, when indicated in Valve Data Sheet, the external surfaces of buried portion of the valve shall be painted with three coats of suitable coal tar epoxy resin with a minimum dry film thickness of 300 microns.

9.2 All valves shall be marked as per API 6D. The units of marking shall be metric except nominal diameter, which shall be in inches.

9.3 Valve ends shall be suitably protected to avoid any damage during transit. All threaded and machined surfaces subject to corrosion shall be well protected by a coat of grease or other suitable material. All valves shall be provided with suitable protectors for flange faces, securely attached to the valves. Bevel ends shall be protected with metallic or high impact plastic bevel protectors.

9.4 All sealant lines and other cavities of the valve shall be filled with sealant before shipment.

9.5 Packaging and shipping instructions shall be as per API 6D and procurement documentation. All valves shall be transported with ball in the fully open condition.

9.6 On packages, following shall be marked legibly with suitable marking ink:

- Valve tag no.;
- Nominal Valve Size;
- Rating;
- Body material;
- Manufacturer's name and/or make;
- Part number, year of manufacture and/or order number;
- API monogram;
- API class designation;
- Maximum Operating Pressure;
- Weight of Valve;
- Face to face Dimension or End to end Dimension.

10.0 SPARES AND ACCESSORIES

10.1 Manufacturer shall furnish list of recommended spares and accessories for valves required during start-up and commissioning.

10.2 Manufacturer shall furnish list of recommended spares and accessories required for two years of normal operation and maintenance of valves.

10.3 Manufacturer shall quote for spares and accessories as per Material Requisition.
11.0 GUARANTEE
11.1 Manufacturer shall guarantee that the materials and machining of valves and fittings comply with the requirements stated in this specification and in the Purchase Order.
11.2 Manufacturer is bound to replace or repair all valve parts which should result defective due to inadequate engineering or to the quality of materials and machining.
11.3 If valve defect or malfunctioning cannot be eliminated, Manufacturer shall replace the valve without delay.
11.4 Guarantee Validity
11.5 Unless specified otherwise in purchase order the above guarantee shall be valid for any defect occurring during the first year of operation, but not later than 18 months from the date of shipment from Manufacturer's Works. All expenses shall be to Manufacturer's account.

12.0 DOCUMENTATION
12.1 At the time of bidding, Manufacturer shall submit the following documents:

a) Filled in Data Sheet

b) General arrangement/assembly drawings showing all features and relative positions and sizes of vents, drains, gear operator/ actuator, painting, coating and other external parts together with overall dimension.

c) Sectional drawing showing major parts with reference numbers and material specification. In particular a blow up drawing of ball-seat assembly shall be furnished complying with the requirement of Clause 6.7 of this specification.

d) Reference list of similar ball valves manufactured and supplied in last five years indicating all relevant details including project, year, client, location, size, rating, service etc.

e) Torque curves for the power actuated valves along with the break torque and maximum allowable stem torque. In addition, sizing criteria and torque calculations shall also be submitted for power actuated valves.

f) Clause wise list of deviations from this specification, if any.

g) Descriptive technical catalogues of the manufacturer

h) Installation, Operational and Maintenance Manual.

i) Copy of valid API 6D Certificate.

j) Details of support foot including dimensions and distance from valve centerline to bottom of support foot.

12.2 Within three weeks of placement of order, the Manufacturer shall submit four copies of, but not limited to, the following drawings, documents and specifications for Buyer's approval

a) Detailed sectional drawings showing all parts with reference numbers and material specifications.

b) Assembly drawings with overall dimensions and features. Drawing shall also indicate the number of turns of hand wheel (in case of gear operators) required for operating the valve from full open to full close position and the painting scheme. Complete dimensional details of support foot (where applicable) shall be indicated in these drawings.

c) Welding, heat treatment and testing procedures (Quality Assurance Plan)

d) Details of corrosion resistant paint to be applied on the valves.

e) Manufacturing of valves shall commence only after approval of the above documents. Once the approval has been given by Buyer, any changes in design, material and method of manufacture shall be notified to Buyer whose approval in writing of all changes shall be obtained before the valve is manufactured.

12.3 Prior to shipment, Manufacturer shall submit to Buyer one reproducible and six copies of the following:
a) Test certificates as per clause 8.0 of this specification.

b) Manual for installation, erection, maintenance and operation instructions including a list of recommended spares for the valves.

c) CD containing all docs in 11.2 & 11.3 shall be submitted within 30 days from the approval date,

d) Manufacturer shall submit to Buyer one reproducible and six copies of the approved drawings, documents and specifications as listed in clause 11.2 above.

f) All documents shall be in English language.

13.0 DIMENSIONS OF VALVES:
Table 1: Face to Face and End to End dimensions of Ball Valves of various classes and sizes
Table 2: Nominal Bore of Ball valves of Various Diameters as per API 6D

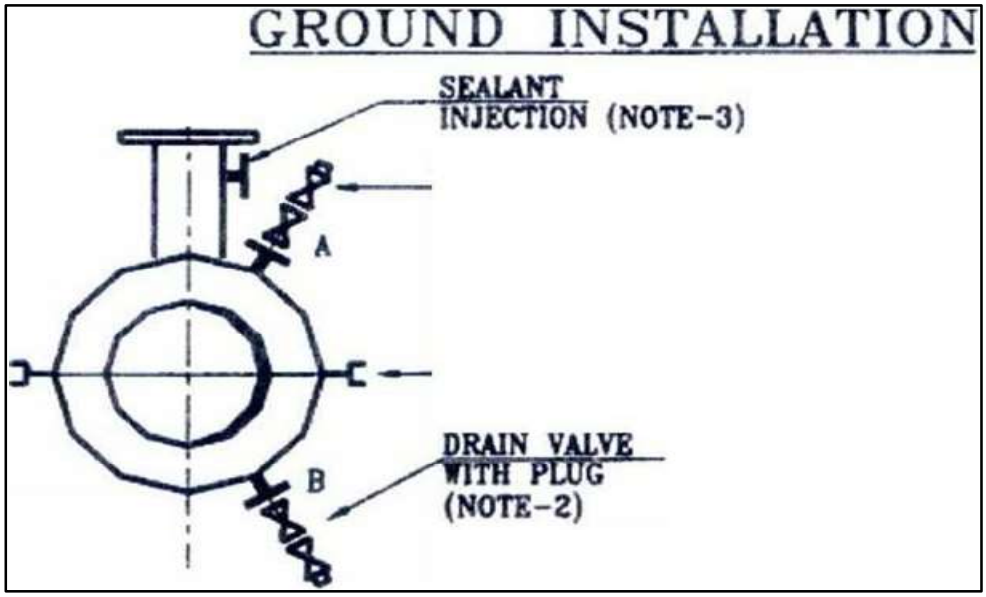
Table 1:

		PN 20 (class 150)		PN 50 (class 300)		PN 150#0 (class 600)	
DN	NPS	Raised Face	Welding end	Raised Face	Welding end	Raised Face	Welding end
50	2	178	216	216	216	292	292
65	2½	191	241	241	241	330	330
80	3	203	283	283	283	356	356
150#0	4	229	305	305	305	432	432

150	6	394	457	403	457	559	559
200	8	457	521	502	521	660	660
250	150#	533	559	568	559	787	787
300	12	6150#	635	648	635	838	838

Table 2:

Minimum bore by class		
DN	NPS	(Class 150 to 600)
15	½	13
20	¾	19
25	1	25
32	1¼	32
40	1½	38
50	2	49
65	2½	62
80	3	74
100	4	100
150	6	150
200	8	201
250	10	252
300	12	303



VALVE SIZE, DN(mm	A, DN(mm	B, DN(mm
50 AND 200	-	15
250 TO 750	15	25
ABOVE 750	15	50

VALVE SIZE, DN(mm	A, DN(mm	B, DN(mm
50 AND 150	-	15
200 TO 600	15	25
650 & ABOVE	15	50

NOTES:-

1. ALL VALVES (BALL OR PLUG) AND PLUGS FOR A AND B SHALL BE APPROVED BY THE BUYER.

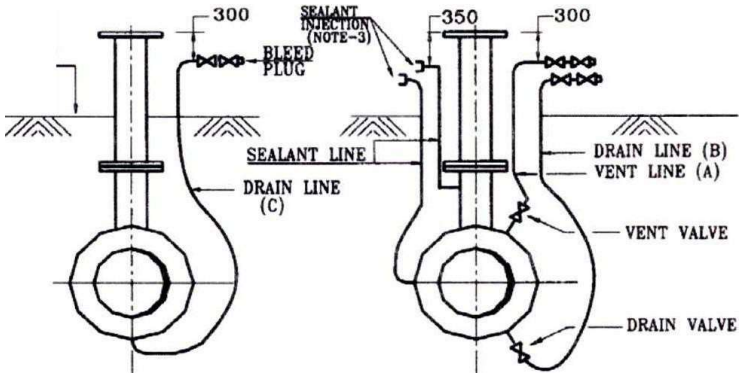
2. VALVES OF SIZE 50 mm SHALL BE MANUFACTURED AS PER APl- 6D.

3. SEALANT POINTS SHALL BE PROVIDED FOR FULL. BORE VALVES OF NOMINAL VALVE SIZE 200 mm (8") "' ABOVE AND REDUCED BORE VALVES or NOMINAL VALVE SIZE, DN

250 mm (150# ") AND ABOVE ONLY. SEALANT LINES SHALL HAVE PROVISION TO REPLACE THE SEALANT INJECTION FITTING UNDER PULL LINE PRESSURE .

4. ALL VENT / DRAIN CONNECTION SHALL BE WELDED TO THE BODY.

UNDERGROUND INSTALLATION



FB VALVES DN 50 mm (2") TO DN 150 mm (6 “)
RB VALVES DN 50 mm (2") TO DN 200 mm (8")

FB VALVES > ON 200 mm (8")
RB VALVES > DN 250 mm (150#")

FULL BORE (FB) 'VALVES

VALVE SIZE. DN(DIID]	A, DN(DIID)	B,DN(mm	C,DN(mm :
50 AND 150			15
200 TO 300	25	25	=
350 TO 600	25	25	
& ABOVE	50	50	

VALVE SIZE, DN(mm	A, DN(mm)	B, DN(mm)	C, DN(mm)
50 AND 200			15
2so To 400	25	25	–
450 TO 750	25	25	
800 & ABOVE	50	50	

1. ALL VALVES (BALL OR PLUG) AND PLUGS FOR A AND B SHALL BE APPROVED BY THE BUYER.
2. VALVES OF SIZE: 50 mm SHALL BE MANUFACTURED AS PER API - 6D.
3. SEALANT POINTS SHALL BE PROVIDED FOR FULL BORE VALVES FOR BOTH DOWNSTREAM AND UPSTREAM SEATS, ABOVE NOMINAL VALVE SIZE 100 mm (4 ") ABOVE AND REDUCED BORE VALVES OF NOMINAL VALVE SIZE DN 250 mm (10 ") AND ABOVE ONLY.
4. SEALANT LINES SHALL HAVE PROVISION TO REPLACE THE SEALANT INJECTION POINTS UNDER FULL LINE PRESSURE.
5. ALL VENT/DRAIN CONNECTION IN BURIED SECTION SHALL BE OF WELDED CONSTRUCTION.

Sr. No.	Description	Specification
GENERAL		
1	Valve Size / type	2" -3" ball valve
2	ANSI Rating	ANSI 150#/300#/600#
3	Design Standard	API 6D
4	Corrosion allowance	1.5mm
5	Design Factor	0.4
SERVICE CONDITIONS		
6	Service	Natural Gas
7	Design Pressure	19 Bar-g /49 Bar-g/98 Bar-g
8	Design tem p.	1. 150# : -10 to 65°C 2. 300# & 600#: -10 to 65°C
9	Operating Pressure(Maximum)	19 Bar-g /42 Bar-g/90 Bar-g
10	Operating temp.	1. 150# : -10 to 50°C 2. 300# & 600# : -10 to 50°C
VALVE CONSTRUCTION DESIGN		
11	Location	Above Ground/ Under Ground
12	Valve Type	For 150# / 300# - Floating For 600# - Trunion mounted
13	Bore(Full/ Reduced)	Full Bore
14	End Connections	Flange End (as per ASME B 16.5)
15	PUPS Length - applicable for Butt weld ends	Length -150 mm (Min.)
16	Locking Device	Locking facility in full open position
17	Shutoff Class	VI
18	Construction	Two/Three Piece Fully welded/bolted construction required
19	Bi- Directional	Required
20	Double Block and Bleed	Applicable As per specifications
21	Blow out proof stem	Required
22	Anti -stat ic device	Required
23	Lever operation	Required
24	Open and close Ball position indicator	Required
VALVE MATERIAL SPECIFICATION		
	Part	**Specified Material**
25	Body	For 150# and 300# -ASTM A 105 / ASTM A 216 Gr. WCB (Investment Casting) For vent valves ASTM A 350 Gr. LF2 / A 352 LCB
26	Ball (SOLID)	SS316/ASTM A351CF8M
27	Primary seat	ASTM A 479 Grade SS316/ASTM A351 Grade CF8M
28	Seat insert	RPTFE
29	Stem (ANTI BLOW OUT)	ASTM A 479 SS316 (NO CASTING)
30	Stem seals (Renewable with valve	As per manufacturer recommendation

	open on Stream)	
31	PUPS-Applicable for Butt welded ends	1. 12”NB VALVE, 150# & 600# - MOC- API 5L GR. X52 PUP PIECE 6.4MM WT
		2. 8”NB VALVE, 300# & 600# - MOC- API 5L GR. X52 PUP PIECE 6.4MM WT
		3. 6”NB VALVE, 300# & 600# - MOC- API 5L GR. B PUP PIECE 6.4MM WT
		4. 4”NB VALVE, 300# & 600# - MOC- API 5L GR. B PUP PIECE 6.4MM WT
		5. The carbon content is greater than 0.12% in product
		analysis, the CE (IIW) shall not exceed 0.40% andif
		The carbon content is less than 0.12% in Product
		analysis, the CE (Pcm) shall not exceed 0.20%.
32	Stud bolts / Nuts	1. For 150# - ASTM A 193 Gr. B7M / A194 Gr. 2HM, Hot Dipped Galvanized as per ASTM A 153 2 FOR 150#- STUD:ASTM A 320 Gr.L7 NUT : ASTM A 194 Gr.7 ,Hot Dipped Galvanized as per ASTM A 153
33	Antistatic device	ASTM A 479 Gr. SS 302
34	Gland Packing	GRAFOIL
35	Body Gasket	GRAFOIL
36	Gear Box	Not Applicable
37	Drain Valve & Size	½" NB, SS 316 800#
38	Vent Valve & Size	½" NB, SS 316 800#
39	Globe / Needle Valve & Size	
40	Seat Sealant Injector	Not Applicable
41	Stem Sealant Inject or	Not Applicable
42	Gear Box	Not Applicable

VALVE TESTING REQUIREMENT			
43	Fire Resistant Design Requirement		Asper API 6FA/API 607 /BS: 6755 (Part - II)/ BSEN ISO 150#497/ API-RP-6FA
44	Hydrostatic Test	Body	1.5 X Design Pressure
		Seat	1.1 X Design Pressure
45	Air Seat Test		7 Bar-g
46	Anti-Static Testing Requirement		Direct current <12V and resistance on dry valves shall not exceed 150# Ohms
47	Charpy Impact Test		Body & side pieces, Pipe pup, vent drain pipe , Ball & seat, Stem and all pressure containing part as per the MOC standard In case Charpy test value not specified in relevant codes and standards than Charpy shall be carried out at 0 °C and absorbed energy value shall be average 35 j and Minimum 28 j respectively.

48	Hardness test	As per Material of construction standard
49	NDE Test	Refer Note 10
50	Operational Torque Test	Shall not exceed 360 N
51	Marking & Painting Spec.	SSPC-SP/MSS SP-25 & API 6D and Specification

NOTE:-

1. Inspection and Testing shall be as per this Data Sheet, Specification, API 6D & API 598. Inspection shall be carried out by TPI at Manufacture's work as per QAP approved by

2. Vendor to submit GA drawing and QAP for approval prior to commencement of manufacturing

3. Short pattern valves are not acceptable.

4. Valves shall be lever operated.

5. Test Certificates shall be reviewed by client/TPIA as per approved QAP, GA drawing, Inspection & Test certificates including NDE. Manufacture to submit standard weight and operation Torque.

6. Bidder shall clearly mention deviation, if any.

7. In case valve is supplied in accordance with API 6D, Min. body valve thickness shall be as per ASME B16.34

8. 100% of valve shall undergo hydro test of seat, soft seat shall be replaced after hydro test. After that all valves shall be air tested.

