



**VCS Quality Services Private Limited**

**CITY GAS DISTRIBUTION PROJECT OF NORTH  
GOA GA**

**TENDER DOCUMENT FOR  
SUPPLY OF METER REGULATING  
STATION (MRS)**

Document No: VCS-1099-CD-IN-TEN-5003

TENDER ID : VCS21000050

Issued Date: 16/12/2023



**GOA NATURAL GAS PRIVATE LIMITED  
(GNGPL)**



# VCS Quality Services Private Limited

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## MATERIAL REQUISITION



**MATERIAL REQUISITION FOR SUPPLY OF  
METER REGULATING STATION (MRS)**

**TOTAL SHEETS**

10

**DOCUMENT NO**

C231099

CGD

IN

MR

5001

**GOA NATURAL GAS PRIVATE LIMITED (GNGPL)**

**CITY GAS DISTRIBUTION PROJECT  
OF NORTH GOA GA**

**MATERIAL REQUISITION FOR SUPPLY OF  
METER REGULATING STATION (MRS)**

C3	08-12-2023	RE-ISSUED FOR CLIENT REVIEW	AK	AS	KNC
C2	04-12-2023	RE-ISSUED FOR CLIENT REVIEW	AK	AS	KNC
C1	27-10-2023	ISSUED FOR CLIENT REVIEW	AK	RA	KNC
B1	25-10-2023	ISSUED FOR IDC	AK	RA	KNC
<b>REV</b>	<b>DATE</b>	<b>DESCRIPTION</b>	<b>PREP</b>	<b>CHK</b>	<b>APPR</b>




Goa Natural Gas Pvt.Ltd.  
A Joint Venture of GAIL Gas Ltd & BPCL

# SUPPLY OF METER REGULATING STATION CITY GAS DISTRIBUTION PROJECT OF NORTH GOA GA

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Goa Natural Gas Pvt.Ltd.  
A Joint Venture of GAIL Gas Ltd & BPCL

## SUPPLY OF METER REGULATING STATION CITY GAS DISTRIBUTION PROJECT OF NORTH GOA GA

### 1. INTRODUCTION

M/s Goa Natural Gas Pvt. Ltd. is a Joint Venture (JV) of Bharat Petroleum Corporation Limited (BPCL), A Govt. of India Enterprise and GAIL Gas Limited, a fully owned subsidiary company of GAIL (India) Limited, has been set up to provide PNG (piped Natural Gas) to industrial, domestic, commercial sectors and CNG to automobile sector in North Goa GA.

VCS Quality Services Pvt. Ltd. (VCS has been appointed as Project Management Consultant for providing consultancy services for CGD Expansion Project for PNG & CNG in North Goa (hereinafter referred as consultant), by GNGPL.

### 2. DEFINITION

PROJECT	CITY GAS DISTRIBUTION PROJECT OF NORTH GOA GA
OWNER / COMPANY	GOA NATURAL GAS PRIVATE LIMITED (GNGPL)
CONSULTANT	VCS Quality Services Private Limited (VCSQSPL) the party to act for and on behalf of OWNER for the Engineering Services.
VENDOR / BIDDER	"VENDOR" MEANS THE PERSON(S), FIRM, COMPANY, ORGANIZATION FROM WHOM CONTRACTOR PROCURES PRODUCTS/SERVICES.


### 3. ORDER OF PRECEDENCE

It shall be the responsibility of the Manufacturer / Vendor to inform the Purchaser of any errors, ambiguities, inconsistencies, discrepancies or conflict of information that may be found to exist in any document, specification or drawing submitted by the Purchaser.

In case of conflict, the order of precedence shall be as follows:

- Material Requisition;
- Data Sheets;
- Technical Specifications;
- Basic Documents;
- Codes and Standards.

As a general rule in the event of any discrepancy between technical matter and local laws/regulations (and documents above listed) the most stringent shall be applied.

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Manufacturer / Vendor shall notify Purchaser of any apparent conflicts between MR, specifications, related datasheets, any code and standards and any other specifications noted herein. (Resolution and / or interpretation precedence shall be obtained from Purchaser in writing before proceeding with the design / manufacturer or completion of services.)

### 4. SCOPE OF SUPPLY & SERVICES

This document covers supply of Meter Regulating Station to be used in City Gas Distribution Project of North Goa GA's.

The scope of supply covers design, engineering, manufacture, integration, inspection, performance testing, shipment, supply, supervision of installation, testing, commissioning, and documentation of these items in accordance with the requirements of this Requisition.

S.NO	DESCRIPTION	QUANTITY	REMARKS
<b>DUAL STREAM MRS WITH FLOW CAPACITY DETAILS GIVEN BELOW:</b>			
1.	<p>Dual stream Meter Regulating Station (MRS) with Metal cabinet/enclosure of <b>flow capacity of 5000 SCMH, Inlet Pressure - (12-45 bar) , Outlet Pressure - (4-6 bar)</b> consisting of filtration, Pressure gauges, temperature gauges, Differential Pressure gauges, Pressure safety valves, Pressure Control valves with integrated SDV, Creep relief valves, Turbine Flow meter, restriction orifice, electronic volume corrector with pressure, flow &amp; temperature transmitter etc. as indicated in <b>P&amp;ID (C231099-GOA-PC-PID-1001N)</b> along with associated accessories including skid cabinet, instrument fittings, manifolds, impulse tubing with fittings, pipes, valves, NRVs, flanges, gaskets, all structure / supports / operating platforms, flame arrestor, cables and cabling from field instruments to EVC, glands, ferrules, lugs, tags at both ends, supports, SS blind plugs, mounting stands, all applicable accessories, mandatory spare required for commissioning.</p> <p>Note- For future communication, EVC must be compatible with all type of GSM/GPRS module to transfer the EVC data at Client station.</p>	1 No.	

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2.	Supervision of Installation, Testing, Commissioning of Meter Regulating Station (MRS) consisting of Filtration, Pressure reduction and Metering at respective site. The price shall be inclusive of Airfare Boarding, Lodging, Local Transport, Incidental, Traveling etc. & all other expenses.	1 Lot	
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### NOTES:

1. Accessories for MRS shall be supplied as specified in the instrument datasheet attached with the material requisition.
2. Bidder has to quote full quantity of quoted item mentioned above; partial quotation for the item shall be liable to rejection.
3. Procurement, fabrication, supply, inspection, Factory Acceptance Test and Site Acceptance Test shall be in the bidder scope;
4. Installation, field calibration shall be in the bidder scope;
5. Transportation, transit insurance, loading and unloading of material at GNGPL site / stores shall be in the bidder scope;
6. Rectification of any damage (if any) occurred during transportation/ unloading / observed on receipt of material at site shall be in bidder scope.
7. Mandatory Spares as required for commissioning.
8. Compliance of Checklist points during FAT, SAT, Site, stores (if any);
9. GNGPL LOGO should be embossed/ stamped/ punched at prominent places on the body of MRS.
10. Signal and power redundancy to be provided;
11. All documentations, calibration test reports, alarm set points as per process design, detail P&ID, earthing drawings to be provided along with the systems and instruments.
12. Mating flange at the inlet and outlet and matching Transition fitting (TF) shall be in the bidder scope;

### 5. DOCUMENTS & DATA REQUIREMENTS


The table hereunder specifies the quantities & nature of the documents to be submitted by the bidder to Company.

The documents required at the inquiry stage to be included in the bid are listed under column A.

The documents required after award of the agreement and subject to the written approval of the Company are listed under column B.

The final & certified documents are listed under column C.

Any document even when preliminary shall be binding and therefore duly identified & signed by the bidder. It shall bear the company project reference, the MR number and identification number.

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The documents are fully part of the supply which shall be complete only if and when the documents complying fully with the material requisition requirements received by the engineer.

S.no.	Documents and Data	A	B		C	
		Number of copies	Number of copies	Required time period	Number of copies	Required time period
1.	Drawing/document/data submittal list/schedule	-	3	2 weeks	3	2 weeks
2.	Signed and stamped P&ID in compliance with the tender document	1	3	2 weeks	3	2 weeks
3.	Fabrication, test and delivery schedule (per item)	-	3	2 weeks	3	2 weeks
4.	Progress report	-	3	2 weeks	3	2 weeks
5.	Catalogues / Datasheets/ Specification/ References of all Instruments	1	3	2 weeks	3	With final tech. file
6.	Outline drawing + unit weight (per skid)	-	3	2 weeks	3	With final tech. file
7.	Detail drawing + material specification	-	3	2 weeks	3	With final tech. file
8.	Code compliance certificate	-	3	2 weeks	3	With final tech. file
9.	Welding procedure specification and records WPS/PQR	-	3	4 weeks	3	With final tech. file
10.	Signed and stamped Inspection and test procedures in compliance with the tender document	1	3	2 weeks	3	With final tech. file
11.	Test reports	-	3	3 weeks	3	With final tech. file

