



HPOIL GAS PRIVATE LIMITED

(A Joint Venture of HPCL & OIL)

**SUPPLY OF METER REGULATING SKID (MRS) AT AMBALA
KURUKSHETRA & KOLHAPUR GA**

TECHNICAL VOLUME PART A

**TENDER NO. HOGPL/2026-27/C&P/021
DATE: 27.08.2026**



SECTION - I

Material Requisition for **Metering Regulating Skid** **& PCV**



MATERIAL REQUISITION

1. SCOPE:

This specification covers the requirements of design, material, manufacturing, construction features, and inspection, testing and commissioning of a complete Metering and Regulating Station (MRS) of 150# with metering system, EVC/FC, including the requirements of all packing, preservation and transportation to HOGPL's stores located at Kolhapur. Unless otherwise specified, all the pressures indicated in this specification are gauge pressures.

The MRS shall be designed and manufactured as per all the prevailing requirements of PNGRB Technical Standard T4S and as per this technical specification. Unless otherwise specified, the latest editions of the standards mentioned herein this specification, including all addenda and revisions, shall apply.

The design and fabrication of the skid shall be such that each of the equipment in the MRS is easily operable and maintainable, and the same shall not obstruct the operation and maintenance of any other equipment in the skid. The Skid includes Single Stream Filter, Pressure Regulating System, Metering System, and associated piping assembly with Canopy.

2. DEFINITIONS

For the purpose of this document, the words and expressions listed below shall have the meanings assigned to them as follows:

Owner/ Purchaser/ Company	HPOIL Gas Private Limited
Consultant	The party which comes out all or part of the engineering, procurement, construction, pre-commissioning and assistance for commissioning, monitors and controls the overall project management.
Bidder/ Manufacturer / Supplier / Vendor	The party(s) which manufactures and / or supplies material, equipment, technical documents / drawings and services to the Owner or perform the duties specified by Contractor.



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Works/ Shop	The place where the ITEM / UNIT is fabricated and tested and transported to Purchaser.
Datasheet	Technical data provided by the Purchaser / Owner / Company.
Standard Specification	Specifications Developed pertaining to particular proj/ Job in regard.
SRM	Service Regulator Module
MRS	Metering Regulating Skid

3. STANDARD CODES

Mechanical Equipment shall generally be mechanically designed in accordance with the relevant institute of Gas Engineers (IGE) codes and the following principal codes of practice (Latest Edition).

ASME Boiler and Pressure vessel Code. / American National Standard Code

- ANSI/ASME B 16.5 Flanges & Flange fittings
- ANSI/ASME B 31.8 Gas Transmission and Distribution Systems.
- ANSI/ASME B 16.20 Metallic Gaskets for pipe flanges
- ANSI/ASME B 1.20.1 Pipe threads general purpose (inch) valve flanged
- ANSI/ASME B 16.34 threaded & welding ends.

American Petroleum Institute (API)

- API RP 520 Part 1 & 2, Design and Installation pressure relieving systems in refineries.
- API RP 521 Guide for Pressure relief and Depressing Systems
- API RP 550 Manual on Installation of refinery instrument and control system
- API 6D Specification for pipeline valves, end closures and swivels.
- API 527 Commercial seat tightness of safety relief valves with metal-to-metal seats

British Standard Specifications

- BS 449 BS 1515 Structural Steel work materials of filters & scrubbers.

American Gas Association

- Gas Measurement Committee Report No.3 – Orifice Metering of Natural Gas
- Report No.7 - Measurement of Gas by RPD Meters



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Indian Standard

- IS-5 Colours for ready mixed paints
- IS-319 Specification for free cutting Brass bars, rods and sections IS-1239 Mild steel tubes, tubulars and other wrought steel fittings
- IS-1271 Specification of Thermal Evaluation and Classification of Electrical Insulation
- IS-1554- PVC insulated (heavy duty) electric cables-working Part I voltage up to and including 1100 V
- IS-2074 Ready mixed paints, air drying, red oxide- zinc chrome
- IS-13947 Degree of Protection provided by enclosures for low voltage switch gear and control gear
- IS-2148 Flame proof enclosures for electrical apparatus IS-3624 Specification for pressure and vacuum gauges
- IS-5831 PVC insulation and sheath of electric cables
- IS-7358 Specifications for Thermocouples

European Standard

- EN334 European standard for pressure regulators upto 100 bar
- EN12186 Gas Pressure Regulating Stations for Transmission and distribution
- EN14382 Safety systems for Gas distribution
- EN 12480 RPD Meter

The meter and governing components should be designed not in isolation, but as a single installation. Normally both should be sized for the same load, and consideration must be given to the effect that each may have on the other.

4. SCOPE OF WORK

The scope includes design, engineering, fabrication, manufacturing/ packaging, integration, shop testing, supply, supervision during installation and commissioning of following gas custody transfer MRS as specified in bid document (as per Material Requisition) including packing, forwarding, transportation and unloading at HOGPL Stores / Site as per tender terms & conditions

Item No.	Item Description	Unit	Qty.
1.	a) DESIGNING, ENGINEERING, FABRICATION AND SUPPLY OF SINGLE STREAM MRS (METER REGULATING STATION WITH CANOPY) INSIDE THE CABINET WITH FLOW CAPACITY OF 250 SCMH(G-100 RPD METER AT DOWN STREAM,	No.	4



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	150#, 2" FLANGE END CONNECTIONS WITH RENGIBILITY OF 1:160 or BETTER) INLET PRESSURE – 2 to 4 BAR, OUTLET PRESSURE- 1.5 BAR CONSISTING OF FILTRATION WITH DIFFERENTIAL GAUGE, PRESSURE REGULATION WITH SSV, REGULATOR (PCV+SSV+CRV), PRESSURE GAUGES, CREEP RELIEF VALVES, FLOW METER, RESTRICTION ORIFICE, TF WITH VALVE AT INLET, NRV WITH VALVE AT OUTLET, 3.0MTR VENT WITH FLAME ARRESTER, ELECTRONIC VOLUME CORRECTOR WITH PRESSURE & TEMPERATURE TRANSMITTER ETC. ALONG WITH ASSOCIATED ACCESSORIES INCLUDING INSTRUMENT FITTINGS, MANIFOLDS, IMPULSE TUBING WITH FITTINGS, PIPES, VALVES, NRVS, FLANGES, GASKETS, ALL STRUCTURE/ SUPPORTS/OPERATING PLATFORMS, CABLES AND CABLING FROM FIELD INSTRUMENTS TO EVC ETC., GLANDS, FERRULES, LUGS, TAGS AT BOTH ENDS, SUPPORTS, SS BLIND PLUGS, MOUNTING STANDS, ALL APPLICABLE ACCESSORIES, MANDATORY SPARE REQUIRED FOR COMMISSIONING, NOTE EVC SHALL COMMUNICATE WITH STATION THROUGH GSM/GPRS. PROVISION SHALL BE KEPT READY IN THE OFFERED EVC BY VENDOR. COMMUNICATION CABLE FOR CONNECTING WITH THE LAPTOP FOR FETCHING DATA. (MAXIMUM ALLOWABLE UPSTREAM VELOCITY- 20m/s AND DOWNSTREAM VELOCITY- 30m/s, PREFERED INLET PIPELINE SIZE- 2" AND OUTLET PIPELINE SIZE- 2"). b) Supervision during Installation, Testing and Commissioning of above MRS at Site		
2	a) DESIGNING, ENGINEERING, FABRICATION AND SUPPLY OF SINGLE STREAM MRS (METER REGULATING STATION WITH CANOPY) INSIDE THE CABINET WITH FLOW CAPACITY OF 100 SCMH (G-40 RPD METER AT DOWN STREAM,	No.	4



MATERIAL REQUISITION

	150#, 2" FLANGE END CONNECTIONS WITH RENGIBILITY OF 1:100 or BETTER) INLET PRESSURE – 2 to 4 BAR, OUTLET PRESSURE- 1.5 BAR CONSISTING OF FILTRATION WITH DIFFERENTIAL GAUGE, PRESSURE REGULATION WITH SSV, REGULATOR (PCV+SSV+CRV), PRESSURE GAUGES, CREEP RELIEF VALVES, FLOW METER, RESTRICTION ORIFICE, TF WITH VALVE AT INLET, NRV WITH VALVE AT OUTLET, 3.0MTR VENT WITH FLAME ARRESTER, ELECTRONIC VOLUME CORRECTOR WITH PRESSURE & TEMPERATURE TRANSMITTER ETC. ALONG WITH ASSOCIATED ACCESSORIES INCLUDING INSTRUMENT FITTINGS, MANIFOLDS, IMPULSE TUBING WITH FITTINGS, PIPES, VALVES, NRVS, FLANGES, GASKETS, ALL STRUCTURE/ SUPPORTS/OPERATING PLATFORMS, CABLES AND CABLING FROM FIELD INSTRUMENTS TO EVC ETC., GLANDS, FERRULES, LUGS, TAGS AT BOTH ENDS, SUPPORTS, SS BLIND PLUGS, MOUNTING STANDS, ALL APPLICABLE ACCESSORIES, MANDATORY SPARE REQUIRED FOR COMMISSIONING, NOTE EVC SHALL COMMUNICATE WITH STATION THROUGH GSM/GPRS. PROVISION SHALL BE KEPT READY IN THE OFFERED EVC BY VENDOR. COMMUNICATION CABLE FOR CONNECTING WITH THE LAPTOP FOR FETCHING DATA. (MAXIMUM ALLOWABLE UPSTREAM VELOCITY- 20m/s AND DOWNSTREAM VELOCITY- 30m/s, PREFERRED INLET PIPELINE SIZE- 1" AND OUTLET PIPELINE SIZE- 2"). b) Supervision during Installation, Testing and Commissioning of above MRS at Site		
3	a) DESIGNING, ENGINEERING, FABRICATION AND SUPPLY OF SINGLE STREAM MRS (METER REGULATING STATION WITH CANOPY) INSIDE THE CABINET WITH FLOW CAPACITY OF 65 SCMH(G-25 RPD METER AT DOWN STREAM, 150#,	No.	1



MATERIAL REQUISITION

	2" FLANGE END CONNECTIONS WITH RENGIBILITY OF 1:50 or BETTER) INLET PRESSURE – 2 to 4 BAR, OUTLET PRESSURE- 1.5 BAR CONSISTING OF FILTRATION WITH DIFFERENTIAL GAUGE, PRESSURE REGULATION WITH SSV, REGULATOR (PCV+ SSV+CRV), PRESSURE GAUGES, CREEP RELIEF VALVES, FLOW METER, RESTRICTION ORIFICE, TF WITH VALVE AT INLET, NRV WITH VALVE AT OUTLET, 3.0MTR VENT WITH FLAME ARRESTER, ELECTRONIC VOLUME CORRECTOR WITH PRESSURE & TEMPERATURE TRANSMITTER ETC. ALONG WITH ASSOCIATED ACCESSORIES INCLUDING INSTRUMENT FITTINGS, MANIFOLDS, IMPULSE TUBING WITH FITTINGS, PIPES, VALVES, NRVS, FLANGES, GASKETS, ALL STRUCTURE/ SUPPORTS/OPERATING PLATFORMS, CABLES AND CABLING FROM FIELD INSTRUMENTS TO EVC ETC., GLANDS, FERRULES, LUGS, TAGS AT BOTH ENDS, SUPPORTS, SS BLIND PLUGS, MOUNTING STANDS, ALL APPLICABLE ACCESSORIES, MANDATORY SPARE REQUIRED FOR COMMISSIONING, NOTE EVC SHALL COMMUNICATE WITH STATION THROUGH GSM/GPRS. PROVISION SHALL BE KEPT READY IN THE OFFERED EVC BY VENDOR. COMMUNICATION CABLE FOR CONNECTING WITH THE LAPTOP FOR FETCHING DATA. (MAXIMUM ALLOWABLE UPSTREAM VELOCITY- 20m/s AND DOWNSTREAM VELOCITY- 30m/s, PREFERRED INLET PIPELINE SIZE- 1" AND OUTLET PIPELINE SIZE- 2"). b) Supervision during Installation, Testing and Commissioning of above MRS at Site		
4	DESIGNING, ENGINEERING AND SUPPLY OF Regulator - 65 SCMH, PCV+ SSV+CRV (Inlet Pressure -2 to 4 Bar, Outlet - 1.5Bar, End Connection - Flanged End 1")	No.	1

5	DESIGNING, ENGINEERING AND SUPPLY OF Regulator - 100 SCMH, PCV+ SSV+CRV (Inlet Pressure -2 to 4 Bar, Outlet - 1.5Bar, End Connection - Flanged End 1")	No.	1
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6	DESIGNING, ENGINEERING AND SUPPLY OF Regulator - 250 SCMH, PCV+ SSV+CRV (Inlet Pressure -2 to 4 Bar, Outlet - 1.5Bar, End Connection - Flanged End 1")	No.	1
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5. SCOPE OF WORK

5.1. Vendor's scope shall include complete design, engineering, manufacturing, integration, performance testing, inspection, FAT, supply, supervision of erection, testing & commissioning, & documentation of MRS skids as per the respective P & IDs, data sheets and other specifications enclosed herewith.

5.2. MRS units shall be comprised of the following items as per enclosed as P & IDs, but not limited to (Refer design basis) the followings:

5.2.1. One cartridge filter with differential pressure gauges, Safety Relief Valves, along with all accessories (as indicated in P & ID).

5.2.2. One pilot operated pressure regulator with integral slam shut as indicated in respective P&ID's

5.2.3. One/Dual stream with RPD Meter as per respective P&ID. RPD Meter's shall be with Battery operated EVC having integral/external ~~GPRS & GSM Battery operated~~, Software's, Cables between EVC & ~~Modem~~, local communication / configuration cable for EVC to Laptop is in scope of vendor.

5.2.4. Pressure control Regulator shall be Pilot Type.

5.2.5. The complete station shall be designed in such a way that the mean gas velocity remains within 20 Meter per second till filtration unit, after filtration unit limited to 30 meter / second. The complete skid shall be designed for 100 % of the maximum flow capacity. Bidder to follow PNGRB guidelines

5.2.6. If any deviation from the specified technical specification, vendor should highlight in advance to HOGPL.

5.2.7. The data sheets provided by HOGPL along with the tender document should be filled up completely and enclosed with Technical BID.

5.2.8. Vendor shall confirm that the MRS are suitable for outdoor installation in tropical climate with following conditions:

- Ambient temperature: -10 – 60 ° C
- Humidity: 100%

5.2.9. Vendor shall furnish Bill of Materials for the skid, and completeness of the Bill of Materials for the skid to meet the functional requirement of



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specifications of tender document is vendor's responsibility.

- 5.2.10. All materials to be used in construction of valves shall be suitable for Natural Gas services.
- 5.2.11. The scope of supply of skid also includes mandatory spares mentioned elsewhere.
- 5.3. Vendor shall be responsible for the design of filters for the successful operation of the skids. Filters shall be cartridge type with 5 microns filtration capacity and shall be provided with a differential pressure gauge.
- 5.4. Flow direction shall be clearly marked on the meter body.
- 5.5. All flanges shall be connected through flexible jumpers of Minimum 3 mm thickness and 20 mm wide copper strips.
- 5.6. All field mounted instruments shall be suitable for continuous working in outdoor installation, considering temperatures, humidity etc. as per the data provided elsewhere in bid.
- 5.7. Sound pressure levels shall be limited to the values prescribed by Environmental authorities but in no case it shall exceed 80 dbA. Vendor shall provide noise suppression treatment to limit the noise level.
- 5.8. Vent shall be provided to discharge gas from relief valve to a safe place at least 3 meters away from the working platform in MRS vicinity and it should be terminated with suitable flame arrestors. Open end of vent pipe shall be provided with weather hood.
- 5.9. All fixtures required for mounting of wall mounted MRS are in the scope of bidder.
- 5.10. HOGPL branding on MRS Canopy must be painted (Scratch proof paint) as per HOGPL approve design which will be submitted after award of PO. Branding shall be done on Front & back side of canopy. Rest 2 (two) sides to match the color of HOGPL branding design.)

6. CABINET/CANOPY

- 6.1. A protecting powder coated cabinet should be provided to cover the MRS and to avert the ingress of water. It should be constructed with durable, corrosion resistant and non-inflammable materials and should have adequate strength so that it should not get damaged / deformed during handling, transportation and installation.



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- 6.2. The cabinet supplied by the vendor should have free ventilation of at least 5% of the surface area. It should have front doors that open fully on either sides, and also be lockable from the outside by padlocks, and rear doors that are lockable from the inside, which are to be supplied by the vendor.
- 6.3. Regulator vents should protrude through the cabinet wall and terminate with flame arrestors. The constructional details of the flame arrestor are also to be provided. Lever handle of outlet valves should protrude through the cabinet wall.
- 6.4. Latches, handles of locking system to be SS riveting.
- 6.5. Cabinet sheet is of MS & the thickness shall be minimum 16 SWG (1.6mm)
- 6.6. The name plate should be fixed on the front door of the cabinet in the mid position and also the font size should be 1.5 cm in height so that it facilitates the easily reading of the details of SRM provided on the cabinet.
- 6.7. A nameplate should be fixed on the Cabinet, which will give the following information:
 - Name of the Manufacturer
 - Description of MRS
 - Flow Capacity
 - Inlet Pressure
 - Outlet Pressure
 - Meter Type, Size and Serial Number
 - EVC (make), Serial No. and year of mfg.
 - ~~GSM Modem (make), Serial No. and year of mfg.~~
 - Set points of Regulators, SSV and CRV of stream
 - Filter (Micron rating, No. of cartridges and size),
 - Date and year of Manufacturing
- 6.8. Hooks of adequate strength should be provided at the base frame of the skid in order to facilitate lifting and convenient handling of the SRM. Lifting rods (of adequate strength) should be provided along with the skid to facilitate easy handling of the skid, and lugs should have placed at locations such that it should not damage the cabinet during the loading and unloading of the skid.

7. CERTIFICATION FOR CUSTODY TRANSFER

- 7.1. The vendor shall furnish the regulations of the certifying authority considered by him for custody transfer applications. If other instruments



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also need to be certified as per the regulations the same shall be complied with.

- 7.2. EVC shall have type approval for flow calculation (as per AGA-7) from the internationally accredited laboratory for custody transfer application.