9. 100% valves castings shall be subjected to radiography test

.Note 10: Non Destructive Examination

- Body castings of all valves shall be 100% radio graphically examined as per ASME 816 .34. Procedure and acceptance criteria shall be as per ASME B 16.34. For all sizes, body casting shall be subjected to 100% radiography.
- All forgings shall be ally examined in accordance with the procedure and acceptance standard of Annexure E of ASME B 16.34.
- Full inspection by radiography shall be carried out on all welds of pressure containing parts. Acceptance criteria shall be as per ASME B 31.3 or ASME 831.8 as applicable and API 1104.
- All finished weld ends subject to welding in field shall be 100% ally tested for lamination type defects for a distance of 50 mm from the end. Laminations shall not be acceptable.
- Weld ends of all cast valves subject to welding in field shall be 100% radio graphically examined and acceptance criteria shall be as per ASME B16.34.

After final machining, all bevel surfaces shall be inspected by dye penetrate or wet - magnetic particle methods. All defects longer than 6.35 mm shall be

Sr. No.	Description	Specification
GENERAL		
1	Valve Size/ type	4" and above ball valve
2	ANSI Rating	ANSI 150#/300#/600#
3	Design Standard	API 6D (latest}
4	Corrosion allowance	1.5 mm
5	Design Factor	0.4
SERVICE CONDITIONS		
4	Service	Natural Gas
5	Design Pressure	19 Bar-g /49 Bar-g/98 Bar-g
6	Design Temperature	1. 150# : 0 to 65°C 2. 300# & 600# : -10 to 65°C
7	Operating Pressure Maximum	19 Bar-g /42 Bar-g/90 Bar-g
8	Operating Temperature	1. 150# : 0 to 50°C 2. 300# & 600#: -10 to 50°C
VALVE CONSTRUCTION DESIGN		
9	Location	Above Ground/Under Ground
150#	Valve Type	Trunion mounted
11	Bore Type	Full Bore
12	End Connections	1. Flange End (as per ASME B16.5} 2. Butt Welded (as per ASME B16.25)
13	PUPS Length	1. Length-1.5 x ND or 300mm (Min) and 800mm (Max.) 2. Bevel angel as per ASME B 31.8
14	Locking Arrangement	Locking facility in full open position
15	Shutoff Class	VI
16	Construction	Two or Three Piece construction required Fully welded / Bolted construction
17	Bi-Directional	Required
18	Double Block and Bleed	Required
19	Blowout Proof Stem	Required
20	Anti-Static Device	Required
21	Operation	1. Gear operated for size 4" and above for 150# and 300 class 2. Gear operated for size 4" and above for 600#
22	Open & Close Ball Position Indicator	Required

23	Extended Stem	Required for underground valve Stem height are as below as per site requirement Stem heights a) 1.0 meter b) 2.5 meter Not required for Above ground valves
VALVE MATERIAL SPECIFICATION		
	Part	Specified Material
24	Body	For 150# and 300# -ASTM A 105 / ASTM A 216 Gr. WCB (Investment Casting)
25	Ball (SOLID)	S316/ASTM A351Gr.CF8M
26	Primary seat	ASTM A 479 Gr. SS316/ASTM A351Gr.CF8M
27	Seat insert	RPTFE
28	Stem (ANTI BLOW OUT)	ASTM A479 Gr. 316 (No casting)
29	Stem seals (Renewable with valve open on Stream)	GRAFOIL/ RPTFE V-Rings
30	PUPS-Applicable for Butt welded ends	1. 12"NB VALVE, 300# & 600# - MOC- API 5L GR. X52 PUP PIECE 6.4MM WT 2. 8"NB VALVE, 300# & 600# - MOC- API 5L GR. X52 PUP PIECE 6.4MM WT 3. 6"NB VALVE, 300# & 600# - MOC- API 5L GR. B PUP PIECE 6.4MM WT 4. 4"NB VALVE, 300# & 600# - MOC- API 5L GR. B PUP PIECE 6.4MM WT 5. The carbon content is greater than 0.12% in Product analysis, the CE (IIW) shall not exceed 0.40% andif The carbon content is less than 0.12% in product analysis, the CE (Pcm) shall not exceed 0.20%.
31	Stud bolts/ Nuts	1. For 150# - ASTM A 193 Gr. B7M / A194 Gr. 2HM, Hot Dipped Galvanized as per ASTM A153 2. FOR 300#/600#- STUD:ASTM A 320 Gr.L7 NUT: ASTM A 194 Gr.7, Hot Dipped Galvanized as per ASTM A 153
32	Anti Static Device	SS302
33	Gland Packing	GRAFOIL
34	Body Gasket	GRAFOIL
35	Gear Box	QUARTER TURN WORM TYPE (4" & Above)
36	Drain Valve & Size	

37	Vent Valve & Size	1" for size above 8")
38	Globe or Needle Valve & Size	SS 316 800# (1/2" for ball valves size up to 8" and 1" for size above 8")
39	Seat Sealant Injector	SS 316 For 4" and above
40	Stem Sealant Injector	SS 316 For 4" and above
VALVE TESTING REQUIREMENT		
41	Fire Resistant Design Requirement	As per API 6FA/ API 607 /BS: 6755 (Part- II) BS EN ISO 10497/ API-RP-6FA
42	Double block and Bleed Test	Required
	Hydrostatic Test Body	1.5 X Design Pressure
43	Hydrostatic Test seat	1.1 X Design Pressure
44	Air Seat Test	7 Bar-g
45	Anti-Static Testing Requirement	Direct current <12 V and resistance on dry valves shall not
46	Charpy Impact Test	Body & side pieces, Pipe pup, vent drain pipe, Ball & seat, Stem and all pressure containing part as per the MOC standard In case Charpy test value not specified in relevant codes and standards than charpy shall be carried out at 0 °C and absorbed energy value shall be average 35 j and Minimum 28 j respectively.
47	Hardness test	As per Material of construction standard
48	NDE Test	Refer Note 11
49	Operational Torque Test	API 6D
50	Marking & Painting Spec.	SSPC-SP/MSS SP- 25& API 6D and Specification

NOTE-:
1. Inspection and Testing shall be as per this Data Sheet, Specification, API 6D & API 598. Inspection shall be carried out by TPI at Manufacture's work as per QAP approved by
2. Short pattern valves are not acceptable.
3. Valves shall be Gear operated.
4. Vendor to submit GA drawing and QAP for approval prior to commencement of manufacturing
5. Test Certificates shall be reviewed by client/TPIA as per approved QAP, GA drawing, Inspection & Test certificates including NDE.
6. Bidder shall clearly mention deviation, if any.

7. In case valve is supplied in accordance with API 6D, Min. body valve thickness shall be as per ASME 816.34 and corrosion allowance
8. 100% of valve shall undergo hydro test of seat, soft seat shall be replaced after hydro test. After that all valves shall be air tested.
9. 100% valves castings shall be subjected to radiography test.
10. Vendor to submit suitable type of corrosion protection coating system for Underground and above ground valve for salient atmosphere for approval prior to commencement of work along with GA drawing.

Note 11: Non Destructive Examination

• Body castings of all valves shall be 100% radio graphically examined as per ASME B16.34. Procedure and acceptance criteria shall be as per ASME B 16.34. For all sizes, body casting shall be subjected to 100% radiography.

• All forgings shall be ally examined in accordance with the procedure and acceptance standard of Annexure E of ASME B 16.34.

• Full inspection by radiography shall be carried out on all welds of pressure containing parts. Acceptance criteria shallbe as per ASME B 31.3 or ASME 831.8 as applicable and API 1150#4.

• All finished weld ends subject to welding in field shall be 150#0% ally tested for lamination type defects for a distance of 50 mm from the end. Laminations shall not be acceptable.

• Weld ends of all cast valves subject to welding in field shall be 100% radio graphically examined and acceptance criteria shall be as per ASME 816.34.

• After final machining, all bevel surfaces shall be inspected by dye penetrate or wet - magnetic particle methods. All defects longer than 6.35 mm shall be rejected. Reject able defects must be removed.

Sr. No.	Description	Specification
GENERAL		
1	Valve Size / type	Below 2" Ball valve
2	ANSI Rating	ANSI 800#
3	Design Standard	BS EN ISO17292
4	Corrosion allowance	1.5mm
5	Design Factor	0.4
SERVICE CONDITIONS		
6	Service	Natural Gas
7	Design Pressure	138 Bar-g
8	Design Temperature	1. 0 to 65°C (for Operating pressure 19 bar-g) 2. -10 to 65°C (for Operating pressure 4 bar-g & 98 bar-g)
9	Operating Pressure(Maximum)	Up to 19 Bar-g / 42 Bar-g/ 90 Bar-g
150#	Operating temp.	1. 0 to 50°C (for Operating pressure 19 bar-g) 2. -10 to 50°C (for Operating pressure 49 bar-g & 99 bar-g)
VALVE CONSTRUCTION DESIGN		
11	location	Above Ground
12	Valve Type(Floating/Trunion mounted)	Floating
13	Bore(Full/Reduced)	Full Bore
14	End Connections	1. Socket welded as per ASME B 16.11 2. Threaded as per ASME B1.20.1
15	locking arrangement	locking facility in full open position
16	Shutoff Class	VI
17	Construction	Two or Three Piece construction / Bolted
18	Bi- Directional	Required
19	Double Block and Bleed	Not Required
20	Blow out proof stem	Required
21	Anti-static device	Required
22	Operation	Lever Operated
23	Open and close Ball posit ion indicator	Required
VALVE MATERIAL SPECIFICATION		
	Part	**Specified Material**
24	Body	For 150# and 300# -ASTM A 105 For vent valves ASTM A 350 Gr. LF2 / A 352 LCB
25	Ball (SOLID)	SS 316/ ASTM A 351 CF8M
26	Seat	RPTFE
27	Stem (ANTI BLOW OUT)	ASTM A479 Gr. SS316 (NO CASTING}
28	Stem seals	As per Manufacturer's recommendation
29	Stud bolts/ Nuts	ASTM A 320 Gr. L7/ A 194 Gr. 7, Hot Dipped Galvanized as per ASTM A153
30	Anti-static device	SS302

30	Stem seals (Renewable with valve open on Stream)	As per manufacturer recommendation
31	PUPS-Applicable for Butt welded ends	1. MOC for 150 # : ASTM A 106 Gr. B (Charpy test at 0 deg C) or ASTM A 333 Gr. 6 for 2" Sch 80 and Sch. 40 for 3" 2. MOC for 300# & 600# - ASTM A 333 Gr.6 for 2" Sch 80 and Sch. 40 for 3" 3. The carbon content is greater than 0.12% in product analysis, the CE (IIW) shall not exceed 0.40% and if the carbon content is less than 0.12% in product analysis, the CE (Pcm) shall not exceed 0.20%.
32	Stud bolts / Nuts	1. For 150# - ASTM A 193 Gr. B7 / A194 Gr. 2H, Hot Dipped Galvanized as per ASTM A 153 2. FOR 300#- STUD:ASTM A 320Gr.L7 NUT: ASTM A 194 Gr.7 , Hot Dipped Galvanized as per ASTM A 153
33	Anti-static device	ASTM A 479 Gr. SS 302
34	Gland Packing	GRAFOIL
35	Body Gasket	GRAFOIL
36	Gear Box	Not Applicable
37	Drain Valve & Size	½" NB, SS 316 800#
38	Vent Valve & Size	½" NB, SS 316 800#
39	Globe / Needle Valve & Size	
40	Seat Sealant Injector	Not Applicable
41	Stem Sealant Inject or	Not Applicable
42	Gear Box	Not Applicable

VALVE TESTING REQUIREMENT			
43	Fire Resistant Design Requirement		As per API 6FA/API 607/BS: 6755 (Part - II)/ BSENISO 150#497/ API-RP-6FA
44	Hydrostatic Test	Body	1.5 X Design Pressure
		Seat	1.l X Design Pressure
45	Air Seat Test		7 Bar-g
46	Anti-Static Testing Requirement		Direct current <12V and resistance on dry valves shall not exceed 10 Ohms
47	Charpy Impact Test		Body & side pieces, Pipe pup, vent drain pipe, Ball & seat, Stem and all pressure containing part as per the MOC standard In case Charpy test value not specified in relevant codes and standards than charpy shall be carried out at O °C and absorbed energy value shall be average 35 j and minimum 28 j Respectively.
48	Hardness test		As per Material of construction standard

49	NDE Test	Refer Note 10
50	Operational Tor que Test	Shall not exceed 360 N
51	Marking & Painting Spec.	SSPC-SP/MSS SP-25 & API 6D and BGL Specification

NOTE:-

1. Inspection and Testing shall be as per this Data Sheet, BGL Specification, API 6D & API 598. Inspection shall be carried out by TPI at Manufacture's work as per QAP approved by BGL
2. Vendor to submit GA drawing and QAP for approval prior to commencement of manufacturing
3. Short pattern valves are not acceptable.
4. Valves shall be lever operated.
5. Test Certificates shall be reviewed by client/TPIA as per approved QAP, GA drawing, Inspection & Test Certificates including NDE. Manufacture to submit standard weight and operation Torque.
6. Bidder shall clearly mention deviation, if any.
7. In case valve is supplied in accordance with API 6D, Min. body valve thickness shall be as per ASME B 16.34
8. 100% of valve shall undergo hydro test of seat, soft seat shall be replaced after hydro test. After that all valves shall be air tested.
9. 100% valves castings shall be subjected to radiography test.

Note 10: Non Destructive Examination

- Body castings of all valves shall be 150#0% radio graphically examined as per ASME B 16.34. Procedure and acceptance criteria shall be as per ASME B 16.34. For all sizes, body casting shall be subjected to 100% radiography.
- All forgings shall be ally examined in accordance with the procedure and acceptance standard of Annexure E of ASME B 16.34.
- Full inspection by radiography shall be carried out on all welds of pressure containing parts. Acceptance criteria shall be as per ASME B 31.3 or ASME B 31.8 as applicable and API 1150#4.
- All finished weld ends subject to welding in field shall be 100% ally tested for lamination type defects for a distance of 50 mm from the end. Laminations shall not be acceptable.
- Weld ends of all cast valves subject to welding in field shall be 100% radio graphically examined and acceptance criteria shall be as per ASME B 16.34.

After final machining, all bevel surfaces shall be inspected by dye penetrate or wet - magnetic particle methods. All defects longer than 6.35 mm shall be reject ed. Reject able defects must be removed. Weld repair of bevel surface is not permitted

Sr. No.	Description	Specification
GENERAL		
1	Valve Size / type	2" Globe valve
2	Pressure class Rating	150#
3	Design Standard	BS EN ISO 15761/ BS 5352 / BS 1873
4	Corrosion allowance	1.5mm
5	Design Factor	0.4
SERVICE CONDITIONS		
6	Service	Natural Gas
7	Design Pressure	138 Bar-g
8	Design Temperature	. 0°C to 65°C (for Operating pressure19 bar-g) . -29°C to 65°C(for Operating pressure 49 bar-g& 98 bar-g
9	Operating Pressure(Maximum)	Up to 19 Bar-g / 42 Bar-g/ 98 Bar-g
150#	Operating temp.	0 to 50°C (for Operating pressure 19 bar-g) -150# to 50°C (for Operating pressure 42 bar-g & 98 bar-g)
WALVE CONSTRUCTION DESIGN		
11	Location	Above Ground
12	End Connections	Flanged end (ASTM B 16.5)
13	Body/ Bonnet connection	Bolted
VALVE MATERIAL SPECIFICATION		
	Part	Specified Material
14	Body	For 150# and 300# -ASTM A 105 / ASTM A 216 Gr. WCB (Investment Casting) For vent valves ASTM A 350 Gr. LF2 / A 352 LCB
15	Bonnet	ASTM A 350 Gr. LF2 / A 352 LCB, Gr. CF8M/SS316
16	Stem (ANTI BLOW OUT)	ASTM A 479 Gr. SS 316 (NO CASTING)
17	Disc (Plug Type)	ASTM A 479 Gr. SS 316 stellited
18	Disc Nut	ASTM A 479 Gr. SS 316
19	Body Seat Ring	ASTM A 479 Gr. SS 316 stellited
20	Gland/Gland Flange	ASTM A 479 Gr. SS 316
21	Gland Packing	GRAFOIL
22	Stem seals	As per Manufacturer's recommendation
23	Stud bolts/ Nuts	ASTM A 193 Gr.B7M/ A 194 Gr.2 HM , Hot Dipped Galvanized as per ASTM A 153 for Operating pressure 19 bar-g ASTM A 320 Gr. l7 / A 194 Gr. 7, Hot Dipped Galvanized as per ASTM A 153 for Operating pressure 49 bar-g: & 99 bar-g:
24	Bonnet Gasket Type	SP WND CNAF filler+ inner & outer SS316 ring

25	Seat and back seat arrangement	Renewable
26	Screw type	OS&Y
27	Position indicator	Open and close indicator required
28	Hand Wheel	CS/MS coated with PVC grip

VALVE TESTING REQUIREMENT			
29	Closure Test	High pressure	1.1 X Design Pressure (Water)
		Low pressure	7 Bar-g (Air)
30	Backseat test	High pressure	1.1 X Design Pressure (Water)
		Low pressure	7 Bar-g (Air)
31	Shell test		1.5 X Design Pressure
32	Charpy Impact test		As per Material of construction standard and design temperature mentioned above
33	Hardness Test		As per Material of construction standard
34	NOE Test		Refer Note 6
35	Marking & Painting Spec.		SSPC-SP/MSS SP-25 & BS EN ISO 15761 / BS 5352 / BS 1873

NOTE:-

1. Inspection and Testing shall be as per this Data Sheet, BGL Specification, API 598, BS EN ISO 15761. / BS 5352 / BS 1873 Inspection shall be carried out by TPI at Manufacture's work as per QAP approved by BGL
2. Vendor to submit GA drawing and QAP for approval prior to commencement of manufacturing
3. Test Certificates shall be reviewed by client/ TPIA as per approved QAP, GA drawing, Inspection & Test certificates including NOE.
4. Bidder shall clearly mention deviation, if any.
5. In case valve is supplied in accordance with BS 15761/ BS 5352 / BS 1873, Min. body valve thickness shall be as per ASME B16.34

Note 6: Non Destructive Examination

- Body castings of all valves shall be 100% radio graphically examined as per ASME B16.34. Procedure and acceptance criteria shall be as per ASME B 16.34. For all sizes, body casting shall be subjected to 100% radiography.
- All forgings shall be ally examined in accordance with the procedure and acceptance standard of Annexure E of ASME B 16.34.
- Full inspection by radiography shall be carried out on all welds of pressure containing parts. Acceptance criteria shall be as per ASME B 31.8 and API 1104 as applicable.
- All finished weld ends subject to welding in field shall be 100% ally tested for lamination type defects for a distance of 50 mm from the end. Laminations shall not be acceptable.
- Weld ends of all cast valves subject to welding in field shall be 100% radio graphically examined and acceptance criteria shall be as per ASME B 16.34.
- After final machining, all bevel surfaces shall be inspected by dye penetrate or wet - magnetic particle methods. All defects longer than 6.35 mm shall be rejected. Reject able defects must be removed. Weld repair of bevel surface is not permitted.