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S.no.	Documents and Data	A	B		C	
		Number of copies	Number of copies	Required time period	Number of copies	Required time period
12.	NDE reports	-	3	1 week after test	3	With final tech. file
13.	Heat treatment reports	-	3	1 week after test	3	With final tech. file
14.	Hydro test and air test report	-	3	1 week after test	3	With final tech. file
15.	Bill of materials (on drawings)	-	3	1 week after test	3	With final tech. file
16.	Installation instructions and Site inspection procedure	-	3	4 weeks	2	With final tech. file
17.	Packing/shipping list with weights and dimensions	-	3	4 weeks before shipping	3	With final tech. file
18.	Material test certificate	-	3	4 weeks before shipping	3	With final tech. file
19.	Painting system description	-	3	1 week after test	3	With final tech. file
20.	List of subcontractors with their scope	-	3	2 weeks	3	With final tech. file
21.	Completed datasheets for all mechanical items like valves, pipes, canopy, filters, flanges with required calculations, PV-lite calculations for filter, GA drawing with part names and MOC etc.	-	3	4 weeks	3	2 Weeks
22.	GA drawing of the skid and the Canopy of the skid	-	3	4 weeks	3	2 Weeks

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S.no.	Documents and Data	A	B		C	
		Number of copies	Number of copies	Required time period	Number of copies	Required time period
23.	Completed Instrument Index	-	3	4 weeks	3	2 Weeks
24.	Functional Loop Drawing	-	3	4 weeks before shipping	3	With final tech. file
25.	Cable schedule	-	3	4 weeks before shipping	3	With final tech. file
26.	Earthing Drawing	-	3	4 weeks before shipping	3	With final tech. file
27.	Interface Descriptions	-	3		3	Before shipping
28.	Instrumentation hook-ups	-	3	2 weeks	3	2 weeks
29.	Installation manuals, catalogues		3	2 weeks	3	2 weeks
30.	Statutory approvals / certificates etc. as applicable	1	3	2 weeks	3	2 weeks
31.	Signed and stamped Datasheets in compliance with Tender Document	1	3	2 weeks	3	2 weeks
32.	Typical GAD of MRS with approximate size	1	3	2 weeks	3	2 weeks
33.	Vendor Recommended Spare parts list with Prices		3	2 weeks	3	2 weeks

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**NOTES:**


1. FAT procedure document must include clause wise reference of tender specification for its compliance. This document shall be prepared in consultation with owner/ owner's representative.
2. Durations in column B (Required date) are weeks after Purchase Order date. Durations in column C (Required date) are weeks before final dispatch.
3. Final technical document file shall be supplied in hard copy as indicated and in electronic format (.pdf Acrobat files) on two (2 Nos.) DVD-ROMs.

**6. LIST OF ATTACHMENTS**

The table below lists the documents which are integral part of this Material Requisition. The applicable revision index of each document is mentioned in the column below the current Material Requisition revision index.

When the Material Requisition revision index is "A" or "1", all listed documents are attached. For other Material Requisition revision index, only modified or new documents are attached.

DOCUMENTS	DOCUMENT NO.	REVISION OF DOCUMENTS		
Technical Specification for MRS	C231099-CD-IN-SP-5002	C1		
P&ID	C231099-GOA-PC-PID- 1001N	C2		
Standards Specification for Gas Regulators	VCS-SS-IN-5307	02		
Standards Specification for Pressure Gauge	VCS-SS-IN -5001	02		
Standards Specification for Temperature Gauge with TW	VCS-SS-IN -5101	02		
Standards Specification for Pressure Safety Valve	VCS-SS-IN -5504	02		
Standards Specification for JB's & Cable Glands	VCS-SS-IN -5802	02		
Standards Specification for Instrument Cables	VCS-SS-IN -5801	02		
Standards Specification for Tube & Fittings	VCS-SS-IN -5803	02		
Standard Specification for Restriction Orifice	VCS-SS-IN 5402	02		
Standard Specification for Gas meters	VCS-SS-IN -5306	02		
Standard Specification for Pressure Transmitter	VCS-SS-IN -5003	02		
Standard Specifications for Fabrication and Erection of Piping	SS-PL-025	00		
Standard Specifications for Seamless fittings and	SS-PL-005	00		


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flanges				
Standard Specifications for Inspection, Filling and testing	SS-PL-007	00		
Standard Specifications for Ball valves	VCS-SS-PP-2004	04		
Standard Specifications for Painting	VCS-SS- PP-2502	04		
Standard Specifications for Assorted pipes	VCS-SS-PP-2503	01		
Piping Material Specification	C231099-00-PP-PMS-2001	00		
Valves Datasheets	-	0		
Datasheets of filters	C231099-CGD-ME-DS-(3001-3014)	C1		
Instrument Datasheets	C231099-CGD-IN-DS-5003	C1		
Inspection and Test plan instruments	C231099-CD-IN-ITP-5003	C1		
Inspection and test plan-Ball valve	VCS-PL-ITP-007	00		
Inspection and test plan-Globe valve	VCS-PL-ITP-008	00		
List of third-party inspection agency	-	00		
Checklist-Technical	VCS-SD-CK-001	00		
Vendor List	VCS-00-00-VL-0001	05		

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<b>TECHNICAL SPECIFICATION FOR METER REGULATING STATION (MRS)</b>	<b>TOTAL SHEETS</b>	23
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<b>DOCUMENT NO.</b>	C231099	CGD	IN	SP	5001
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## GOA NATURAL GAS PRIVATE LIMITED (GNGPL)

### CITY GAS DISTRIBUTION PROJECT OF NORTH GOA GA

#### TECHNICAL SPECIFICATION FOR METER REGULATING STATION

REV	DATE	DESCRIPTION	PREP	CHK	APPR
C1	26-10-2023	ISSUED FOR CLIENT REVIEW	AK	RA	KNC

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## 1 INTRODUCTION

M/s Goa Natural Gas Pvt. Ltd. is a Joint Venture (JV) of Bharat Petroleum Corporation Limited (BPCL), A Govt. of India Enterprise and GAIL Gas Limited, a fully owned subsidiary company of GAIL (India) Limited, has been set up to provide PNG (piped Natural Gas) to industrial, domestic, commercial sectors and CNG to automobile sector in North Goa GA.

VCS Quality Services Pvt. Ltd. (VCS has been appointed as Project Management Consultant for providing consultancy services for CGD Expansion Project for PNG & CNG in North Goa (hereinafter referred as Consultant), by GNGPL.

## 2 DEFINITION

PROJECT	CITY GAS DISTRIBUTION PROJECT OF NORTH GOA GA
OWNER / COMPANY	GOA NATURAL GAS PRIVATE LIMITED (GNGPL)
CONSULTANT	VCS QUALITY SERVICES PRIVATE LIMITED (VCSQSPL) THE PARTY TO ACT FOR AND ON BEHALF OF OWNER FOR THE ENGINEERING SERVICES.
VENDOR / BIDDER	"VENDOR" MEANS THE PERSON(S), FIRM, COMPANY, ORGANIZATION FROM WHOM CONTRACTOR PROCURES PRODUCTS/SERVICES.

## 3 ORDER OF PRECEDENCE

It shall be the responsibility of the Manufacturer / Vendor to inform the Purchaser of any errors, ambiguities, inconsistencies, discrepancies or conflict of information that may be found to exist in any document, specification or drawing submitted by the Purchaser.

In case of conflict, the order of precedence shall be as follows:

- a) Material Requisition;
- b) Data Sheets;
- c) Technical Specifications;
- d) Basic Documents;
- e) Codes and Standards.

As a general rule in the event of any discrepancy between technical matter and local laws/regulations (and documents above listed) the most stringent shall be applied.

Manufacturer / Vendor shall notify Purchaser of any apparent conflicts between MR, specifications, related datasheets, any code and standards and any other specifications noted herein. (Resolution and/ or interpretation precedence shall be obtained from Purchaser in writing before proceeding with the design/ manufacturer or completion of services).

## 4 CODES & STANDARDS

The design shall be made in accordance with latest Codes & Standards and statutory requirements

In the event that there is no applicable Indian Standard, a corresponding International Standard may be applied to the design, as long as use of substitute standard is approved in writing by principal. Latest revisions of following standards are applicable for the package.

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<b>International Electro technical Commission Standards</b>	
IEC 617-12	Graphical Symbols for Diagrams - Binary Logic Diagrams
IEC 751	Industrial Platinum Resistance Thermometers Sensors.
IEC 801	Electromagnetic Compatibility for Industrial Process Measurement and Control Equipment.
IEC-60529	Specification for Enclosures
IEC-60079	Hazardous Area Classification
<b>American Petroleum Institute Standards</b>	
API RP 520	Sizing, Selection, and Installation of Pressure-Relieving Devices in Refineries
API 526	Flanged Steel Pressure Relief Valves
<b>ISA Standards</b>	
ANSI/ISA S7.0.01	Quality Standard for Instrument Air
ANSI/ISA SI8.1	Annunciator Sequences and Specifications
ANSI/ISA S51.1	Process Instrumentation Terminology
ANSI/ISA S75.01	Flow equations for Sizing Control Valves
ANSI/ISA S75.03	Face-to-Face dimensions for flanged globe style control valve bodies (ANSI Classes 125, 150, 250, 300 and 600)
ANSI/ISA S75.04	Face-to-face dimensions for flangeless control valve bodies (ANSI classes 150, 300 and 600)
ASME Standard	ASME section VIII: Boiler and pressure vessel code - Pressure vessels.
<b>OTHER CODES</b>	
AGA 8	Compressibility factors of natural gas and other related Hydrocarbon Gases
PNGRB	Petroleum and Natural Gas Regulatory Board
EN 334	Gas pressure regulators for inlet pressures up to 100 Bar
EN 837	Part-1, 2, 3 for pressure gauges.
OISD-STD-226	Natural gas transmission pipeline and city gas distribution network



OISD-STD-220

Distribution of piped Natural Gas

## 5 ENVIRONMENTAL CONDITION

The equipment considered and the complete installation shall be suitable for continuous operation under the following site conditions:

Description	Indoor (Air Conditioned)	Indoor (Non-Air conditioned)	Outdoor (Under shade)	Outdoor (Open to sky)
Operating Temperature	0 ~ 35 Deg C	-5 ~ 50 Deg C	-5 ~ 50 Deg C	-10 ~ 60 Deg C
Relative Humidity	20% ~ 80%	90%	100%	

The instruments shall be suitable to the ambient conditions provided in the above table.