8. STATUTORY APPROVALS

- 8.1. Vendor shall be responsible for obtaining all statutory approvals, as applicable for all instruments, equipment, calibration gas cylinders and control systems.
- 8.2. In addition, equipment / instruments / systems located in the hazardous area shall be certified by the local statutory authorities for their use in the area of their installation. In general, following certification shall be given:
- For all intrinsically safe / explosion proof / flameproof equipment's / instruments / systems or equipment with any other type of protection allowable as per this package which are manufactured abroad and certified by any statutory authority like BASEEFA, FM, UL, PTB, LCIE etc. should also have the approval of PESO/CCOE, Nagpur.
 - For all flame proof equipment manufactured locally (indigenously), the testing shall be carried out by any of the approved test house like CMRI / ERTL etc. The equipment shall in addition bear the valid approval from PESO/CCOE, Nagpur and a valid BIS license.
 - For all intrinsically safe equipment manufactured locally (indigenously), the testing shall be carried out by any of the approved test house like CMRI / ERTL etc. The equipment shall in addition bear the valid approval from Chief Controller of Explosives, Nagpur.
 - Custody transfer approval from NMI / PTB / NPL or equivalent body from the country of origin
- 8.3. All instruments in the skid shall be certified for IEC Zone 1 Gas Group IIA / IIB, T3.
- 8.4. Flame-proof (explosion proof) junction boxes as applicable shall be certified for IEC-Zone-1, IIA / IIB for all the classified areas for flame proof instruments.

9. TESTING AND INSPECTION

All materials and equipment shall be factory tested before shipment in the presence of HOGPL's representative. No material shall be transported to site



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until all required tests have been carried out and equipment is certified as ready for shipment. Acceptance of equipment or the exemption of inspection or tests thereof, shall in no way absolve supplier of the responsibility for delivering equipment meeting the requirements of the specifications.

9.1. QAP shall be provided by bidder for approval of HOGPL

9.2. Following tests shall be included

- I. Material test certificate, hydrostatic test certificate for self-actuated pressure control valves, slam shut valves, pressure relief valves, control valves, isolation valves and for all piping /valves of skid
- II. Testing to demonstrate set-point accuracy and actuation time for integral Slam shut valves
- III. Testing to demonstrate the set point accuracy for self-actuated pressure control valves for the complete range of pressure and flow conditions
- IV. Calibration certificate for pressure relief for set pressure and all field instruments.
- V. Seat tightness test for self-actuated integral slam shut valves, pressure relief valves
- VI. Test certificate for all field instruments such as PGs, TGs, DPGs, and PTs& TTs.
- VII. Skid piping material testing and NDT of welds as per PMS
- VIII. Skid functional testing considers pressure regulation, limiting and safety characteristics.

9.3. Supplier shall perform the usual standard tests to maintain quality control Procedures. Purchaser shall submit these certificates for review before starting inspection. Suppliers shall be responsible for testing and complete integration of the system.

9.4. Detailed procedures of test and inspection shall be submitted by the supplier for review before order and mutually agreed upon

9.5. Inspection will be done by Owner/ Third Party Inspector at vendor's shop. For this inspection, labor, consumable, equipment, and utilities as required shall be in vendor's scope.

9.6. Testing and inspection works must be carried out at Vendor's works or works designated by the Vendor

9.7. The Vendor must submit certificate EN 10204 3.1 stating the relevant quality of the Supplied MRS.

10. DOCUMENTATION

10.1. The Purchaser in vendor data requirement sheets indicates detailed drawings,



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data and catalogs required from the vendor. The required number of reproducible and prints should be dispatched to the address mentioned, adhering to the time limits attached. Final drawings from the vendor shall include dimensional details, weight, mounting details and any other special requirements etc. for the skids. All dimensions in general shall be in millimeters. Vendor shall furnish all manuals necessary to test, operate and maintain the system. The Vendor shall submit the following documents in Minimum 3 sets

- A. Bill of Material
- B. P&ID and GAD (Plan & Isometric Drawing)
- C. Performance specification and Test certificate.
- D. Certificate from DVGW or equivalent.
- E. Construction drawings, material specification and technical data sheets.
- F. Instructions and recommendations regarding installation, operation, and maintenance of all the components of the unit
- G. Spare part list
- H. Material test certificate for all the pipe and fittings material
- I. Hydrostatic and Pneumatic test certificates.
- J. WPS, PQT & WQT records wetted by TPIA
- K. Statutory test certificates, as applicable.
- L. Traceability Records (including welding rods)
- M. Dimensional Check Record
- N. FAT Report and TPI Inspection Report
- O. Operation & Maintenance Manual
- P. Civil Foundation drawing shall be submitted with following details
 - Bought out item weight.
 - Detailed pressure drop calculation.
 - Base frame weight
 - Equipment, pipe & fitting weight
 - Canopy weight
 - Empty weight
 - Hydro test weight
 - Total weight of skid with canopy

10.2. Vendor to submit soft copies (pen - drive as well through email) & Hard copies of all the Test certificates, Inspection release note and O & M Manual.



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11. COMMISSIONING:

- 11.1. The supplier's technical personnel, at no additional cost to HOGPL, should carry out commissioning of the MRS at our site.
- 11.2. Vendor is required to commission the MRS within 7 days of intimation by HOGPL.
- 11.3. Vendor shall keep ready all commissioning spares during commissioning period, if required. Any consumable spares during commissioning such as filter, gasket etc. are in scope of vendors.



SECTION- II

1- MATERIAL SPECIFICATION



MATERIAL SPECIFICATION

1. PIPING MATERIAL SPECIFICATIONS:

<i>CODE: ASME B 31.8</i>		<i>SERVICE: NATURAL GAS</i>			<i>GUIDELINES AS PER PNGRB T4S</i>		
ITEM	SHORT	SIZE FROM-THRU	DESCRIPTION	RATINGS	DIMENSION STANDARD	MATERIAL STANDARD	REMARKS
PIPELINE	PL	4"-12"	BR.ERW OR SEAMLESS	6.4MM	API 5L	API 5L Gr. x52 (PSL 2)	A/G - PRIMARILY SEAMLESS
STATION PIPING	SP	2"	BE SEAMLESS	SCH 80	ASME B 36.10	ASTM A106 GR.B Charpy at 0 deg C OR ASTM A333 Gr.6	
		3"	BE SEAMLESS	SCH40	ASME B 36.10	ASTM A106 GR.B Charpy at 0 deg C OR ASTM A333 Gr.6	
		4"-12"	BE SEAMLESS	6.4MM	ASME B 36.10	ASTM A106 GR.B Charpy at 0 deg C OR ASTM A333 Gr.6	
VENT PIPE	VP	1"-1 1/2"	BE SEAMLESS	SCH 80	ASME B 36.10	ASTM A106 GR.B Charpy at 0 deg C OR ASTM A333 Gr.6	
		2"	BE SEAMLESS	SCH 80	ASME B 36.10	ASTM A106 GR.B Charpy at 0 deg C OR ASTM A333 Gr.6	
		3"	BE SEAMLESS	SCH 40	ASME B 36.10	ASTM A106 GR.B Charpy at 0 deg C OR ASTM A333 Gr.6	



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		4"	BE SEAMLESS	6.4MM	ASME B 36.10	ASTM A106 GR.B Charpy at 0 deg C OR ASTM A333 Gr.6	
BALL VALVE	BLV	1/2"- 1 1/2"	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 B16.11 THREDED - ASME B1.20.1
		2"-3"	BW OR FLGD RF 125-250 AARH	150#	API 6D	BODY ASTM A 216Gr.WCB (Charpy at 0 deg C) BALL A351 CF8M/SS316	FLOATING BALL VALVE BUTT WELD ASME B16.25 FLANGEDEND - ASME B16.5
BALL VALVE	BLV	4"-12"	BW OR FLGD RF 125-250 AARH	150#	API 6D	BODY ASTM A 216Gr.WCB (Charpy at 0 deg C) BALL A351 CF8M/SS316	TRUNION MOUNTED ,BUTT WELD ASME B16.25, FLANGED END - ASME B16.5 UNDER GROUND- EXTENDED STEM
GLOBE VALVE	GLV	1/2"-1 1/2"	SW OR THREADED	800#	BS EN ISO 15761	BODY ASTM A 105 (Charpy at 0 deg C) TRIM: SS316	SOCKET WELD - ASME B 16.11 THREDED - ASME B1.20.1
		2"-4"	BW OR FLGD RF125-250 AARH	150#	BS EN ISO 15761	BODY ASTM A 216 Gr. WCB (Charpy at 0 deg C) TRIM: SS316	BUTT WELD ASME B 16.25 FLANGEDEND - ASMEB 16.5



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		ABOVE 4"	BW OR FLGD RF 125-250 AARH	150#	BS 1873	BODY ASTM A 216 Gr. WCB (Charpy at 0 deg C) TRIM:SS316	BUTT WELD ASME B16.25 FLANGED END - ASME B16.5
LIFT CHECK VALVE	NRV	1/2" -1 1/2"	SW	800#	BS EN ISO 15761	BODYASTM A 105 (Charpy at 0 deg C)	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 B16.25 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 B16.25 FLANGED END ASME B 16.5x
ELBOWS LR/LRBENDS	EL	1/2" -1 1/2"	SW 1.5 D	3000#	ASME B 16.11	ASTMA105 Gr. B CHARPY AT 0 DEGC	SOCKET WELD - ASME B 16.11
		2"-3"	BW 1.5 D	M	ASME B 16.9	ASTMA234Gr.WPBCHARPYAT 0DEGC	BUTT WELD - ASME B 16.25
		4"-12"		M		MSSP 75 WPHY 52 (FOR PIPELINE)/ASTM A 234 GR	



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			BW 1.5 D OR 3D		ASME B16.9	WPB CHARPY AT 0 DEGCOR(FOR STATION PIPING)	BUTT WELD - ASME B 16.25
REDUCERS CONCENTRIC	RC	2"-3"	BW	MXM	ASME B 16.9	ASTM A234 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 GR WPB CHARPY AT 0 DEG C OR (FOR STATION PIPING)	BUTT WELD - ASME B 16.25
TEE EQUAL AND REDUCING	T	1/2" -1 1/2"	SW	3000#	ASME B 6.11	ASTM A 105 CHARPY AT 0 DEG C	SOCKET WELD - ASME B 16.11
		2"-3"	BW	MXM	ASME B 16.9	ASTM A234 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 GR WPB CHARPY AT 0 DEG C OR (FOR STATION PIPING)	BUTT WELD - ASME B 16.25
SOCKOLET/THREDOL ET	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 1.20.1
WELDOLET	W	2"-12"	BW	MXM	MSS SP 97	ASTM A 105 CHARPY AT 0 DEG C	BUTT WELD ASME B 16.5
END CAP	C	1/2"-1 1/2"	SW	3000#	ASME B16.11	ASTM A 105 CHARPY AT 0 DEG C	SOCKET WELD - ASME B 16.11 BUTT WELD ASME B 16.5



MATERIAL SPECIFICATION

		2"-12"	BW	M	ASME B 16.9	ASTM A234 Gr. WPB CHARPY AT 0 DEG C	
PIPE NIPPLE	NIPL	1/2"-1 1/2"	PE SEAMLESS	SCH 80	ASME B 36.10	ASTMA 106 GR. BCHARPYAT 0 DEGC	
COUPLING (HALF/FULL)	COUP	1/2" - 1 1/2"	SW OR THREADED	3000#	ASME B 16.11	ASTM A 105 CHARPY AT 0 DEG C	SOCKET WELD - ASME B 16.11 THREADED - ASME 1.20.1
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 M	ASME B 16.5	ASTM A 105 CHARPY AT 0 DEG C	-
		4"-12"	WNRF 125- 250 AARH	150" BEVEL END WT M	ASME B 16.5	MSS SP 44 GR F52 (FOR PIPELINE)/ASTM A 105 CHARPY AT 0 DEG C (FOR STATION PIPING)	-
BLIND FLANGE	FB	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	



MATERIAL SPECIFICATION

		4"-12"	RF,125-250 AARH	150#	ASME B 16.5	MSS SP 44 GR F52 (FOR PIPELINE)/ASTM A 105 CHARPY AT 0 DEG C (FOR STATION PIPING)	
SPECTACLE BLIND	FSB	2"-12"	RF,125-250 AARH	150#	ASME B 16.48	ASTM 105 CHARPY AT 0 DEG C	–
STUD & NUT BOLT	B	1/2" - 12"	–	–	ASME B 18.2	STUD:ASTM S 193 B7 NUT:ASTM A 194 Gr.2H ASTM A153	HOT DIP GALVANIZED
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 B16.5 FLANGE S
NOTE 1.M=THICKNESS TO MATCH PIPE WALL THICKNESS							



2- MATERIAL DATA SHEET



MATERIAL REQUISITION

DATASHEET FOR RPD FLOWMETER

General	1	Tag No.		Refer P&ID	
	2	Quantity		Refer Section I	
	3	Line No.		*	
	4	Line Size & Schedule		* Vendor to submit proper sizing calculations as per process parameters.	
	5	P&ID Number		Ref tender	
	6	Service		Natural Gas	
Flow Meter	7	End connection	Size and Rating	Flanged End, 150#	
	8		Facing & Finish	*	
	9	Pulses / M3		LF & HF/LF	
	10	Flow Range		*	
	11	Enclosure		Weatherproof IP65 as per IEC 60529 / IS 2147	
	12	Cable Entry		*	
	13	F-F Distance* (mm)		*	
	14	Material	Body	Cast Aluminum alloy or equivalent	
	15		End Connections	ASTM A 105 Flanged or equivalent	
	16		Impeller & Shaft	*	
	17		Bearing	SS316 or Alloy steel	
	18		Other Wetted Parts	SS316	
	19	Accuracy		±2% (Qmin to 0.1Qmax) and ±1% (0.1Qmax to Qmax)	
	20	Rangeability		G-25 RPD Meter, 1:80 or better	
				G-40 RPD Meter, 1:100 or better	
				G-65 RPD Meter, 1:160 or better	
				G-250 RPD Meter, 1:200 or better	
P u Pre-amplifier	21	Type - 2 wire/ 3 wire		2 wires	
	22	Preamplifier location		Field	
	23	Power supply		24 VDC loop powered from EVC	
	24	Cable Entry		1/2" NPT(F)	
	25	Enclosure		Weatherproof IP65 as per IEC 60529 / IS 2147	
	26	Intrinsic safe		Ex'ia'	
	27	Mounting	Accessories	Integral with RPD flow meter	Required
P u	28	Power supply	Cable Entry	24 VDC loop powered from EVC	



MATERIAL REQUISITION

	29	Output		Pulses
	30	Enclosure		Weatherproof IP65 as per IEC 60529 / IS 2147
	31	Intrinsic safe		Ex'ia'
	32	Mounting		Integral with RPD flow meter
Options	33	-		-
	34	-		-
	35	Local Counter		Required 8 Digit, Mechanical, non-resettable counter
	36			
	37	Strainer	Size and Mesh	*
	38	Temperature taps on meter body		Required, 1/4" NPT, Thermowell SS316, RTD 6mm probe.
	39	Pressure Tap on Meter Body		Required
	40	Lubricator with accessories		Required
	41	Radiography		100 % required for all welded joints
Service Conditions	42	Fluid and State		Natural gas
	43	Flow (min/max) SCMH		Refer P&ID
	44	Design Temp(°c)		-29 to 65 °c
	45	Design Pressure(kg/cm2)		19 kg/cm2g
	46	Molecular Wt.		*
	47	Viscosity (cP)		*
	48	Cp/ Cv ratio		*
	49	Max. allowable pressure drop		*
	50	Compressibility Factor		*
	51	Area Classification		Zone 1 Group IIA /IIB as per IEC, T3
	52	Model No.		*
	53	Make		*

Notes:

1	Vendor to specify. *
2	Vendor to submit proper sizing calculations as per process parameters for review and approval.
3	Vendor to refer P&ID for more information about process data.
4	Vendor shall provide detailed GA drawing along with all parts name and MOC for the RPD meter along with data sheet.
5	In addition to first fill, lubricating oil (500 ml) along with feeding accessories shall be supplied with each meter.
6	Type Approval Certificate and Weights & Measures Certificate along with Model & Make information shall be provided for meters supplied. OIML 137 ½ Certificate for the foreign manufactured meters.
7	Calibration certificate (original + soft copy) shall be provided to Client. One copy of the certificate shall be provided within the packing box of each meter.
8	Pulse generators shall be provided with means of plugging and sealing arrangement



MATERIAL REQUISITION

	against unauthorized interference.
9	Meter casing shall be tamperproof, corrosion resistant suitable for indoor / outdoor installation. Maximum velocity through the RPD Meter shall be less than or limited to 20m/s
10	Quantity indicated in datasheet is for thirteen locations of Ambala, Kurukshetra district and Kolhapur district, please refer P&ID for more information.
11	Pressure drops across complete meter assembly consisting of meter, NRV, RO and strainer shall be calculated and provided. Over flow protection shall be 120% of max. flow.
12	RPD meter shall be selected in such a manner that its normal operating range lies in between (70% - 80%) of overall range.

NOTE: BIDDERS / SUPPLIERS OF ALL TYPES OF RPD METERS SHALL HAVE REPAIRING & CALIBRATION FACILITIES FOR RPD FLOW METERS IN INDIA.



MATERIAL REQUISITION

DATA SHEET FOR ELECTRONIC VOLUME CORRECTOR

GENERAL

1	Type	Microprocessor based battery operated volume corrector with integral pressure transmitter and temperature sensor suitable for mounting in the field location and applicable for custody transfer
2	Service	Natural Gas
3	Site conditions	Temp.: -10 to 60 degC, Hot, Humid, tropical, Saline environment
4	Governing Standard	EN 12405-1+A1 or Latest
5	Approval	Type Approval Certificate as per Governing Standard
6	Area Classification	Zone 1 Group IIB /IIC T4 Ex 'ia'
7	Enclosure Protection	IP 66 or better
8	Quantity	Refer P&ID
9	Function	To measure actual gas volume, pressure, temperature and compressibility factors of the gas and based on which calculates standard volume of gas. The unit shall be complete in all respects to achieve functionality. Base parameters for calculation of corrected gas flow shall be as under or configurable Pressure: 1.01325 Bar, Temperature: 15.56 Deg. C
10	Accuracy	Typical error< 0.15%, 0.5 % at reference conditions, 1 % at nominal operating conditions

ELECTRONIC VOLUME CORRECTOR

11	Input	1.EVC input shall be either LF/ HF pulse
12		2.Closed & Open Indication of Slam Shut Valve
13		3.Temperature signal from RTD measured value PT100/PT500/PT1000. All interconnecting cable shall be screened and armoured
14		4.Pressure sensor shall be directly mounted on the meter and wired to EVC with a range in accordance with max. working pressure and design pressure
15	Output	1.Correct Flow rate in standard cubic meter per hour (SCMH)
16		2.Correct Totalized volume (sm3)
17		3.Temperature
18		4. Pressure
19		5. Correction Factor
20		6. Uncorrected Flow Rate
21		7. Uncorrected Volume
22	Isolation	All Inputs, Outputs and power supply shall be individually isolated
23	Display	Graphical Backlit LCD, 128 X 64 Pixels
24	Power Supply (Note 5)	Lithium battery along with mounting hardware. (Refer Note: 7)
25	Calculations / Corrections	Compressibility: AGA8 (Detail method), NX-18,S-GERG
26	Features	Built in diagnostics to detect proper functioning. EVC shall be capable of continuing with flow measurement even when downloading / uploading of data is going on
27		Data security to password / key-lock. Hardware and software seals required.