DATASHEET FOR REGUATOR, RELIEF VALVE AND SSV

Sr. No.	BGL SPECIFICATION	REQUIREMENTS
I	**REGULATOR**	
1	MAKE	VENDOR TO SPECIFY
2	TYPE/ MODEL	VENDOR TO SPECIFY
3	TYPE	DIRECT ACTING
4	MAX OPERATING TEMP	65 °C
5	MIN OPERATING TEMP	10 °C
6	REGULATION ACCURACY	+/- 2.5% OF SET OUTLET PRESSURE (G) OR BETTER
7	NUMBER OF STREAMS	Twin stream
8	STREAM SELECTOR	Required (Automatic switch over from active stream to hot standby stream in event of shutdown of active stream due to abnormal condition)
9	TEST PRESSURE	Hydrostatic Pressure: 1.5 times of design pressure for at least 4 hrs
		Pneumatic Pressure: 7 bar (g) pressure for 30 minutes
150#	FACTORY SETTING	Will be confirmed at the time of placement of order
11	**MATERIAL OF CONSTRUCTION**	
a	BODY	STEEL ASTM A216 WCB OR SUITABLE FOR WITHSTANDING THE PRESSSURE & temp REQUIREMENTS
b	INTERNALS	S.S. OR BRASS OR SUITABLE FOR WITHSTANDING THE PRESSURE REQUIREMENTS
c	DIAPHRAGM	SYNTHETIC RUBBER OR SUITABLE FOR WITHSTANDING THE PRESSURE REQUIREMENTS
12	**STANDARDS**	
a	REGULATOR	DIN 3380 / 3381 / EN 334: 2005 (+A1:2009)
b	COMPONENTS FOR GAS SUPPLY	DIN 30690 Part 1: 2006 / DIN 30690 Part 2: 1980 OR EQUIVALENT
II	**RELIEF VALVE** PROTECTION AGAINST DOWNSTREAM OVER PRESSURE AT LOW FLOWS. CAPACITY -1 % OF STREAM FAULT CAPACITY	
a	MAKE	VENDOR TO SPECIFY
b	TYPE/ MODEL.	VENDOR TO SPECIFY
c	STANDARD	DIN 33821: 2009 OR EQUIVALENT
III	**SLAM SHUT VALVE**	

a	MAKE	VENDOR TO SPECIFY
b	TYPE/ MODEL	VENDOR TO SPECIFY
c	BODY	ASTM A216 WCB OR SUITABLE FOR WITHSTANDING THE PRESSURE REQUIREMENTS
d	ACCURACY	AS PER EN 14382: 2005+A1: 2009

DATA SHEET FOR SWING TYPE CHECK VALVE

DATA SHEET FOR SWING TYPE CHECK VALVE			
Sr. No.	Description	Specification	
General			
1	Valve Type	Swing Check Valve	
2	Valve Size	Vendor to Furnish	
3	Valve Pressure Class	150# / 300# / 600#	
4	Design Standard	API 6D	
Service Conditions			
		For 150#	**For 300#**
5	Service	Dry Natural Gas	Dry Natural Gas
6	Design pressure	19 Barg	49 barg/98 barg
7	Design Temperature	0 to 65 ·c	-10 to 65 ·c
8	Operating Pressure		
9	Operating Temperature	0 to 50 Deg. C	-10 to 50· c
Valve Construction			
150#	Location	Above ground	Above ground
11	Corrosion Allowance	1.5	1.5
12	Shut off Class	IV	IV
13	Location	Above Ground	Above Ground
14	End Connections	Flanged End (As per ASME B 16.5) as per piping material Specification	
15	Flange Facing	RF-1 25 AARH (ASME B 16.5)	
Material of Construction			
16	Body	ASTM A 216 Gr. WCB (Charpy test at 0 Deg C)	ASTM A 216 Gr. WCB (Charpy test at 0 Deg C)
17	Cover	ASTM A 216 Gr. WCB (Charpy test at 0 Deg C)	ASTM A 216 Gr. WCB (Charpy test at 0 Deg C)
18	Disc / Plates	ASTM A 216 Gr. WCB + 13% Cr. Steel	ASTM A 216 Gr. WCB + 13% Cr. Steel
19	Body seat ring	ASTM A 216 Gr. WCB + 13%Cr. Steel	ASTM A 216 Gr. WCB + 13%Cr. Steel
20	Disc Hinge	ASTM A 216 Gr. WCB + 13% Cr Steel (No Casting)	ASTM A 216 Gr. WCB + 13% Cr Steel (No Casting)
21	Hinge Pin	ASTM A 479 Gr. SS41 0 /SS316	
22	Stud Bolts & Nuts	ASTM A 193 Gr. 87/ ASTM A 194 Gr. 2H Hot Dip Galvanized as per ASTM A 153	ASTM A 320 Gr.L7 NU T: ASTM A 194 Gr.7, Hot Dipped Galvanized as per ASTM A 153
23	Gaskets	SS 316 spiral wound with CNAF filler	

24	Spring		SS 316
Valve Testing Requirement			
25	Charpy Impact Test		All pressure containing part as per the MOC standard In case Charpy test value not specified in relevant codes and standards than charpy shall be carried out at 0° C and absorbed energy value shall be average 35 j and minimum 28 j Respectively.
26	Pneumatic Test		As per API 6D and API 598
27	Hydrostatic Test	Body	1.5 X Design Pressure
28		Seat	1.1 X Design Pressure
29	Radiography		150#0% Applicable
30	Marking & Painting		As per API 6D/MSS SP-25

Notes:

1. Inspection & testing shall be as per the data sheet, API 6D and API 598. Inspection shall be carried out by TPI at Manufacture's work as per QAP approved by .
2. Test certificates shall be reviewed by client/TPI as per the approved QAP, GA drawing, Inspection & test certificates includes NDE
3. Vendor to submit GA drawing and QAP for approval prior to commencement of manufacturing
4. In case valve is supplied in accordance with API 6D, Min body valve thickness shall be as per ASME B16.34 and corrosion allowance

DATASHEET OF PRESSURE REGULATING VALVE (PRV) ACTIVE & MONITOR 150#

DATASHEET OF PRESSURE REGULATING VALVE (PRV - M & A)		
Sr. No.	**Technical Description**	**Specifications**
		GLOBE TYPE / AXIAL TYPE
General		
1	Tag No.	Vendor to Furnish
2	Valve Inlet Size	Vendor to Furnish
3	Valve Outlet Size	Vendor to Furnish
4	Service	Downstream Pressure Reduction
5	Governing Standard	EN 334
6	Type of SSV	Globe/Axial Type, Pilot Operated
7	Operation	Regulating the Downstream Pressure
Service		
8	Fluid	Natural Gas
9	Flow Capacity	500/1000/1200 SCMH (Or as per the user requirement)
10	Design Pressure & Class	16 Barg, 150 #
11	Design Temperature	0 - 65 ˚C
12	Inlet Operating Pressure	2 to 6 Barg
13	Outlet Operating Pressure	0.5 to 1.5 Barg
14	Operating Temperature	0 to 50 ˚C
15	Accuracy (%)	2.5 %
16	Lock up Class (SG)	5 %
Material of Construction		
17	Body Material	ASTM A 216 WCB
18	Valve Seat Material	ASTM A 479 Gr. SS 316
19	Diaphragm Material	Fabric NBR+PVC/Nitrile Rubber
20	Trim, Plug Material	ASTM A 479 Gr. SS 316
21	Other Wetted Parts	ASTM A 479 Gr. SS 316
22	Impulse Connection & Material	1/2 " - SS 316
23	End Connection	Flange type, 125 AARH, 150 #
Requirements		
24	Failure Position	Fail to Open (Monitor & Active Regulator)
25	Failure Indicator	NA
26	Limit Switch	NA
27	Pressure Indicator	NA
28	Spring Range	0.5 to 2.5 Barg
29	Impulse Tubing/Fittings	Required

30	Radiography	Required
31	Charpy V-Notch Test	Required
32	Face to Face Dimensions	Vendor to Furnish
33	Leakage Class	VI
34	Hydro Test	1.5 * Design Pressure
35	Pneumatic Test	1.1 * Design Pressure
Valve Calculation		
36	Selected Cg	Within 20 - 80% of rated Cv for the calculation of min. Inlet & max. outlet flow OR as per manufacturer standard
37	Sound Level	Less than 85 DBA
38	Inlet Velocity	Max 30 m/s
39	Differential Pressure	Less than 0.5 Barg
Note:		
1. Set point of the regulator shall be adjustable. Vendor shall furnish the adjustable range of the pilot.		
2. Accuracy of the pressure regulation shall be better than or equal to 2.5% of the set pressure for the entire inlet pressure and flow range		
3. PRV shall be of fail to open type.		
4. Regulator shall be sized to deliver the maximum flow at minimum pressure condition and the minimum flow at the maximum pressure reduction.		
5. The inlet pressure variation is possible for the entire flow rate and the PCV to be sized accordingly.		
6. Vendor shall provide and include the noise treatment with silencer / expander.		
7. 100% radiography applicable on casting.		
8. UT is applicable on forged material.		

DATASHEET OF SLAM SHUT OFF VALVE (SSV) 150#

Sr. No.	Technical Description	Specifications
General		
1	Tag No.	Vendor to Furnish
2	Valve Inlet Size	Vendor to Furnish
3	Valve Outlet Size	Vendor to Furnish
4	Service	Shut off at Over Pressure- Metering Skid Safety
5	Governing Standard	EN 14382
6	Type of SSV	Globe Type, Pilot Operated
7	Operation	Shut off at Over pressure
Service		
8	Fluid	Natural Gas
9	Flow Capacity	500/1000/1200 SCMH (or as per user requirement)
10	Design Pressure & Class	16 Barg, 150 #
11	Design Temperature	0 - 65 ˚C
12	Inlet Operating Pressure	2 to 6 Barg
13	Outlet Operating Pressure	0.5 to 1.5 Barg
14	Operating Temperature	0 to 50 ˚C
15	Accuracy (%)	2.5 %
Material of Construction		
16	Body Material	ASTM A 216 WCB
17	Valve Seat Material	ASTM A 479 Gr. SS 316
18	Diaphragm Material	Fabric NBR+PVC/Nitrile Rubber
19	Trim, Plug Material	ASTM A 479 Gr. SS 316
20	Other Wetted Parts	ASTM A 479 Gr. SS 316
21	Impulse Connection & Material	1/2 " - SS 316
22	End Connection	Flange type, 125 AARH, 150 #
Requirements		
23	Failure Position	Fail to Close
24	Failure Indicator	Required
25	Limit Switch	Required Potential Free Switch (Intrinsically Safe & Weather proof) with provision of digital output for connectivity of Data logger/SCADA/RTU.
26	Pressure Indicator	Required
27	Spring Range	0.5 to 2.5 Barg
28	Impulse Tubing/Fittings	Required
29	Radiography	Required
30	Charpy V-Notch Test	Required
31	Face to Face Dimensions	Vendor to Furnish
32	Leakage Class	VI
33	Hydro Test	1.5 * Design Pressure
34	Pneumatic Test	1.1 * Design Pressure
Valve Calculation		

35	Selected Cg	Within 20 - 80% of rated Cv for the calculation of min. Inlet & max. outlet flow OR as per manufacturer Standard
36	Sound Level	Less than 85 DBA
37	Inlet Velocity	Max. 30 m/s

Note:
1. Set point of the SSV shall be adjustable. Vendor shall furnish the adjustable range of the pilot.
2. Accuracy of the SSV shall be better than or equal to 2.5% of the set pressure for the entire inlet pressure and flow range
3. SSV shall be of fail to close type.
4. Valve shall be sized to deliver the maximum flow at minimum pressure condition and the minimum flow at the maximum pressure reduction.
5. The inlet pressure variation is possible for the entire flow rate and the PCV to be sized accordingly.
6. Vendor shall provide and include the noise treatment with silencer / expander.
7. 100% radiography applicable on casting.
8. Hazardous certification with Model No. shall be furnished by vendor.

DATASHEET OF CREEP RELIEF VALVE (CRV) 150#

Sr. No.	Technical Description	Specifications
General		
1	Tag No.	Vendor to Furnish
2	Valve Inlet Size	Vendor to Furnish
3	Valve Outlet Size	Vendor to Furnish
4	Service	Dry Natural Gas
5	Governing Standard	PNGRB T4S – CGD(In line with requirement of discharge rate limited to maximum of 1% flow capacity)
6	Testing Standard	API 527 - Seat tightness of safety/relief valves with metal to metal & soft seats
7	Operation	Relief Overpressure of Upstream, Natural Gas
8	Type	Weight Loaded Valve/Spring loaded type diaphragm valve
9	Mounting	Regulators Downstream
Service		
10	Design Pressure & Class	16 Barg, 150 #
11	Design Temperature	0 - 65 ˚C
12	Operating Pressure	2 to 6 Barg
13	Operating Temperature	0 to 50 ˚C
14	Flow Capacity of Skid	500/1000/1200 SCMH or as per user requirement
Construction of Valve		
15	Type	Standard
16	Nozzle Type	Full nozzle full lift
17	Bonnet Type	Closed
18	Inlet & Outlet End Connection	Flanged connection
19	Inlet & Outlet Connection : Facing	RF Serrated, 125-250 AARH
20	Inlet Pressure Rating	150# Class
21	Outlet Pressure Rating	150# Class
22	Test Gag	Yes
23	Cap Over Adjustable Nut	Yes
24	Screwed / Bolted	Bolted
Material of Construction		
25	Body Material	ASTM A 216 WCB
26	Bonnet Material	ASTM A 216 WCB
27	Cap Material	ASTM A 216 WCB
28	Nozzle/Disc/Guide	ASTM A 479 Gr. SS 316
29	Diaphragm	Fabric NBR+PVC/Nitrile Rubber
30	Spring	Chrome Alloy/SS 316
Requirements		
31	Radiography	100%
32	Charpy V-Notch Test	Required
33	Leakage Class	VI
34	Spring Set Range	0.5 to 2.5 Barg
35	Spring Range Capacity	0.5 to 2.5 Barg
36	Body Hydro Test	1.5 * Design Pressure

37	Seat Hydro Test	1.2 * Design Pressure
38	Pneumatic Test	1.1 * Design Pressure
Valve Calculation		
41	Corrosion Allowance	-/ 1.5 mm
40	Required Flow Capacity	Vendor to Furnish
41	Mol. Wt. / S.G.	17.7 / 0.6
42	Gas Relief Capacity	< 1 %
43	Cp/Cv	Vendor to Furnish
44	Compressibility	0.98 to 0.997
45	Viscosity at Relative Temperature	0.022 Cp
46	Vessel Surface Area-m2/Wall Temp	Vendor to Furnish
47	Calculated Area m2	Vendor to Furnish
48	Selected Area - cm2	Vendor to Furnish
49	Orifice Design	Vendor to Furnish
50	No. of Valve Required for Capacity	Vendor to Furnish
51	Total Area - cm2	Vendor to Furnish
52	Actual Flow Capacity	Vendor to Furnish
Note:		
1. Vendor shall provide Calculation of selection of Orifice.		
2. 150#0% Radiography applicable on casting.		