## 6 DESIGN CRITERIA

### 6.1 Operation & Design Life

MRS shall be designed to operate in the site environmental conditions continuously. The life time of the plant is envisaged to be 25 years. However, optimum design life expectancy of the skid shall be 10 years and spare parts availability shall be for 10 years after cease of production.

### 6.2 Hazardous Area Classification

Electrical materials shall in general follow the IEC 60079 standards and shall be compliance with all applicable local regulations.

The material will be installed in hazardous area zone 1 and classified as "EExd" IIA/IIB T3.

Enclosure protection degree shall be min. IP65 as per IEC 60529.

### 6.3 Ingress Protection

All field instruments and outdoor equipment such as junction boxes and cabinets/panels shall have ingress protection to IP 65 / NEMA 4 or better in accordance with IEC 60529. Panels installed indoors shall have ingress protection of IP 42 as a minimum.

### 6.4 EMC Compliance

All valves shall be immune to Radio Frequency Interference (RFI) and Electro Magnetic Interference (EMI). The design and installation of all electrical / electronic equipment shall meet the RFI/EMI requirements according to IEC 61000, emission (IEC61000-6-4) and immunity (IEC-61000-6-2) requirements for an industrial environment. Power Supply.

### 6.5 Earthing

Instrument and systems shall be connected to the proper earthing system for the protection of personnel and instrument / equipment from fault currents (protective earth) and to minimize electrical interference in signal transmission circuits (instrument earth). The following separate earthing systems are to be provided:

- Protective Earth (PE) – Bonded to the site structure and utilized for electrical safety of metal enclosures and chassis on all instruments and electrical components. This earthing system is used for protection of personnel and equipment from fault currents;
- Instrument Clean Earth (IE) – Insulated from the site structure and other metal work utilized for instrument cable screens and bonded to the main electrical earthing system at a single point. Electronics in the instrument shall be insulated from the metal work.

	<p align="center">TECHNICAL SPECIFICATION FOR METER REGULATING STATION</p>	<b>Document No.</b>	<b>Rev</b>
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Cable screens of signal cables shall be segregated from metallic structural earth in the field and earthed at one point only at the cable marshaling point. Cable shields must have a single, continuous path to earth. Earth loops and floating shields shall be avoided. Shield drain wires shall not be daisy-chained to the ground connection.

The purpose of instrument DC & shield earth bus bar is to reduce the effect of electrical interference upon the signal being transmitted. A DC & shield earth bus bar shall be provided within each cabinet for consolidating instrument signal commons and cable shield drain wires. This earth bus shall be isolated from the safety earth system and from the body of the cabinet except at the plant earthing reference point.

Each instrument signal common shall be connected to the isolated instrument DC & shield earth bus with copper wire sized to carry the expected fault current or 1.5 mm<sup>2</sup>, whichever is larger. Two insulated copper conductors shall be connected from the instrument DC & shield earth bus within each cabinet to a single tie point on the master instrument earth bar within the control building in a closed loop configuration. The resistance from the isolated instrument DC & shield earth bus to the plant ground grid shall be less than 1 ohm.

Isolated instrument DC & shield earth bars from all cabinets shall be consolidated into a master instrument earth bus located within that building. The master instrument earth bar shall be connected to the master reference earth. The master reference earth should then be connected in a loop configuration to a single point on the plant earthing. Bonding cabinet AC or DC & shield earth bus bars in a daisy-chain connection is not acceptable.

The bidder shall be responsible for all earthing requirements within his scope of supply.

**6.6 Material of Construction**

The material of construction of the wetted parts and the body of all the individual instruments / equipment shall be suitable to the process fluid / conditions and the site ambient conditions.

All materials and equipment furnished shall be new and unused, of current manufacture and the highest grade and quality available for the required service and free of defects.

Process wetted parts shall be suitable for process fluid and conditions. Body / trim materials shall be selected based on the applicable pipe class as per Piping Material Specification. Wetted parts material shall be SS316 as a minimum. Tubing and tube / pipe fittings used to hook up instruments to piping / vessel shall be SS316. Material of construction of enclosures and junction boxes shall be cast aluminum (LM6 / LM25) or GRP.

Galvanic compatibility between dissimilar materials is to be ensured to prevent corrosion due to galvanic action.


**6.7 Painting and Coating**

Field instruments shall be epoxy coated as per Manufacturer's standard. The finish of junction boxes (Non-IS) shall be light gray shade equivalent to RAL7035 and junction boxes (IS) shall be blue shade. Field mounted panel's surface and inside coating and finish shall be as per manufacturer's recommendation. Field stanchions shall be coated with corrosive resistant coating and finish shall be light gray shade.

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

All exposed carbon steel parts to be painted and shall be thoroughly cleaned from inside and outside to remove scale, rust, dirt and other foreign materials by wire brushing and sand blasting.

Non-ferrous materials, austenitic stainless steels, plastic or plastic coated materials, insulated surfaces of equipment and pre-painted items shall not be painted.

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

The following supplies shall be included in Bidder's scope:

- Spare parts for start-up/commissioning operations and pre-commissioning /compulsory spares;
- The engineering documents requested in the DDR attached to the Material Requisition;
- The Material Certificates.

**6.8 Identification & Tagging**

All instruments and equipment shall be permanently identified by tags, labels and/or nameplates. Use of adhesive tapes shall not be allowed.

In addition to the instruments and equipment nameplate, the structural skid (each part of skid) shall be supplied with a permanent, weather resistant, stainless steel nameplate affixed to the skid, with the following details, as a minimum;

- Project Title and SOR item number/ location;
- Owner's logo and Owner name;
- Equipment name and tag number;
- Manufacturer's name and skid serial number, skid capacity;
- Body Size, pressure rating, flow range in SCM/H, Set pressure range;
- Skid part number and overall dimension data;
- No smoking or spark flame or naked flame within a radius of 1.5 meters.
- Skid weight data;

Each skid and each part thereof and all the instruments in the skid shall have a Stainless steel nameplate attached firmly to it at a visible place furnishing the following information:

- Tag number of the skid;
- Project Name with location: "GNGPL, ----- (name of site / station)";
- PO No.-
- Inlet size (in inch) and Outlet Size (in inch) with class rating;
- Min/ Normal/ Max. Flow capacity in SM3/Hr. for each of the MRS;
- Tag number of Instruments, JB as per Material's data sheets;
- Body sizes with class rating in inches and the Valve Cg value or flow meter G-Rating (as applicable);
- Rating for all the individual instruments;

On the MRS cabinet the following instructions shall be described in ENGLISH.

- Danger – Inflammable Gas
- GOA NATURAL GAS PRIVATE LIMITED (GNGPL)
- MRS NO –

All cable should have tag no. at JB / panel end and Instrument end. All wires terminated inside skid and JB should have identification mark, ferrules etc. (for the termination of supplied cables, Identification tag no, ferrule etc. shall be provided by bidder).

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## **7 SCOPE OF WORK & RESPONSIBILITY OF BIDDER**

### **7.1 Scope of Work**

7.1.1 General : Bidder shall be responsible for execution of the package on turnkey basis with scope of work as listed below and the P&ID attached but not limited to the following :-

- a) Design and Engineering
- b) Procurement/ Supply, Inspection, Factory testing and Acceptance
- c) Supervision for Installation, field calibration/ testing and commissioning.

7.1.2 Design and Engineering:

(a) Owner shall provide the bidder with this bid package consisting of typical Piping & Instrumentation Diagrams and process data sheets. The bidder shall be responsible to carry out the design and detailed engineering based on the data provided in the bid package and in line with other technical requirements specified elsewhere in this document. Scope shall also include sizing and verification for all items including where data is dependent upon detailed engineering, detailing of basic engineering designs, preparation of data sheets, coordination drawings for instruments and system-oriented items, engineering drawings etc.

b) Residual Engineering

The bidder shall also be responsible for carrying out any residual basic engineering necessary for proceeding with detailed engineering like equipment/ instrument sizing, utility consumption, specifying derived data in process data sheets, type and material selection of instruments/ equipment's wherever required.

c) Engineering Drawings & Documents

i) Vendor Data Requirements indicate the list of drawings and documents required to be supplied by the bidder, as a minimum. Bidder to note that list specifies only the major deliverables. Documents and drawings not listed but necessary for proper engineering, construction shall also be prepared by the bidder.

ii) Bidder shall be responsible for preparation of all engineering drawings and documents including those necessary for construction like instrument index, tray layouts, location plans, cable schedules, installation standards, bill of material etc.

iii) Bidder shall also be responsible for providing all drawings and documents for package/ sub package units

iv) It is expected that bidder utilizes uniform data sheet formats enclosed along with this document, for preparing specifications for various instruments, including those, which are being prepared by package/ sub package vendors. Items for which no format has been attached with the document, bidder may use standard ISA formats. Use of manufacturer standard formats shall be avoided.

v) The bidder shall supply all the documents in both hard copy and soft copy. This includes all the documentation including those for package units.

d) The design and engineering work shall also include review of post-order vendor drawings and documents for all instruments and system oriented items. Following methodology must be followed for drawings and documents being forwarded.

i) The Bidder shall thoroughly review and approve vendor drawings for all instruments including sub-package items, before forwarding. Only the approved drawings duly stamped and signed by a competent representative/ engineer of Bidder shall be forwarded.