MATERIAL REQUISITION

28		Parameters and programmed constants shall be stored in EEPROM / non-volatile memory
29		Conduit connection of 1/2" NPTF with plugs shall be provided for output
30		Alarm output for unit malfunctioning. No setup data should be lost while changing battery. It should be possible to change battery in field.
31		EVC can store monthly data of minimum 24 months
32		Large and configurable database and can store hourly, daily, monthly data with date & time stamp for pressure, temperature and corrected flow and consumption up to 1500 records or better.
33		Facility for entry and accessing live and stored data through Keypad / Laptop / SCADA system
34		EVC should be supplied with single SIM GSM/GPRS modem. Modem shall be powered by EVC battery. Polling frequency shall be once in a day. Vendor shall consider life of EVC battery accordingly. Modem shall be 3G/4G/LTE/Latest and upcoming technology compatible. This shall be an intelligent and running 24x7. IPsec encrypted VPN shall be supported.
35	Identification	Unique Addressing Facility
36	Communication Ports	1. RS 232/ 485 serial port for SCADA facility (configurable up to 9600 bps); 2. USB 2.0 / 3.0 port for PC/Laptop connectivity; 3. Optical port
37	Software	Suitable communication protocol adaptor with 2.5 mtr of communication cable along with driver software to communicate with EVC / Windows 10/11 based laptop shall be supplied with each EVC.
38	Mounting Accessories	Required
39	Fittings	1. Pressure sensor: Tapping from pipeline or RPD meter body as shown in P&ID 2. Temperature Sensor: 1/4" NPTM (RTD Diameter Max.6mm) from RPD meter body or from pipeline as shown in P&ID
40	Cable Entry	*Vendor to specify
41	Canopy	Not applicable (EVC is mounted inside skid cabinet/canopy)
42	Communication Cable	Required, 2.5 mtrs length (Or as per standards)
MISCELLANEOUS		
43	Make	*Vendor to specify
44	Model No.	*Vendor to specify
Notes:		
1	EVC shall be certified for type test and custody transfer from NMI / PTB or equivalent independent international laboratories as per EN standards.	
2	The Calibration certificate for RTD, PT and EVC (original + soft copy) shall be provided to Client/Owner. One copy of the certificate shall be provided within the packing box of each EVC.	
3	Vendor shall provide 5 sets of volume corrector documentation including product literature, software / hardware manual, operation manual, maintenance instruction, certificates etc.	
4	Battery life shall be minimum 5 year if replaceable considering polling once in a day and if not replaceable battery life shall be 10 years. Battery capacity shall be sufficient for 24 hr. continuous operation with all the equipment powered.	



MATERIAL REQUISITION

5	The communication protocol and message structure details to be used on the RS 232 / 485 serial communication port (for SCADA) shall be supplied after placement of order.
6	If any external power supply is required for EVC, other than Lithium battery. Vendor shall provide solar power systems along with inverters and batteries for powering the EVC.
7	ATEX Certificate confirming to 2014/34/EU along with Weights & Measures Certificate shall be provided for EVC supplied
8	Tag plate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm)



MATERIAL REQUISITION

DATASHEET FOR JUNCTION BOX

GENERAL

Sr. No.	DESCRIPTION	SPECIFICATION
1	Make	Vendor to specify
2	Enclosure	EX-d as per IS 2148/81
3	Protection	IP 67 as per IS 13947/93 (Part-1)
4	Area Classification	Gas Groups IIA IIB as per IS 21248/81
5	Material	Dia. Cast Aluminium alloy LM-6
6	Thickness	min 5 mm
7	Gasket	Endless, Moulded neoprene
8	Earthing	1 no. inside & 2 Nos. outside M6
9	Size	As per mfg. std.
10	Finish	Epoxy light grey shade as per IS-5
11	Painting	2 Coats of lead free base primer & 2 Coats of Lead free Epoxy base paint applied on both for interior and exterior Surface
12	Engraving	Engraved/internally cast on the cover isolate power supply elsewhere before opening
13	Cable Entry	Vendor to specify
14	Bottom Entry	Vendor to specify
15	Top Entry	Vendor to specify
16	Left Side Entry	Vendor to specify
17	Right Side Entry	Vendor to specify



MATERIAL REQUISITION

DATASHEET FOR FILTER MATERIAL CONNECTION	
Shell	1) 150# - MOC – ASTM A 106 Gr B (Charpy Testat 0 °C) or ASTM A333 Gr.6 WT as per HOGPL Piping and Valve Material Specification 2) 300# & 600# - MOC –ASTM A 333, Gr.6 wall Thickness Matchingto the pipe WT as per HOGPL Piping. 3. The carbon Contents is greater than 0.12% in product analysis the CE (IIW) shall not exceed than 0.40% and if the Carbon contentis less than 0.12% in product analysis, the CE(Pcm) shall not exceed0.20%
Shell flange	1.150#- ASTM A105 2.300# ASTM A350 Gr. LF2, MSS SP 44 GR. F52 3.600# =ASTMA350 Gr.LF2, MSSSP 44 GR. F52, MSS SP 44 GR.F65 The carbon Contents is greater than 0.12% in product analysis theCE (IIW) shall not exceed than 0.40% and if the carbon content is less than 0.12% in product analysis, the CE(Pcm) shall not exceed0.20%
Nozzle	Same as Shell MOC
Nozzle flange	Same as Shell flange MOC
Head	150#: ASME A 516 Gr. 70/SA 234 WPB 300#/600#: ASME A 420 Gr. WPL 6
Perforated sheet	CS plated
Stud bolts	For 150# - ASTM A 193 Gr. B7/A194 Gr.2H, Hot Dipped Galvanizedas per ASTM A153 For 300#/600#- STUD: ASTM A320 Gr.L7 NUT : ASTM A 194 Gr.7, Hot dipped galvanized as per ASTM A153
Gasket	SS 316 Spiral Wound With CANF filler +SS316 inner and Outer ring as per ASME 16.20
O Ring	Buna N
Support	ASME A 283 Gr. C/IS:2062
Accessories	
QOEC Davit Details (with make & model)	Davit arm for filter shell size of 8" and above.
Companion flange, blind, flange, gasket, bolts/stud for all nozzles, earthing lug	Yes (refer PNGRB T4S for Details Specifications and Standards)
NOTE	
All CS parts weld joints to be stress relieved. Hardness in welds not to exceed 200 BHN.	
Filtration area should be minimum 8 times of inlet nozzle area. Sizing calculations to be submitted by the vendor.	



MATERIAL REQUISITION

Fire case PSV of suitable capacity shall be provided on each dry gas filter.
Proper support, crossover & platform required for maintenance of filter, PSV, DPG etc.
Sizing calculation of filter element to be submitted by VENDOR'S
100% Radiography applicable on casting
Filter Design & Calculations shall be approved by HOGPL



MATERIAL REQUISITION

DATASHEET FOR PAINTING

SR. No.	Technical Description	Filter, Pressure Safety Valve, Regulator, Creep Relief Valve, Ball Valve, Globe Valve, Check Valve, Base frame & Support	Piping
GENERAL			
	Standard	(Guideline :PNGRB T4S Standard)	
1	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 & 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.
2	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
3	Colour 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	



MATERIAL REQUISITION

SLAM SHUT OFF VALVE						
GENERAL	1	Tag Numbers			Refer P&ID	
	2	Quantity			Refer P&ID	
	3	Service			Downstream pressure protection	
	4	Governing standard			BS EN 14382:2005+A1:2009	
	5	Inlet Line No.			Refer P&ID	
	6	Outlet Line No.			Refer P&ID	
	7	Line Size & Schedule			Refer P&ID	
PROCESS	8	Fluid	State		NG	Gas
	9	Flow Gas	Min.	Nor.	Max.	Refer P&ID's
	10	Inlet Pressure			Refer P&ID	
	11	Pressure Drop at Various Flow Rates			*	
	12	Shut Off Pressure			*	
	13	Temp.	Oper.		Max.	Refer P&ID
	14	Oper S.G	Mol Wt.		*	
BODY	15	Cp/Cv	Compress. Factor			*
	16	Type of Valve			Slam Shut	
	17	Body Size	Port Size			*
	18	End Conn: Flgd. Size & Rating			Refer P&ID	
	19	Facing & Finish			Flanged & RF	
	20	Body Material			Refer P&ID & PMS	
	21	Trim Material			SS 316	
OPTIONS	22	Other Wetted Parts			SS 316	
	23	Leakage Class			Class VI as per FCI 70.2	
	24	Closing Time			Less than 2 secs	
	25	Pilot Operated			Integral Pilot Required	
	26	Manual Reset			Required	
	27	Failure Position			Close	
	28	Limit Switch			2 Nos. (Open/Close)	
MISC.	29	Cable Entry			Required	
	30	Valve Position Indicator (Local)			Required	
	31	Radiography			Required	
	32	Charpy V-Notch			Required	
	33	Impulse Tubing/Fittings			Required	
	34	Pressure Indicator			*	
	35	Installation			Horizontal	
	36	Kg or Cg Min.	Kg or Cg Max.		*	
	37	Kg or Cg Selected			*	
	38	Predicted Sound Level (dBA)			less than 85 dBA	
	39	Inlet Velocity (meters/second)			Refer P&ID	
	40	Valve Setpoint	Adjustable Range		*	
	41	OPSO	UPSO		*	
	42	Model No.	Make		*	
Notes:						
1	* By Bidder					
2	Calibration, material and certificates shall be provided by the Vendor.					
3	Monitor Pressure regulator with integral slam shut valve shall be fail to close type for P&ID (1007-PL-PR-PID-1010 I, Rev.C3).					



MATERIAL REQUISITION

4	Tag plate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm).
5	Vendor to provide over pressure shut off (OPSO) and under pressure shut off (UPSO) along with sizing calculations of slam shut off valve for review and approval.
6	Vendor shall submit detailed GA drawing along with part names and MOC of the part along with MOC.
7	Vendor shall submit detailed catalogue with model decodification with datasheet.



MATERIAL REQUISITION

SELF ACTUATED PRESSURE CONTROL VALVE

GENERAL	1	Tag Numbers				Refer P&ID	
	2	Quantity				Refer MR and P&ID	
	3	P&ID Number				Refer P&ID	
	4	Service				Downstream pressure protection	
	5	Governing standard				EN 334: 2005+A1:2009	
	6	Sensing Type				External	
	7	Line Size & Schedule				Refer P&ID	
PROCESS DATA	8	Fluid		State		Natural Gas	Gas
	9	Flow Gas		Min.	Nor.	Max.	Refer P&ID
	10	Inlet Pressure (Barg)				Refer P&ID	
	11	Pressure Drop at Various Flow Rates				*	
	12	Shut Off Pressure				*	
	13	Temp.	Oper.		Max.	Refer P&ID	
	14	Oper S.G		Mol Wt.		-	-
	15	Cp/Cv		Compress. Factor		-	-
	16						
BODY	17	Type of Valve				Self-Actuating Pressure Reduction	
	18	Body Size		Port Size		*	
	19	End Conn: Flgd. Size & Rating				Refer P&ID	
	20	Facing & Finish				Flanged & RF	
	21	Body Material				ASTM A 216 WCB	
	22	Trim Material				SS 316	
	23	Other Wetted Parts				SS 316	
	24	Leakage Class				Class VI as per FCI 70.2	
	25	Closing Time				Less than 2 secs	
	26	Diaphragm				Synthetic rubber or equivalent	
OPTIONS	27	Pilot Operated				Self-actuated	
	28	Manual Reset				Required	
	29	Failure Position				Open	
	30	Limit Switch				N/A	
	31	Cable Entry				Required	
	32	Valve Position Indicator (Local)				Required	
	33	Radiography				Required	
	34	Charpy V-Notch				Required	
	35	Impulse Tubing/Fittings				Required	
	36	Pressure Indicator				*	
	37	Installation				Horizontal	
	38						
MISC.	39	Kg or Cg Min.		Kg or Cg Max.		*	
	40	Kg or Cg Selected				*	
	41	Predicted Sound Level (dBA)				less than 85 dBA	
	42	Inlet Velocity (meters/second)				Refer P&ID	
	43	Valve Setpoint		Adjustable Range		*	
	44	Make		Model No.		*	

Notes:

1 * By Vendor



MATERIAL REQUISITION

2	Calibration, material and certificates shall be provided by the Vendor.
3	Tag plate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm).
4	Accuracy of pressure regulation shall be +/- 2.5 % or better than of the set pressure for the entire inlet pressure and flow range. (AC5 & SG10)
5	Pressure drop across the valve shall be selected by the Vendor considering the given set points (staggered set point of the two regulators and the Slam Shut valves) and the given inlet pressure conditions.
6	Regulator shall be sized to deliver the maximum flow at minimum pressure condition and the minimum flow at the maximum pressure condition.
7	Vendor to provide sizing calculations of self-actuated pressure control valve for review and approval.
8	Vendor shall submit detailed GA drawing along with part name and MOC of the parts with datasheet.
9	Vendor shall submit catalogue with model decodification sheet with datasheet.



MATERIAL REQUISITION

CREEP RELIEF VALVE (EXTERNAL)									
GENERAL	1	Tag Number		Quantity		Refer P&ID		Refer P&ID	
	2	P&ID Number				Refer P&ID			
	3	Line No/Equipment No.				Refer P&ID			
	4	Inlet Line Size/Sch		Outlet Line Size/Sch		Refer table below			
	5	Inlet Line Material		Outlet Line Material		*		*	
	6	Corrosion Allowance				As per PMS			
PROCESS DATA	8	Service				Natural Gas			
	9	State		Phase		Gas		Single	
	10	Corrosive		Erosive		N/A		N/A	
	11	Flow (Min./Max.)	SCM H	Max. Oper Pressure	Barg	Refer P&ID		Refer P&ID	
	12	Set Pressure	Barg	%Allow Overpressure		Refer P&ID	Barg	10%	
	13			Constant		*			
	14	Back Pressure (barg)		Variable					
	Total								
	16	Oper Temperature	DegC	Relief Temperature	Deg C	Refer P&ID		*	Deg C
	17	SG @ Relief		Visc @ Relief		*		*	
	18	MW @ Relief		Density @ Relief		*		*	
	19	Sp HT Ratio (Cp/Cv)		Compressibility (Z)		*		*	
	20	Design Pressure	Barg	Design Temperature	DegC	19	barg	-29 / 65	DegC
	21	Latent Heat of Vap		Barometric Pressure		*		-	
	22	Wetted Surface Area (m2)				N/A			
DESIGN BASIS	23	Nozzle				Full Nozzle			
	24	Type				Conventional			
	25	Bonnet Type				Closed			
	26	Design Code				To meet the PNGRB requirement for Creep Relief			
	27	Sizing Basis				Creep Relief			
	28	Relieves To				Vent to Atmosphere			
	29	Calculated Area		Selected Area		*		*	
	30	Orifice Designation				*			
	31	Calculated Capacity				*			
CONNE	33	Size				*		*	
	34	Type				RF		RF	
	35	Rating				*		*	
MATE	40	Body		Bonnet		ASTM A216 GR. WCB		ASTM A216 GR. WCB	
	41	Nozzle (Seat)		Nozzle Ring		SS 316		*	
	42	Spring		Disc		SS 304		SS 316	



MATERIAL REQUISITION

	43	Bellows	Guide	N/A	*
	44	Main Valve Seat / Seal			*
MISC.	46	Cap		Bolted	
	47	Lever	Lever Type	N/A	-
	48	Test Gag	Range	Required	-
	49	Rupture Disc	Tag No	N/A	-
	50	Manufacturer	Model No.	*	*
	51				

Notes:

1	* By Vendor
2	Calibration, material and certificates shall be provided by the Vendor.
3	Tag plate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm).
4	Creep Relief Valve shall be sized as per PNGRB requirements. Vendor to provide sizing calculations and select material as per detail engineering.
5	Vendor shall submit detailed catalogue with model decodification sheet with datasheet.
6	Vendor shall submit detailed GA drawing along with part names and MOC of the parts along with datasheets.