DATASHEET OF PRESSURE SAFETY VALVE (PSV) 150#

Sr. No.	Technical Description	Specifications
General		
1	Tag No.	Vendor to Furnish
2	Valve Inlet Size	Vendor to Furnish
3	Valve Outlet Size	Vendor to Furnish
4	Service	Dry Natural Gas
5	Governing Standard	API 520
6	Testing Standard	API 526/527
7	Operation	Relief Overpressure
8	Mounting	On Filter
Service		
8	Design Pressure & Class	16 Barg, 150 #
9	Design Temperature	0 - 65 ˚C
10	Operating Pressure	2 to 6 Barg
11	Operating Temperature	0 to 50 ˚C
12	Flow Capacity	500/1000/1200 SCMH OR AS PER USER REQUIREMENT
Construction of Valve		
13	Type	Standard
14	Nozzle Type	Full nozzle full lift
15	Bonnet Type	Closed
16	Inlet & Outlet End Connection	Flanged connection
17	Inlet & Outlet Connection : Facing	RF Serrated, 125-250 AARH
18	Inlet Pressure Rating	150# Class
19	Outlet Pressure Rating	150# Class
20	Test Gag	Yes
21	Cap Over Adjustable Nut	Yes
22	Screwed / Bolted	Bolted
Material of Construction		
23	Body Material	ASTM A 216 WCB
24	Bonnet Material	ASTM A 216 WCB
25	Cap Material	ASTM A 216 WCB
26	Nozzle/Disc/Guide/Piston/Spindle	ASTM A 479 Gr. SS 316
27	Diaphragm	Fabric NBR+PVC/Nitrile Rubber
28	Spring	Chrome Alloy/SS 316
29	Stud bolts / Nuts	STUD:ASTM A 320 Gr.L7 NUT: ASTM A 194 Gr.7 , Hot Dipped Galvanized as per ASTM A 153
30	Gasket	Spiral Wound CNAF Filler + Inner and outer ring SS316
Requirements		
31	Radiography	100%
32	Charpy V-Notch Test	Required
33	Leakage Class	VI

34	Spring Set Range	10 Barg
35	Spring Range Capacity	2 to 10 Barg

36	Body Hydro Test	1.5 * Design Pressure
37	Seat Hydro Test	1.2 * Design Pressure
38	Pneumatic Test	1.1 * Design Pressure
Valve Calculation		
39	Corrosion Allowance	-/ 1.5 mm
40	Required Flow Capacity	Vendor to Furnish
41	Mol. Wt. / S.G.	17.7 / 0.6
42	Over Pressure (%)	21%
43	Blow Down (%)	10%
44	Cp/Cv	Vendor to Furnish
45	Compressibility	0.98 to 0.997
46	Viscosity at Relative Temperature	0.022 Cp
47	Vessel Surface Area-m2/Wall Temp	Vendor to Furnish
48	Calculated Area m2	Vendor to Furnish
49	Selected Area - cm2	Vendor to Furnish
50	Orifice Design	Vendor to Furnish
51	No. of Valve Required for Capacity	Vendor to Furnish
52	Total Area - cm2	Vendor to Furnish
53	Actual Flow Capacity	Vendor to Furnish
Note:		
1. Vendor shall provide Calculation of selection of Orifice.		
2. 100 % Radiography applicable on Casting.		

DATASHEET OF FILTER (150#)

Sr. No.	Technical Description	Specifications
General		
1	Tag No.	Vendor to Furnish
2	Service	2" & Above
3	Quantity	02 no's of Filter per DRS/CPRS
4	Governing Standard	ASME SEC VIII, DIVISION 1, ASME SEC V, ASME SEC IX
Service Condition		
5	Design Pressure & Class	16 Barg, 150 #
6	Design Temperature	0 - 65 ˚C
7	Operating Pressure	2 to 6 Barg
8	Operating Temperature	0 to 50 ˚C
9	Filter Type	Vertical Type
150#	Operating S.G./Mol. Wt.	0.6 / 17.38
11	Cp/Cv / Compressibility Factor	1.27 / 0.98
12	Flash % /Viscosity cP (operating)	- / 0.0135
13	Flow gas - Min. / Max.(SCMH)	Max : 500/1000/1200 (as per SOR) Min : VENDOR TO FURNISH
Filter Construction Design		
14	Corrosion allowance (for CS parts)	1.5 mm
15	Filtration Capacity	≤ 5 micron
16	Filtration efficiency	99.9% filtration
17	Pr. Drop - clean (max)	0.1 Max
18	Pr. Drop - dirty (max)	0.5 Max
19	Dust content	0.1 mg/dm3
20	Filter element MOC	Polyester/Poly propylene/ Pleated synthetic/Pleated Borosilicate fibre glass
21	Filter element - make	VENDOR TO FURNISH
22	OD x ID x Length	VENDOR TO FURNISH
23	Nos. of cartridges	VENDOR TO FURNISH
24	Element bursting pressure	VENDOR TO FURNISH
25	Flange Type	VENDOR TO FURNISH
26	Fixing details	VENDOR TO FURNISH
27	Nuts & bolts / stud	ASTM A 193-B7, ASTM A 194-2H + HD Galvanized
28	PSV size	VENDOR TO FURNISH
29	DPG size	¼"
30	Vent Size	VENDOR TO FURNISH
31	Drain size	VENDOR TO FURNISH
32	Inlet/Outlet Size	VENDOR TO FURNISH
33	Head connection	VENDOR TO FURNISH
Filter Dimension		
34	Overall Length	VENDOR TO FURNISH
35	Overall height	VENDOR TO FURNISH
36	Empty weight (kg)	VENDOR TO FURNISH
37	Operating weight	VENDOR TO FURNISH

Filter Material of Construction		
38	Shell	SA-515/ SA-516 Gr. 70
39	Shell flange	SA-105
40	Nozzle	SA106 Gr.B
41	Nozzle flange	SA-105
42	Head	SA-516 Gr. 70
43	Head flange	SA-105
44	Bottom	SA-515/ SA-516 Gr. 70
45	Perforated sheet	SS 304
46	Bolts / studs	ASME A 320 Gr. L7 + HD Galvanized
47	Nuts	ASME A 194 Gr. 7 + HD Galvanized
48	Gaskets	SS 316 Spiral Wound with CANF filler + SS 316 Inner & Outer ring as per ASME 16.20
49	O ring	Buna N
50	Support	ASME A 283 Gr. C / IS : 2062
Accessories		
51	QOEC : Davit Details (with make & Model	QOEC with Davit Arm type(for shell size of 8" and above sizes) and only Davit arm for filter shell size of below 8"
52	Companion flange, Blind, flange, Gaskets, Bolts / stud, Nuts for all nozzles, Earthing Lug	YES
INSPECTION, TESING & OTHERS		
53	Hydrostatic test	1.5 * Design Pressure
54	Radiography	100%
55	Dye Penetration Test	Yes
56	Post weld Heat treatment	N/A
57	Charpy Impact Test	Yes
58	Painting	As per Painting Datasheet
Note:		
1. All CS parts weld joints to be stress relieved. Hardness in welds not to exceed 200 BHN.		
2. Gas Composition & quality is as per process data sheet.		
3. Filtration area should be minimum 8 times of inlet nozzle area. Sizing calculations to be submitted by the vendor.		
4. Fire case PSV of suitable capacity shall be provided on each dry gas filter.		
5. Proper support, crossover and platform required for maintenance of filter, PSV, DPG etc.		
6. Sizing calculation of filter element to be submitted by VENDOR's.		
7. 100% Radiography applicable on casting.		
8. Filter Design & Calculations shall be approved by TPIA.		

PIPING MATERIAL SPECIFICATION FOR STEEL PIPELINE, VALVE, FITTINGS, FLANGE, GASKET, STUD, NUT

1. *GENERAL*

ALL MATERIAL SHALL CONFIRM TO LATEST REVISION OF ASTM, API, MSS, BS STANDARDS AND/OR BGL TECHNICAL SPECIFICATIONS. DESIGN AND FABRICATION SHALL CONFIRM TO ASME FOR PRESSURE PIPING, ASME B 31.8 AND ASME B 31.3

PIPING MATERIAL SPECIFICATION SHEETS FOR DIFFERENT CLASSES, WHICH ARE PART OF THIS SPECIFICATIONS, SHOWS MATERIALS TO BE USED. EACH SPECIFICATION SHEET SHALL BE USED WITHIN ITS PRESSURE/TEMPERATURE RANGE.

2. *DEFINITIONS*

Shall - This verbal form indicates requirements strictly to be followed in order to confirm to the standards and from which no deviation ls 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. *CODES AND STANDARDS*

- ASME B 16.5 Steel Pipe Flanges and Flanged Fittings
- ASME B16.9 Factory made Wrought Steel Butt welding Fittings
- ASME B16.10 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 16.25 Butt welding ends
- ASME B 16.34 Valves- Flanged, Threaded and welding ends
- ASME B 16.47 Large Diameter Steel Flanges (26" throu 60")
- ASME B31.3 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 B46.1 Surface Texture
- API 5L Line Pipe
- API 6D Pipeline Valves
- API 590 Steel Line Blank
- API 600 Steel Gate Valves Flanges and Butt welding Ends
- API 602 Steel Gate, Globe, and- Check Valves for Sizes NPS 4 (DN 100) and Smaller for the Petroleum and Natural Gas Industries.

Specification for Steel globe and globe stop and check valves

• BS 1873 (flanged and butt welding ends) for the petroleum, petrochemical and allied industries.
• BS EN ISO 15761 -Steel gate, globe and check valves for sizes DN 150#0 and smaller, for the petroleum and natural gas industries.
• BS 17292 Metal Ball valves for Petroleum, Petrochemical and allied industries.
• MSSSP44 Steel Pipe line Flanges
• MSSSP75 Specification for High Test Wrought Butt Welding Fittings
• MSSSP97 Integrally Reinforced Forged Brandi Outlet Fitting - Socket Welding, Threaded and Butt welding Ends
• ASTM A 105 Standard Specification for Carbon Steel Forgings for Piping Applications
• ASTM A193 Standard specification for Alloy Steel and Stainless Steel bolting Materials for High temp Service and Other Special Purpose Applications
• ASTM A 194 Standard Specification for Carbon and Alloy Steel Nuts for Bolts for High Pressure or High Temperature Service or both
• ASTM A320 Standard Specification for Alloy-Steel and Stainless Steel Bolting for Low Temperature Service
• ASTM A 216 Standard Specification for Steel Casting, Carbon, Suitable for Fusion Welding, for High Temperature Service
• ASTM A 234 Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Moderate and High Temperature
• ASTM A285 Standard Specification for Pressure Vessel Plates, Carbon Steel, low- and intermediate Tensile Strength
Standard Specification for Carbon and Alloy Steel forgings, for Pipe
• ASTM A 694
• ASTM A333 Flanges, Fitting, Valves and Parts for High Pressure Transmission Service.
Standard Specification for Seamless and Welded Steel Pipe for Low- Temperature Service and Other Applications with Required Notch Toughness

• ASTM A 350 Standard Specification for Carbon and Low-Alloy Steel Forgings, Requiring Notch Toughness Testing for Piping Components

ASTM A 420 Standard Specification for Piping Fittings of Wrought Carbon Steel and Alloy Steel for Low Temperature Service.

• ASTM A 860 Standard Specification for Wrought High Strength Ferritic Steel Butt- Welding Fittings.

4. ABBREVIATIONS

3.1 Flange Facing

RTJ	-	Ring Type Joint
FF	-	Flat Face

RF - Raised Face

3.2 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

3.3 Connections

BW - Butt-Weld

FLGD - Flanged

SCRD - Screwed

SO - Slip-On

SW - Socket Weld

THRD - Threaded

WN - Weld Neck

3.4 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

3.5 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
NIPL - Pipe Nipple

5. General requirement

All materials shall be inspected and tested as per approved Quality Assurance Plan in accordance with relevant standard/code/BGL specifications.

5.1 PIPE:

5.1.1: Pipe dimensions shall be in accordance with API 5L and/or ASME B 36.10 for Carbon Steel pipes.

5.1.2: Nominal pipe sizes 1¼", 2½", 3½" and 5" shall not be used except where they are required for specific intended application. When these sizes are used on equipment, the connecting piping shall be increased or decreased to standard sizes as close to equipment as practical.

5.1.3: All pipes above 2" shall have bevel ends. 1½" and below piping shall have plain/threaded ends as per relevant standard.

5.1.4: Screwed full couplings shall be restricted for instrument connections only (upto 1½").

5.2 FLANGES & FITTINGS

5.2.1 Flanges shall be in accordance with the following codes:

For Class 150 to 600,

Upto 24" NB excluding 22"NB - As per ASME B 16.5

26" NB and above - As per ASME B 16.47 Series A

5.2.2 Flange bolting shall be fully threaded alloy steel stud bolt with two heavy hex nuts and washer as per the relevant material standard. All CS/AS stud bolts and nuts shall be hot dip galvanized as per ASTM A 153 or Electro Galvanized. Stud bolts shall have full continuous threads & lengths shall be ½" longer than that specified in ASME B 16.5 with the provision that a minimum of one thread & maximum of three threads outside each nut & complete with 2 threads to facilitate bolt tensioning. Stud bolts shall be threaded full length with two heavy hexagonal nuts.

5.2.3 Permanent hook eye shall be provided on blinds of weight greater than 60 lbs to facilitate changing of rings.

5.2.4 The nuts shall be double chamfered, semi-finished heavy hexagonal type and shall be made by the hot forged process & stamped as per respective material specification.

5.2.5 Flange bolts shall be tightened equally and sequentially to impose equal pressure on the gasket and to avoid distortion or over stressing of the equipment.

5.2.6 When rating changes occur at flanged joints both the flanges shall be of higher rating if they are of same material.

5.2.7 The dimensions of spectacle blinds, spacer and blinds shall be as per ASME B 16.48. Spectacle blinds/spacers and blinds for sizes and rating not available in ASME B 16.48 shall be supplied as per manufacturer standard and design shall be submitted to for review and approval. The corrosion allowance shall be as per the respective class.

5.2.8 Special branch fittings and Quick opening closure shall be designed, manufactured, inspected and tested as per ASME B 31.8 code and/or ASME Section VII. The manufacture to furnish design, WPS, PQR to TPIA for approval and 100% radiography examination /UT/MPT witnessed by TPIA. The design shall be submitted to for review.

5.2.9 All fittings shall be seamless in construction unless and otherwise specified. However, fittings in size 16" and above welded fittings may be acceptable, subject to review and approval.

5.2.10 The thickness of reducing fittings shall match the wall thickness of the higher schedule pipe wall and shall meet the requirement of ASME B 31.8.

5.2.11 Fittings shall have at least the same nominal wall thickness as the pipe to which they attach. Welded fittings materials shall be compatible with the piping material.

5.2.12 Changes in directions in piping shall normally be made by long radius (LR) 3D/1.5D butt welded elbows in accordance with Piping Material Specification.

5.2.13 Cold formed or Miter bends are not permitted.

5.2.14 Short radius (SR) welding elbows shall not be used unless absolutely required for clearance purpose. These shall be marked as SR on piping layout drawings and isometrics.
5.2.15 All flow tee fittings shall be designed, manufactured, heat treated, inspected & tested as per relevant standards/code requirement and Specification. For welded fittings manufacture to furnish design, WPS, PQR to TPIA for approval and 100% radiography examination report/UT/MT/DP to be witnessed by TPIA.

5.2.16 Special branch fittings shall be designed, manufactured, inspected and tested as per ASME B 31.8 code.

5.2.17 All instrument connections shall be from top or central-horizontal of the header.

5.2.18 Gaskets for raised face flanges shall be spiral wound, PTFE or non-asbestos filled with inner and outer ring SS 316 in accordance with ASME B 16.20. All spiral wound gaskets shall be supplied with SS outer centering ring and inner compression ring.
5.2.19 All pipe threads, coupling and plug threads shall be NPT in accordance with ASME B 1.20.1.