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ii) The Bidder shall be responsible for all System Engineering documents for the Gas metering systems. This shall include all related documents such Functional design specifications, sizing calculations, pressure drop calculation etc. and Engineering documents such as functional loop schematics, instrument details and cable schedule, Power supply distribution schemes etc. These documents shall be reviewed and approved by Bidder based on philosophy specified/ agreed for the engineering before forwarding.

iii) All multidisciplinary fabrication and construction drawings shall be reviewed and signed by bidder's respective departmental representatives before forwarding for review/ approval/record.

(e) Bidder shall be fully responsible for co-coordinating with all agencies concerned to ensure proper, uniform and smooth engineering. This shall include coordination with:

i) All individual item suppliers for uniformity in engineering and documentation supplied by them including P&ID's, instrument specifications, installation standards etc. and obtaining all requisite drawing and documents for review, record and final documentation.

ii) All instrument item suppliers including suppliers/ manufacturers of various system oriented items.

iii) Bidder's own inter-departmental coordination with departments like mechanical, piping, electrical, QC, pressure vessel, heater group etc. This shall include furnishing all necessary engineering data in the form of drawings & documents and review of drawings & data supplied by other departments.

(f) Bidder shall be responsible for preparation of all As-Built drawing / documents including

i) All P&IDs and GADs

ii) All Datasheets, specifications of instruments

iii) All Purchase documents.

iv) All System documents including hardware and software documentation.

## **8 TECHNICAL REQUIREMENTS**

### **8.1 General**

The skids shall be designed in accordance with the General specification for the Skid Mounted Assemblies. The vents shall be min. 3 meters high from the highest operating platform.

Contractor shall confirm the size of Skid and furnish the foundation loads and footprints of skid along with the bid. Size of Skid (LXWXH) shall be kept to as minimum as possible while meeting all the technical requirements.

Supply of anchor fasteners, nut-bolts (corrosion proof), angles for installation of cable trays, earthing cables, earth strips for earthing of the skid instruments, panels and copper earth strips across flanges etc. shall be in the scope of contractor.

All piping shall be rigidly supported. Adequate pipe supports shall be provided for the filters & regulators. These shall be bolted to the skid structure and shall be designed and located with due regards to weight distribution and operational pipe stress.

Lifting lugs and their supporting structure and spreader bar (one for each skid) shall be designed for a Load equal to two times the weight to be lifted (shipping weight).

All installation and erection materials such as impulse piping, pipe fittings and valves, tubing, tube fittings, cable tray and supports, foundation bolts of the skid, gaskets, companion flanges for tube fittings, instrument supports, tray supports, canopies/ sunshades for all field mounted instruments, cable glands, gland covers etc. shall be in the scope of contractor.

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All the cables used for inter-skid cabling shall be IS (Intrinsic safe) type (Blue).

The skid shall be complete in all respect, ready for quick installation and commissioning of equipment with minimum work at site. All field-mounted instruments shall be mounted on the skid and impulse lines properly supported on the skid.

Regulation skid shall be tested at working pressure with the help of Nitrogen gas. The regulator setting shall be done during the FAT only.

Contractor shall furnish material test certificate, Hydrostatic test certificate, certificates of radiography for all line mounted instruments on the skid, Certificates from statutory body for hazardous area approval for all electrical items mounted on the skid, Calibration certificates, certificates for the conformity to the standards to be submitted, and all other certificates mentioned in individual general specification.

Contractor shall take single point responsibility for the engineering, design, certification, procurement, inspection, testing, supply, commissioning & performance of the Gas filtration & Regulation skids along with all instruments, equipment and valves of the skids, based on the data sheets and the specifications furnished and taking into consideration successful operation, safety and the established International standards for the complete skids.

Supplier shall note that the complete skid to be pneumatically tested in the factory premises @ 7.7 Barg with N<sub>2</sub>/Air. In case of dismantling of the skid due to transportation, same shall be re-tested once again at the installation site @ 7.7 Barg with N<sub>2</sub>/Air. For testing at site, all the arrangement shall be in the scope of skid supplier.

The relief valve should be installed and provided with test connections in the impulse pipe work in such a way as to enable them to be set up and tested in-situ.

All required accessories such as filter, regulator, lubricator, etc., if required, for safe and proper operation of SOV shall be in the scope of contractor. It is not shown in the P&ID.

Automatic switch over from active stream to the hot standby stream should take place in the event of shut down of the active stream for any abnormal reason., if any instrument not shown in the P&ID and not specified in specifications but required for successful & Safe operation, shall also be in the scope of skid supplier. The automatic switchover shall be achieved with appropriate staggered setting of Pressure regulator/monitor and slam shut valves. Vendor shall select the appropriate set points such that the switch-over is smooth without affecting the safety of the system and gas supply to consumers is also not interrupted. All the instruments shall be considered for safe and successful operation of the automatic switch over adjustment system. Detailed description of automatic switch over system shall be submitted during detail engineering.

At tapping for gas supply to the pressure regulators, ball valve (Lock Open type) shall be provided.


End connection spool piece between the transition fitting and skid end flange shall be in the scope of skid supplier. Transition fitting will not be in the scope of vendor.

All the drains shall be connected to the common drain header with one common outlet at the skid end. End connection of the drain line shall be flanged type and one companion flange shall be provided by skid vendor for the same.

Companion flange with gasket, nut and bolts for the skid inlet shall be in the scope of vendor complying with tender specifications. All flange joints bolts & nuts shall be SS-304.

MRS skid shall be in full compliance with the PNGRB requirements. If the requirements of PNGRB missing in the tender, it is vendors responsibility to fulfill the requirements without any cost implication.

Contractor / Vendor shall keep all necessary items in their inventory for any kind of replacement up to Defect Liability Period.

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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.

### 8.2 Filtration System

The supply shall include all the required material, instruments along with valves impulse pipes, tubes etc. inside the battery limits of the skid, as shown in the P&ID and tender specification. Filtration shall be 'In to Out' type. The design of the filter shall be in such a way that there shall be provision to remove the dust from the filters by using the filter whenever required. There shall be no possibility for the accumulation of dust.

Design and construction of filter shall meet the requirements as per ASME Boiler & Pressure Vessel (BPV) Code, Section VIII: 2007. The flow of gas shall be of out-to-in type, i.e., the design of the filters shall be such that the (unfiltered) gas from the inlet piping shall enter in the annular space (i.e., the space between the filtering element(s) and the wall of the filter) and then the filtered gas should flow in the skid.

Differential pressure indicator (clogging indicator) shall be provided across the filter. All the filters shall have drain connections with valve (with positive blind arrangement) and shall be suitably located and sized to ensure a reasonably short blow down time. All welded joints shall be radiographically examined and acceptance criteria shall comply with ASME BPV Codes.

A dust concentration of 0 – 0.1 mg/scm shall be considered for designing the filter. The details of calculations that have been considered for designing the filter along with all the drawings (of filter, cartridge, etc.) relevant to the same shall be provided along with the technical bid. The filter element has to be a single cartridge type only.

### 8.3 Regulator System

Pressure regulators shall be provided in MRS skid for regulating pressure in gas service lines supplying to industrial, commercial & domestic customers from steel pipeline distribution systems. In addition, slam shut valves shall be provided as safety devices to protect against excess and lack of downstream pressure.

Each stream shall contain one/two regulator for single stream MRS and two/four regulators for dual stream MRS as shown in the P&ID, so that if any one fails, then the other one will maintain in safe conditions. Regulator shall be integral strength regulator as per EN 334: 2005+A1:2009 and proved as satisfactory pressure vessels by hydrostatic and pneumatic tests.

Pressure shut-off device shall be provided to protect against excess and lack of downstream pressure. Accuracy of slam shut operation should be as per the requirements of BS EN 14382: 2005+A1:2009 or better.

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

The material of construction shall be as specified in related technical specification. All the internals / wetted parts shall be SS316. All tubing & tube fittings within the skid shall be SS316. Vendor to ensure that all tube fittings used in the skid shall be procured from single vendor.

Regulators design shall be such that the outlet set point can be varied as shown in the P&ID.

Vendor to carry out detail engineering and shall submit the operational philosophy and details of the automatic switch over adjustment system.

It is vendor's responsibility to design the system full proof and if any problem arises in operation of the system, vendor shall resolve it without any cost implication.

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## 8.4 Instrumentation Components

### 8.4.1 Temperature and Pressure Gauges

Temperature gauges shall be used for local indication. These local temperature indicators shall in general be heavy duty, weatherproof, dial type bi-metal thermometers with 150 mm dial size, external zero adjustment, every angle rotatable and rigid stems.