MATERIAL REQUISITION

DATASHEET FOR TRUNION MOUNTED BALL VALVE (4" & ABOVE)		
SR.NO	DESCRIPTION	SPECIFICATION
GENERAL		
1	Valve Size	4" & above
2	ANSI RATINGS	ANSI 150#/300#/600#
3	Design Standards (Guideline: PNGRB T4S Standard)	API 6D(latest)
4	Corrosion allowances	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 Temp.	1. 150#: 0 to 65°C 2. 300# & 600# :- -10 to 65°C
9	Operating Pressure (maximum)	19 bar – g /42 Bar -g/90bar-g
10	Operation temp	150#: 0 to 50 deg C 300# & 600# :- -10 to 50 deg C
11	Fire safe design	API 6 FA' 2008
VALVE CONSTRUCTION DESIGN		
12	Location	Above Ground/Under Ground
13	Valve type	Trunion Mounted
14	Bore (Full/Reduced)	Full Bore
15	End Connection	Flange End (as per ASME B 16.5) Raised face
16	Locking Devices	Locking facility in full open Position
17	Shutoff Class	VI
18	Construction	Two/Three Piece Construction required
19	Bi-directional	Required
20	Double Block & Bleed	Applicable only for 600#
21	Blow out proof	Required
22	Anti-Static device	Required
23	Lever Operation	Required
24	Open and Close Ball position indicator	Required
VALVE MATERIAL SPECIFICATIONS		
25	Body	150# - ASTM A216 Gr. WCB 300#/600# -ASTM A 352 Gr. LCB/LCC, ASTM A 350 Gr.LF2
26	Ball (Solid)	ASTM A479 SS316/ASTM A351 grade CF8M +



MATERIAL REQUISITION

		80 micron ENP
27	Primary Seat	ASTM A479 SS316/ASTM A351 grade CF8M
28	Seat insert	RPTFE
29	Stem (Anti blow out)	ASTM A 479 SS 316



MATERIAL REQUISITION

DATASHEET 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 (Guideline: PNGRB T4SStandard)	API 6D	
SERVICE CONDITIONS			
		For 150#	For 300# and 600#
5	Service	Natural Gas	Natural Gas
6	Design pressure	19 Bar-g	49 bar-g/98 bar-g
7	Design Temperature	0 to 65 °C	-.10 to 65 °C
8	Operating Temperature	0 to 50 Deg. C	-.10 to 50 °C
9	Fire safe design	API 6 FA' 2008	
VALVE CONSTRUCTION			
10	Location	Above Ground	Above Ground
11	Corrosion Allowance	1.5	1.5
12	Shut off Class	IV	IV
13	End Connections	Flanged End (As per ASME B 16.5) as per piping material specification	
14	Flange Facing	RF-125 AARH (ASME B 16.5)	
MATERIAL OF CONSTRUCTIONS			
15	Body	ASTM A 216 Gr. WCB (Charpy test at 0 Deg C)	ASTM A 352 Gr. LCB/LCC
16	Cover	ASTM A 216 Gr. WCB (Charpy test at 0 Deg C)	ASTM A 352 Gr. LCB/LCC
17	Disc/Plates	ASTM A 216 Gr. WCB +13 Cr Steel	ASTM A 352 Gr. LCB/LCC + 13 Cr. Steel
18	Body Seat ring	ASTM A 216 Gr. WCB +13 Cr Steel	ASTM A 352 Gr. LCB/LCC + 13 Cr. Steel
19	Disc Hinge	ASTM A 216 Gr. WCB +13 Cr Steel	ASTM A 352 Gr. LCB/LCC + 13 Cr. Steel
20	Hinge pin	ASTM A 479 Gr. SS410/SS316	
21	Stud Bolts & Nuts	ASTM A 193 Gr. B7/ASTM A 194 Gr. 2H, Hot Dipped Galvanized as per ASTM A 153.	ASTM A 320 Gr.L7 NUT: ASTM Gr. 7, Hot Dip Galvanized as per ASTM A 153.
22	Gasket	SS316 Spiral Wound with CNAF Filter	
23	Spring	SS316	



MATERIAL REQUISITION

DATASHEET FOR SOCKET WELDED AND THREADED GLOBE VALVE (BELOW 2"-800#)

SR.NO.	DESCRIPTION	SPECIFICATION
1	Valve Size	Below 2"
2	Pressure class Rating	800#
3	Corrosion allowance	1.5 mm
4	Design Standard (Guideline: PNGRB T4S Standard)	BS EN ISO 15761
5	Design Factor	0.4
SERVICE CONDITIONS		
7	Service	Natural Gas
8	Design Pressure	138 Bar-g
9	Design Temperature	1. 0 to 65°C (for Operating pressure 19 bar-g) 2. -10 to 65°C (for Operating pressure 49 bar-g & 98 bar-g)
10	Operating temp.	0 to 50°C (for Operating pressure 19 bar-g) -10 to 50°C (for Operating pressure 42 bar-g & 98 bar-g)
11	Operating Pressure (Maximum)	Up to 19 Bar-g / 42 Bar-g/98 Bar-g
VALVE CONSTRUCTION DESIGN		
12	Location	Above Ground
13	End Connections	1. Socket Welded (As per ASME B 16.11) 2. Threaded-ASME B 1.20.1.
14	Body/ Bonnet connection	Bolted
VALVE MATERIAL SPECIFICATION		
	PART	MATERIAL SPECIFICATIONS
15	Body	1) ASTM A 105 (Charpy test at 0°C) for Operating pressure 19 bar-g 2) ASTM A 350 Gr. LF2 for Operating pressure 49 bar-g & 99 bar-g
16	Bonnet	1) ASTM A 105 (Charpy test at 0°C) - for Operating pressure 19 bar-g 2) ASTM A 350 Gr. LF2-for Operating pressure 49 bar-g & 99 bar-g
17	Stem (ANTI BLOW OUT)	ASTM A 479 Gr. SS 316 (No Casting)
18	Disc (Plug Type)	ASTM A 479 Gr. SS 316 Stellite
19	Disc Nut	ASTM A 479 Gr. SS 316
20	Body Seat Ring	ASTM A 479 Gr. SS 316 Stellite



MATERIAL REQUISITION

21	Gland/Gland Flange	ASTM A 479 Gr. SS 316
22	Gland Packing	GRAFOIL
23	Stem seals	As per Manufacturer's recommendation
24	Stud bolts/Nuts	1) ASTM A 193 Gr. B7/ A 194 Gr.2H, 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
25	Bonnets Gasket Type	SP WND CNAF filler + Inner and Outer SS316 ring
26	Seat and back seat arrangement	Renewable
27	Screw type	OS & Y
29	Position indicator	Open and close indicator required
30	Hand wheel	CS/MS coated with PVC grip



MATERIAL REQUISITION

DATASHEET FOR ISOLATION BALL VALVE 1", 1.5", 2" & 3" (CS Piping Valves)

SR.NO.	DESCRIPTION	SPECIFICATION
GENERAL		
1	Valve Size	1", 1.5", 2" & 3"
2	ANSI RATINGS	ANSI 150#
3	Design Standards (Guideline: PNGRB T4S Standard)	API 6D
4	Corrosion allowances	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 Temp.	150#: 0 to 65°C 300# & 600# : -10 to 65°C
9	Operating Pressure (maximum)	19 bar – g /42 bar-g/90 bar-g
10	Operation temp	150#: 0 to 65°C 300# & 600# : -10 to 65°C
11	Fire safe design	API 6 FA' 2008
VALVE CONSTRUCTION DESIGN		
12	Location	Above Ground/Under Ground
13	Valve type	For 150# & 300#- Floating For 600# - Trunnion mounted
14	Bore (Full/Reduced)	Full Bore
15	End Connection	Flange End (as per ASME B 16.5) Raised face
16	Locking Devices	Locking facility in full open Position
17	Shutoff Class	VI
18	Construction	Two/Three-Piece Construction required
19	Bi-directional	Required
20	Double Block & Bleed	Not Required
21	Blow out proof	Required
22	Anti-Static device	Required
23	Lever Operation	Required
24	Open and Close Ball position indicator	Required
VALVE CONSTRUCTION DESIGN		



MATERIAL REQUISITION

SR NO	PART	SPECIFIED MATERIAL
25	Body	150# - ASTM A216 Gr. WCB 300#/600# ASTM A 352 Gr. LCB/LCC, ASTM A350 Gr. LF2
26	Ball (Solid)	ASTM A479 SS316/ASTM A351 grade CF8M + 80 micron ENP
27	Primary Seat	ASTM A479 SS316/ASTM A351 grade CF8M
27	Seat insert	RPTFE
28	Stem (Anti blow out)	ASTM A 479 SS 316 (No Casting)
29	Stem seals (Renewable with valve open on stream)	As per manufacture recommendation
30	Stud bolts	For 150# - ASTM A 193 Gr. B7 / A194 Gr.2H, Hot Dipped Galvanized as per ASTM A 153 For 300# - STUD: ASTM A 320 Gr. L7 NUT: ASTM A194 Gr.7, Hot dipped Galvanized as per ASTM 153
31	Anti-Static device	ASTM A 479 Gr. SS 302



MATERIAL REQUISITION

DATASHEET FOR SEAMLESS FITTINGS

SR.N O	DESCRIPTION	SPECIFICATION
GENERAL		
1	Size	AS per HOGPL approved design Calculations.
2	Pressure Rating/Schedule No.	
2a	Butt-welded Fittings/Weld-On-let	STD/SX/XXS SCH.40, SCH 80
3	Design Standards (Guideline: PNGRB T4S Standard)	ASME B 16.9/ASME B 16.11/MSS SP 75/MSS-SP 97/ASME B1.20.1/ASME B16.48
4	Corrosion allowances	1.5mm
5	Design Factor	0.4
SERVICE CONDITION		
11	Service Fluid	Natural Gas
12	Design Pressure	19 Bar-g/49bar-g/98-barg
13	Design temperature	1.150# = 0 to 65 deg.C 2.300#,600# = -10 to 65 deg C
14	Operating Pressure (Max)	150# = 16 Bar-g 300# = 42 Bar-g 600# = 90 bar-g
15	Operating Temp	1) 150# = 0 to 50 deg C 2) 300#,600# = -10 to 50 deg C
CONSTRUCTION DESIGN		
16	Bevel Angle	ASME B 31.8
MATERIAL SPECIFICATION		
	Part	Specified material
17	Material Construction	150# = ASTM A 105, A234 WPB, MSS SP 75 WPHY 52 The carbon Contents is greater than 0.12% in product analysis, the CE(IIW) shall not exceed than 0.40% and if the carbon content is less than 0.12% in product analysis, The CE(PCM) shall not exceed 0.20%.



MATERIAL REQUISITION

DATASHEET FLANGES AND BLINDS

SR. NO	DESCRIPTION	SPECIFICATION
GENERAL		
1	Size	AS per approved design Calculations
2	Pressure Rating	150#
3	Design Standard (Guideline: PNGRB T4S Standard)	ASME B16.5/ASME B 16.47/ASME B 16.48
4	Corrosion allowances	1.5mm
5	Design factor	0.4
SERVICE CONDITION		
7	Design Pressure	19barg
8	Design Temperature	150# = 0 to 65 deg. C
9	Service Fluid	Natural Gas
10	Design temperature	150# = 0 to 50 deg. C 300#, 600# = -10 to 65 deg. C
11	Operating Pressure(Max)	19barg/42barg/90barg
CONSTRUCTION DESIGN		
12	Allowable Stress	ASME B 31.8
13	Flange Type	WNRF/BLRF/SORF/BLIND
14	Flange Facing	Raised Face (125 AARH)
15	Bevel End & Bevel Angle for WNRF	ASME B 31.8
MATERIAL SPECIFICATION		
	PART	SPECIFIED MATERIAL
16	Material Construction	1)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 The carbon Contents is greater than 0.12% in product analysis, the CE(IIW) shall not exceed than 0.40% and if the carbon content is less than 0.12% in product analysis, the CE(Pcm) Shall not Exceed 0.20%



MATERIAL REQUISITION

DATA SHEET FOR- CARTRIDGE FILTER	
Service	Natural Gas
Type	Cartridge Type
Size (Inlet/Outlet)	As Per Igetd 13 Or As Per ASME Section VIII-Div.I
End Connection	Flanged 150# Rf
Rating	ANSI B16.5 150#
Service Condition	
Fluid/State	Natural Gas/Vapors
Flow Rate-Min./Op./Max	As Per P&ID and SOR Attached With Tender
Inlet Pressure -Min./Op./Max	2 Barg / 4 Barg / 6 Barg
Temp.-Min./Op./Max.	0/45/50 Deg C
Sp. Gravity/Mol. Wt.	0.6/16-17
Pressure Drop (In Bar) Clean/Dirty	0.05/.1
Material Of Construction	
Shell	1. 150# - MOC - ASTM A 106 Gr B (Charpy Test at 0 °C) or ASTM A333 Gr.6 WT as per HOGPL Piping and Valve Material Specification 2. 300# & 600# - MOC -ASTM A 333, Gr.6 wall Thickness Matching to the pipe WT as per HOGPL Piping. The carbon Contents is greater than 0.12% in product analysis the CE (IIW) shall not exceed than 0.40% and if the Carbon content is less than 0.12% in product analysis, the CE(Pcm) shall not exceed 0.20%
Shell Dia.	8" Nb
Shell Flanges	1. 150#- ASTM A105 2. 300# ASTM A350 Gr. LF2, MSS SP 44 GR. F52 3. 600# = ASTM A350 Gr. LF2, MSS SP 44 GR. F52, MSS SP 44 GR. F65 The carbon Contents is greater than 0.12% in product analysis the CE (IIW) shall not exceed than 0.40% and if the carbon content is less than 0.12% in product analysis, the CE(Pcm) shall not exceed 0.20%
Cover Flanges	1. 150#- ASTM A105 2. 300# ASTM A350 Gr. LF2, MSS SP 44 GR. F52 3. 600# = ASTM A350 Gr. LF2, MSS SP 44 GR. F52, MSS SP 44 GR. F65 The carbon Contents is greater than 0.12% in product analysis the CE (IIW) shall not exceed than 0.40% and if the carbon content is less than 0.12% in product analysis, the CE(Pcm) shall not exceed 0.20%



MATERIAL REQUISITION

Nozzles	Same as Shell MOC
Nozzles Flanges	Same as Shell Flange MOC
Fasteners	ASTM A 193 Gr. B7, ASTM A 194 Gr. 2h
Filter Element	Borosilicate Fibre Glass
Element Type	Cartridge
Filtration Size	5 Micron
Filtration Eff.	99%
Flow Direction	Out To In
Element Code/Size	L100p-025-B/0dxidxl=75x40x250 Mm
Accessories	
Drain Size/Valve	150# / 300# Ball Valve With Blind Plung (Bv + Gv For Drain & Vent)
Dp Gauge	Manifold & Root Isolation Ball Valve
Vent	150 # / 300# Vent Line
NOTE	
1. Sizing calculation of filter element to be submitted by VENDOR	
2. Proper support, crossover & platform required for maintenance of filter, PSV, DPG etc	
3. Filtration area should be minimum 8 times of inlet nozzle area. Sizing calculations to be submitted by the vendor.	
4. All CS parts weld joints to be stress relieved. Hardness in welds not to exceed 200 BHN.	



MATERIAL REQUISITION

DATA SHEET FOR DIFFERENTIAL PRESSURE GAUGE	
Type	Direct Reading
Sensor	Piston
Dial Size	100 Mm
Process Connection	1/4 " NPT(F)
Connection Orientation	In-Line
Accuracy	± 2% FSD(Ascending)
Material	
Seal Material	Buna-N
Case	Ss 304 With Rubber Ring
Bezel	Rubber Ring
Window	Toughened Glass
Pointer	Black Aluminum
Colour	White With Black Colour
Enclosure	Weather Proof IP-65
Design Temperature	65 Deg C
Range	0-1000 Mbar
Design Temperature	0-50 Deg C
Accessories	3 Valve Manifold - R Type, SS 316



MATERIAL REQUISITION

DATA SHEET FOR TEMPERATURE GAUGE

System	Bi-Metallic
Casing	SS304
Glass	Toughened Glass
Pointer	Aluminum, Black Color
Dial Size	6"(150 Mm)
Mounting	Bottom Entry
Temp. Range	0-100 Deg C
Stem Material	SS 316
Stem Dia(D)	8 Mm
Connection	1/2" NPT(M) Adjustable
Accuracy	± 1% FSD
Thermowell	-
Material	SS 316
Type	Bar Stock Drilled
Process Connection	1, 1/2" Flanged
Flange Material	ASTM A 105
Instrument Connection	1/2" NPT(F)



MATERIAL REQUISITION

DATA SHEET FOR RESISTANCE TEMPERATURE DETECTOR	
GENERAL / ELEMENT	
No. of Elements	Simplex
Calibration	As per DIN 43760
Element Material	Platinum (Pt-100)
Resistance at 0 °C	100 ohms
Leads	Standard
Max. Flow Rate (m³/hr)	20 – 400
O.D.	8 mm
Material	SS 316
Nipple & Union mtl.	SS 316
No. of Wires	4 wires
Range	0-100°C
Accuracy	± 0.15 %
Bidder to SPECIFY	
Make	
Model Offered	
Type Approval Certificate Detail & No.	
HEAD & THERMOWELL	
Head Cover type	Screwed cap & SS chain
Material	Cast Aluminum
Cable Entry	1/2" NPT (F)
No. of entries	Single
Enclosure	Weather proof to IP55
Material for Thermowell	SS 316
Thermowell Construction	Drilled bar stock
Thermowell Process Connection	1 1/2" Flanged
Instrument Connection	1/2" NPT(F)
Well Dimensions - U	200
Material	ASTM A 105
Rating	300# RF
Language to be used (Name Plate & Documents)	ENGLISH
Manufacturer Calibration Certificate	To be supplied along with each Meter
Warranty Certificate	To be supplied along with RTD
Operation & Maintenance Manual	To be supplied along with RTD
Product Brochure	To be attached with offer



MATERIAL REQUISITION

DATA SHEET FOR PRESSURE TRANSMITTER		
1	FUNCTION	Transmit & indicate
2	TYPE	Electronic Smart μ P based
3	Case	Mfg. Std.
4	Mounting	Yoke
5	Enclosure	Weather proof to IS2147 Explosion proof to IS2148/ IEC 60079-1
	Encl. Class	NEMA 4 & NEMA 7
6	Elec. Area Class	Zone-1, Gr. IIA & IIB, T3
7	Intrinsically safe	Required
8	Power Supply	12 V DC Supply
9	Cable Entry	1/2" NPT (F)
10	Accuracy	± 0.075 % of SPAN
11	Repeatability	± 0.05 %
12	Output	1-5 V DC, 3 wire
13	Transmitter Power Supply	External
MEASURING UNIT		
14	Service	Pressure
15	Element	Diaphragm
16	Body material	Carbon Steel
17	Element Material	SS 316
18	Process Connection	1/2" NPT (F)
MISCELLANEOUS		
19	Over Range Protection	130 % of Range
20	Options	
	a)	Intrinsically safe Digital Output meter
	b)	2 way manifold - SS 316 body & Trim
	c)	Mounting accessories for 2" pipe Mounting



MATERIAL REQUISITION

DATASHEET FOR WAFER TYPE CHECK VALVE (NRV) (2" & above)

SR. NO	DESCRIPTION	SPECIFICATION	
GENERAL			
1	Tag No.	Vendor to furnish	
2	Valve Size	Vendor to Furnish	
3	Make	As per HOGPL Approved Specification.	
4	Service	Natural Gas	
5	Governing Standard (Guideline: PNGRB T4S Standard)	API 6D	
SERVICE CONDITION			
		For 150#	For 300# and 600#
6	Design Pressure and Class	19 bar-g	49barg/99 bar-g
7	Design Class	150#	300#/600#
8	Design Temperature	0 to 65°C	-10 to 65°C
9	Operating Pressure	As per P & ID	As per P & ID
10	Operating Temperature	0 to 50°C	-10 to 50°C
11	Fire safe design	API 6 FA' 2008	
CONSTRUCTION OF VALVE			
12	Location	Above ground	Above ground
13	Valve Type	Wafer Type	Wafer Type
14	End Connections	Sandwich type	Sandwich type
15	Flange facing	RF-125 AARH(ASME B 16.5),150#	RF-125 AARH(ASME B 16.5) 300#/600#
16	Shutoff Class	IV	IV
MATERIAL OF CONSTRUCTION			
17	Body of material	ASTM A 216Gr. WCB with Charpy Test at 0 °C	ASTM A352 Gr. LCB/LCC
18	Disc / Plates	ASTM A 217 Gr. CA15	ASTM A182 F6 (13% Cr Steel)
19	Body Seat Ring	ASTM A216 Gr WCB+13% Cr.Steel	ASTM A 352 Gr LCB/LCC +13% Cr.Steel
20	Disc Hinges	ASTM A217 Gr. CA15/SS 316/ASTM A352 Gr. LCB/ A352 Gr.LCB/A352 Gr. LCB	
21	Hinges Pin	ASTM A 479 Gr. SS410/SS 316	
22	Holder	SS316	
23	Clip	SS316	
24	Spring	SS316/Inconel X 750	