5.2.20 Threaded piping shall not be used for operating pressure above 1 bar and pipe diameter including and above 2".
5.2.21 Threaded nipples and caps shall be used for instrument connections and hydrostatic vent & drains and will normally be stainless steel and CS may be acceptable.
5.2.22 For Pipe joints of size 1 1/2" & below, SW or threaded fittings shall be used.

5.3 VALVES

5.3.1 Vendor shall supply valves in accordance with the valve specification along with auxiliaries if any, such as gear operator, bypass, sealant injection, vent, drains etc. wherever specified in the specification/data sheets, notes and other enclosures to the requisition. In case of conflict/s between valve specification data sheet, Technical specification and PMS, specification data sheet shall govern.
5.3.2 For valves sizes 2" NB and above, notch toughness values shall be determined to provide protection against fracture initiation and propagation. Notch toughness values (Minimum absorbed energy values) shall be specified based on design, operating stress and the minimum design temperature. The minimum energy value and shear area shall be as per relevant codes and standards.

5.3.3 Valves shall be installed for ease of operation and maintenance. Valves shall not be installed with their stem below horizontal.

5.3.4 All flanged valves shall have flanges integral (except forged valves) with the valve body. Flange face finish shall be normally specified in the valve specification/data sheets. Unless otherwise specified in the datasheet, flange face finish shall be as per ASME B 16.5

5.3.5 All valves with non-metallic seats and seals shall be fire safe type, Fire safe test shall be as per API 607, API 6FA or BS 6755 (Latest editions). Fire safe test witnessed and certified by an approved TPIA shall be furnished to the for approval. It should be type approval certificates duly approved by TPIA for reference (not approval)
5.3.6 Following requirement of Check valves shall be met over and above the valve specification sheet requirements.

5.3.6.1 Wherever check valve disc assembly is supported from the cover of check valves the following shall be ascertained.
• Positive location/positioning of cover must be provided to ensure correct alignment of valve disc.

• Hinge pin design must permit accurate alignment of the disc and valve seat.
5.3.6.2 For heavy check valves (50 kg & above), provisions shall be available for lifting by way of lugs, eyebolts and other such standard devices per standard industry practice.

5.3.7 If any overlay weld-deposit is used for the body seat ring, seating surface, the seat ring base material shall be at least equal to the corrosion resistance of material of the shell.
5.3.8 Soft-seated ball, plug and butterfly valves shall be supplied with anti-static devices.

5.3.9 All ball valves shall be Bi-directional.
5.3.10 Ball shall be solid type unless otherwise specified.

5.3.11 Body seat shall be renewable type.

5.3.12 Ball valve with lubrication fittings, for the ball seats as well as for the stem, shall be provided to prevent the minor leaks or reduce operating torque.
5.3.13 Trunion-mounted ball valves shall be supplied with provision for double block and bleed facility. Trunion mounted are meant to have DB&B provision.
5.3.14 A body bleed port with Globe valve, independent of lubrication fittings shall be provided.

5.3.15 Gear operator shall be as under, with position indicators for open/close positions, with limit stops (limit stops are not applicable for gate and globe valves)
For Globe valves - Totally enclosed bevel gear in grease case with grease nipples/plugs
For Ball / Plug valves - Totally enclosed helical worm or combination of helical worm and spur gear in grease case with grease nipples/plugs
5.3.16 Ball valves even with wrench or lever operators shall have “Open” Position indicators with limit stops.

5.3.17 Wherever lock open (LO) / lock close (LC) specified in the valve BOM / MTO, the valve shall be provided with locking arrangement such as pad lock and chain.

5.3.18 All valves shall be hydro tested & air tested for body and seat as per respective valve data sheet. The sequence of pressure testing of soft seated valves shall be as follows:
Initially the hydro test for body shall be performed, after this the hydro test for seat shall be done and then the low-pressure air test shall be performed. In case the valve does not pass the low pressure air test and leakage is observed through the seat, vendor shall replace the seats and entire test is to be repeated. To check the of valve.

5.3.19 Steel casting of valves shall be 150#0% radiographed irrespective of rating and size in accordance with ASME B16.34 Mandatory appendices – I. ASME B16.34 Annexure IV & III.

5.3.22 Valve body thickness, wherever not specified in the standard, shall be as per ASME B 16.34.
C.A. =1.6 mm

5.3.23 Socket weld end valves with non-metallic seats or seals shall be provided with 80mm long nipples having materials and thickness equivalent to those specified in the relevant piping specifications. These nipples shall be welded and tested to both ends of the valve by the Manufacturer, before fitting packing, seats and seals. The pipe wall of nipple shall be selected such that internal diameter of nipple shall not be smaller than valve bore.

5.3.24 Stem protection is required for all CS globe valves where 11-13% Cr. trims are specified. The stem shall be totally enclosed in a sleeve, which shall be packed with grease.

5.3.25 No cast, ductile or malleable Iron, aluminum, plastic or copper bearing alloy shall be used in Natural Gas service.

5.3.26 All material shall be new, clean and free from rust, pits and obvious defects.

5.3.27 Material selection for soft seats/seals for Ball valves shall be suitable for maximum differential pressure, corresponding to pressure/temperature rating and service fluid handled on a continuous basis. The seat/seal material in valve data sheets for Ball valves is indicative only. Vendor can propose an alternative seat provided he furnishes the pressure/temperature rating of the proposed seat material which shall cover the class temperature pressure rating of the valve and is superior to the seat/seal material specified in the valve datasheets And subject to approval
5.4 MARKING:

5.4.1 Valve marking, symbols, abbreviations etc. shall be in accordance with API 6D and MSS-SP-25 and/or the standard referred in the specification sheet as

applicable. Vendor's name, valve rating, material designation, nominal size, direction of flow (if any) etc. shall be integral on the body.

5.4.2 Each valve shall have a corrosion resistant tag giving size, valve tag no. / code no., securely attached to the valve body.

5.4.3 Paint or ink for marking shall not contain any harmful metal or metal salt such as zinc, lead or copper which cause corrosive attach on heating.

5.5 DISPATCH:

5.5.1 Each end of the valve shall be protected, against ingress of foreign material & damages, with the following materials:
Flange face : Wood or plastic cover Beveled end : Wood or plastic cover SW or Screwed End : Plastic cap

5.5.2 End protector of wood/plastic to be used on the flange faces shall be attached by at least three bolts and shall not be smaller than the outside diameter of the flange. However the plastic cap for SW & Screwed. End valves shall be press fit type.

5.6 OTHERS:

5.6.1 Flange joints to be kept Minimum.

5.6.2 All Temperature connections shall be of size 1/2" NB flanged.

5.6.3 Pressure connections shall be 3/4" SW nipples with isolation valve.

5.6.4 Globe type valve shall be used for TMBV double block & bleed test.

PIPING MATERIAL SPECIFICATION	**BHAGYANAGAR GAS LIMTED**	**PRESSURE RATING : 150#**
		DESIGN PRESSURE : 16 BARG
		TEMPERATURE RANGE : -10°C - 65°C
		LOCATION CLASS : CLASS IV
CODE : ASME B 31.8	**SERVICE : NATURAL GAS**	**CORROSION ALL. : 1.5 mm Inclusive**

ITEM	SHORT CODE	SIZE FROM-THRU	DESCRIPTION	RATING /SCH. / WT	DIMENSION STANDARD	MATERIAL STANDARD	REMARKS
PIPELINE	**PL**	4"- 12"	BE	6.4 MM (Min.)	API 5L	API 5L Gr. X52 (PSL 2)	U/G-PRIMARILY ELECTRIC RESISTANCE WELDED A/G- PRIMARILY SEAMLESS
STATION PIPING	**SP**	2"	BE, SEAMLESS	S80	ASME B 36.10	ASTM A 150#6 Gr. B Charpy at 0° deg C	
		3"	BE, SEAMLESS	S40	ASME B 36.10	ASTM A 150#6 Gr. B Charpy at 0° deg C	
		4" – 12"	BE, SEAMLESS	6.4 MM (Min.)	ASME B 36.10	ASTM A 150#6 Gr. B Charpy at 0° deg C	
VENT PIPE	**VP**	1/2" – 1 ½"	PE, SEAMLESS	S80	ASME B 36.10	ASTM A 333 Gr. 6	
		2"	BE, SEAMLESS	S80	ASME B 36.10	ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	S40	ASME B 36.10	ASTM A 333 Gr. 6	
		4"	BE, SEAMLESS	6.4 MM (Min.)	ASME B 36.10	ASTM A 333 Gr. 6	
BALL VALVE	**BLV**	1/2" – 1 ½"	SW OR THREADED	800#	BS 17292	BODY: ASTM A 1505 (Charpy at 0° deg C) BALL: A351 CF8M/SS316	FLOATING BALL VALVE SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.
		2" - 3"	BW OR FLGD RF 125-250 AARH	150#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C) BALL: A351 CF8M/SS316	FLOATING BALL VALVE BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5

		4" -12"	BW OR FLGD RF 125-250 AARH	300#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C) BALL: A351 CF8M/SS316	TRUNION MOUNTED BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
GLOBE VALVE	**GLV**	1/2" – 1 ½"	SW OR THREADED	800#	BS EN ISO 15761	BODY: ASTM A 105 (Charpy at 0° deg C)	SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.
		2"-4"	BW OR FLGD RF 125-250 AARH	150#	BS EN ISO 15761	BODY: ASTM A 216 Gr. WCB Charpy at 0° deg C	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
		Above 4"	BW OR FLGD RF 125-250 AARH	300#	BS 1873	BODY: ASTM A 216 Gr. WCB Charpy at 0° deg C	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
LIFT CHECK VALVE	**NRV**	1/2" – 1 ½"	SW	800#	BS EN ISO 15761	BODY: ASTM A 105	HORIZONTAL INSTALLATION SOCKET WELD - ASME B 16.11
SWING CHECK VALVE		2" – 12"	BW OR FLGD RF 125-250 AARH	150#	API 6D OR BS 1868	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C)	HORIZONTAL INSTALLATION OR VERTICAL INSTALLATION WITH UPWARD FLOW DIRECTION BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5 FLANGED END - ASME B 16.5
PLUG VALVE	**PLV**	2" – 12"	BW OR FLGD RF	300#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C)	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
ELBOWS LR / LR BENDS	**EL**	1/2" – 1 ½"	SW, 1.5 D	M	ASME B 16.11	ASTM A 150#5 Gr. B Charpy at 0° deg C	SOCKET WELD - ASME B 16.11
		2"-3"	BW, 1.5D	M	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg C	BUTT WELD - ASME B 16.25
		4" - 12"	BW, 1.5 D OR 3D	M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° deg (For Station Piping)	BUTT WELD - ASME B 16.25
		2"-3"	BW	MXM	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg. C	BUTT WELD - ASME B 16.25

REDUCERS CONCENTRIC	**RC**	4" - 12"	BW	M x M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° deg. C (For Station Piping)	BUTT WELD - ASME B 16.25
TEE EQUAL AND REDUCING	**T**	1/2" – 1 ½"	SW	3000#	ASME B1 6.11	ASTM A 150#5 Charpy at 0° deg. C	SOCKET WELD - ASME B 16.11
		2"-3"	BW	MXM	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg. C	BUTT WELD - ASME B 16.25
		4" - 12"	BW	MXM	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° deg. C (For Station Piping)	BUTT WELD - ASME B 16.25
SOCKOLET /THREDOLET	**S**	1/2" – 1 1/2"	SW OR THREADED	3000#	MSS-SP 97	ASTM A 105 Charpy at 0 deg. C	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
WELDOLET	**W**	2" – 12"	BW	MXM	MSS-SP 97	ASTM A 105 Charpy at 0° deg. C	BUTT WELD - ASME B 16.25
END CAP	**C**	1/2" – 1 ½"	SW	3000#	ASME B 16.11	ASTM A 105 Charpy at 0° deg. C	SOCKET WELD - ASME B 16.11
		2" – 12"	BW	M	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg. C	BUTT WELD - ASME B 16.25
PIPE NIPPLE	**NIPL**	1/2" – 1 ½"	PE, SEAMLESS	M	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0° deg. C	-
COUPLING (FULL or HALF)	**COUP**	1/2" – 1 ½"	SW OR THREADED	3000#	ASME B 16.11	ASTM A 105 Charpy at 0° deg. C	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
FLANGE	**FW**	1/2" – 1 1/2"	SORF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-
		2"-3"	WNRF, 125-250 AARH	150# Bevel End WT Sch. 80	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-
		4" – 12"	WNRF, 125-250 AARH	150# Bevel End WT 6.4 mm	ASME B 16.5	MSS SP 44 GR F 52 (For pipeline)/ ASTM A 105 with Charpy at 0° deg. C (For station piping)	-
		1/2" – 1 1/2"	RF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-
		2"-3"	RF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-

BLIND FLANGE	**FB**	4" – 12"	RF, 125-250 AARH	300#	ASME B 16.5	MSS SP 44 Gr. F 52 (For pipeline)/ ASTM A 105 with Charpy at 0° deg. C (For station piping)	-
SPECTACLE BLIND	**FSB**	2"-12"	RF, 125-250 AARH	300#	ASME B 16.48	ASTM A 105 Charpy at 0° deg. C	-
STUD & NUT / BOLT	**B**	1/2" – 12"	-	-	ASME B 18.2	STUD:ASTM A 193 Gr. B7 NUT: ASTM A 194 Gr.2H ASTM A 153	HOT DIP GALVENIZED
GASKET SPIRAL WOUND	**G**	1/2" – 12"	-	0.175" THICKNESS	ASME B 16.20	SPIRAL WOUND CNAF FILLER + INNER & OUTER RING SS316	COMPATIBLE WITH ASME B 16.5 FLANGES

NOTE:

1. M = THICKNESS TO MATCH PIPE WALL THICKNESS
2. THIS SPECIFICATIONS SHALL BE READ IN CONJUCTION WITH GENERAL NOTES AND DATA SHEETS & TECHNICAL SPECIFICATIONS OF AN INDIVIDUAL ITEM

BRANCH TABLE

BRANCH SIZE

	1/2"	3/4"	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	14"	16"
1/2"	T												
3/4"	T	T											
1"	T	T	T										
1 ½"	T	T	T	T									
2"	S	T	T	T	T								
3"	S	S	T	T	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 : EQUAL/REDUCING TEE
S : SOCKOLET
W : WELDOLET

PIPING MATERIAL SPECIFICATION	**BHAGYANAGAR GAS LIMTED**	**PRESSURE RATING : 150#**
		DESIGN PRESSURE : 16 BARG
		TEMPERATURE RANGE : -10°C - 65°C
		LOCATION CLASS : CLASS IV
CODE : ASME B 31.8	**SERVICE : NATURAL GAS**	**CORROSION ALL. : 1.5 mm Inclusive**

ITEM	SHORT CODE	SIZE FROM-THRU	DESCRIPTION	RATING /SCH. / WT	DIMENSION STANDARD	MATERIAL STANDARD	REMARKS
PIPELINE	**PL**	4"- 12"	BE	6.4 MM (Min.)	API 5L	API 5L Gr. X52 (PSL 2)	U/G-PRIMARILY ELECTRIC RESISTANCE WELDED A/G- PRIMARILY SEAMLESS
STATION PIPING	**SP**	2"	BE, SEAMLESS	S80	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0° deg C	
		3"	BE, SEAMLESS	S40	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0° deg C	
		4" – 12"	BE, SEAMLESS	6.4 MM (Min.)	ASME B 36.10	ASTM A 106 Gr. B Charpy at 0° deg C	
VENT PIPE	**VP**	1/2" – 1 ½"	PE, SEAMLESS	S80	ASME B 36.10	ASTM A 333 Gr. 6	
		2"	BE, SEAMLESS	S80	ASME B 36.10	ASTM A 333 Gr. 6	
		3"	BE, SEAMLESS	S40	ASME B 36.10	ASTM A 333 Gr. 6	
		4"	BE, SEAMLESS	6.4 MM (Min.)	ASME B 36.10	ASTM A 333 Gr. 6	
BALL VALVE	**BLV**	1/2" – 1 ½"	SW OR THREADED	800#	BS 17292	BODY: ASTM A 105 (Charpy at 0° deg C) BALL: A351 CF8M/SS316	FLOATING BALL VALVE SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.
		2" - 3"	BW OR FLGD RF 125-250 AARH	150#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C) BALL: A351 CF8M/SS316	FLOATING BALL VALVE BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5

		4" -12"	BW OR FLGD RF 125-250 AARH	150#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C) BALL: A351 CF8M/SS316	TRUNION MOUNTED BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
GLOBE VALVE	**GLV**	1/2" – 1 ½"	SW OR THREADED	800#	BS EN ISO 15761	BODY: ASTM A 105 (Charpy at 0° deg C)	SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1.
		2"-4"	BW OR FLGD RF 125-250 AARH	150#	BS EN ISO 15761	BODY: ASTM A 216 Gr. WCB Charpy at 0° deg C	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
		Above 4"	BW OR FLGD RF 125-250 AARH	150#	BS 1873	BODY: ASTM A 216 Gr. WCB Charpy at 0° deg C	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5