The bi-metal gauges shall be adjustable union stem type with SS 316 material for the stem. The Union size shall be ½" NPT and the diameter shall suit the well diameters. However, Vendor shall verify the compatibility of the material of construction with the site/process requirements and suggest suitable material. Case material for all temperature gauges shall be SS316. Capillary and armor shall be of stainless steel.

Thermowell material in general shall be of AISI 316 SS. temperature gauges shall be installed in a suitable thermowell. Thermowells shall be SS316 as a minimum and shall confirm to the process service and piping class requirements.

Thermowell shall be flanged machined from solid bar stock and with tapered end. Thermowell construction details and insertion length criteria shall be defined during detailed design.

Thermowell shall be designed to withstand vibration stresses caused by stream velocity. Wake frequency at maximum flow velocity shall be less than 80% of the natural frequency of the thermowell. The Contractor shall provide calculations to ASME performance Test Code 19.3, Part 3: Instruments and Apparatus for Temperature Measurement.

Pressure gauge dial shall be white, non-rusting plastic with black figures. The dial face shall be marked with pressure element material. Pointers shall have micrometer adjustment.

Pressure gauges shall be weatherproof with dial size of 150 mm and shall have features like screwed bezels, externally adjustable zero, over range protection and blowout discs. Pressure gauge sensing element shall be SS 316 and movement of SS 316, as a minimum. Connection shall normally be ½" NPTM bottom.

Pressure gauges shall have an accuracy of +/- 1% of FSD. Differential pressure gauges may have an accuracy of +/- 2% of FSD.

Differential pressure gauges shall generally be diaphragm type. Diaphragm seals type shall be used for slurries, viscous and corrosive fluids. All differential pressure gauges shall be installed so as to minimize the length of impulse lines. Necessary isolation valve / manifold shall be provided for all differential pressure gauges.

Over range protector and pulsation dampener, whenever used, shall be of SS 304, as a minimum. Pulsation dampener should be used for all pulsating services. It shall be floating pin type, externally mounted and externally adjustable.

Cases shall normally be cast aluminum alloy or black phenol and weatherproof to IP 65.

### 8.4.2 Pressure Safety Valves / Creep Relief Valve

Pressure safety valves (PSV) shall be direct acting, spring loaded; full nozzle / full lift, adjustable blow down high capacity type.

PSV shall have flanged end connections, enclosed spring, bolted bonnet, screwed cap, and full one-piece nozzle. Flanges shall be in accordance with ANSI ASME B16.5 requirements.

Flanges shall be integral part of the body. Weld-on flanges shall not be allowed. Bodies and flanges shall be of the same material. Inlet flange shall be of sufficient rating to withstand the reaction force of the PSV.

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PSV sizing shall be carried out based on API RP 520 Part 1. Orifice letter designation shall be in accordance with API Std 526. For blocked discharge case, overpressure shall be 10% above the set pressure. For fire relieving case overpressure shall be 21% above the set pressure.

All wetted parts of PSV shall be SS316. Safety valves shall be provided with test gags and manual test lever. Springs of safety valves shall be selected as per process conditions.

This specification with the attached datasheet covers the minimum of requirement design, material, testing, and marking etc. for the Pressure Safety Valves. It is Bidder's responsibility to select suitable safety valve required.

Creep Relief Valves (CRV) shall be provided in each of the stream as indicated in respective P&ID in order to protect against downstream over pressure.

A Vent shall be provided to discharge gas from relief valve to safe place at least 3 meters above the ground level and it should be terminated with suitable flame arrestors. Open end of vent pipe shall be provided with weather hood

#### 8.4.3 SSV and Pressure Regulators

Set point of the Gas pressure regulators (PCV's) and Slam shut down valves (SDV's) shall be adjustable. Bidder shall furnish the adjustable range of the PCV's & SDV's.

Valve action on control signal or air failure shall be as indicated in P&ID.

Following are some general points shall be followed by the vendor:-

Valves shall have flanged end connections. The flange rating and facing shall be in accordance with piping class.

Connections for on-off valves shall be in accordance with piping class.

Pressure regulators shall be of flanged type.

Set point of the Gas pressure regulators/ Monitor (PCVs) and Slam Shut Valves (SDVs) shall be adjustable. Vendor shall furnish the adjustable range of the Gas pressure regulators/monitors and slam shut valves.

It is intended to provide slam shut valves on upstream of the self-actuated pressure control valves at gas receiving points for tight shut off at increasing pressure beyond a preset limit to take care of self-actuated pressure control valves failure.

Each pressure regulator shall be designed for maximum gas flow rate at the minimum inlet arrival pressure.

The materials selected for the regulators and SSV components shall be conform to the process requirements (minimum SS 316) and shall be specified in the data sheets. Vendor shall seek the approval from owner for the MOC of the parts of the valves prior to start the manufacturing.

Pressure regulators shall be of self-actuating pressure reduction with regulation accuracy of better than +/- 2.5% of set point.

The construction of the Regulators / monitors shall be such that there will be no continuous gas bleeding.

Closing time of slam shut valve shall be less than 2 seconds for all sizes of the valves. Actual closing time of the valve shall be furnished by vendor in the datasheet.

Slam shut valves shall be provided with limit switches for transmitting position status in EVC.

Resetting of slam shut valves shall be only manual.

Slam shut valves shall be provided with a mechanical indicator to indicate valve open or close position.

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Slam shut valve shall have a set point accuracy of +1% over the whole operating range.

SSV shall have facility of over and under pressure shut off. Vendor shall mention the over pressure and under pressure set range for the SSV in the datasheet.

Velocity in the piping upstream/downstream of filtration shall be within 18 m/s and 30 m/s respectively. Maximum seat velocity of external SSV shall be limited to 30 m/s.

Vendor shall install the pressure regulators & its sensing lines and SSVs with suitable upstream and downstream lengths required for safe and proper operation of the regulators.

The PCV & SSV shall be designed in such a way the noise generated by these equipment's shall not interfere with the performance of the meter.

Vendor shall submit the detailed sizing calculations of the regulators and SSV of all the streams in detail for review and approval during detail engineering, (Vendor to consider all the combinations such as Minimum Pressure and Maximum flow rate, maximum pressure and Minimum flow rate etc for all the streams. The velocity, noise level shall comply in all combinations as specified in the tender document).

Provide ball valve in each of the sensing line for each of the active/monitor regulators and SSVs. Size of the valve shall be minimum 1/2". These ball valves shall have lock open facility.

For all Lock open type valves, Vendor shall provide the locks.

In case, if the size of the regulator and SSV is less than the size of the pipe, vendor shall use the reducer and expander at the inlet and outlet of each regulator and SSV. In no case the velocity in the pipe immediately after the regulator shall not be more than the velocity specified in the tender specification (30 m/s).

The self-actuating Pressure regulating valve shall be designed as per EN334 or Pressure Equipment Directive PED 2014/EU/68 covering the production quality assurance.

The Slam shut valve shall be designed as per EN 14382 or Pressure Equipment Directive PED 2014/EU/68 covering the production quality assurance.

Leakage class for pressure control valve & slam-shut valve shall be class-VI as per ANSI B16.4.

#### 8.4.4 Temperature Instruments

The temperature element shall be RTD PT-100, 2-wire system. Elements shall be spring loaded, mineral insulated and shall have SS316 sheath as minimum. The element head shall be screwed-in type and weatherproof to IP-65 as a minimum.

Sensor elements of temperature transmitters shall be installed in a suitable thermo well. Thermo wells shall be SS316 as a minimum and shall conform to the process service and piping class requirements.

Thermowell shall be flanged machined from drilled bar stock and with tapered end. Thermowell construction details and insertion length criteria shall be defined Vendor.

Thermowell shall be designed to withstand vibration stresses caused by stream velocity. Wake frequency at maximum flow velocity shall be less than 80% of the natural frequency of the thermowell. The Contractor shall provide calculations to ASME performance Test Code 19.3, Part 3: Instruments and Apparatus for Temperature Measurement.

Temperature transmitters shall not be part of the sensing element assembly. The sensing element shall be RTD 3/4 wire type. The temperature element length shall be selected to suit the thermowell insertion length.

The transmitter shall be head mounted "SMART" type, two wire loop powered at 24V DC with 4-20 mA output with integral digital output meter. Transmitters shall have HART protocol for digital communication.

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The range shall be selected so that the normal operating temperature shall fall in the middle third of the span.

Temperature transmitters shall have a built-in linearization function to produce an output linear to temperature range.

Skin type temperature sensors shall be provided where pipe temperature is required to be measured. Skin RTD shall be PT-100, 2 wire system, 4-20mA + HART. A weld pad shall be provided on the pipe with 1/2" NPT entry for RTD sensor. Sensor length shall be decided during detailed engineering stage.

#### 8.4.5 Cables

The instrumentation cables shall be selected in function of the application on basis of the standards specification.

### 8.5 Junction Boxes

The material of construction of JB's shall be Corrosion resistant , Cast Aluminum LM6 /25 or FRP. All JB's shall be weatherproof to IP-65 minimum in accordance with IEC 60529.

JB's shall be certified increased safety EEx'd'Explosion proof located in a hazardous area.