MATERIAL REQUISITION

DATASHEET FOR PRESSURE GAUGE

GENERAL

1	Tag Number	Quantity	Refer P&ID	Refer P&ID
2	Line No	Equipment No.	Refer P&ID	Refer P&ID
3	P&ID Number	Vendor	Refer P&ID	*
4	Manufacturer	Model No.	Baumer/General/bourdon	*
5	Design Pressure	Design Temperature	Refer P&ID	-29 to 65 Deg C
6	Service	Natural Gas		
7	Flow (Min/Max)	Refer P&ID		

GAUGE

8	Type		Bourdon	
9	Case	Type	Direct	
10		Material	SS 316	
11		Mounting	Local	
12		Bezel	Bayonet	
13		Glass Type	Shatter Proof Glass (3 mm)	
14		Blowout Device	Required	
15		Gasket Material	*	
16	Dial Size	Dial Color	150 mm	White with Black Marking
17	Enclosure Class		IP - 65	
18	Range		*	

ELEMENT

19	Type	Accuracy	C-type Bourdon	±1% FSD
20	Element Material	Socket Material	SS316	SS316
21	Movement Material		SS316	
22	Conn. Size/Type	Connection Location	1/2" NPT	Bottom
23	Zero Adjustment		Micropointer	
24	Blow Out Protection	Over-Rng Protection	Required	Required, 130% of Full Scale

SEAL

25	Type	Model No.	N/A
26	Wetted Parts Mat'l	Seal Material	
27	Housing Lower Mat'l	Housing Upper Mat'l	
28	Conn. Size/Type	Connection Rating	
29	Seal Flush Conn.	O-Ring Material	
30	Seal Fill Fluid		



MATERIAL REQUISITION

31	Design Pressure			
MISC.				
32	Snubber Type	Model No.	*	*
33	Siphon Type	Model No.	*	*
34	Pulsation Dampner	Model No.	*	*
35	Manifold	Model No.	2 valve 3-way Manifold	*
Notes:				
1	* By Vendor			
2	Calibration, material and certificates shall be provided by the Vendor.			
3	Tagplate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire 1mm			
4	Pressure gauge shall be selected in such a manner that normal operating pressure is approximately in the middle third of full scale (30% - 70% of range).			
5	Pressure gauge shall be fitted with blow-out protection at back and shall have a over-range protection of 130% of max. reading.			



MATERIAL REQUISITION

DATA SHEET FOR PRESSURE SAFETY VALVE

GENERAL

1	Tag Number	Quantity	PSV 101	2 Nos./Skid
2	P&ID Number		*Vendor to Specify	
3	Line No/Equipment No.		*Vendor to Specify	
4	Inlet Line Size/Sch		*Vendor to Specify	
5	Inlet Line Material	Outlet Line Material	*Vendor to Specify	*Vendor to Specify

PROCESS DATA

6	Service		Natural Gas	
7	State	Phase	Gas	Single
8	Corrosive	Erosive	N/A	N/A
9	Flow (min/max)	Max. Oper Pressure (bar g)	650 SCMH	90% of Set Pressure
10	Set Pressure	% Allow Overpressure	19 Bar g	21%
11	Back Pressure (barg)	Constant	0 Bar g	
		Variable		
		Total		
12	Oper Temperature	Relief Temperature	65 °C	153.99 °C
13	SG @ Relief	Visc @ Relief	0.665	~0.02 centipoise
14	MW @ Relief	Density @ Relief	17.7	~0.68 kg/Sm3
15	Sp HT Ratio (Cp/Cv)	Compressibility (Z)	1.27	1
16	Design Pressure	Design Temperature	49 Bar g	-29 / 65 °C
17	Latent Heat of Vap	Barometric Pressure	N/A	-
18	Wetted Surface Area (m2)		N/A	

DESIGN BASIS

19	Nozzle		Full Nozzle	
20	Type		Conventional	
21	Bonnet Type		Closed	
22	Design Code		API 520, API 521, API 526/ANSI	
23	Sizing Basis		Fire Case	
24	Relieves To		Vent to Atmosphere	
25	Calculated Area	Selected Area	*Vendor to specify	*Vendor to Specify
26	Orifice Designation		D	
27	Calculated Capacity		*Vendor to specify	

CONNECTOR

28	Size		* Vendor to specify	
29	Type		RF	RF
30	Rating		150#	150#

MATERIAL



MATERIAL REQUISITION

31	Body	Bonnet	ASTM A216 GR. WCB	ASTM A216 GR. WCB
32	Nozzle (Seat)	Nozzle Ring	SS 316/ CF8M	A351 Gr. CF8M
33	Spring	Disc	SS 304	SS 316
34	Bellows	Guide	N/A	SS-316
35	Main Valve Seat / Seal		LEAD	
MISC.				
36	Cap		Bolted	
37	Lever		Lever Type	
38	Test Gag		*Vendor to specify	
39	Model No.		*Vendor to specify	
Notes				
1	Calibration, material and certificates shall be provided by the Vendor.			
2	Tagplate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm)			
3	Pressure safety Valve shall be sized as per API 520 & 526. Vendor to provide sizing calculations and select material as per detail engineering.			
4	Vendor shall submit detailed catalogue with model decodification sheet with datasheet			
5	Vendor shall submit detailed GA drawing along with part names and MOC of the parts along with datasheets.			



MATERIAL REQUISITION

DATA SHEET FOR ELECTRONIC VOLUME CORRECTOR

GENERAL

1	Type	Microprocessor based battery operated volume corrector with integral pressure transmitter and temperature sensor suitable for mounting in the field location and applicable for custody transfer
2	Service	Natural Gas
3	Site conditions	Temp.: -10 to 60 degC, Hot, Humid, tropical, Saline environment
4	Governing Standard	EN 12405-1+A1 or Latest
5	Approval	Type Approval Certificate as per Governing Standard
6	Area Classification	Zone 1 Group IIB /IIC T4 Ex ' ia'
7	Enclosure Protection	IP 66
8	Quantity	Refer P&ID
9	Function	To measure actual gas volume, pressure, temperature and compressibility factors of the gas and based on which calculates standard volume of gas. The unit shall be complete in all respects to achieve functionality. Base parameters for calculation of corrected gas flow shall be as under or configurable Pressure: 1.01325 Bar, Temperature: 15.5 Deg. C
10	Accuracy	Typical error< 0.15%, 0.5 % at reference conditions, 1 % at nominal operating conditions

ELECTRONIC VOLUME CORRECTOR

11	Input	1.EVC input shall be either LF/ HF pulse
12		2.Closed & Open Indication of Slam Shut Valve
13		3.Temperature signal from RTD measured value PT100/1000. All interconnecting cable shall be screened and armoured
14		4.Pressure sensor shall be directly mounted on the meter and wired to EVC with a range in accordance with max. working pressure and design pressure
15	Output	1.Correct Flow rate in standard cubic meter per hour (SCMH)
16		2.Correct Totalized volume (sm3)
17		3.Temperature
18		4. Pressure
19		5. Correction Factor
20		6. Uncorrected Flow Rate
21		7. Uncorrected Volume
22	Isolation	All Inputs, Outputs and power supply shall be individually isolated
23	Display	Graphical Backlit LCD, 128 X 64 Pixels
24	Power Supply (Note 5)	Lithium battery along with mounting hardware. (Refer Note: 7)
25	Calculations / Corrections	Compressibility : AGA8 (Detail method), NX-18,S-GERG
26	Features	Built in diagnostics to detect proper functioning. EVC shall be capable of continuing with flow measurement even when downloading / uploading of data is going on
27		Data security to password / key-lock. Hardware and software seals required.



MATERIAL REQUISITION

28		Parameters and programmed constants shall be stored in EEPROM / non-volatile memory
29		Conduit connection of 1/2" NPTF with plugs shall be provided for output
30		Alarm output for unit malfunctioning. No setup data should be lost while changing battery. It should be possible to change battery in field.
31		EVC can store monthly data of minimum 24 months
32		Large and configurable database and can store hourly, daily, monthly data with date & time stamp for pressure, temperature and corrected flow and consumption up to 1500 records or better.
33		Facility for entry and accessing live and stored data through Keypad / Laptop / SCADA system
34		EVC should be supplied with single SIM GSM/GPRS modem. Modem shall be powered by EVC battery. Polling frequency shall be once in a day. Vendor shall consider life of EVC battery accordingly. Modem shall be 3G/4G/LTE/Latest and upcoming technology compatible. This shall be an intelligent and running 24x7. IPsec encrypted VPN shall be supported.
35	Identification	Unique Addressing Facility
36	Communication Ports	1. RS 232/ 485 serial port for SCADA facility (configurable up to 9600 bps); 2. USB 2.0 / 3.0 port for PC/Laptop connectivity; 3. Optical port
37	Software	Suitable communication protocol adaptor with 2.5 mtr of communication cable along with driver software to communicate with EVC / Windows 10/11 based laptop shall be supplied with each EVC.
38	Mounting Accessories	Required
39	Fittings	1. Pressure sensor : Tapping from pipeline or RPD meter body as shown in P&ID 2. Temperature Sensor : 1/4" NPTM (RTD Diameter Max.6mm) from RPD meter body or from pipeline as shown in P&ID
40	Cable Entry	-
41	Canopy	Not applicable (EVC is mounted inside skid cabinet/canopy)
42	Communication Cable	Required, 2.5 mtrs length
MISCELLANEOUS		
43	Make	*Vendor to specify
44	Model No.	*Vendor to specify
Notes:		
1	EVC shall be certified for type test and custody transfer from NMI / PTB or equivalent independent international laboratories as per EN standards.	
2	The Calibration certificate for RTD, PT and EVC (original + soft copy) shall be provided to Client/Owner. One copy of the certificate shall be provided within the packing box of each EVC.	
3	Vendor shall provide 5 sets of volume corrector documentation including product literature, software / hardware manual, operation manual, maintenance instruction, certificates etc.	
4	Battery life shall be minimum 5 year if replaceable considering polling once in a day and if not replaceable battery life shall be 10 years. Battery capacity shall be sufficient for 24 hr. continuous operation with all the equipment powered.	



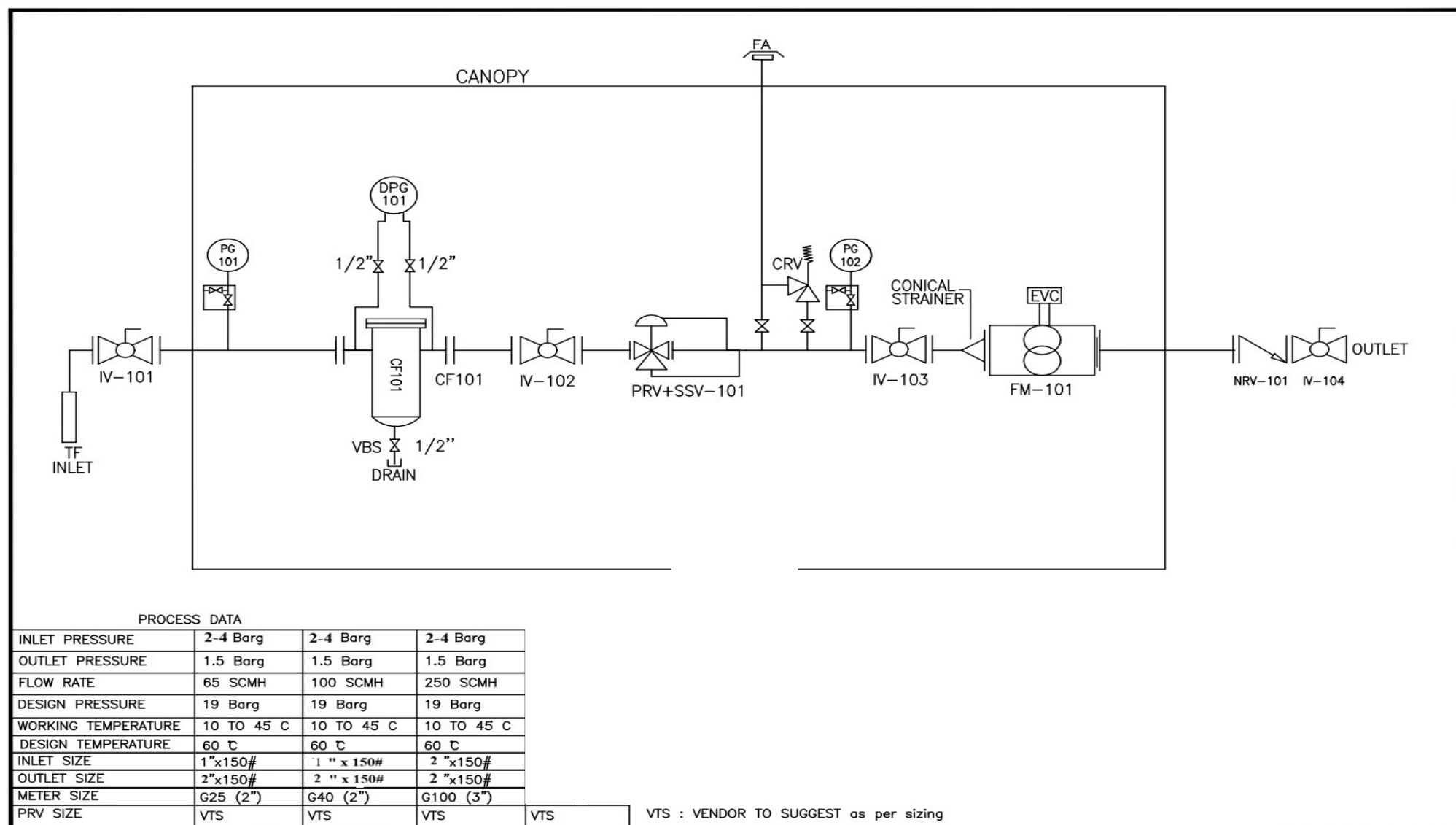
MATERIAL REQUISITION

5	The communication protocol and message structure details to be used on the RS 232 / 485 serial communication port (for SCADA) shall be supplied after placement of order.
6	If any external power supply is required for EVC, other than Lithium battery. Vendor shall provide solar power systems along with inverters and batteries for powering the EVC.
7	ATEX Certificate confirming to 2014/34/EU along with Weights & Measures Certificate shall be provided for EVC supplied
8	Tagplate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm)

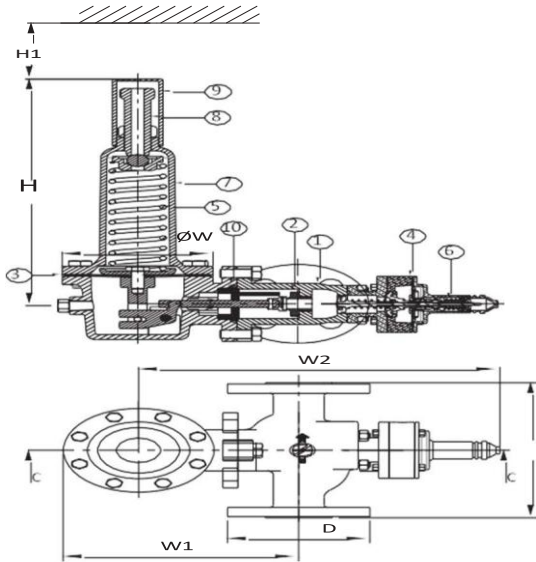


MATERIAL REQUISITION

3- P&ID AND BOQ (FOR REFERENCE)



SELF ACTUATED DOWNSTREAM PRESSURE CONTROL VALVE DATA SHEET (65 SCMH)



SERVICE CONDITION				
FLUID STATE		NATURAL GAS		GAS
FLOW RATE-MIN/OP/MAX		10-65		SCMH
INLET PRESSURE-MIN/OP/MAX		2	TO	4 Barg
OUTLET PRESSURE-MIN/OP/MAX		1.5	1.5	Barg
DP SIZING		2.5		Bar
TEMP-MIN/OP/MAX		0	—	60 °C
SP. GRAVITY/MOL.WT.		0.6		—
VISCOSITY		—		
COMPRESSEBILITY FACTOR		—		
SET PRESSURE	PRV	1.5		Barg
	SSV OPSO	2.1		Barg
	SSV UPSO	1.2		Barg
SET PRESSURE RANGE	PRV	1.0 – 2.8		Barg
	SSV OPSO	1 TO 2.5		Barg
	SSV UPSO	1 TO 2		Barg
VALVE SIZING DATA				
REGULATION		DOWNSTREAM		
Calculated Cg		26.2		
Selected Cg		108		
PREDICTED NOISE LEVEL dBA—at 1m		<85dBA		
VALVE & ACTUATOR CONSTRUCTION				
BODY SIZE		1"		
END CONNECTION		FLANGE RF SERR		
RATING		150#		
IMPULSE CONNECTION		INTERNAL		
IMPULSE SIZE		NA		
LEAKAGE CLASS		TIGHT SHUT OFF		
IBR CERTIFICATION				

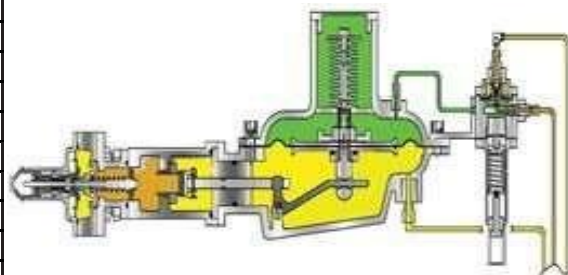
10	' O' RING	
9	CAP	ALUMINIUM
8	SET SCREW	S.S.304
7	SPRING CASING	A216 Gr.WCB
6	SPRING SSV	SPRING STEEL
5	SPRING PRV	SPRING STEEL
4	DIAPHRAGM SSV	NITRILE
3	DIAPHRAGM PRV	NITRILE
2	SEAT	SS316
1	BODY	A216 Gr. WCB

DIMENSIONS	L	W2	W1	ΦW	D	H≤	H1≤
IN MM	184	290	190	120	108	325	100
REMARKS :							

DATA SHEET FOR PCV + SSV (250 SCM/H)