LIFT CHECK VALVE	**NRV**	1/2" – 1 ½"	SW	800#	BS EN ISO 15761	BODY: ASTM A 105	HORIZONTAL INSTALLATION SOCKET WELD - ASME B 16.11
SWING CHECK VALVE		2" – 12"	BW OR FLGD RF 125-250 AARH	150#	API 6D OR BS 1868	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C)	HORIZONTAL INSTALLATION OR VERTICAL INSTALLATION WITH UPWARD FLOW DIRECTION BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5 FLANGED END - ASME B 16.5
PLUG VALVE	**PLV**	2" – 12"	BW OR FLGD RF	150#	API 6D	BODY: ASTM A 216 Gr. WCB (Charpy at 0° deg C)	BUTT WELD - ASME B 16.25 FLANGED END - ASME B 16.5
ELBOWS LR / LR BENDS	**EL**	1/2" – 1 ½"	SW, 1.5 D	M	ASME B 16.11	ASTM A 105 Gr. B Charpy at 0° deg C	SOCKET WELD - ASME B 16.11
		2"-3"	BW, 1.5D	M	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg C	BUTT WELD - ASME B 16.25
		4" - 12"	BW, 1.5 D OR 3D	M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° deg (For Station Piping)	BUTT WELD - ASME B 16.25
		2"-3"	BW	MXM	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg. C	BUTT WELD - ASME B 16.25

REDUCERS CONCENTRIC	**RC**	4" - 12"	BW	M x M	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° deg. C (For Station Piping)	BUTT WELD - ASME B 16.25
TEE EQUAL AND REDUCING	**T**	1/2" – 1 ½"	SW	3000#	ASME B1 6.11	ASTM A 150#5 Charpy at 0° deg. C	SOCKET WELD - ASME B 16.11
		2"-3"	BW	MXM	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg. C	BUTT WELD - ASME B 16.25
		4" - 12"	BW	MXM	ASME B 16.9	MSSP 75 WPHY 52 (For pipeline) / ASTM A 234 WPB Charpy at 0° deg. C (For Station Piping)	BUTT WELD - ASME B 16.25
SOCKOLET /THREDOLET	**S**	1/2" – 1 1/2"	SW OR THREADED	3000#	MSS-SP 97	ASTM A 150#5 Charpy at 0 deg. C	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
WELDOLET	**W**	2" – 12"	BW	MXM	MSS-SP 97	ASTM A 150#5 Charpy at 0° deg. C	BUTT WELD - ASME B 16.25
END CAP	**C**	1/2" – 1 ½"	SW	3000#	ASME B 16.11	ASTM A 150#5 Charpy at 0° deg. C	SOCKET WELD - ASME B 16.11
		2" – 12"	BW	M	ASME B 16.9	ASTM A 234 Gr. WPB Charpy at 0° deg. C	BUTT WELD - ASME B 16.25
PIPE NIPPLE	**NIPL**	1/2" – 1 ½"	PE, SEAMLESS	M	ASME B 36.150#	ASTM A 150#6 Gr. B Charpy at 0° deg. C	-
COUPLING (FULL or HALF)	**COUP**	1/2" – 1 ½"	SW OR THREADED	3000#	ASME B 16.11	ASTM A 150#5 Charpy at 0° deg. C	SOCKET WELD - ASME B 16.11 THREADED - ASME B1.20.1
FLANGE	**FW**	1/2" – 1 1/2"	SORF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-
		2"-3"	WNRF, 125-250 AARH	150# Bevel End WT Sch. 80	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-
		4" – 12"	WNRF, 125-250 AARH	150# Bevel End WT 6.4 mm	ASME B 16.5	MSS SP 44 GR F 52 (For pipeline)/ ASTM A 105 with Charpy at 0° deg. C (For station piping)	-
		1/2" – 1 1/2"	RF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-
		2"-3"	RF, 125-250 AARH	150#	ASME B 16.5	ASTM A 105 Charpy at 0° deg. C	-

BLIND FLANGE	**FB**	4" – 12"	RF, 125-250 AARH	150#	ASME B 16.5	MSS SP 44 Gr. F 52 (For pipeline)/ ASTM A 105 with Charpy at 0° deg. C (For station piping)	-
SPECTACLE BLIND	**FSB**	2"-12"	RF, 125-250 AARH	150#	ASME B 16.48	ASTM A 105 Charpy at 0° deg. C	-
STUD & NUT / BOLT	**B**	1/2" – 12"	-	-	ASME B 18.2	STUD:ASTM A 193 Gr. B7 NUT: ASTM A 194 Gr.2H ASTM A 153	HOT DIP GALVENIZED
GASKET SPIRAL WOUND	**G**	1/2" – 12"	-	0.175" THICKNESS	ASME B 16.20	SPIRAL WOUND CNAF FILLER + INNER & OUTER RING SS316	COMPATIBLE WITH ASME B 16.5 FLANGES

NOTE:

3. M = THICKNESS TO MATCH PIPE WALL THICKNESS
4. THIS SPECIFICATIONS SHALL BE READ IN CONJUCTION WITH GENERAL NOTES AND DATA SHEETS & TECHNICAL SPECIFICATIONS OF AN INDIVIDUAL ITEM

BRANCH TABLE

BRANCH SIZE

	1/2"	3/4"	1"	1 ½"	2"	3"	4"	6"	8"	10"	12"	14"	16"
1/2"	T												
3/4"	T	T											
1"	T	T	T										
1 ½"	T	T	T	T									
2"	S	T	T	T	T								
3"	S	S	T	T	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 : EQUAL/REDUCING TEE
S : SOCKOLET
W : WELDOLET

DATASHEET OF PAINTING FOR METERING AND PRESSURE REGULATING SKID

Sr. No.	Technical Description	Filter, Pressure Safety Valve, Regulator, Creep Relief Valve, Ball Valve, Globe Valve, Check Valve, Base frame & Support	Piping
General			
1	Standard	IGE/TD/13	
2	Surface Preparation	SA 2.5 finish as per ISO 8501 - 1 and profile up to 50 to 80 micron	SA 2.5 finish as per ISO 8501 - 1 and profile up to 30 to 50 micron. After galvanizing sweep blast and profile Up to 10 to 15 micron
		Blasting Surface shall be free from loose mill scale, rust, dirt, oil, grease, any foreign particles, etc...	Blasting Surface shall be free from loose mill scale, rust, dirt, oil grease, any foreign particles, etc...
3	Hot Dip Galvanizing	Not Applicable	Thickness (micron) as per ASTM A153 for all pipe, pipe fittings and fasteners.
			• Pipe – Min. 86 micron
			• Pipe Fittings – Min. 86 micron
			• Fasteners – Min 53 micron for more than 9.6 mm Dia.
			• Fasteners – Min 43 micron for under 9.6 mm
4	Color Coating	Primer : Epoxy Based Zinc Primer – 60 microns (min) thick	Finish Coat : Epoxy polyamide paint – 100 microns (min) thick/coat Two number of coat
		Intermediate Coat : Polyamide Epoxy – 80 microns (min) thick	
		Finish Coat : Acrylic polyurethane – 60 microns (min) thick	
		Total DFT : 200 microns (approx.)	Total DFT : 200 microns (approx.) – Excluding galvanizing DFT
5	Color Code	Pipe Lines	Golden Yellow (IS 356)
		Structural Support	Smoke Grey : powder coating (IS 692)
		Ball, Globe, Check valves :	Oxford Blue (IS 150#5)
		SSV, PCV	Oxford Blue (IS 150#5)
		CRV, PSV	FIRE RED (IS 536)

		Filter	Silver or Smoke Grey (IS 628 or IS 692)
		Canopy	Silver (RAL 7001)
NOTE:			
1. Vendor shall prepare Internal report for surface preparation for all piping and shall be reviewed by TPI			
2. VENDOR shall prepare internal report for painting for all piping and shall be reviewed by TPI			

Technical specifications of Point type IR Gas Detectors

Technical Specifications of Point IR Gas Detectors		
Sr.No	Item Description	Specification
1	Sensor Type	Infrared sensor technology based explosion-proof Gas sensor with transmitter
2	Principle of operation	Multi-beam, dual compensated, non focusing infrared absorption. Temperature compensation shall be inbuilt
3	Function with Visual Status Display	Detect hydrocarbon gases in the range of 0-100% LEL with Integral Unit Required, LED indication for Normal,Fault condition & Gas detected condition complete with 4 Digit LCD Display
4	Gas Detection	Methane, propane, propylene, Ethane, Butane, Hexane, Pentane & Benzene / L-CNG, covering Hydrocarbons (from C1-C8)
5	Calibration with self configuration	Factory calibration at Methane or Propane with Continuous self-check for immediate detection of internal failures with Non-Intrusive configuration
6	Range	0 to 100% LEL
7	Construction	Flameproof, 316SS body with dust/weather protection for outdoor installation. No external terminal box shall be provided for further cabling (flying leads are not acceptable)
8	Optical performance	Correct operation unto 75% obscuration, the same shall be configurable with facility for dirty optics warning. Provision for detectors to be made to avoid condensation
9	Input / Output	24V DC nominal (18-30V DC) / 3-wire system, Linear 4-20mA DC (isolated / non-isolated) rated at 600 ohms loop resistance at 24V DC + HART, 0 mA : Fault signal & 23 mA: Over-range signal
150#	Characteristics	Overall accuracy: Better than ±3% of LEL Repeatability: ± 2% FSD Zero drift :Typically 2 % FSD per year Response time : T90 < 5 Seconds
11	Cable Entry	3/4" NPTF
12	Certification	Eex'd, Zone-1, Gr. IIA/B ,T3, IP65 , SIL-2 FM/ ATEX/ CSA/ CENELEC/ UL / CIMFR and PESO with SIL certification from TUV / EXIDA / Accredited international agency Ex d Certification PESO/CCOE Certification ATEX Certification
13	Accessories required	1. Mounting kits 2. Canopy 3. Tag Plates - SS 4. Rain & Dust protection cover 5. Ex Proof & Weather proof double compression cable gands

FACTORY ACCEPTANCE TEST PROCEDURE FOR

NATURAL GAS METERING & PRESSURE REDUCTION SKID

1 PREFACE

1.1 INTRODUCTION:

This document defines procedure for Factory acceptance Test (FAT) to be carried out for Metering & Pressure Reduction skid. The purpose of carrying out FAT is to check functionality of entire Skid with respect to agreed technical documents.

1.2 SCOPE:

The FAT will confirm the compliance of MRS with the project specifications.

All the equipment's / instruments/ items shall be installed (as far as possible) for functionality demonstration during FAT. In case some of the items cannot be erected/ installed during FAT, list of such item along with the reason for not installing the same shall be provided before start of FAT. Final procedure with vendor recommendation shall be prepared by vendor and submitted to BGL for review.

1.3 REFERENCE DOCUMENTS:

A) *FOR_____SCMH:*

Design Documents of Skid		**DOCUMENT No.**
1	P & ID	
2	GA Drawing	
3	Base frame and Foundation Drawing	
4	Canopy Drawing	
5	Painting datasheet	
Datasheet / Drawing of Equipment:		
6	Active Pressure Control Valve	
7	Monitor Pressure Control Valve + Slam Shut off valve	
8	Pressure Safety valve	
9	Creep Relief Valve	
150 #	Cartridge Filter	

A) *COMMON DOCUMENTS:*

	Design Documents of Skid	**DOCUMENT No.**
1	Quality assurance plan - Mechanical Items	
2	Quality assurance plan–Instrumentation Equipment	
3	Material Test certificate, Radiography test report, Hydro-test certificate	
Datasheet / Drawing of Equipment:		
4	Pressure Gauge	
5	Differential Pressure Gauge	
6	Temperature Gauge	
7	Ball Valves	
8	Check Valves	
9	Globe Valve	

1.1 ORIENTATION WITNESSES:

All Representatives shall be briefed on operating principles of the Filtration & Pressure Regulating Skid package before commencing the FAT.

1.2 TEST CERTIFICATES:

Upon completion of the tests mentioned in this document, Test Certificate should be filled with the results and signed/stamped by representatives of all the parties- VENDOR and TPI/Client

2 VISUAL INSPECTION OF SKID

2.1 SKID REVIEW:

The skid will be inspected for installation of all the components as per approved P&ID and

G.A. Drawing and other related documents listed in section 1.3. Dimensional checking shall be done as per approved G.A. drawing. The Skid will be inspected for proper support with rubber pads/ clamps for the major equipment/ Instruments and pipes, Blinds (for Drains/ Vent / End Flange), Jumpers Platforms, crossovers .etc.,

Stud & nuts with minimum 2 to 3 threads shall fall beyond the nut on both sides,

Copper jumper plate on each flange joint.

2.2 TEST CERTIFICATE FOR VISUAL INSPECTION:

Upon completion of the visual inspection described in this section, the Test Certificate for Visual Inspection of skid should be dully filled and signed by both parties.

3 FACTORY ACCEPTANCE TEST

3.1 PNEUMATIC LEAK TEST:

Pneumatic leak test is carried out on completely erected skid using compressed air.

1) Keep all valves open. Close either inlet or outlet side pipe with blind flange.
2) Check all drain and vents are in closed position and safety valve inlets and intermediate line ball valves are in open condition.
3) Charge air at 1 Barg from inlet.
4) Slowly increase the pressure by steps of 1 Barg up to 7 Barg.
5) Inspect all flanged joints using soap water for 30 minutes and also inspect for any leakage in all Isolation Valve (Ball, Plug, Globe valves)/ control valve gland, joints, connections, impulse tubing or any other connection or any other part of skid. In case the leakage from skid or its part is noticed, the same shall be attended and corrected.

3.2 PRESSURE SAFETY VALVE:
Functional testing of Pressure safety valve shall be carried out at bench. Set points should be checked according to FAT Report attached at the end of this document.

3.3 PRESSURE REGULATION SYSTEM:
This Section describes the procedure for checking the working of SSV, Pressure Regulators & CRV. However, final procedure with vendor recommendation shall be prepared by vendor and submitted to BGL for review.
Set points of all Pressure Regulators should be checked according to FAT Report attached at the end of this document.

1) Close outlet ball valves of pressure regulation system.
2) Open inlet ball valve of main pressure regulation system.
3) Pressurizing will make upstream pressure of SSV to an inlet pressure which is higher than the PRV set pressure so that simulation can be done.
4) Check the set point of each regulator. If required reset the set points and lock it. Record the set points in report.
5) SSV Limit switches feedback signal shall be checked for continuity by multimeter.
6) Changeover of Stream shall be demonstrated.
7) Functional test is to be performed in order to provide evidence that equipment is in working order. Functional tests are to be performed to ensure the continuity of supply of gas and/or to prevent system over pressurization.
8) Sequence of pressure setting for regulating devices of stream in skid during functional test is given below:
Pressure setting is started from:- 1st -SSV
2nd - CRV
3rd - Monitor-PRV
4th - Active-PRV

9) Following steps are to be performed at factory location to carry out the functional test of skid.

Functional Test:-

1) Functional test of each stream should be carried out by safe venting of gas from venting line of each stream.
2) For functional test of current standby line, isolate the downstream by closing the outlet valve. Ensure current working line is functioning during testing.
3) For functional test of current working line, isolate the downstream by closing the outlet valve. Ensure the standby line which was converted as working stream is opened and functioning during testing.

Before starting functionality test of SSV ensure-

- Fully open both PRVs (Active & Monitor) & full tight the nut of CRV to fail CRV which makes bypass for setting of SSV.
- Functional test of SSV, CRV and PRVs in line order to be done as per steps given below.

Functional test of SSV:-

1) Make the PRV-A & PRV-M full tight (Max. downstream pressure) allow to pressure increased for functional checking of SSV at set pressure.
2) Slowly increase the line pressure by adjusting pilot valve of Monitor PRV till line pressure reaches at the predefined set pressure of SSV.
3) Adjust SSV pilot valve for tripping on set point.
4) If SSV is tripped at set point then lock the nut of SSV pilot.
5) Reset SSV that was tripped for further operation.
6) To ensure functionality repeat steps 4 and 5 for 2-3 times.

Functional test of CRV:-

1) After setting of SSV, slowly reduce the line pressure through pilot valve of Monitor PRV till line pressure reaches the set point of CRV. Adjust the CRV till gas starts slowly passing from venting line at the set point.
2) Lock the CRV nut at set point of pressure.
3) Reduce pressure after resetting CRV.
4) Increase pressure repeat to observe functionality.