Cable entries shall be generally in the bottom for multi-core cables and in the side for single pair or single triad cables. Top entry into JB's is not permitted. All unused entry holes shall be sealed with the certified blanking plugs. Cable entries shall be ISO metric threads M20 X 1.5 mm minimum.

The cables entering the junction box from the side shall form a drip loop below the junction box before entering the junction box, to avoid water / moisture seeping into the junction box.

Sufficient terminals shall be installed inside the junction boxes to terminate all cable pairs/cores including spares.

The JB's shall be provided with metallic gland plate inserts to provide earth continuity. Also breather shall be provided for the junction boxes.

### 8.6 Pipe Work & Fittings

MRS skid construction / fabrication, reinforcement pads, etc. shall meet the requirements of codes ASME B31.8: 2010 and or ASME BPV Code, Section VIII: 2010. The design and assembly of all the equipment's shall be such that there is no difficulty in the operation and maintenance of the same.

Pipe work and fittings shall be of seamless type and as per ASTM A106 Gr. B: 2010 / API 5L Gr. B: 2007 and ASTM a 234 Gr. WPB: 2011 & ASTM A105: 2010. All branch connections shall be of weld let type up to d\D ratio less than 0.3 and sweep let type up to d\D ratio less than 0.6. All valves for pressure / vent, pressure gauge and bleed should have positive blind arrangement.

Welders and welding procedures have to be qualified in accordance with ASME BPV Code Section IX: 2010 / API 1104: 2005. All the welded joints shall be radio graphically examined and acceptance criteria shall comply with ASME BPV Code, Section VIII: 2010 / API 1104: 2005.

### 8.7 CABLE TRAYS AND CABLE DUCTS

- All branch cables/trench cable shall run on cable trays.
- These cable trays shall be made out of galvanized iron-perforated type of 2.5 mm thickness. These trays are supported with suitable clamps shall be supplied for binding the cables/tubes at every 500 mm interval. All the cable/tubes will be laid in trench, false flooring/ ceiling trays, instrument support structures and supported with 50 mm x 50 mm angles as a minimum.

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- Maximum width of the cable tray shall be 600mm and height 50mm, 75mm or 100mm as applicable. 25% spare capacity shall be provided in cable trays.
- The above ground outdoor field cables shall be laid in durable, non-corrosive hot dipped galvanized perforated cable trays of suitable sizes shall be provided for cable routing between junction boxes/instruments and buried trench in the station/unit facilities. The cable trays shall be supported at regular intervals.
- Contractor shall submit details of cable trays including size, layout drawings etc. during detailed engineering stage. Supply, installation and fixing of Prefabricated hot dipped galvanized perforated cable trays of width 50 mm / 100 mm / 150 / 300 mm as per site requirement for laying of cables. The work includes cutting to size, fixing with all accessories on concrete / wall / structures etc.
- The proper NEMA strength classification trays shall be used in accordance with loading requirements. The tray shall be installed with standard vendor/contractor components and shall be covered with perforated covers (of same material) after laying cables.
- Cable tray shall be rigidly supported to carry the weight of the cables laid within, as well as any vibrations which may be experienced in normal operation of work. At no time shall the cable tray be used to sit or stand on, nor shall tools or pipe be placed on the tray.
- Cable trays and supporting steel structure etc. to be painted as per standard procedures of painting to meet the corrosive area requirement. Proper color shall be provided in the cable trays. Epoxy based paint is to be applied on the all MS structures including support structures. Cable trays shall be installed with cabling etc as per site requirements. Cable laid in horizontal trays shall be fixed to the trays by means of suitable detachable type, non-corrosive straps at intervals not exceeding 500 mm.
- Cable trays shall be supported at each 2500 mm or less of horizontal run and shall be so routed that there is no danger of mechanical damage. Routing shall follow major structure axis.

### 8.8 SCOPE FOR SUPPLY OF CABINET

This specification covers the basic requirements for the design, selection and the installation of canopy to cover entire mechanical, instrumentation and control systems associated with equipment and to be termed as "CABINET"

- These cabinet doors will be lockable from outside.
- Cabinet shall be weatherproof. The thickness shall be minimum 16 SWG (1.6mm) SS304/M.S.
- For all doors, side lowered sheets and roof sheet proper bracing's to be provided.
- Wherever S.S nuts, Bolts are provided, shall be properly sealed to avoid entering of rain water etc. inside canopy.
- All outer locks, handles to be provided at Man Working Height.
- Godrej Cupboard Lock (Internal rod type) shall be used.
- Adequate Stiffener will be provided to avoid vibration.
- A 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 during handling, transportation and installation.
- The cabinet should have free ventilation of at least 5% of the surface area. It should have front doors that open fully on either side or also lockable from outside. The rear doors are lockable form inside.
- Regulator vents should protrude through the cabinet wall and terminate with flame arrestors with minimum 03 meters height.

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- Sufficient and adequate lighting arrangement shall be provided from operation and maintenance point of view.

## **9 QUALITY ASSURANCE, INSPECTION AND TESTING**

### **9.1 Quality Assurance**

The Bidder shall have in effect at all times, a QA / QC program that clearly establishes the authority and responsibility of those responsible for the quality system. Persons performing quality functions shall have sufficient and well-defined authority to enforce quality requirements, initiate, identify, recommend and provide solutions to quality problems and verify the effectiveness of the corrective action.

### **9.2 Quality Control**

The Bidder shall submit certified reports of production tests as soon as the tests are completed satisfactorily.

The Company / PMC reserves the right to inspect materials and workmanship at all stages of manufacture and to witness any or all tests. The Bidder, after award but prior to the pre-inspection meeting, shall provide the Company / PMC with a signed and stamped copy of QAP included in this tender as compliance.

### **9.3 Inspection and Testing**

Inspection and testing shall be performed in accordance with written procedures prepared by the Bidder and approved by the Company / PMC. Test procedures shall include a schematic of testing arrangement with details of instrumentation used during test.

It will be in Contractor's scope to arrange TPIA for GNGPL order. No separate payment shall be made for it. Manufacturer / Vendor shall submit TPIA list for GNGPL approval and hire TPIA from approved TPIA list for witnessing and testing as per approved QAP of GNGPL.

Before deputing TPI engineer, Contractor is required to forward resume of TPI engineer for GNGPL approval. GNGPL shall review the same and shall conduct telephonic / skype interview with suitable inspector. Only approved inspector shall only be authorized for inspection.

In case GNGPL could not find suitable candidate proposed by Contractor then GNGPL reserves right to nominate any specific TPIA and Contractor is bound to carry our inspection from this TPIA). Inspection shall be carried out as per Owner Technical Specification, approved QAP and approved drawing only.

Owner Representative shall carry out stage wise inspection during manufacturing / final inspection.

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

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

Even after third party inspection, Owner reserves the right to carry out test independently. If the results of these tests fall outside the limits specified in Owner technical specification, then GNGPL reserves the right to reject the same.

Visual inspection shall be carried out by Bidder for all package Instrumentation, confirming that the package supplied meets the relevant specifications, design codes and data sheets.

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Inspection will be required on all aspects of the Bidder's documentation, including applicable certification and test / material certificates.

Calibration equipment (of an order of magnitude greater than the device being tested) shall be traceable to National Standards and shall have been calibrated within 6 months prior to tests.

The Bidder shall be responsible for the provision of all test and calibration equipment, utilities (e.g. power / air / water) supplies as applicable and the recording of all test results on approved test record sheets.

Inspection and witnessed tests by the Company / PMC and third parties shall not relieve the Bidder of any guarantees, responsibilities or obligations to provide satisfactory equipment.

The Bidder shall provide quality records appropriate to all inspection and test activities. The records shall be referenced against appropriate activities within the inspection and test plan.

Bidder shall collate all such quality records and certification for submission to the Company / PMC as a certification dossier. Note that, where necessary, certificates shall be stamped as approved by the third party inspector.

Adequate data on capacity, range ability, lock-up, minimum and maximum operating pressure differentials, dynamic performance characteristics and predicted noise level emissions, set points of slam-shut valve, relief valve, etc., shall be given by the manufacturer in order to determine the performance of the regulators under various operating conditions. Results of such tests carried out by the manufacturer to determine operational performance and thereby confirm these design data and Manufacturing Test Certificates (MTC) for all components / parts, NDT results, Welding Procedure Specification (WPS), Welder's Performance Qualification Record (WPQR), Welding Procedure Qualification Record (PQR), etc., shall be made available prior to offering the complete skid for witnessing the performance testing by GNGPL / Third Party Inspection agency appointed by GNGPL.

The final performance test of complete skid shall be carried out in presence of Third Party Inspecting agency / GNGPL representative before accepting the skid and giving clearance for dispatch. Inspection shall be carried out by GNGPL appointed TPI & charges will be borne by vendor. 2.3. Acceptance of equipment or the exemption of inspection or tests thereof, shall in no way absolve contractor of the responsibility for delivering equipment meeting the requirements of the specifications. Following minimum tests shall be included.