GENERAL

1	Type Of PCV	: Pilot Operated			
2	Process Con. / Rating	: 1" ANSI150#			
3	Service	: Pressure Control, OPSO UPSO			
4	Model	:			
5	Fluid / State	: Natural Gas (G)			
6	Flow Rate (Min/Opr/Max)		25-250		SCMH
7	Inlet Pr. (Min/Opr/Max)	2	4	4	Bar g
8	Outlet Pr. (Min/Opr/Max)	1.5	1.5	1.5	Bar g
9	Temp. (Min/Opr/Max)	0	-	50	°C
10	DP Sizing	: 2.5 Barg			
11	Sp. Gravity / Mol. Weight	: 0.65 / 17.73			
12	Viscosity	: --			
13	Compressibility Factor	: --			
14	PRV-01 Set Pressure	: 1.5 Barg			
15	PRV-01 Set Pressure Range	: 0.4 to 2.0 Barg			
16	SSV (OPSO) Set Pr.	: 2.1 Barg			
16	SSV (UPSO) Set Pr.	: 1.2 Barg			
17	SSV (OPSO) Set Range	: 1 TO 2.5 Barg			
18	SSV (UPSO) Set Range	: 1 TO 2 Barg			



VALVE SIZING DATA

18	Regulation	: Down Stream			
19	Calculated Cg	: 126.1			
20	Selected Cg	: 190			
21	Predicted Noise dBA at 1 M	: <85 dBA			

ACTUATOR CONSTRUCTION

22	Impulse connection	: External			
23	Impulse Size (PRV / SSV)	: External			
24	Leakage Class	: VI			
25	IBR Certification	: NO			

MATERIAL

26	Body	: A216 Gr. WCB			
27	Seat	: SS316			
28	Diaphragm	: Nitrile			
29	Spring PRV	: Spring Steel			
30	Spring Casing	: A216 Gr. WCB			
31	Set Screw	: SS 304			
32	Cap	: CS			

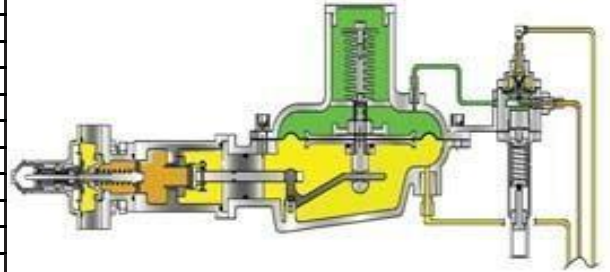
GENERAL

33	Product Code	: D61P+SSV			

DATA SHEET FOR PCV + SSV (100 SCMH)

GENERAL

1	Type Of PCV	: Pilot Operated			
2	Process Con. / Rating	: 1" ANSI150#			
3	Service	: Pressure Control, OPSO UPSO			
4	Model	: D61P+SSC(PCV-FC/SSC-FC)			
5	Fluid / State	: Natural Gas (G)			
6	Flow Rate (Min/Opr/Max)		10-100		SCMH
7	Inlet Pr. (Min/Opr/Max)	2	4	4	Bar g
8	Outlet Pr. (Min/Opr/Max)	1.5	1.5	1.5	Bar g
9	Temp. (Min/Opr/Max)	0	-	50	°C
10	DP Sizing	: 2.5 Barg			
11	Sp. Gravity / Mol. Weight	: 0.65 / 17.73			
12	Viscosity	: ---			
13	Compressibility Factor	: ---			
14	PRV-01 Set Pressure	: 1.5 Barg			
15	PRV-01 Set Pressure Range	: 0.4 to 2.0 Barg			
16	SSV (OPSO) Set Pr.	: 2.1 Barg			
16	SSV (UPSO) Set Pr.	: 1.2 Barg			
17	SSV (OPSO) Set Range	: 1 TO 2.5 Barg			
18	SSV (UPSO) Set Range	: 1 TO 2.4 Barg			



VALVE SIZING DATA

18	Regulation	: Down Stream			
19	Calculated Cg	: 50.5			
20	Selected Cg	: 190			
21	Predicted Noise dBA at 1 M	: <85 dBA			

ACTUATOR CONSTRUCTION

22	Impulse connection	: External			
23	Impulse Size (PRV / SSV)	: External			
24	Leakage Class	: VI			
25	IBR Certification	: NO			

MATERIAL

26	Body	: A216 Gr. WCB			
27	Seat	: SS316			
28	Diaphragm	: Nitrile			
29	Spring PRV	: Spring Steel			
30	Spring Casing	: A216 Gr. WCB			
31	Set Screw	: SS 304			
32	Cap	: CS			

GENERAL

33	Product Code	: D61P+SSV			
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BILL OF MATERIAL (65 SCMh)

SR	COMPONENT	DESCRIPTION	TAG NO.	QTY	MAKE	SIZE/ Model	LOCATION
Part : A [Isolation Valves, Equipments, Regulator, Relief valves and Metering]							
1	Isolation Ball valve	Isolation Ball Valve; Floating ball type, Full Bore, Fire Safe, Body : A216 WCB, Ball & Stem : SS, Flanged End 150#, Fire safe design: API6D, RF-Flanged ends, Lever Operated.	IV101 - IV104	4	refer AVL	1" & 2"	Inlet- 1" & Outlet- 2"
2	Small Ball valve	Floating Type Ball Design, Full Bore, Body: CS A 105; Ball: SS, Fire Safe, Screwed End, Lever Operated	VBS	3	refer AVL	1/2"	At PG, CRV & Filter Drain
3	Non return Valve	Wafer Type Non Return Valve	NRV	1	refer AVL	2"	At Outlet
4	Gauge Cock Valve	Gauge Cock Valve for DPG Isolation	GCV	1	refer AVL	1/2"	At Filter
Part : B [Field Instruments and Metering]							
1	Filter Assembly	Cartridge Gas filter :inlet/outlet with borosilicate fiber glass element, Filtration 5μ with Manual Drain Arrangement, DPG Mounted on it	CF101	1	refer AVL	1"	At Inlet
2	RPD Meter (G25)	Rotary Positive Displacement type of Flow meter with Electronic Volume corrector.	FM101	1	refer AVL	2"	At Outlet
3	EVC	Electronic Volume Corrector without Modem	EVC	1	refer AVL	-	At Meter
4	Conical Strainer	100 Micron Mesh Conical Strainer in upstream of RPD Meter	CS	1	refer AVL	2"	At Meter Inlet
5	Restriction orifice	2"X150# Restriction Orifice mounted on Outlet of RPD Meter	RO	1	refer AVL	2"	At Meter Outlet
6	Pressure Control Valve with SSV	Direct Operated Pressure Control Valve with slam shut valve Flanged end as per attached datasheet.	PCV+SSV-101	1	refer AVL	VTS	-
7	Creep Relief Valve	Back Pressure Creep Relief Valve as per PNGRB T4S Guidelines relieving 1% of total flow	CRV	1	refer AVL	VTS	-
Part : C [Field Instruments]							
1	Pressure Gauge	Dial Size - 4", End Connection- ½" Screwed, NPT(M), with 2 way manifold, Burdan Type.	PG101 - PG102	2	refer AVL	-	At Inlet & Outlet
2	DPG	DPG, 4" dial size, Dp Range 0-1000mbar, 1/4" NPTF Conn.	DPG101	1	refer AVL	-	At Filter
3	Flame Arrestor	Flame Arrestor - 1/2"x150#	FA	1	refer AVL	-	At Vent
Part : C [MISC.]							
1	Transition Fitting	1"X32mm Transition Fitting at inlet of the skid	TF	1	refer AVL	-	At inlet
2	Pipe, Fittings	Pipe: A106 Gr. B, Flanges: A105, Fittings: A234 Gr. WPB, Gasket: Spiral Wound SS 304 with PTFE Filled, Stud & Nut: B7/2H	-	1	refer AVL	-	-
3	Fabrication Cost	Welding, Fabrication, assembly and Testing	-	1	refer AVL	-	-
4	Structural Steel	Vertical Structural Steel Support With Base Frame	-	1	refer AVL	-	-
5	Canopy	Powder Coated canopy 16 CRC sheet, With Locking Arrangement	-	1	refer AVL	-	-
6	Instrumentation fittings	Inst. Tube fittings for skid	-	1	refer AVL	-	-
7	Name Plate & Painting	Name plate & Painting for skid	-	1	refer AVL	-	-



BILL OF MATERIAL (100 SCMh)

SR	COMPONENT	DESCRIPTION	TAG NO.	QTY	MAKE	SIZE/ Model	LOCATION
Part : A [Isolation Valves, Equipments, Regulator, Relief valves and Metering]							
1	Isolation Ball valve	Isolation Ball Valve; Floating ball type, Full Bore, Fire Safe, Body : A216 WCB, Ball & Stem : SS, Flanged End 150#, Fire safe design: API6D, RF-Flanged ends, Lever Operated.	IV101 - IV104	4	refer AVL	1 "	Inlet- 1" & Outlet- 2"
2	Small Ball valve	Floating Type Ball Design, Full Bore, Body: CS A 105; Ball: SS , Fire Safe, Screwed End, Lever Operated	VBS	3	refer AVL	1/2"	At PG, CRV & Filter Drain
3	Non return Valve	Wafer Type Non Return Valve	NRV	1	refer AVL	2"	At Outlet
4	Gauge Cock Valve	Gauge Cock Valve for DPG Isolation	GCV	1	refer AVL	1/2"	At Filter
Part : B [Field Instruments and Metering]							
1	Filter Assembly	Cartridge Gas filter :inlet/outlet with borosilicate fiber glass element, Filtration 5µ with Manual Drain Arrangement, DPG Mounted on it	CF101	1	refer AVL	1.5"	At Inlet
2	RPD Meter (G40)	Rotary Positive Displacement type of Flow meter with Electronic Volume corrector.	FM101	1	refer AVL	2"	At Outlet
3	EVC	Electronic Volume Corrector without Modem	EVC	1	refer AVL	-	At Meter
4	Conical Strainer	100 Micron Mesh Conical Strainer in upstream of RPD Meter	CS	1	refer AVL	2"	At Meter Inlet
5	Restriction orifice	2"X150# Restriction Orifice mounted on Outlet of RPD Meter	RO	1	refer AVL	2"	At Meter Outlet
6	Pressure Control Valve with SSV	Direct Operated Pressure Control Valve with slam shut valve Flanged end as per attached datasheet.	PCV+SSV-101	1	refer AVL	VTS	-
7	Creep Relief Valve	Back Pressure Creep Relief Valve as per PNGRB T4S Guidelines relieving 1% of total flow	CRV	1	refer AVL	VTS	-
Part : C [Field Instruments]							
1	Pressure Gauge	Dial Size - 4", End Connection- ½" Screwed, NPT(M), with 2 way manifold, Burdan Type.	PG101 - PG102	2	refer AVL	-	At Inlet & Outlet
2	DPG	DPG, 4" dial size , Dp Range 0-1000mbar, 1/4" NPTF Conn.	DPG101	1	refer AVL	-	At Filter
3	Flame Arrestor	Flame Arrestor - 1/2"x150#	FA	1	refer AVL	-	At Vent
Part : C [MISC.]							
1	Transition Fitting	1"X32mm Transition Fitting at inlet of the skid	TF	1	refer AVL	-	At inlet
2	Pipe , Fittings	Pipe: A106 Gr. B, Flanges: A105, Fittings: A234Gr. WPB, Gasket: Spiral Wound SS 304 with PTFE Filled, Stud & Nut: B7/2H	-	1	refer AVL	-	-
3	Fabrication Cost	Welding, Fabrication, assembly and Testing	-	1	refer AVL	-	-
4	Structural Steel	Vertical Structural Steel Support With Base Frame	-	1	refer AVL	-	-
5	Canopy	Powder Coated canopy 16 CRC sheet, With Locking Arrangement	-	1	refer AVL	-	-
6	Instrumentation fittings	Inst. Tube fittings for skid	-	1	refer AVL	-	-
7	Name Plate & Painting	Name plate & Painting for skid	-	1	refer AVL	-	-



BILL OF MATERIAL (250 SCMH)

SR	COMPONENT	DESCRIPTION	TAG NO.	QTY	MAKE	SIZE/ Model	LOCATION
Part : A [Isolation Valves, Equipments, Regulator, Relief valves and Metering]							
1	Isolation Ball valve	Isolation Ball Valve; Floating ball type, Full Bore, Fire Safe, Body : A216 WCB, Ball & Stem : SS, Flanged End 150#, Fire safe design: API6D, RF-Flanged ends, Lever Operated.	IV101 - IV104	4	refer AVL	2"	Inlet- 2" & Outlet- 2"
2	Small Ball valve	Floating Type Ball Design, Full Bore, Body: CS A 105; Ball: SS, Fire Safe, Screwed End, Lever Operated	VBS	3	refer AVL	1/2"	At PG, CRV & Filter Drain
3	Non return Valve	Wafer Type Non Return Valve	NRV	1	refer AVL	2"	At Outlet
4	Gauge Cock Valve	Gauge Cock Valve for DPG Isolation	GCV	1	refer AVL	1/2"	At Filter
Part : B [Field Instruments and Metering]							
1	Filter Assembly	Cartridge Gas filter inlet/outlet with borosilicate fiber glass element, Filtration 5µ with Manual Drain Arrangement, DPG Mounted on it	CF101	1	refer AVL	1"	At Inlet
2	RPD Meter (G100)	Rotary Positive Displacement type of Flow meter with Electronic Volume corrector.	FM101	1	refer AVL	3"	At Outlet
3	EVC	Electronic Volume Corrector without Modem	EVC	1	refer AVL	-	At Meter
4	Conical Strainer	100 Micron Mesh Conical Strainer in upstream of RPD Meter	CS	1	refer AVL	3"	At Meter Inlet
5	Restriction orifice	3"X150# Restriction Orifice mounted on Outlet of RPD Meter	RO	1	refer AVL	3"	At Meter Outlet
6	Pressure Control Valve with SSV	Direct Operated Pressure Control Valve with slam shut valve Flanged end as per attached datasheet.	PCV+SSV-101	1	refer AVL	VTS	-
7	Creep Relief Valve	Back Pressure Creep Relief Valve as per PNGRB T4S Guidelines relieving 1% of total flow	CRV	1	refer AVL	VTS	-
Part : C [Field Instruments]							
1	Pressure Gauge	Dial Size - 4", End Connection- 1/2" Screwed, NPT(M), with 2 way manifold, Burdan Type.	PG101 - PG102	2	refer AVL	-	At Inlet & Outlet
2	DPG	DPG, 4" dial size, Dp Range 0-1000mbar, 1/4" NPTF Conn.	DPG101	1	refer AVL	-	At Filter
3	Flame Arrestor	Flame Arrestor - 1/2"x150#	FA	1	refer AVL	-	At Vent
Part : C [MISC.]							
1	Transition Fitting	2"x63mm Transition Fitting at inlet of the skid	TF	1	refer AVL	-	At inlet
2	Pipe, Fittings	Pipe: A106 Gr. B, Flanges: A105, Fittings: A234Gr. WPB, Gasket: Spiral Wound SS 304 with PTFE Filled, Stud & Nut: B7/2H	-	1	refer AVL	-	-
3	Fabrication Cost	Welding, Fabrication, assembly and Testing	-	1	refer AVL	-	-
4	Structural Steel	Vertical Structural Steel Support With Base Frame	-	1	refer AVL	-	-
5	Canopy	Powder Coated canopy 16 CRC sheet, With Locking Arrangement	-	1	refer AVL	-	-
6	Instrumentation fittings	Inst. Tube fittings for skid	-	1	refer AVL	-	-
7	Name Plate & Painting	Name plate & Painting for skid	-	1	refer AVL	-	-



SECTION- III

FACTORY ACCEPTANCE TEST **PROCEDURE FOR METERING** **REGULATING SKID**

For Tender Purpose only



1. INTRODUCTION

This document defines procedure for Factory acceptance Test (FAT) to be carried out for Skid(s). The purpose of carrying out FAT is to check functionality of the entire natural Gas Pressure regulation Skid with respect to agreed technical documents.

Note:

- a. All the tests, inspection, checking, data-configuration etc. shall be conducted as per FAT procedure by the vendor and the same shall be submitted to for review before calling for witnessing FAT by TPI/Client.
- b. The records / test reports/ calibration reports/ certificates, configuration sheet for EVC and other relevant document should be prepared / obtained by the vendor and sent to Client/Authorized Consultant for review before calling for FAT

2. SCOPE

FAT will confirm the compliance of Skid with the project specifications. The purpose of FAT is to check the performance of each component as well as entire skid. Upon completion of the test described in the following procedures, the system will be ready to be dispatched to the site. All the physical & functional tests are described in the remaining sections. When each functional test has been completed, the TPIA & Customer representative will indicate acceptance of the tests by signing the test certificates. All the equipment's / instruments / items shall be installed (as far as possible) for 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. FAT shall not be conducted before our approval of such list. In case difference in calculated values (calculated by different Instruments) is observed for any parameter, the list of such parameters along with values and suitable reason for such deviation to be submitted to us in advance for our review.

In case deviation is observed in the parameter-values displayed by various components, the same shall be recorded and may result into rejection of FAT.

PCV, CRV and SSV set point will be decided during FAT.

Lock up pressure setting shall be done during FAT.

All connectivity/ its simulation mentioned elsewhere in tender (like Laptop, SCADA / RTU, etc.) shall be established and demonstrated during FAT. Non-compliance to any of these shall result in rejection of skids.

All representatives shall be briefed on details / description / operating principles of the Skid for this project before commencing the FAT.

3. ACTION LIST

Any discrepancies noted during the functional tests shall be defined, recorded and summarized in the Action List Form. Once proper action has been taken on those points, this Action List shall be signed / stamped by Customer / TPIA duly filled with the results.



4. VISUAL INSPECTION OF SKID

4.1. Skid Review

The Skid will be inspected for installation of all the components as per approved P & ID and approved G.A. Drawing. Dimensional Checking shall be done as per approved G.A. Drawing. Skid will also be inspected for correctness of installed Equipment's/ instruments and approachability for maintenance. The Skid will be inspected for proper support with rubber pads / clamps for the major equipment's/ Instruments and pipes

5. FACTORY ACCEPTANCE TEST

5.1. Hydrostatic Test: Refer QAP

5.2. Pneumatic Leak Test: Refer QAP

5.3. Functional Test of PG, TG & DPG

Check the readings of Local Pressure Gauge, Temperature Gauge & Differential Pressure Gauge when pressurized.