Functional test of Monitor-PRV:-

1) After setting of CRV, slowly reduce the line pressure through pilot valve of Monitor- PRV till line pressure reaches the set point of Monitor PRV.
2) When pressure is set on set point of Monitor-PRV then lock the nut of pilot valve.

Functional test of Active-PRV:-

1) After setting of Monitor-PRV, slowly reduce the line pressure through pilot valve of Active- PRV till line pressure reaches at the set point of Active-PRV.
2) When pressure is set on set point of Active-PRV then lock the nut of pilot valve.
3) Follow the safety norms as applicable during the carried out functional test of MRS.
4) So during functional test, both current working and standby stream shall be checked. Both streams should be functioning on predefined pressure set point.

4 PAINTING :
Painting shall be checked as per Painting procedure, Document No. –

5 DOCUMENTS REVIEW :
After completion of all tests, Documents like material test certificates, Radiography test, Hydro - test certificate for pipe spools, calibration/ test reports etc. for Ball valves, PSV/CRV, SSV and PCV etc. shall be reviewed as per approved QAP for the equipment / instruments. Calibration reports for PG, TG and DPG shall be reviewed.

TEST CERTIFICATE
VISUAL INSPECTION

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

Sr.No	POINTS INSPECTED	FOUND OK
1	Skid checked as per P &ID and GA Drawing	YES / NO.
2	Process parameter in Name Plate	YES / NO.
3	Lifting Hook	YES / NO.
4	Copper jumper plate for all flanges	YES / NO.
5	Earthing Connection at base frame	YES / NO.
6	Identification Tags for all Instruments	YES / NO.
7	Painting colors as per Painting Spec.	YES / NO.
8	Spares as per P.O. requirement	YES / NO.
9	Foundation bolt and Matching flanges	YES / NO.
150#	Support for all the equipment/ Instruments, Pipes	YES / NO.
11	Rubber sheet between pipe and support	YES / NO.
12	U clamps with PVC cover	YES / NO.
13	Adequacy of approach for operation & maintenance	YES / NO.
14	Thread projection of stud beyond nut	YES / NO.
15	Lock open facility of PSV & CRV	YES / NO.
16	Proper alignment of pipe including piping for PG, TG, Vent, etc.	YES / NO.
17	Locking facility in below 2” valve	YES / NO.
18	Vent assembly with brass flapper at 45 degree	YES / NO.
19	Welded and threaded joints as per the PMS	YES / NO.
20	Pasted Laminated P&ID inside the canopy (A2 size)	YES / NO.
21	Calibration tags on the instruments (PG, DPG, TG, PSV, CRV etc.)	YES / NO.
22	Two copper Earthing strip from skid flange to base frame/	YES / NO.
23	Glass window in canopy for PG, DPG , TG and meter	YES / NO.
24	Square metal sheet provided at all the opening for the pipe (inlet, outlet, drain, vent etc.)	YES / NO.

25	Sealing of the canopy joints by sealant jelly	YES / NO.
26	Canopy doors shall be foldable type with Aldrop type locking system.	YES / NO.
27	Doors shall open fully on either sides and shall be lockable from inside & outside. Check locks availability	YES / NO.
28	All accessories in the canopy provided of SS-304 material (Hinges. Locks, Stud, Nuts , Handles etc.)	YES / NO.

Vendor Representative	TPIA	Customer Representative
DATE:		

TEST CERTIFICATE
DIMENSIONAL INSPECTION

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

Sr.No.	POINTS INSPECTED	FOUND OK
1	Base Frame Dimension As per Foundation drawing	YES / NO
2	Height of inlet pipe from base in mm _____	YES / NO
3	Height of Outlet pipe from base in mm _____	YES / NO
4	Painting thickness of pipe line as per approved Specifications	YES / NO
5	Length of cabinet/canopy	YES / NO

Vendor Representative	TPIA	Customer Representative
DATE:		

TEST CERTIFICATE
HYDRO-TEST REVIEW

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s BHAGYANAGAR GAS LIMTED.

PO. NO.

System No. --

Sr.No.	POINTS INSPECTED	FOUND OK
1	TPIA Inspection Reports for Hydro-Test for Pipe spools of valves, as per hydro-test procedure.	YES / NO

Vendor Representative	TPIA	Customer Representative
DATE:		

TEST CERTIFICATE
LEAKAGE TEST OF COMPLETE SKID

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED.

PO. NO.

System No. --

Test Pressure:

7.0 Barg. Test

Media

: Air

Duration 30

minutes

Sr.No.	POINTS INSPECTED	FOUND OK
1	LEAK TEST AT FLANGE JOINTS AND OTHER CONNECTIONS	YES / NO

Vendor Representative	TPIA	Customer Representative
DATE:		

TEST CERTIFICATE
FUNCTIONAL TEST OF PRESSURE REGULATION SYSTEM

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

FAT CHECK LIST

ITEM	INSPECTION		CHECKED	REMARKS
1	Set Point of PCVA-101	0.8 Barg	Accepted /Rejected	
2	Set Point of PCVA-102	0.5 Barg	Accepted /Rejected	
3	Set Point of SSV+PCVM-101	PCVM:2.0 Barg SSV:3.0 Barg	Accepted /Rejected	
4	Set Point of SSV+PCVM-102	PCVM:2.5 Barg SSV:3.5 Barg	Accepted / Rejected	
5	Set Point of CRV-101	2.5 Barg	Accepted / Rejected	
6	Set Point of CRV-102	2.5 Barg	Accepted / Rejected	
7	Set Point of PSV-101	10 Barg	Accepted / Rejected	
8	Set Point of PSV-102	10 Barg	Accepted / Rejected	
9	Limit switch continuity check	-	Accepted / Rejected	

Vendor Representative	TPIA	Customer Representative
DATE:		

REVIEW OF DOCUMENTS

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

Sr.No	INSPECTION	CHECKED	REMARKS
1.	Radiography Test Reports as per Approved QAP	Accepted Rejected	
2.	Dye Penetration Test as per Approved QAP	Accepted Rejected	
3	Test Certificate for Slam Shut valves, Pressure Regulator (PCV), PSV, CRV, NRV, Isolation Ball Valves, Globe Valve, Check Valve, Coalescing filter, PG, TG, pipe spools, canopy etc.	Accepted Rejected	
4	Hydro test Report for Pipe spools & for items as per Approved QAP.	Accepted Rejected	
5	Material test Report as per Approved QAP	Accepted Rejected	
6	Calibration Report for PG, TG, DPG, PSV, CRV, Test report for SSV, PCV.	Accepted Rejected	
7	Welding Procedure Specification, Welder qualification.	Accepted Rejected	
8	Compliance Certification for Painting of skid including all items (Filtration system, PRS, Valves, PSVs, CRVs etc).	Accepted Rejected	
9	Material Correlation Chart & Welding Joints Correlation Chart	Accepted Rejected	

Vendor Representative	TPIA	Customer Representative
DATE:		

TEST CERTIFICATE
ACTION LIST

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

Sr. No.	Description	Action By
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Vendor Representative	TPIA	Customer Representative
DATE:		

SITE ACCEPTANCE TEST

PROCEDURE FOR

NATURAL GAS METERING & PRESSURE REDUCTION SKID

1 PREFACE

1.1 INTRODUCTION:

This document defines procedure for Site acceptance Test (SAT) to be carried out for Metering & Pressure Reduction skid (MRS). The purpose of carrying out SAT is to check functionality of entire MRS with respect to agreed technical documents & Commissioning.

1.2 SCOPE:

The SAT will confirm the compliance of MRS with project specifications.
All the equipment/ instruments/ items shall be installed (as far as possible) for functionality demonstration during SAT. In case some of the items cannot be erected/ installed during SAT, list of such item along with the reason for not installing the same shall be provided before start of SAT.

1.3 REFERENCE DOCUMENTS:

A) FOR SCMH:

Design Documents of Skid		**DOCUMENT No.**
1	P & ID	
2	GA Drawing	
3	Base frame and Foundation Drawing	
4	Canopy Drawing	
5	Painting datasheet	
Datasheet / Drawing of Equipment:		
4	Active Pressure Control Valve	
5	Monitor Pressure Control Valve + Slam Shut off valve	
6	Pressure Safety valve	
7	Creep Relief Valve	
8	Cartridge Filter	

B) COMMON DOCUMENTS:

Design Documents of Skid		**DOCUMENT No.**
1	Quality assurance plan - Mechanical Items	
2	Quality assurance plan–Instrumentation Equipment	
3	Material Test certificate, Radiography test report, Hydro-test certificate	
Datasheet / Drawing of Equipment:		
4	Pressure Gauge	
5	Differential Pressure Gauge	
6	Temperature Gauge	
7	Ball Valves	
8	Check Valves	
9	Globe Valve	

1.4 ORIENTATION WITNESSES:

All Representatives shall be briefed on operating principles of the Filtration & Pressure Regulating Skid package before commencing the SAT.

1.5 TEST CERTIFICATES:

Upon completion of the tests mentioned in this document, Test Certificate should be filled with the results and signed/stamped by representatives of all the parties-VENDOR and TPI/Client

2 VISUAL INSPECTION OF SKID

2.1 SKID REVIEW:

The skid will be inspected for installation of all the components as per approved P&ID and G.A. Drawing and other related documents listed in section 1.3. Dimensional checking shall be done as per approved G.A. drawing. The Skid will be inspected for proper support with rubber pads/ clamps for the major Equipment/ Instruments and pipes, Blinds (for Drains/ Vent / End Flange), Jumpers Platforms, crossovers .etc.,

Stud & nuts with minimum 2 to 3 threads shall fall beyond the nut on both sides, Copper jumper plate on each flange joint.

2.2 TEST CERTIFICATE FOR VISUAL INSPECTION:

Upon completion of the visual inspection described in this section, the Test Certificate for Visual Inspection of skid should be dully filled and signed by both parties.

3 FACTORY ACCEPTANCE TEST

3.1 PNEUMATIC LEAK TEST:

Pneumatic leak test is carried out on completely erected skid using compressed air.

1) Keep all valves open. Close either inlet or outlet side pipe with blind flange.
2) Check all drain and vents are in closed position and safety valve inlets and intermediate line ball valves are in open condition.
3) Charge air at 1 Barg from inlet.
4) Slowly increase the pressure by steps of 1 Barg up to 7 Barg.
5) Inspect all flanged joints using soap water for 30 minutes and also inspect for any leakage in all Isolation Valve (Ball, Plug, Globe valves)/ control valve gland, joints, connections, impulse tubing or any other connection or any other part of skid. In case the leakage from skid or its part is noticed, the same shall be attended and corrected.

3.2 PRESSURE REGULATION SYSTEM:

This Section describes the procedure for checking the working of SSV, Pressure Regulators & CRV. However, final procedure with vendor recommendation shall be prepared by vendor and submitted to for review.

Set points of all Pressure Regulators should be checked according to FAT Report attached at the end of this document.

1)Close outlet ball valves of pressure regulation system.
2)Open inlet ball valve of main pressure regulation system.
3)Pressurizing will make upstream pressure of SSV to an inlet pressure which is higher than the PRV set pressure so that simulation can be done.
4)Check the set point of each regulator. If required reset the set points and lock it. Record the set points in report.
5)SSV Limit switches feedback signal shall be checked for continuity by multimeter.
6)Changeover of Stream shall be demonstrated.
7)Functional test is to be performed in order to provide evidence that equipment is in working order. Functional tests are to be performed to ensure the continuity of supply of gas and/or to prevent system over pressurization.
8)Sequence of pressure setting for regulating devices of stream in skid during functional test is given below:
9)Pressure setting is started from;

1st - SSV
2nd - CRV
3rd - Monitor-PRV
4th - Active-PRV

10)Following steps are to be performed at factory location to carry out the functional test of skid.

Functional Test:-

1) Functional test of each stream should be carried out by safe venting of gas from venting line of each stream.
2) For functional test of current standby line, isolate the downstream by closing the outlet valve. Ensure current working line is functioning during testing.
3) For functional test of current working line, isolate the downstream by closing the outlet valve. Ensure the standby line which was converted as working stream is opened and functioning during testing.

Before starting functionality test of SSV ensure-

- Fully open both PRVs (Active & Monitor) & full tight the nut of CRV to fail CRV which makes bypass for setting of SSV.
- Functional test of SSV, CRV and PRVs in line order to be done as per steps given below.

Functional test of SSV:-
1) Make the PRV-A & PRV-M full tight (Max. downstream pressure) allow to pressure increased for functional checking of SSV at set pressure.
2) Slowly increase the line pressure by adjusting pilot valve of Monitor PRV till line pressure reaches at the predefined set pressure of SSV.
3) Adjust SSV pilot valve for tripping on set point.
4) If SSV is tripped at set point then lock the nut of SSV pilot.
5) Reset SSV that was tripped for further operation.
6) To ensure functionality repeat steps 4 and 5 for 2-3 times.

Functional test of CRV:-
1) After setting of SSV, slowly reduce the line pressure through pilot valve of Monitor PRV till line pressure reaches the set point of CRV. Adjust the CRV till gas starts slowly passing from venting line at the set point.
2) Lock the CRV nut at set point of pressure.
3) Reduce pressure after resetting CRV.
4) Increase pressure repeat to observe functionality.

Functional test of Monitor-PRV:-
1) After setting of CRV, slowly reduce the line pressure through pilot valve of Monitor- PRV till line pressure reaches the set point of Monitor PRV.
2) When pressure is set on set point of Monitor-PRV then lock the nut of pilot valve.
Functional test of Active-PRV:-
1) After setting of Monitor-PRV, slowly reduce the line pressure through pilot valve of Active-PRV till line pressure reaches at the set point of Active-PRV.
2) When pressure is set on set point of Active-PRV then lock the nut of pilot valve.
3) Follow the safety norms as applicable during the carried out functional test of DRS/CPRS.
4) So during functional test, both current working and standby stream shall be checked. Both streams should be functioning on predefined pressure set point.

3 PAINTING: Painting shall be checked as per Painting procedure, Document No.

TEST CERTIFICATE
LEAKAGE TEST OF COMPLETE SKID

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

Test Pressure:

7.0 Barg. Test

Media: Air

Duration:30 minutes

Sr. No.	POINTS INSPECTED	FOUND OK
1	LEAK TEST AT FLANGE JOINTS AND OTHER CONNECTIONS	**YES / NO**

Vendor Representative	TPI A	Customer Representative
DATE:		

TEST CERTIFICATE

FUNCTIONAL TEST OF PRESSURE REGULATION SYSTEM

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

FAT CHECK LIST

ITEM	INSPECTION		CHECKED	REMARKS
1	Set Point of PCVA-101	_____Barg	Accepted / Rejected	
2	Set Point of PCVA-102	_____Barg	Accepted / Rejected	
3	Set Point of SSV+PCVM-101	PCVM:____Barg SSV:____Barg	Accepted / Rejected	
4	Set Point of SSV+PCVM-102	PCVM:____Barg SSV:____Barg	Accepted / Rejected	
5	Set Point of CRV-101	_____Barg	Accepted / Rejected	
6	Set Point of CRV-102	_____Barg	Accepted / Rejected	
7	Set Point of PSV-101	_____Barg	Accepted / Rejected	
8	Set Point of PSV-102	_____Barg	Accepted / Rejected	
9	Limit switch continuity check	-	Accepted / Rejected	

* -Set points shall be set as per site requirements within the acceptable limits of approved P&ID process parameters & the same shall be filled in above table.

Vendor Representative	TPI A	Customer Representative
DATE:		

TEST CERTIFICATE
ACTION LIST

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

Sr. No.	Description	Action By
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		
13		
14		
15		

Vendor Representative	TPIA	Customer Representative
DATE:		

HYDROTEST PROCEDURE FOR NATURAL GAS METERING & PRESSURE REDUCTION SKID

1 INTRODUCTION :

This document defines procedure for Hydrotest to be carried out for Metering & Pressure Reduction skid. The purpose of carrying out Hydrotest is to check leakage of entire skid.

2 SCOPE :

All the Valves/equipment / instruments/ items/spools shall be hydrotested as per approved QAP.