- a) Material test certificate,
- b) Hydrostatic test certificate for self-actuated pressure control valves, slam shut valves, creep relief valves, isolation valves and for all piping /valves of skid. The hydro test is to be performed at 1.5 times of maximum operating pressure
- c) Testing to demonstrate set-point accuracy and actuation time for integral Slam shut valves
- d) Testing to demonstrate the set point accuracy for self-actuated pressure control valves for the complete range of pressure and flow conditions.
- e) Calibration certificate for creep relief for set pressure and all field instruments.
- f) Seat tightness test for self-actuated integral slam shut valves and creep relief valves
- g) Test certificate for all field instruments such as PGs, TGs, DPGs, and PTs& TTs.
- h) Certificates from statutory body for limit switch being flame proof and weather proof.
- i) Skid piping material testing and NDT of welds as per applicable standards.
- j) Pneumatic Test report with air/N2 at as per approved QAP and standard.
- k) Skid functional testing considering pressure regulation, limiting and safety characteristics.

Inspection is to be carried out as per the inspection plan stated below.

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#### 9.4 Inspection and Test Plan

Inspection of the skid shall be carried out as per EN 10204, type 3.1:

- Review / checking of all test certificates;
- Visual inspection of skid assembly;
- Following tests shall be Witnessed:
  - a. Hydrostatic & pneumatic testing of the assembly, as per the parameters given in 'Specific requirements'.
  - b. Performance testing of regulator: Outlet pressure v/s flow (for various inlet pressures), inlet pressure v/s flow (for various outlet pressures), checking of lock up pressure to be within limits, slam shut operation & its setting, regulator and relief valve operation & its setting.
  - c. Stage-wise inspection to be carried out for inspection of workmanship quality and for inspection of surface preparation and primer coat / intermediate coats to ensure proper adhesion / paint quality.

#### 9.5 Factory Acceptance Test (FAT)

Factory Acceptance Test (FAT) is an inspection procedure for verification which ensures the functionality of all equipment as per design intend and integrity of the skid. FAT shall be conducted according to the approved FAT procedure.

Prior to notification of FAT to Company / PMC, all the involved contractual documentation shall be approved by Company / PMC and internal testing reports shall be submitted for Company / PMC review. During FAT, all the equipment and components shall be assembled and installed. The system shall be ready in respect.

Bidder shall demonstrate all the functions of the system working properly during the FAT.

Each test shall be carried out on the procedure reviewed and accepted by Company / PMC after submitting Manufacturing Internal Test Certificate.

FAT certificate shall be issued by the bidder at the successful end of the test activities.

All the hardware and software failures and problems shall be documented. All the failures and problems shall be resolved before shipment to site; all series of actions shall be taken in accordance with the FAT procedure.

Range, calibration span, set points, reports etc. shall be modified as per Company / PMC requirement by the bidder during the FAT.

FAT shall include the following activities as minimum:

- Quantity of all the equipment and components;
- Installation of all the cabinets, equipment and components;
- Tagging of all the cabinets, equipment and components;
- Wiring of all the cabinets, equipment and components;
- Hardware Testing shall include the following activities as minimum;
- Redundancy of Power Supply on failure;
- Diagnostics of the main equipment;
- Redundancy of the main equipment on failure if any;
- Modem communication to data host check.

#### 9.6 Hydrostatic Test

Hydrostatic test shall be carried out up to the test pressure as detailed in the specific requirements. Wherever necessary, regulators, relief valves and similar components that have been tested independently shall be removed from the line.

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Blind flanges or double flange pipes shall be installed temporarily in their place. All small bore connections and impulse lines shall be disconnected and suitable plugs or blank flanges shall be installed.

**9.7 Leakage Testing**

Pneumatic testing using air or an inert gas shall be undertaken on all installations and shall include all equipment and associated small bore pipe work.

Care must be taken to disconnect equipment, which might get damaged at the testing pressure. All joints, flanges and glands on valves and fittings shall be tested for leakage with a suitable foaming fluid.

**9.8 Package Test Panels**

All testing shall be carried out at the Bidder’s test facility. Test equipment shall be supplied by the Bidder and shall be calibrated within six months of the test date. The minimum scope of testing is summarized below. The Bidder shall supply an Inspection & Test Plan (ITP) with the Tender.

The Vendor shall provide the Company with at least 14 calendar days advance notice to witness tests performed in either the Vendor’s shop or his sub-Vendor’s shops.

**9.9 Control Panel**

Control Panels (if applicable) and associated equipment shall as a minimum be tested and checked upon completion as follows:

- The panel and its contents shall be inspected to ensure that it has been constructed to the specification and latest approved drawings.
- All labels, tags plates and ferrules shall be checked to verify correct text, location and secure attachment.
- All fuse ratings shall be checked and fuse holders shall be marked with rating and service as detailed in the latest drawings. The fuses and isolating switches shall be checked to ensure they are connected to the correct circuits.
- The circuits shall be checked for correct polarity.
- The total electrical load and power factor shall be measured.
- Electromagnetic interference shall be checked to ensure compliance with the relevant Standards.
- Earthing shall be checked so as to be in accordance with the Bidder's requirements and such additional requirements as may be specified by the Company.

**9.10 Cables and Wiring**

All cables / wiring shall be tested for continuity and inspected to verify installation is in accordance with the drawings. All cables shall be tested for insulation resistance. The test voltage shall be compatible with the cabling being tested. Equipment or devices shall not be connected during testing.

**9.11 Test Certificates**

A record of all hydrostatic testing and pneumatic testing carried out shall be prepared for every installation. A material test certificate for all components of skid shall be furnished at the time of inspection by third party / GNGPL representative. GNGPL reserves the right to witness all the tests.

Records of all calibrations, tests and conformity checks shall be provided by the Bidder using the Company’s acceptance certificates. The acceptance certificates shall be completed by the Vendor and attested by the Company’s site engineer prior to commissioning. The procedure for

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site testing and witnessing shall be agreed in writing by the Company prior to commencement of work.

**9.12 Instrumentation Test**

Skid-mounted instrumentation shall be tested as follows:

Bench calibration of instruments shall be carried out prior to installation, where applicable.

All skid wiring shall be tested for continuity and insulation; the test voltage shall be compatible with the wiring being tested. Equipment or devices shall be disconnected before wiring is tested.

Instrument air systems shall be tested for leakage using dry air at a pressure 110% of maximum working pressure.

Process impulse lines shall be disconnected from the process line and the instrument, and shall be hydraulically tested to 1.5 times line design pressure. All instrumentation equipment and piping shall be thoroughly flushed and dried out on completion of test. Instrument impulse lines on lube oil service shall be pneumatically tested, using air or nitrogen.

All test equipment shall be certified by a recognized calibration authority and be provided by the Vendor. Test equipment shall have an accuracy of 10 times better than that of the equipment to be tested.

Skid mounted instrumentation simulated tests shall be performed with the remote or local panel connected to field instruments.

All alarm, shutdown and control systems shall be tested under simulated operating conditions prior to machine test, after it has been demonstrated that the equipment has been fully installed, properly connected, pressure tested and is fully operable, as proved by support documentation.

Test procedures shall be submitted to the Company / PMC for approval, prior to test.

The test shall simulate, as near as possible, actual working conditions. The Bidder shall provide means whereby any process variable may be measured and adjusted to demonstrate correct functioning of the associated control system.

The Bidder shall provide any temporary cabling necessary for string testing, (i.e. temporary cabling between skid and off skid panel provided by the Bidder).

Acceptable evidence of the satisfactory condition of the test equipment, (e.g. current test certificates) shall be supplied by the Bidder.

**9.12.1 Functional Tests**

Each pneumatic instrument shall be tested by connecting an input signal of the correct range while monitoring the instrument output. The input signal shall be varied over the full range and each device checked for proper operation.

Temperature instrument input signals shall be simulated over the full range and each temperature instrument checked for proper operation.

**9.12.2 Electronic Instrument and Instrument Loop Test**

Electronic instruments and loops shall be tested from the junction box to the instrument concerned as all electronic instruments terminate at local skid junction boxes (cable installation from local skid junction boxes to the equipment room is by others).

**9.12.3 Pressure Safety Valve Test Certificates**

The Vendor shall issue a test certificate covering each valve fully compatible with the requirements of API RP 520.

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**10 SUPERVISION OF INSTALLATION / ERECTION, COMMISSIONING AND STARTUP**

- Bidder shall carryout installation of all instruments in the skid as described in this document. Installation shall include but not limited to installation of all supplied items, installation skid assemblies explained in this package, installation of junction boxes, interconnection between instruments and junction boxes, fabrication, laying and painting of cable trays, laying of all single pair and multi pair cables in the skid, JB earthing/ grounding, Field Instruments/ signal earthing/ Grounding, tagging, ferruling, cable glanding and pair/ core identification of all field cables.
- Bidder's scope of supply/ work shall include earthing cable/ strips (as applicable) etc. (along with cable tray with supports for installation) in the skid/ JB/ control room, as per the requirements of various instruments.

**10.1 Testing & Calibration**

- Bidder scope of work includes testing of all supplied items and systems including impulse lines, pneumatic signal tubes and instrument cables and special instruments/ items if any. Bidder shall also carryout testing and calibration of all instruments as per the requirements specified elsewhere in tender document. Testing and calibration of Gas metering system shall be as described elsewhere in the document.

**10.2 Commissioning**

- It is the responsibility of Bidder to co-ordinate and make available the services of vendors/ sub-vendors for gas metering system package, control system, etc. and other special instruments/ equipment's like Gas flow meters, On line Battery , EVC / field mounted flow computer (as applicable), Pressure regulators, testing, FAT, Site acceptance, startup/ commissioning of the station. The bidder shall provide assistance during commissioning without any condition/ pre-requisite. It is the responsibility of the vendor to get the certification from site Engineer. Installation of all the loose supplied items, its interconnection etc shall be in the scope of supplier. In case of any dispute / conflict arising due to difference in opinion/ interpretation, the interpretation of Client /Consultant shall be considered final.