5.4. Functional test of SSV, PCV, CRV

- a. Set point of PCV– set the required pressure of PCV as per approved data sheet/approved P&ID by Pilot/spring adjusting screw.
- b. Set point of SSV - Increase the PCV pressure to cross the set point of SSV. The SSV should trip at set pressure value as per approved data sheet / approved P&ID. Record the Over Pressure Shut off value, UPSO, Lockup pressure, CRV set point during test.
- c. SSV's Limit switch feedback (contact) signal to be checked with Multimeter (if any).

5.5. Functionality Test of EVC

- a. Configuration check, parameter settings/ checking etc. shall be carried out as per approved Data Sheet / FDS.
- b. Volumetric flow rate, Mass flow rate by simulation of meter signal using Function Generator / any other equipment. Flow, Energy and Mass Totalizers, shall also be checked.
- c. Line Temperature and pressure, Diff. Pressure etc. shall be checked by inputting respective analog signals.
- d. Interface data of EVC with RTU – Measurement by Laptop
- e. Visual checking of instrumentation cable connection including cable gland, cable tag nos., JB mounting installation, cable dressing etc. as per drawing, wiring diagram.
- f. Facility of entry of Atmospheric pressure and temperature by operator to be verified.
- g. Various Units of measurement (Pressure, flow rate, heating value, energy etc.) shall be checked as per approved documents.
- h. Simulation of EVC output to SCADA.
- i. Proper entry of the Meter error curve, K factors etc.
- j. Checking of Audit Trail facility in the EVC and its printing.



- k. Availability and functioning of USB ports with connecting cables for communication of various devices/Instruments/ Equipment's.
- l. EVC. (Functioning of standalone Software for flow calculation verification to be checked).
- m. Check functioning of Charging System.

5.6. Meter:

The calibration Certificates shall be submitted for review during FAT. Insulation of metering system and Environmental enclosure for custody metering equipment's shall be checked visually during FAT (as applicable).

6. SPARES:

List to be prepared as per P.O. terms/ tender documents for all the mandatory spares, commissioning spares, cables, and materials required for erection. All the spares shall be verified by TPIA and CLIENT representative during FAT test. All spares shall be identified with proper tags. Foundation bolt and mating flanges shall be checked during FAT.

7. DOCUMENTS REVIEW

After completion of all tests, Documents like material test certificates, Radiography test, Hydro- test, calibration / test reports etc. for Ball valves / Plug valves / CRV / NRV / Filters, pipes, fittings, Tee / elbow / weld joints, shall be reviewed to check the compliance with the tender specifications and QAP for the equipment's / instruments.



TEST CERTIFICATE

VISUAL INSPECTIONS

Project:Supply of MRS

Customer: HPOIL Gas Private Limited

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 (Inc. Design calculation with factor of safety -2.0)	YES/NO
4	Copper jumper strips on all flanges	YES/NO
5	02 Nos earthing provision diagonally opposite (Earthing boss of material SS304) at Base frame of the skid.(separate earthing clits for both instrumentation and skid piping are to be provided as per HOGPL specification)	YES/NO
6	Identification Tags on all instruments	YES/NO
7	Painting color as per painting spec.	YES/NO
8	Mandatory & Commissioning Spares as per P.O requirement (technical specification/drawing to be included)	YES/NO
9	Foundation bolt and matching flanges	YES/NO
10	Support for all the equipment/instruments, pipes	YES/NO
11	Rubber sheet between pipe and support	YES/NO
12	U clamps with PVC sleeve	YES/NO
13	Adequacy of approach for operation and maintenance	YES/NO
14	Thread projection of stud beyond nut	YES/NO
15	Insulating pad to be provided between Filter leg/skirt and base frame	YES/NO
16	Proper alignment of pipe including piping for PG, 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 HOGPL spec.	YES/NO
20	Pasted Laminated P&ID inside the canopy (A2 size)	YES/NO
21	Calibration tags on the instruments (PG, DPG etc.)	YES/NO
22	Filter DP Gauge nozzle shall be SWRF.	YES/NO
23	Meter Bolts/stud-bolts	YES/NO
24	Glass window in canopy for PG, DPG and meter	YES/NO
25	Square metal sheet provided at all the opening for the pipe(inlet, outlet, drain, vent, etc.)	YES/NO



26	Sealing of the canopy joints by sealant jelly	YES/NO
27	Canopy doors shall be foldable type with Aldrop type locking system	YES/NO
28	Doors shall open fully on either side and shall be lockable from inside & outside. Check locks availability	YES/NO
29	All accessories in the canopy provided of SS-304 material (Hinges, locks, stud, nuts, handles etc.)	YES/NO
30.	HOGPL Scratchproof branding Quality	YES/NO

VENDOR

TPIA

CLIENT



TEST CERTIFICATE
DIMENSIONAL AND WEIGHT INSPECTION

Project: Supply of MRS

Customer: HPOIL Gas Private Limited

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

TPIA

CLIENT



TEST CERTIFICATE
HYDROSTATIC TEST

Project: Supply of MRS

Customer: HPOIL Gas Private Limited

PO.NO.

SYSTEM NO.

Sr No.	POINTS INSPECTED	FOUND OK
1	TPIA Inspection Reports for Hydro -Test for pipe spools, as per approved procedure	YES/NO

VENDOR

TPIA

CLIENT



TEST CERTIFICATE
PNEUMATIC TEST OF COMPLETE SKID

Project:Supply of MRS

Customer: HPOIL Gas Private Limited

PO.NO.

SYSTEM NO.

Test Pressure:7.0 Bar(g)

Test media: Nitrogen

Duration:120 minutes (post pressure stabilization)

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

VENDOR

TPIA

CLIENT



DOCUMENTS REVIEW

Project:MRS

Customer: HPOIL Gas Private Limited

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 isolation ball valves, Globe Valve, check valve, filter, PG, DPG, pipespools, 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 all instruments	Accepted/Rejected	
7	Welding procedure specification, Welder qualification.	Accepted/Rejected	
8	Compliance certification for painting of skid including all items (Filtrationsystem, valves, etc.)	Accepted/Rejected	
9	Material correlation chart & Welding joints correlation chart	Accepted/Rejected	
10	Technical specification/datasheet/drawing/PO copy should be available for all bought out items	Accepted/Rejected	

VENDOR

TPIA

CLIENT



SECTION- IV

SPARES PHILOSOPHY



1. SPARE PARTS

The spare parts required in the warranty period (18 months from the date of delivery or 12 months from the date of commissioning, whichever is earlier) should be supplied free of cost.

Also, a separate detailed list in addition to the spare parts mentioned below (with the rates valid for 2 years after the end of warranty period) for the requirement of spare parts after the warranty period should be submitted along with the technical bid. This separate detailed list must include the minimum items mentioned in Clause No. 2 of Section – IV, Spares Philosophy of tender document. Vendor shall submit his recommended list of spare parts with recommended quantities and itemised prices for 2 years after the end of warranty period. However, HOGPL may or may not or defer the purchase of spare parts.

Proper coding and referencing of spare parts shall be done so that later identification with appropriate equipment will be facilitated.

Recommended spares and their quantities should take into account related factors of equipment reliability, effect of equipment downtime upon production or safety, cost of parts and availability of vendor's service facilities around proposed location of equipment.

List of mandatory spares to be provided with each MRS:

Regulator/Pressure Control Valve

Standard spare kit containing diaphragms springs – 1 Nos.

O' rings – 2 nos.

Gaskets – 2 nos.

Slam shut valve:

Standard spare kit containing diaphragms springs – 1 Nos.

'O' rings – 2 nos.

Gaskets – 2 nos.

Relief valve:

Standard spare kit containing diaphragms springs – 1 Nos.

'O' rings – 2 nos.

Gaskets – 2 nos.

Filter Element – 1 Nos.

If any of spares missed in above which is mandatory for the repair/service of above said equipment's needs to be added.

Any and all spare parts required for commissioning of MRS is in the scope



of Bidder & no additional cost shall be levied by Bidder for the same.

2. LIST OF ADDITIONAL SPARE PARTS

Bidder is required to provide the prices of spare parts for the detailed list of spare parts mentioned in Schedule of Rates Table - B, which shall be valid for 2 years after the end of warranty period.

NOTE:

- I. Vendor to provide additional spares if any other than the items mentioned in the above list.
- II. Vendor to provide quantity and unit rate for spare parts for each of the MRS offered in this tender.

3. COMPLIANCE STATEMENT

SR NO	Requirement	Bidder's Confirmation
1	Bidder confirms that all materials proposed by the bidder are same/ superior to those specified in specification/ data sheets enclosed.	
2	Bidder confirms that the offer is in total compliance with the technical requirements of the Material Requisition. Bidder confirms that deviation expressed or implied anywhere else in the offer shall not be considered valid.	
3	Bidder confirms that all spares and accessories required for two years of normal operation after end of Warranty period have been quoted separately.	
4	Bidder confirms that all spares and accessories required for two years of normal operation have been quoted separately.	



SECTION- V

LIST OF RECOMMENDED VENDORS FOR BOUGHT OUT ITEMS



1.0 CARBON STEEL PIPES

1.1 PIPE CARBON STEEL TO INDIAN STANDARDS

- a. A.S.T. Pipes Pvt. Ltd. (AST Group)
- b. Advance Steel Tube Ltd.
- c. Apl Apollo Tubes Ltd. (Er. Bihar Tubes Ltd.
- d. Asian Mills Pvt. Ltd.
- e. Asrani Tubes Limited
- f. Dadu Pipes (P) Ltd.
- g. Essar Steel Limited(Er Hazira Pipes Mill)
- h. Gaurang Products Pvt Ltd. (Ast Group)
- i. Goodluck Steel Tubes Ltd.
- j. Hi-Tech Pipes Limited
- k. Indus Tube Limited
- l. Jindal Industries Ltd
- m. Jindal Pipes Ltd.
- n. Jindal Saw Ltd (Kosi Works)
- o. Jotindra Steel & Tube Ltd
- p. Lalit Pipes And Pipes Ltd.
- q. Maharashtra Seamless Ltd.
- r. Man Industries (India) Ltd. – Pithampur
- s. Man Industries (India) Ltd. Anjar
- t. Mukat Tanks & Vessels Ltd.
- u. Nezone Tubes Limited
- v. North Eastern Tubes Limited
- w. Pratibha Industries Limited
- x. Pratibha Pipes & Structural Ltd.
- y. Psl Ltd (Chennai)
- z. Psl Ltd (V1, V2 & NC)
- aa. Rama Steel Tubes Ltd.
- bb. Ratnamani Metals And Tubes Ltd.
- cc. Ravindra Tubes Limited
- dd. Samshi Pipe Industries Limited
- ee. Surya Roshni Ltd.
- ff. Swastik Pipes Ltd.
- gg. Utkarsh Tubes & Pipes Ltd. (Formly Bmw)
- hh. Welspun Corp. Limited (Dahej)
- ii. Zenith Birla (India) Limited

1.2 PIPE & TUBULARS TO A.P.I. STANDARDS

- a. Arcelormittal Tubular Products Roman Sa, Romania
- b. Bhel (Trichy),India
- c. Dalmine Spa (Enquiry To Tenaris),Uae
- d. Eewkorea Co. Ltd (Germany), Korea
- e. Eew Korea Co. Ltd. (Korea), Korea
- f. Eisenbau Kramer Gmbh, Germany
- g. Hyundai Rb Co. Ltd. South Korea
- h. Ilva Lamiere E Tubi Srl (Enq To Ilva Spa, Italy
- i. Inox Tech. Spa, Italy
- j. ISMT Ltd. Ahmednagr, India



- k. TATA Steel, India
- l. PSL
- m. Jindal Pipes Ltd., India
- n. Jindal Saw Ltd. (Kosi Works), India
- o. Jindal Saw Ltd. (Nashik Works), India
- p. Lalit Pipes And Pipes Ltd. India
- q. Maharashtra Seamless Ltd., India
- r. Man Industries (I) Ltd. (Pithampur), India
- s. Mukat Tanks & Vessels Ltd., India
- t. Pratibha Industries Limited, India
- u. Ratnamani Metals And Tubes Ltd., India
- v. Siderca S.A.I.C (Enquiry Totenaris), Uae
- w. Sumitomo Metal Ind. Ltd., India
- x. Surya Roshni Ltd., India
- y. Swastik Pipes Ltd, India
- z. Tata Steel Uk Limited (Formerly C702)
- aa. Tubos De Acero De Mexico Sa (Enq. Tenaris), Uae
- bb. Tubos Reunidos Sa Spain
- cc. Umran Steel Pipe Inc (Turkey), Turkey
- dd. Valcovny Trub Chomutov, Czech Republic
- ee. Vallourec And Mannesmann Tubes, France
- ff. Welspun Corp Limited (Dahej), India

1.3 PIPE/TUBE CS (SEAMLESS) TO ASTM STANDARDS

- a. Arcelormittal Tubular Products Roman Sa, Romania
- b. Bhel (Trichy), India
- c. Changshu Seamless Steel Tube Co. Ltd., China
- d. Dalmine Spa (Enquiry To Tenaris, Uae
- e. Heavy Metals & Tubes Limited (Mehsana), India
- f. Ismt Ltd. Ahmedngr, India
- g. Ismt Ltd. Baramati India
- h. Jfe Steel Corporation, Uae
- i. Jindal Sdaw Ltd (Nashik Works) India
- j. Klt Automotive And Tubular Products Ltd., India
- k. Mahalaxmi Seamless Limited, India
- l. Maharashtra Seamless Ltd, India
- m. Products Tubulares S.A.U, Spain
- n. Ratnadeep Metal Tubes Ltd., India
- o. Staineest Tubes Pvt Ltd., India
- p. Sumitomo Metal Ind. Ltd., India
- q. Tubos Reunidos Sa Spain
- r. Valcovny Trub Chomutov, Czech Republic
- s. Vallourec Andmannesmann Tubes France
- t. Yangzhou Chengde Steel Pipe Co. Ltd Dubai (UAE)
- u. Jindal SAW Ltd Kosi Kalan Mathura



1.4 PIPE CARBON STEEL (WELDED) TO ASTM STANDARDS

- a. Eew Korea Co. Ltd. (Germany), Korea
- b. Eew Korea Co. Ltd. (Korea), Korea
- c. Eisenbau Kramer Gmbh, Germany
- d. Hyundai Rb Co. Ltd., South Korea
- e. Inox Tech. Spa, Italy
- f. Jindal Saw Ltd (Kosi Works), India
- g. Lalit Pipes and Pipes Ltd., India
- h. Man Industries (I) Ltd.(Pithampur), India
- i. Man Industries (India) Ltd. Anjar, India
- j. Mukat Tanks & Vessels Ltd., India
- k. Ratnamani Metals And Tubes Ltd., India
- l. Sumitomo Metal India Ltd., India
- m. Tata Steel Uk Limited

2.0 VALVES

2.1 GLOBE VALVES

- a. BDK (New Delhi)
- b. Datre Corpn (Calcutta)
- c. KSB Pumps (New Delhi)
- d. L&T (New Delhi)
- e. Neco Schuber & Salzer Ltd. (New Delhi)
- f. Niton Valve (Mumbai)
- g. Ornate Valves (Mumbai)
- h. Panchavati Valves (Mumbai)
- i. AV Valves Ltd.
- j. BHEL (Trichy), India
- k. Econo Valves Pvt Ltd, India
- l. Fouress Engg (I) Ltd (Aurangabad)
- m. Guru Industrial Valves Pvt Ltd
- n. Leader Valves Ltd, India
- o. NSSL Ltd. (Neco Schubert & Salzerltd)
- p. Oswal Industries Ltd, India
- q. Petrochemical Engineering Enterprises, India
- r. Sakhi Engineers Pvt Ltd
- s. Shalimar Valves Pvt Ltd
- t. Steel Strong Valves India Pvt Ltd, India
- u. Petro Valves Pvt. Limited, Ahmedabad
- v. Hawa Engineers Limited, Ahmedabad (Non API)
- w. G M Engineering PVT LTD (Non API)

2.2 CHECK VALVES

- a. Advance Valves Pvt. Ltd., Noida
- b. Aksons & Mechanical Enterprises, Mumbai
- c. Larsen & Toubro Limited (Audco India Limited, Chennai)
- d. AV valves Ltd., Agra
- e. BDK engineering India Ltd., Hubli



- f. BHEL, OFE&OE Group, New Delhi
- g. Datre Coroportion Limited, Calcutta
- h. Leader Valves Ltd., Jalandhar
- i. Neco schubert & Salzer Ltd., New Delhi
- j. Niton Valves Industries (P) Ltd., Mumbai
- k. Precision Engg. Co., Mumbai
- l. Econo Valves Pvt Ltd, India
- m. Fouress Engg (I) Ltd (Aurangabad)
- n. KSB Pumps Ltd (Coimbatore), India
- o. NSSL Ltd. (Neco Schubert & Salzer Ltd)
- p. Oswal Industries Ltd, India
- q. Panchvati Valves & Flanges Pvt Ltd, India
- r. Petrochemical Engineering Enterprises, India
- s. Sakhi Engineers Pvt Ltd
- t. Shalimar Valves Pvt Ltd
- u. Steel Strong Valves India Pvt Ltd, India
- v. Shiv Shakti Engineering Works (Approved up to 06 inch)
- x. Hawa Engineers Limited, Ahmedabad
- y. G M Engineering PVT LTD (Non API)

2.2 PLUG VALVES

- a. Breda Energia Sesto Industria Spa, Italy
- b. Fisher Sanmar Ltd., Chennai
- c. Larsen & Toubro Ltd., New Delhi
- d. Nordstrom Valves, USA
- e. Serck Audco Valves, UK
- f. Sumitomo Corporation India Pvt. Ltd., New Delhi
- g. Z Corporation, Korea
- h. Hawa Valves (India) Pvt. Ltd., Mumbai
- i. Steel Strong Valves India Pvt. Ltd., Navi Mumbai
- j. Econo Valves
- k. Flow-Serve PTE (Mfr. SERCK), India

2.4 BALL VALVES

- a. Hawa Valves (India) Pvt. Ltd, Navi Mumbai
- b. Larsen & Toubro, Delhi
- c. Microfinish Valves Pvt. Ltd., Noida
- d. Oswal Industries Ltd., Gandhi nagar
- e. Virgo Engineers Ltd., Delhi
- f. Boteli Valve Group Co. Ltd., China
- g. Cameron (Malaysia) SDN BHD, Malaysia
- h. Dafram S.P.A., Italy
- i. Fangyuan Valve Group Co. Ltd., China