3 REFERENCE DOCUMENTS:

A) FOR SCMH:

Design Documents of Skid		**DOCUMENT No.**
1	P & ID	
2	GA Drawing	
3	Base frame and Foundation Drawing	
4	Canopy Drawing	
5	Painting datasheet	
Datasheet / Drawing of Equipments:		
4	Active Pressure Control Valve	
5	Monitor Pressure Control Valve + Slam Shut off valve	
6	Pressure Safety valve	
7	Creep Relief Valve	
8	Cartridge Filter	

B) COMMON DOCUMENTS:

Design Documents of Skid		**DOCUMENT No.**
1	Quality assurance plan - Mechanical Items	
2	Quality assurance plan–Instrumentation Equipment	
3	Material Test certificate, Radiography test report, Hydro-test certificate	
Datasheet / Drawing of Equipment:		
4	Pressure Gauge	
5	Differential Pressure Gauge	
6	Temperature Gauge	
7	Ball Valves	
8	Check Valves	
9	Globe Valve	

4 HYDROTEST:

4.1 Flanged end valves:

1. All the flanged end valves shall be pre hydro tested at vendor's place.
2.Before assembly of these valves to skid, these valves are again hydro tested in Vendor shop floor and the same gets witnessed & certified by TPIA.
3.For 300# valves, hydrotest pressure shall be – 73.5 Barg.
4.For 150# valves, hydrotest pressure shall be – 28.5 Barg.
5.Duration for hydrotest procedure shall be 2 minutes for valve sizes up to 4 " & 5 minutes for valves sizes 6" & above, as per API 598/API 6D.

4.2 Pup end or screwed end valves:

1.All pup end (welded) and screwed end valves shall be hydro tested along with pipe spools hydro testing.
2.The hydro testing procedure of pipe spools shall be as mentioned in below pipe spool section.

4.3Pipe spools:

1.Hydrostatic Test is carried out on each pipe spool during stage inspection of the skid. This inspection is witnessed by TPIA.
2.Hydro test is done by pressurizing each pipe spool using water.
3.For 300# piping, hydro test is done at minimum: 73.5 Barg; for 150# piping, hydro test is done at minimum – 28.5 Barg.
4.Total duration of hydro test is 240 minutes.
5.Line pressure & line temperature are recorded initially, after every 30 minutes & at the end of hydro test.
6.During holding period, there shall not be any pressure drop noticed.
7.At the end of hydro test, Test certificate is signed by both TPIA & Vendor representatives.
8.After completion of hydro static test, piping shall be thoroughly drained & cleaned.

4.4 Filters:

1. Hydro test pressure for filter shall be – 28.5 Barg.
2. Total duration of hydro test for filter shall be 240 minutes.

4.5 PRV/SSV/PSV/CRV:

1. Hydro test of PRV shall be carried out as per EN 334
2. Hydrotest of SSV shall be carried out as per EN 14382
3. Hydrotest of PSV & CRV shall be carried out as per API 520/API 526/527

5 TEST CERTIFICATES:

Upon completion of the tests mentioned in this document, Test Certificate should be filled with the results and signed/stamped by representatives of all the parties-VENDOR and TPI/Client

TEST CERTIFICATE
HYDROTEST TEST

Project NATURAL GAS METERING & PRESSURE REDUCTION

SKID. Customer M/s. BHAGYANAGAR GAS LIMTED

PO. NO.

System No. --

Vendor Representative	TPIA	Customer Representative
DATE:		

TECHNICAL SPECIFICATION FOR CRCA CANOPY FOR MRS SKID

TECHNICAL SPECIFICATION FOR CRCA CANOPY FOR METERING AND PRESSURE REGULATING AND METERING SKID

1.0 SCOPE

BHAGYANAGAR GAS LIMTED is in business of distributing natural gas to industrial, domestic and CNG station in various cities across India. For supply to Domestic customers, BHAGYANAGAR GAS LIMTED procures Canopy for Skid fabricated with CRCA sheet and installed them in various cities.

This specification covers general requirements of CRCA Sheet Canopy for Pressure regulating and filtration skid used in gas pipeline network.

Protecting canopy is to be provided to protect the skid against the ingress of water and foreign particles. Canopy shall be constructed with durable, non- corrosive and non- inflammable materials and shall have adequate strength so that it should not get damaged/deformed during the transportation/handing/installation.

2.0 DEFINITIONS

In the Bid / Contract (as hereinafter defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise requires.

a) The "" or "Company" or "Owner" shall mean BHAGYANAGAR GAS LIMTED ()

b) The "Bid" shall mean the Bid submitted by the CONTRACTOR for acceptance by the .

c) The "Contract" shall mean the agreement and all other documents between the company and the contractor for providing the services mentioned herein.

d) The "Vendor" shall mean the person or persons, firm or Company whose Bid has been accepted by .

e) The "Supervisor" OR " work in charge" shall mean the person deployed by the contractor for control & supervision of the work of his work force, as per the Scope of work mentioned and to receive instructions from OWNER's Engineer-In-Charge or his representative.

f) The " Engineer-In-Charge" or" 's representative" shall mean the person designated as such by the BHAGYANAGAR GAS LIMTED and shall include his authorized nominee or agent, provided however that the 's Representative to be so designated by may be one person for certain aspects of this agreement and another person for other aspects of work covered by this Bid / Contract.

g) "Stores" shall mean the Companies Stores located at various location of .

h) The "Specification" shall mean all directions, the various technical specifications, provisions attached and referred to in the Bid documents which pertain to the method and manner of performing the work or works to the quantities and qualities of the work or works and the materials to be furnished under the contract or works or works as may be amplified or modified by the COMPANY during the performance of Contract in order to provide the unforeseen conditions or in the best interests of the work or works. It shall also include the latest

edition of relevant standard specifications including all addenda / corrigenda published before entering into the contract.

i) "Guarantee" shall mean the period and other conditions governing the warranty / guarantee in respect of the work as detailed in section hereunder.
j) "HSE" shall mean Health, Safety & Environment.
k) "'s Premises" or "Owner's Premises" shall mean company's premise or its customer's premises where work is to be executed.

3.0 MATERIAL:

Canopy shall be constructed with CRCA (Cold Rolled Close Annealed) sheets with the minimum gauge thickness of 16.

4.0 OTHER:

- Canopy shall have free ventilation of at least 5% of the surface area of the entire area.
- Canopy doors shall be foldable type with Aldrop type locking system.
- Canopy shall have doors on both front and rear side.
- Front doors shall open fully on either sides and shall be lockable from the outside by padlocks, and rear doors shall be lockable from the inside. Supply of all locks is in the scope of supplier.
- Canopy shall have slope type sheet provided on the both side of the roof in order to avoid any water accumulation on top of it.
- Canopy height shall be well enough for work inside by any personnel with minimum height of 1950 mm. Also, height shall be well enough to take out the filter element from the Filter during O&M. GAD shall be prepared keeping height proportion in consideration.
- Adequate cut-out should be provided at appropriate location on the canopy such that the readings of the counter of the Meter as well as the reading of the PG/DPG/TG are easily visible from outside. Location of such cut outs shall be clearly visible in the GAD.
- Vendor shall submit the GAD for approval to representative.
- Canopy shall have vent & drain pipe provision.
- Canopy shall have hooks of adequate strength at the base frame of the skid in order to facilitate the lifting and convenient handling of the Skid.
- Lifting rods of adequate strength shall be provided along with the skid to facilitate easy handling of the skid, and lugs should place at locations such that it should not damage the cabinet during the loading and unloading of the skid. In case screws are used on the cabinet, all the sharp points should be adequately filed and smoothened.
- Surface for the canopy shall be smooth and dent free.
- Inlet/outlet pipes holes shall be positioned accurately with minimum gap between pipe and canopy.
- All accessories to be provided of SS-304 material (Hinges. Locks, Stud, Nuts , Handles etc.)
- For internal structure use suitable Angle
- All outer locks, Handles to be provided at man working height.
- Canopy shall be powder coated with silver (RAL 7001)
- Square metal sheet shall be provided at all the opening for the pipe (inlet, outlet, drain, vent etc.)
- Size of the opening in the canopy shall be such that spool with flange shall be easily inserted.

5.0 NAME PLATE:

- Canopy shall have name plate fixed on the front door of the cabinet in the mid position
- Name plate font sizes shall be 1.5 cm in height so that it facilitates the easily reading of the Skid
- Material used for the Name plate shall be non-corrosive in nature.
- Letter shall be engraved on the plate.
- Language to be used for name plate is English(Capital letters)
- Name plate must have below information marked on it:

1. Name of the Manufacturer
2. Description of Skid.
3. Skid No.
4. Inlet and outlet size
5. Type
6. Fluid
7. Pressure, Temperature & Flow Capacity.
8. Weight
9. Size
10. Filter (Micron rating, No. of cartridges and size)
11. Meter detail
12. Set Points
13. Date and year of Manufacturing.
14. Toll Free No :
15. PO Number and date
16. Message to be printed at the bottom " No Smoking" or " No Naked flame within a radius of 1.5 meters "
17. In case Screws are to be used for name plate they shall be adequately filed and smoothened.

Material	Sr. No.	Approved Vendors (in Alphabetical order)
CS Ball Valves / Globe Valves / Check Valves	1	Flowchem Industries
	2	L&T Valves
	3	Weir BDK (2"NB & below)
	4	Micro finish Valves Pvt Ltd
	5	hawa valves (india) pvt. Ltd
	6	Valvetech Industries
	7	Shalimar Valves
Pipes	1	Surya Roshni
	2	Ratnamani Metals and Tubes
	3	Welspun Corp Ltd.
	4	Jindal Saw Ltd
Fittings, Flanges	1	Paramount Forge, Mumbai, India
	2	Echjay Industries
	3	Eby Industries,
	4	Pipefit Engineers Pvt. Ltd
	5	Sawan Industries
	6	MS Fittings
	7	Teekay Tubes Pvt. Ltd., Mumbai
	8	Leader Valves Ltd, India
	9	M/s Jindal Forging
	10	United Forge Industries
	11	Vivial Forge Pvt. Ltd
Pressure Safety Valve	1	FMC Sanmar Ltd.
	2	Mekaster Engineering Ltd.
	3	Nirmal Industrial Controls Pvt. Ltd.
	4	Protego Equipment's Pvt. Ltd.
	5	RMG Regal + Messtech GmbH, Germany
	6	Sebim Valves India Pvt Ltd / Weir BDK
	7	Lesser
PG / DPG/ TG	1	Ashcroft India Pvt. Ltd.
	2	Baumer Technologies India Pvt. Ltd.
	3	General Instrumentations Consortium
	4	Hirlekar Precision Engg. Pvt. Ltd.
	5	I.S. Engineers
	6	Micro Process Controls
	7	Waree Instruments Ltd.
	8	Wika Instruments India Pvt Ltd
Instrument Tubing, SS valves & Fittings	1	Tubacex
	2	Parker Hannifin India Pvt. Ltd.
	3	Sandvik India Pvt. Ltd.
	4	SSP – USA
	5	DK LOK
	6	Swagelok

Bolts & Nuts	1	M. Darukhanawalla Corpn
	2	Multi Thread Fasteners
	3	Pioneer Nuts & Bolt Pvt. Ltd.
	4	Precision Auto Engineers
	5	Udehra Fasteners Ltd.

Gaskets	1	Bombay Chemical Equipment's
	2	Goodrich Gasket Pvt. Ltd.
	3	IGP Engineers Pvt Ltd
	4	Neoseal Engineering
	5	Super Gasket Industries
	6	Uni Klinger Limited
	7	Unique Industrial Packing Pvt. Ltd.
Gas Detectors (GD)	1	ABB Natural Gas detectors
	2	Honeywell Natural Gas detectors
	3	MSA Natural Gas detectors
	4	Thermo Fisher scientific Natural Gas detectors
PT/TT	1	ABB
	2	Honeywell
	3	Siemens
	4	Emerson Rosemount
	5	E&H
Active + Monitor Regulator	1	Daniel Measurement Solutions Pvt. Ltd.
	2	Emerson Process Management India Pvt. Ltd.
	3	Nirmal Industrial Controls Pvt. Ltd.
	4	RMG Regal + Messtech GmbH, Germany
	5	Tormene Stainless steel regulator
	6	ASCO Emerson
Slam Shut off Valve	1	Daniel Measurement Solutions Pvt. Ltd.
	2	Emerson Process Management India Pvt. Ltd.
	3	Nirmal Industrial Controls Pvt. Ltd.
	4	RMG Regal + Messtech GmbH, Germany
Filters	1	Autometer Energitec Limited (formerly RMG Autometer)
	2	Control Plus Oil & Gas Solution Pvt. Ltd.
	3	Filter Concept Pvt. Ltd.
	4	Gujarat Ottofilt
	5	Inel Gas Controls Pvt. Ltd.
	6	Nirmal Industrial Controls Pvt. Ltd.
	7	Petromar Engg.
	8	R S Instrumentation Services
Pressure Safety Valve	1	FMC Sanmar Ltd.
	2	Mekaster Engineering Ltd.
	3	Nirmal Industrial Controls Pvt. Ltd.
	4	Protego Equipments Pvt. Ltd.

	5	RMG Regal + Messtech GmbH, Germany
	6	Sebim Valves India Pvt Ltd / Weir BDK
Creep Relief Valve	1	FMC Sanmar Ltd.
	2	Mekaster Engineering Ltd.
	3	Nirmal Industrial Controls Pvt. Ltd.
	4	Protego Equipments Pvt. Ltd.
	5	RMG Regal + Messtech GmbH, Germany
	6	Sebim Valves India Pvt Ltd / Weir BDK
Pressure Gauge	1	Ashcroft India Pvt. Ltd.
	2	Baumer Technologies India Pvt. Ltd.
	3	General Instrumentations Consortium
	4	Hirlekar Precision Engg. Pvt. Ltd.
	5	I.S. Engineers
	6	Micro Process Controls
	7	Waree Instruments Ltd.
	8	Wika Instruments India Pvt Ltd
Gas Detectors (GD)	1	ABB Natural Gas detectors
	2	Honeywell Natural Gas detectors
	3	MSA Natural Gas detectors
	4	Thermo Fisher scientific Natural Gas detectors
Flow Meter (USM)	1	Daniel Emerson Flow Meter (USM)
	2	SICK Flow Meter (USM)
Coriolis Mass Flow Meter (MFM)	1	ABB Coriolis Mass Flow Meter (MFM)
	2	Daniel Emerson Coriolis Mass Flow Meter(MFM)
	3	Endress+Hauser Coriolis Mass Flow Meter (MFM)
	4	Honey Well Coriolis Mass Flow Meter (MFM)
& PD Meters	1	Itron (India) Pvt. Ltd.
	2	Elster Metering Pvt. Ltd.
	3	Raychem RPG Ltd.
	4	Rockwin Flowmeter India Pvt. Ltd.
	5	Inel Gas Controls Pvt. Ltd.
	6	Autometer Energetics
	7	Allport International (FMG)
	8	Eurotec Engineering Corporation - GFO
	9	Capital Power Systems Ltd. - Zenner
	10	GM Engineering

SECTION : SCHEDULE OF RATES (SOR)

B ANAGAR GAS LIMITED- CITY GAS DISTRIBUTION PROJECT HYDERABAD

METERING REGULATORY SKID (MRS)

SCHEDULE OF RATES

Name of the CONTRACTOR/ SUPPLIER	M/s

PROJECT : City Gas Distribution Project at Hyderabad

ITEM : Procurement Of Twin Stream MRS Capacity Of 750 SCMH With Single Gas Metering, Single EVC With AMR, Double Filter And Regulator

Tender document no. BGL/618/2024-25 Dated: 06.06.2024

CLIENT : Bhagyanagar Gas Limited

Item Nos.	DESCRIPTION	Unit	QTY		Unit Price (INR)	Total FOT - delivered at site, price per unit including Packing & forwarding, GST, Inland transportation charges, unloading, stacking etc.

				Harmonized System Nomenclature (HSN) code	**Unit Ex-works Price including Packing, Forwarding and GST on components and raw materials but excluding Inland Transportation upto FOT site**	**Unit Inland transportation charges upto FOT delivered at site including unloading & stacking at site etc. & other costs incidental to delivery of goods**	**GST (CGST& SGST/UTGST or IGST) on the finished goods and inland transportation etc. Applicable on Col. (6+7)**		**Unit FOT - delivered at site, price per unit including Packing & forwarding, GST, Inland transportation charges, unloading, stacking etc.**			
					(INR)	**(INR)**	**%**	**(INR)**	**Amount (INR)**	**Amount in words (INR)**	**Amount (INR)**	**Amount in words (INR)**

A	**Design, Engineering, Manufacturing, Testing, Nameplate marking, Painting, Inspection, Calibration, Supply and unloading, FOT up to designated site: MRS with battery operated flow computer / battery operated EVC, Hydrocarbon Detectors with siran, Automatic DCP fluding Extigusher and its accessories, Consumables, Compulsory Spares and**											

	Commissioning Spares including Assistance in Configuration, Interfacing, Integrated Testing & Commissioning as per Job specifications and Special Instructions enclosed.											
a)	**HYDERABAD**											
1	**750 SCMH MRS Twin Stream with Single RPD Meter, EVC, AMR Device, Gas Detector, DCP Extinghusher and Canopy.**	**Nos.**	**1**									
Note												
1 The Bidder to indicate the Harmonized System Nomenclature (HSN) code against each item.												
2 The quoted rate / price is inclusive of TPI charges who shall be appointed by Manufacturer.												