**11 PERFORMANCE GUARANTEE**

Bidder shall provide performance guarantee for 18 months from the date of delivery of skid.

**12 PACKAGING, PRESERVATION / STORAGE AND PREPARATION FOR SHIPMENT**

**12.1 Packing**

Preparation for shipment shall be in accordance with the Bidder's standards and as noted herein. Bidder shall be solely responsible for the adequacy of the preparation for shipment provisions with respect to materials and application, and to provide equipment at the destination in ex-works condition when handled by commercial carriers.

Adequate protection shall be provided to prevent mechanical damage and atmospheric corrosion in transit and at the jobsite. Preparation for shipment and packing will be subject to inspection and rejection by Company / PMC. All costs occasioned by such rejection shall be to the account of the Vendor. After inspection and test, equipment shall be completely free of water and dry before start of preparation for shipment.

All threaded and flanged opening shall be protected to prevent entry of foreign material. All the field mounted instruments shall be supplied loose to avoid damages during transportation. Skids shall bear proper shipping markings. Entire shipment shall be made with proper packing to ensure zero damage. It will be in Contractor's scope to replace all damaged parts during transportation to the satisfaction of GNGPL at no extra cost

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Each package shall be identified with Material order number and content list in a weatherproof envelope. All openings shall be sealed. Threaded connections shall be protected with forged steel or molded plastic screwed plugs.

**12.2 Preservation / Storage**

The Bidder shall be solely responsible for the adequacy of the preparation for shipment and shall also state in their offer his recommendations for long term storage (up to 12 months) for both indoors and open air storage.

Instruments and their parts have to be stored in dust-free area at controlled temperature environment. Sensitive parts such as PCBs and chips are to be covered in anti-static sheets.

**12.3 Marking**

The Bidder shall attach a packing list along with all requisition details, in a waterproof enclosure, to the outside of the package.

**13 DOCUMENTATION**

Vendor shall furnish the complete set of documents in hard copy in English only. The minimum documents submitted by the bidder shall be as follows. Refer Material Requisition for detail documentation requirement.

**14 SPARES**

Bidder shall provide the following spare list for all items of skid:

- Mandatory and commissioning spares;
- O&M spare parts list.

Following Installed spare criteria shall be considered as a minimum in instrumentation and control system design:

- All pairs of multi-pair cables shall be terminated in the junction boxes as well as at panel side (including the unused spare pairs);
- Field junction boxes shall have 20% spare terminals and 20% cable entries for connecting future instrument cables;
- All multi-pair/multi-core instrument cables shall have 20% spare pairs;
- All Instrument cable trays and trenches shall have at least 20% spare capacity for future cables;
- Instrument cabinets shall have 20% spare space for I/O cards, marshaling terminals, cable entries etc. for future additions;
- I/O cards shall have 20% spares for future use (separate for each I/O card type i.e. AI/AO/DI/DO etc.).

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PROCESS PARAMETER	
FLUID	NATURAL GAS
CAPACITY	250-5000 SCMH
INLET PRESS.	12 - 45 kg/cm <sup>2</sup> g
OUTLET PRESS.	4 - 6 bar.g
INLET TEMP.	10° - 48° C
DESIGN TEMP.	-29 - 65° C
DESIGN PRESS.	INLET 49 Bar.g / OUTLET 19 Bar.g
DESIGN CLASS	INLET 300# / OUTLET 150#
OPERATION	CONTINUOUS

**F-1001A / B (1 WORKING + 1 STANDBY)**  
**CARTRIDGE FILTER**  
 TYPE : HORIZONTAL / VERTICAL  
 QUANTITY : 1  
 FLOW RATE : 250-5000 SCMH  
 MAX. PR.DROP : 0.1 Bar (Clean) & 0.3Bar (Dirty)  
 FILTRATION EFFICIENCY 99% REMOVAL UPTO 5 MICRON SIZE  
 DESIGN PRESS. : 49 Bar.g  
 DESIGN CLASS : 150#

**TOTAL NO. OF QUANTITY : 1**

REFERENCE DRAWINGS

DRAWING TITLE	DRAWING NUMBER

GENERAL NOTES:-

- ALL LINE NUMBERING AND EQUIPMENT TAG NUMBERING SHALL BE PRE-FIXED WITH PROJECT & AREA CODE AS "C231099-GO".
  - ALL INSTRUMENT TAG NUMBER SHALL BE PRE-FIXED WITH PROJECT AREA CODE AS "C231099-GO" AND P & ID NUMBER.
  - ALL LINE NUMBERING OF THE PIPING PERTAINING TO GNGPL SCOPE SHALL BE DECIDED AT SITE IN CONSULTATION WITH GNGPL EIC.
- NOTES :-
- ALL VENTS SHALL BE LOCATED AT A MIN. HEIGHT OF 3M ABOVE THE HIGHEST WORKING PLATFORM.
  - ALL VENTS SHALL BE PROVIDED WITH FLAP CAPS & ARRESTOR.
  - PSV SHALL BE DESIGNED FOR FIRE CASE.
  - EACH VENT AND DRAIN LINE SHALL BE PROVIDED WITH A BALL VALVE & A GLOBE VALVE.
  - MRS SHALL BE SUPPLIED INSIDE A SPRAY COATED STEEL CABINET WITH LOUVERS. INLET AND OUTLET FLANGES TO BE INSIDE THE CABINET.
  - DESIGNATION, NO., DESIGN CLASS OF PSVs & CRVs TO BE DECIDED DURING DETAILS ENGINEERING.
  - CARTRIDGE ELEMENTS SHALL BE SUITABLE FOR DRY GAS.
  - JUNCTION BOX TO BE MOUNTED AT SUITABLE LOCATION ON THE ENCLOSURE CABINET.
  - SIZES INDICATED FOR PIPE/VALVES/ EQUIPMENT ARE MINIMUM INDICATIVE ONLY. BIDDER TO SELECT PIPES/VALVES/ EQUIPMENT SIZES AS PER SIZING CALCULATION FOR THE RATED CONDITION SUITABLE REDUCER/EXPANDER & PIPING COMPONENT SHALL BE PROVIDED AS PER SIZING CALCULATIONS REQUIRED.
  - VELOCITY: a) UPSTREAM FILTRATION VELOCITY SHALL BE 18M/SEC MAXIMUM. b) DOWN STREAM FILTRATION VELOCITY SHALL BE 30M/SEC MAXIMUM.
  - CABINET DOORS SHALL BE SLIDING TYPE/ FOLDABLE TYPE.
  - SET POINT FOR PSV LOCATED ON CARTRIDGE FILTER IS 47 Bar.g.
  - FLOW METER MEASUREMENT SHALL BE THROUGH TURBINE METER. UPSTREAM 10D AND DOWNSTREAM 5D DISTANCE TO BE MAINTAINED FOR INSTALLATION OF TURBINE FLOW METER.
  - RTU WILL NOT BE IN THE SCOPE OF BIDDER/VENDOR.
  - FLAME ARRESTER IS TO BE PROVIDED FOR INSTALLATION OF MRS NEAR OPERATIONAL AREA. IN CASE INSTALLED OUTSIDE OPERATIONAL AREA REGULAR VENT AT A HEIGHT OF 3.5M FROM OPERATIONAL TO BE PROVIDED.

LEGEND :-

	BALL VALVE FO (SW&NPTF)		PRESSURE SAFETY VALVE
	BALL VALVE (FLANGED)		CREEP RELIEF VALVE
	GLOBE VALVE (FLANGED)		CHECK VALVE
	NEEDLE VALVE		FLAME ARRESTOR
	PRESSURE REGULATING VALVE WITH SSV		RESTRICTION ORIFICE
	PRESSURE CONTROL VALVE		FLOW STRAIGHTENER
	PRESSURE GAUGE		ROTARY POSITIVE DISPLACEMENT METER
	ELECTRONIC VOLUME CORRECTOR		
	DIFFERENTIAL PRESSURE GAUGE		

REV. DATE	DESCRIPTION	PREP.	CHKD.	APPD.
C3 27.10.23	RE-ISSUED FOR CLIENT REVIEW	HS	KT	BND
C2 20.10.23	RE-ISSUED FOR CLIENT REVIEW	HS	KT	BND
C1 07.06.23	ISSUED FOR CLIENT REVIEW	HS	HKT	BND
B1 07.06.23	ISSUED FOR IDC	HS	HKT	BND

CLIENT: **GOA NATURAL GAS PVT. LIMITED (GNGPL)**  
 PMC: **VCS PROJECT CONSULTANTS PVT. LTD. (ENGINEERING)**

PROJECT: **CITY GAS DISTRIBUTION PROJECT AT GEOGRAPHICAL AREAS OF GOA GA**

SCALE	TITLE:
N.T.S	PIPING & INSTRUMENTATION DIAGRAM FOR MRS - 500-5000 SCMH
SIZE	JOB NO. DRAWING NUMBER SHEET REV.
A1	C231099 C231099-GO-PC-PID-1001N 1 OF 1 C3