- j. Franz Schuck GmbH, Germany**
- k. O.M.S. Saleri (Italy)**
- l. Pibi Viesse S.P.A (Italy)**
- m. Nuovo Pignone (Italy)**
- n. Perar S.P.A (Italy)**
- o. Pietro Fiorentini (Italy)**
- p. Cooper Cameron Valv Italy SRL-FRM, Itly**
- q. Petrol Valves SRL**
- r. Tormene Gas Technology S.P.A (VALVITALIA)**
- s. Petro Valves Pvt. Limited, Ahmedabad**
- t. Shiv Shakti Engineering Works (Approved up to 08 inch)**
- u. Hawa Engineers Limited, Ahmedabad**
- v. G M Engineering PVT LTD.**
- w. DelVal Flow Controls Pvt. Ltd**

3.0 TEE

3.1 FLOW TEE

- a. Coprosider SPA, Italy**
- b. GEA Energy System India Limited, Chennai**
- c. Multitex Filtration**
- d. Pipeline Engineering, UK**
- e. Scomark Engg. Limited (U.K.)**
- f. Skeltonhall Limited, Engaland(U.K.)**
- g. Technospecial SPA, Italy**
- h. Tectubi SPA, Italy**
- i. RMA Germany**
- j. Pipefit Engineers Pvt. Ltd.**
- k. Vee Kay Vikram & Co.**

3.2 SPLIT TEE

- a. IPSCO, Canda**
- b. TD Willamsons, USA**
- c. Plant-Tech Power Technical Services Pvt Ltd**
- d. Teemans, UK**
- e. Vee Kay Vikram & CO.**

4.0 FLANGES

- a. Aditya Forge Ltd., Vadodara**
- b. Amforge Industries Ltd., Mumbai**
- c. CD Engineering Co., Ghaziabad**
- d. Echjay Forgings Pvt. Ltd. (Bombay), Mumbai**
- e. Echjay Industries Ltd., Rajkot**
- f. Forge & Forge Pvt. Ltd., Rajkot**



- g. Golden Iron & Steel Works, New Delhi
- h. JK Forgings, New Delhi
- i. Metal Forgings Pvt. Ltd., Mumbai
- j. Perfect Marketings Pvt. Ltd., New Delhi
- k. Sky Forge, Faridabad
- l. S&G, Faridabad
- m. Chaudhry Hammer Works Ltd, India
- n. JAV Forgings (P) Ltd, India
- o. Kunj Forgings Pvt Ltd, India
- p. MS Fittings
- q. R.N. Gupta & Co. Ltd, India
- r. R.P. Engineering Pvt Ltd, India
- s. Sanghvi Forgings & Engineering Ltd
- t. Shri Ganesh Forgings Ltd., India
- u. Uma Shankar Khandelwal & Co., India
- v. Sawan Engineers, Baroda
- w. Stewarts & Lloyds of India Ltd., Kolkata
- x. Engineering Services Enterprises
- y. Pipefit Engineers Pvt. Ltd.
- z. Jindal Forging
- aa. Vivial Forges
- bb. N J Engineers (Up to 12 Inch Class 600 Only)

5.0 FITTINGS

- a. Commercial Supplying Agency, Mumbai
- b. Dee Development Engineers Ltd.
- c. Eby Industries, Mumbai
- d. Flash Forge Pvt. Ltd., Vishakhapatnam
- e. Gujarat Infra Pipes Pvt. Ltd., Vadodara
- f. M.S. Fittings Mfg. Co. Pvt. Ltd., Kolkata
- g. Stewarts & Lloyds of India Ltd., Kolkata
- h. Teekay Tubes Pvt. Ltd., Mumbai
- i. Pipe Fit, Baroda
- j. Sky Forge, Faridabad
- k. S&G, Faridabad
- l. Sawan Engineers, Baroda
- m. Eby Fasteners, India
- n. Leader Valves Ltd, India
- o. R.N. Gupta & Co. Ltd, India
- p. Exten Engg Pvt Ltd
- q. Sivananda Pipe & Fittings Ltd
- r. Jindal Forging
- s. Vivial Forges
- t. PK Tubes Rajasthan
- u. CSA Fitting
- v. Gujarat Infrapipes pvt ltd, Vadodara
- w. KS Pipes Fitting Pvt Ltd, Palwal
- x. Tube Bend, Kolkata



6.0 BENDS

- a. Jindal Saw Ltd. (Kosi Works), India
- b. PSL Limited (Gandhidham – Mfrg), India
- c. BHEL, Trichy, Tamilnadu
- d. Welspun, Gujarat
- e. Sawan
- f. Gujarat Infra
- g. P K Tubes
- h. DEE Development
- i. Pipefit Engineers Pvt. Ltd.

7.0 GASKETS

- a. IGP Engineers (P) Ltd., Madras
- b. Madras Industrial Products, Madras
- c. Dikson & Company, Bombay
- d. Banco Products (P) Ltd., Vadodara
- e. Goodrich Gaskets Pvt Ltd
- f. Starflex Sealing India Pvt Ltd, India
- g. Teekay Meta Flex Pvt Ltd
- h. UNIKLINGER Ltd
- i. HEM Engg. Corp.
- j. Unique Industrial Packing Pvt. Ltd.

8.0 FASTENERS

- a. Nireka Engg. Co. (P) Ltd., Calcutta
- b. Precision Taps & Dies, Bombay
- c. AEP Company, Vithal Udyoug Nagar
- d. Fix Fit Fasteners, Calcutta
- e. Precision Engg. Industries, Baroda
- f. Echjay Forgings Pvt. Ltd., Bombay
- g. Capital Industries, Bombay
- h. Boltmaster India Pvt Ltd, India
- i. Deepak Fasteners Limited, India
- j. Fasteners & Allied Products Pvt Ltd, India
- k. Hardwin Fasteners Pvt Ltd, India
- l. J.J. Industries, India
- m. Multi Fasteners Pvt Ltd, India
- n. Nexo Industries, India
- o. Pacific Forging & Fasteners Pvt Ltd, India
- p. Pioneer Nuts & Bolts Pvt Ltd, India
- q. Precision Auto Engineers, India
- r. President Engineering Works, India



- s. Sandeep Engineering Works, India**
- t. Syndicate Engineering Industries, India**

9.0 WELDING ELECTRODES FOR PIPELINE/PIPING WORK

- a. For Mainline – Lincoln/ Bohler make**
- b. For Terminal – For root pass –Lincoln/ Bohler make**
For other passes – Lincoln, D&H or equivalent make Lincon
- c. D & H SECHERON ELECTRODE PVT. LTD. (For Mainline & Terminal- Root & Other pass)**

10.0 STRAINERS

- a. Bombay Chemical Equipments**
- b. Gujarat Auto filed**
- c. Multitex Filtration Engineering Limited**
- d. Grand Prix Engineering Limited**

11.0 STUD BOLTS WITH NUTS

- a. Multi Thread Fasteners, Baroda**
- b. Darukhanwala**
- c. Precision Engineers, Baroda**
- d. Unbrako**
- e. TVC**

12.0 DRY GAS FILTER & FILTER SEPERATOR

- a. Grand Prix Fab (Pvt.) Ltd. (New Delhi)**
- b. Perry Equipment, USA**
- c. Faudi Filter, Germany**
- d. Forain S.r.l., Italy**
- e. ABB, Faridabad**
- f. Burgess Manning, USA**
- g. Multitex Filtration Engineers India**
- h. Triveni Plenty Engg. Ltd. (New Delhi)**
- i. Siirtec International Contractor S.P.A (Italy)**
- j. Flashpoint, Pune india**
- k. Filtration Engineers (I) Pvt Ltd, India**
- l. Gujarat Otofilt, India**
- m. Tormene Gas Technology**
- n. Ultrafilter (India) Pvt Ltd, India**
- o. Ravi Techno Systems Pvt Ltd, India**



- p. Siirtec Nigi S.P.A**
- q. Filtan Filter Anlagenbau Gmbh**
- r. Fairley Arlon BV**
- s. PECO Facet**
- t. EPE Epenstenner GMBH**
- u. Filtrex srl**
- v. Petromar Engineered Soln**
- w. Plenty Filter**
- x. Eurofiltec**
- y. PTI Technologies Inc**
- z. RS Instrumentation and Services**
- aa. Inel Gas Control Pvt Ltd**
- ab. Kimpex Flow**
- ac. Gas Tech**
- ad. GFS**

13.0 FILTER ELEMENT

- a. Peco – Facet**
- b. Velcon**
- c. Pall – Filterite**
- d. Burgess Manning**

14.0 NDT AGENCY

- a. NDT Services, Ahmedabad**
- b. GEECY Industrial Services Pvt. Ltd., Mumbai**
- c. Corrosion Control Services, Mumbai**
- d. Perfect Metal Testing & Inspection Agency, Calcutta**
- e. Inter Ocean Shipping Co., New Delhi**
- f. RTD, Mumbai**
- g. Sievert, Mumbai**
- h. X-Tech, Vizag**
- i. Industrial X Ray and Allied Radiographers (I) Pvt. Ltd.**
- j. Inspection Technology**
- k. IXAR**
- l. Aditya NDT Services**
- m. Riya NDT Engineers**
- n. Star NDT Services**
- o. Technical testing & Inspection Services**
- p. PD Engineering Inspection Services**
- q. Victor Engineering & Testing**

15.0 PRESSURE GAUGES (Only SS 316)



- a. AN Instruments Pvt Ltd
- b. Badotherm Process Instruments B.V.
- c. Baumer Bourdon Haenni S.A.S
- d. British Rototherm Co Ltd
- e. Budenberg Gauge Co Ltd
- f. Dresser Inc
- g. Forbes Marshall (Hyd) Pvt Ltd
- h. General Instrument Consortium
- i. H. Guru Instruments (South India) Pvt Ltd
- j. Manometer (India) Pvt Ltd
- k. Nagano Keiki Seisakusho Ltd
- l. Hirlekar Precision, India
- m. Waaree Instruments Ltd
- n. Walchandnagar Industries Ltd (Tiwac Divn)
- o. Wika Alexander Wiegand & Co GmbH
- p. Wika Instruments India Pvt Ltd
- q. Ashcroft India Pvt Ltd.
- r. ITEC Measures Pvt Ltd

16.0 TEMPERATURE GAUGES (Only SS 316)

- a. AN Instruments Pvt Ltd.
- b. Badotherm Process Instruments B.V.
- c. Bourdon Haenni S.A.
- d. Dresser Inc.
- e. General Instruments Consortium
- f. H. Guru Instruments (South India) Pvt Ltd
- g. Nagano Keiki Seisakusho Ltd
- h. Solartron ISA
- i. Walchandnagar Industries Ltd (Tiwac Divn)
- j. Wika Alexander Wiegand & Co GmbH
- k. Wika Instruments India Pvt Ltd
- l. Pyro Electric, Goa
- m. Ashcroft India Pvt Ltd.
- n. ITEC Measures Pvt Ltd

17.0 POSITIVE DISPLACEMENT FLOW METERS (RPD METERS)

- a. RMG
- b. Elster
- c. Romet
- d. Dresser



e. Itron/Acteris

f. FMG

g. Common

h. Metreg

i. Vemmtec

j. Honeywell

k. Capital Innotech

l. Pietro Fiorentini

m. Flow Metering Technology

18.0 ELECTRONIC VOLUME CORRECTOR

a. Elgas

b. Itron

c. Plum

d. Pietro Fiorentini

e. Romet

f. Elster

g. Dresser

19.0 PRESSURE REGULATOR AND SLAM SHUT VALVE

a. Pietro Fiorentini

b. Emerson

c. RMG-Regel Messtechnik

d. Itron

e. Mesura-Nirmal

f. Gorter Controls B V (Netherlands)

g. Instromet International NV

h. Nirmal Industrial Controls Pvt Ltd.

i. ESME Valves Ltd

j. Richards Industries (Formerly Treloar)

k. Samson AG Mess-und Regel technik

l. Dresser Inc

m. ESKA

n. VANAZ Engineers

o. Gas Tech

20.0 PRESSURE SAFETY VALVES AND CRV

a. Keystone Valves (India) Pvt. Ltd.

b. Larson & Toubro Ltd.



- c. Lesser GmbH & Co KG
- d. Mekaster Engg Ltd..
- e. Tyco Sanmar Ltd. (New Delhi)
- f. Anderson Greenwood Crosby
- g. BHEL (Trichy)
- h. Curtiss Wright Flow Control Corporation
- i. Dresser Inc.
- j. Fukui Seisakusho Co. Ltd
- k. Nakakita Seisakusho Co Ltd
- l. Nuovo Pignone S.P.A (Italy) (GE Oil co)
- m. Parcol S.P.A
- n. Safety Systems UK Ltd
- o. Tai Milano S.P.A
- p. Weir Valves & Controls France
- q. Bliss Anand Pvt Ltd.
- r. VANAZ Engineers
- s. Hawa Engineers
- t. Nirmal Industrial Controls
- u. FMC Sanmar
- v. RMG
- w. Emerson
- x. Pietro Fiorentini
- y. Protego Equipments
- z. Rajarshi Engineering

21.0 SS FITTINGS, INSTRUMENT VALVES & MANIFOLDS

- a. Swagelok Co.
- b. Parker
- c. Aura INC.
- d. HOKE
- e. Excelsior Engineering works
- f. Swastik Engineering works India
- g. Comfit and valves pvt ltd
- h. Arya craft and engineering Pvt ltd
- i. DK lok
- j. ASTEC Valves & Fittings Pvt Ltd
- k. Dawsons Tech Components LLP
- l. DelVal Flow Controls Pvt. Ltd

22.0 SS TUBES

- a. Swagelok Co.



- b. Parker**
- c. Sandvik**
- d. Jindal Saw**
- e. Tubacex Tubes and Pipes Private Ltd**
- f. Krystal Global Engineering Ltd.**
- g. Maxim Tubes Company Pvt. Ltd.**
- h. VENUS PIPES & TUBES LIMITED**
- i. Ratnamani Metals and Tubes**
- j. Jindal Saw**



SECTION- VI

QUALITY ASSURANCE PLAN



QUALITY ASSURANCE PLAN FOR METER REGULATING SKID

QUALITY ASSURANCE PLAN FOR METER REGULATING SKID													
									Inspection By				
Sr. No	Description	Characteristic	Class	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format of Records	M	TPI A	PMC / Client	Remarks	
1	Incoming Material for Skid Spool Fabrication												
1.1	Pipe – ASTM A106 Gr. B (Seamless)	As per Specification	Major	Laboratory + Dimensional	1 pc/pipe size	ASTM A106 Gr. B (Seamless)	ASTM A106 Gr. B (Seamless)/Mate. std	Mfr/Lab Cert.	P	R	R		
1.2	Pipe Fittings	As per Specification	Minor & Major	Lab	Per heat	ASTM A105/Mate.std	ASTM A105/Mate.std	Mfr/Lab Cert.	P	R	R		
			Minor	Visual	10%	ANSI B16.9/Mate.Std	ANSI B16.9/Mate.Std	Mfr Cert.	P	R	R		
1.3	Flanges – ASTM A105	As per Specification	Minor & Major	laboratory	100%	ASTM A105/Mate.std	ASTM A105/Mate.std	Mfr/Lab Cert.	P	R	R		
			Minor	Visual	10%	ANSI 16.5 /Mate.std	ANSI 16.5 /Mate.std	Mfr Cert.	P	R	R		
1.4	Studs, Bolts, Gaskets	Chem/Phys/Impact	Minor	Visual + 10% Dimensional	Random Selection- One piece per size	ASME Sec II and ANSI B1.1/Mate.std	ASME Sec II and ANSI B1.1/Mate.std	Mfr Cert.	P	R	R		
1.5	Structure	Dimensional	Minor	Visual + Dimensional	100%	as per IS 2062/Mate.std	as per IS 2062/Mate.std	Mfr Cert.	P	R	R		
1.6	Ball Valve	As per Spec	Major	As per Datasheet	100%	Approved Datasheet	Mfr Cert.	Mfr Cert.	P	R	R		
1.7	Globe Valve	As per Spec	Major	As per Datasheet	100%	Approved Datasheet	Mfr Cert.	Mfr Cert.	P	R	R		



2 Welding, NDT & Testing for Interconnecting Piping

2.1	WPS/PQR	Qualification	Major	Welders Qualification & Welding	100%	WPS/PQR Record	As per ASME SEC.IX	WPS/PQR Record	P	R	R	
2.2	DPT (Non-Radiographic Joints)	D.P.T After Final Welding	Major	100% Fillet Weld	100%	ASME SEC V / VIII,	ASME B31.3 (Table 341.3.2, Normal & Category M. Fluid)	Internal Inspection Report	P	W	R	
2.3	Radiography Test	Radiography after final weld	Major	As per Standard	100% RT EXCLUDING DRAIN & VENT PIPING	ASME SEC V / VIII	ASME SEC.31.3 (table 341.3.2, Normal & Category M fluid),	Interpretation Report	P	R	R	
2.4	Hydrotesting (Piping/Filter Unit)	240 mins Hydrotesting at 1.5 times the design Pressure (4 Hours)	Major	Strength	100%	Approved P&ID & GAD	As per ASME SEC.31.8 & IGE/TD/13/ No Leak Gas ASME SEC VIII DIV 1 for filter	Inspection Report	P	W	R	
2.5	Internal Cleaning of Pipe Spools after Hydro Test.	Internal Surface Finish	Major	Visual	100%	Internal Report	Internal Report	Internal Report	R	R	R	

3 Final Inspection of Skid Assembly

3.1	Final Dimensional / Visual Inspection	Complete Skid: L x B x H	Major	Inspection	100%	GAD	Approved Datasheet	Reports	P	W	W/R	
3.2	Painting of Skid	Painting	Major	DFT – micron value – 275 micron	100%	Approved Painting Spec	Reports	Reports	P	W	R	



3.3	Pneumatic Leak Test	Pneumatic Leak Test at 7 kg/cm ² g for 30 mins to 1 hr as required for complete skid checking	Major	Strength	100%	Approved P&ID & GAD	As per ASME SE C.31.8 & IGE/TD/13 / No leak Gas	Inspection Report	P	W	R	
3.4	Factory Acceptance Test	Testing as per FAT Report	Major	Performance Test	100%	Approved FAT Procedure	Approved FAT Procedure	FAT Report	P	W	W/R	
3.5	Completeness + Inspection Release Certificate (IRC)		Major	Visual + Dim	100%	Approved Bill of Materials	Approved Bill of Materials	Inspection Report	P	W	W/R	
4 Final Documentation												
4.1	Design & Calculation, Material TC, Calibration Certificate, In line process inspection & test records, As Built GAD & P & ID	History Docket	Major	Verification of records	100%	Specification, As-Built GAD, Calibration Cert.	Specification, As-Built GAD, Calibration Cert.	History Docket, MDR	R	R	R	
	Legend:											
	M: Manufacturer	P: Performer	W: Witnesses	TPIA: Third Party Inspection Agency	R: Review	A: Approval	RW: Random Witness	C: Client				