VCS Quality Services Private Limited

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TENDER

FOR

MRS FABRICATION AND INTERNAL PIPING WORK FOR INDUSTRIAL & COMMERCIAL CONNECTIONS IN NORTH GOA

Tender No: GNGPL/C&P/T-14-A
Document No: VCS/NOIDA/C&P/GNGPL/2020-03

Technical Volume
Issued : 20.10.2020

GOA NATURAL GAS PRIVATE LIMITED (GNGPL)
North Goa | India

VCS Quality Services Private Limited

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ENERGISING QUALITY

GOA NATURAL GAS PRIVATE LIMITED (GNGPL)

MRS FABRICATION AND INTERNAL PIPING WORK FOR INDUSTRIAL & COMMERCIAL CONNECTIONS IN NORTH GOA

SCOPE OF WORK

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SCOPE OF WORK

The present document gives the specification to be adopted for procurement of CS pipes & fittings, fabrication, erection, installation, and commissioning of MRS (Meter Regulating Skid) along with internal piping (on request) on downstream of MRS to supply Natural Gas for commercial and industrial customers in North Goa GA complying with OISD standards & petroleum and Natural Gas Regularly Board (PNGRB) Guidelines.

The scope of contractor includes receiving, taking over, transportation and unloading of free issue material (Commercial/Industrial Meter & Regulator) from GNGPL"s designated place to site or vice versa. Scope also includes procurement and supply of all materials (butt end or threaded) CS pipe & fittings, Ball valves, TF(Transient Fitting), Rubber Hoses, Brass jets/Nozzles consumables like spiral wound & insulating gaskets, fasteners, painting material, cold applied tape, tools & tackles, clamps, pressure gauges, skilled and unskilled manpower etc, for satisfactory completion of the work.

The designing and installation procedures shall also be provided by the contractor to GNGPL before start of installation work.

The bidder/ contractor shall procure & supply the following materials/ items/ equipment but not limited to:

Procurement and supply of all items /material viz. pipes, ball valves, fittings and flanges, Brass Valves, Globe Valves, gaskets, fasteners, clamps and supports (refer enclosed drawings), pressure gauges, Cold applied tapes, consumables and other tools and tackles for fabrication, erection, installation, commissioning of MRS & internal piping.

Supply of items/ materials other than free issue materials (Meter & Regulator) for work like providing utilities (water compressed air, electricity, nitrogen gas etc.) manpower (skilled and unskilled), consumables (welding rods, filler wires, lubricants/oils, waste cottons etc.) etc. for fabrication of MRS & internal piping is included in the scope.

Procurement & supply of personnel protective equipment (PPE). Procurement & supply of first aid facilities. Procurement & supply of painting material as per specification of paintwork.
Procurement & supply of any other items not listed above, but required to complete the entire scope of work. All the above procurement and supply of listed items/material shall be in line with the specification. Data sheets, GNGPL approved drawing and QAP and shall be procured of approved vendor makes as enclosed in tender documents. Contractor shall be liable for supply and installation of required fittings, tubing etc. necessary for installation of PT / RT / Flow input for EVC / Data Logger and commissioning shall be deemed complete only after the complete installation of PT / RT / Flow Input along with EVC / Data logger.

MDPE Laying is excluded in the scope of work. Contractor has to start work from TF point/RIV/Ball valve point to conversion point which includes fabrication of MRS skids, piping works, installation of valves, fittings etc. Scope is also included with testing, commissioning & conversion of industrial/commercial connection. The scope is also including in preparing civil foundation for MRS skids, Fencing work as per instructions from GNGPL/VCS.

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DETAILED SCOPE OF WORK

The present document gives the specification to be adopted for procurement of CS pipes & fittings, fabrication, erection, installation, and commissioning of MRS (Meter Regulating Skid) along with internal piping (on request) on downstream of MRS to supply Natural Gas for commercial and industrial customers in North Goa complying with OISD standards & petroleum and Natural Gas Regularly Board (PNGRB) Guidelines.
A city gas distribution system, connection to commercial and industrial customers is a major activity and it consists of variety of gas equipment from high flow burners, simple furnace to complex thermos pack or boiler.

The scope of contractor includes receiving; taking over, transportation and unloading of free issue material (Meter and Regulator) from GNGPL's designated place to site or vice versa. It also included procurement and supply all materials (butt end or threaded) CS pipe& fittings, Ball valves, Brass Valves, Rubber Hoses, Brass jets/Nozzles consumables like spiral wound & insulating gaskets, fasteners, painting material, cold applied tape, tools &tackles, clamps, pressure gauges, skilled and unskilled manpower etc. for satisfactory completion of the work.
The designing and installation procedures shall also provide by the contractor to GNGPL before
start of installation work.
The bidder/ contractor shall procure & supply the following materials/ items/ equipment's but not limited to:

1) Procurement and supply of all items /material viz. pipes, ball valves, fittings and flanges, Transient fittings, Brass Valves, Globe Valves, gaskets, fasteners, clamps and supports (refer
enclosed drawings), pressure gauges, Cold applied tapes, consumables and other tools and tackles for fabrication, erection, installation, commissioning of MRS & internal piping.
2) Procurement & Supply of safety devices.
3) Supply of items/ materials other than free issue materials (Meter & Regulator) for work like providing utilities (water compressed air, electricity, nitrogen gas etc.) manpower (skilled and unskilled), consumables (welding rods, filler wires, lubricants/oils, waste cottons etc.) etc. for fabrication of MRS & internal piping is included in the scope.
4) Procurement & supply of personnel protective equipment (PPE).
5) Procurement & supply of first aid facilities.
6) Procurement & supply of painting material as per specification of paintwork.
7) Procurement & supply of any other items not listed above, but required to complete the entire scope of work.
8) All the above procurement and supply of listed items/material shall be in line with the specification. Data sheets, GNGPL's approved drawing and QAP's and shall be procured of approved vendor makes as enclosed in tender documents.
9) Contractor shall be liable for supply and installation of required fittings, tubing etc. Necessary for installation of PT / RT / Flow input for EVC / Data Logger and commissioning shall be deemed complete only after the complete installation of PT / RT / Flow Input along with EVC / Data logger.

ENERGISING QUALITY

VCS PROJECT CONSULTANTS PVT. LTD.

STANDARD SPECIFICATION

FOR

INSTALLATION OF MRS & INTERNAL PIPING FOR COMMERCIAL & INDUSTRIAL CUSTOMERS

VPC – SS – PL – 0051

REV.	DATE	Purpose	Prepared By	Checked By	Approved By
00	18.06.2018	ISSUED AS STANDARD	PK	MVK	AD

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1.0 GENERAL INFORMATION

Goa Natural Gas Pvt. Ltd. is a Joint Venture Company of Gas GAS Ltd. (GAIL GAS) & Bharat Petroleum Corporation Ltd. (BPCL). GNGPL plans to install an underground Natural Gas Distribution network throughout the North Goa Region. The objective is to supply Natural Gas to both DOMESTIC and COMMERCIAL customers, and to provide compressed gas as a fuel for Automobiles. GNGPL is seeking Contractors to assist in meeting the above objective.

The present document gives the specification to be adopted for procurement of CS pipes & fittings, fabrication, erection, installation, and commissioning of MRS (Meter Regulating Skid) along with internal piping (on request) on downstream of MRS to supply Natural Gas for commercial and industrial customers in North Goa complying with OISD standards & petroleum and Natural Gas Regularly Board (PNGRB) guidelines.

2.0 APPLICABLE CODES & STANDARDS

3.1 GENERAL

Piping works shall be carried out in accordance with the requirement of this specification and other National/international relevant applicable standards like Oil India Safety Directorate (OISD) norms, PNGRB, ASME B 31.3-Process Piping Systems, ASME B 31.8 "Gas transmission and distribution piping systems."
Minimum requirement shall be as per latest edition of following codes and standards

ASME STANDARDS

ASME B 16.5	Pipe flanges and flanged fittings up to 24"
ASME B16.34	Valves-flanged and Butt welding ends
ASME B 31.8	Gas transmissions and distribution piping system
ASME VIII, DIV-I	Boiler and Pressure Vessel code
ASME B 16.9	Factory-made wrought steel butt welding fittings
ASME B 31.3	Process piping

ASTM STANDARDS

ASTM A 53/A 53 M	Pipe steel black and hot dipped, Zinc-Coated, Welded and seamless
ASTM A 105/A 105 M	Forgings, Carbon steel, for piping components
ASTM A193/A 193 M	Alloy steel and stainless steel bolting materials for high temperature services.
ASTM A194/A194 M	Carbon and alloy steel nuts for bolts for high temperature Services
ASTM A234/A 234 M	Piping, fitting, of wrought carbon steel and alloy steel for

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	moderate and elevated temperature
ASTM A 370	Mechanical testing of steel product
ASTM A 515	Pressure vessel plate, carbon steel for intermediate and higher temperature services
ASTM A 516	Pressure vessel plate, carbon steel for intermediate and higher temperature services
ASTM A 707/A 707 M	Flanges, forged, carbon and alloy steel for low temperature Service

API STANDARDS

API 5L	Specification for line pipe
API 1104	Specification for welding pipeline and related facilities
API 6D	Specification for pipeline valves (Ball, Gate, Plug Ball and Check Valves)
API 6 FA (Spec 6 FA)	Specification for fire Test for valves
BS 5351	Specification of small size valves (Below 2")

ISO STANDARDS

ISO 148	Determine the impact strength of steel and energy absorbed by charpy.
ISO 9001	Quality Management Standards

OIL INDUSTRY SAFETY DIRECTORATE (OISD STANDARDS)

OISD-GGN-115	Guidelines on fire fighting, Equipment and appliances in Petroleum industry
OISD-standard-113	Hazardous area classification
OISD-Standard-163	Process Control Room Safety

In case of contradiction, the most stringent will apply

3.0 SYSTEM OF UNITS

The international system of Units (SI), also known as the "Metric system" shall be used.

The international Gas union (IGU) has also recommended, generalizing the use of the SI system in all matters relating to Gas and Gas facilities.

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4.0 PROCESS PARAMETERS

Inlet pressure	:	Max. 4 barg(PE) Max. 49 barg(CS)
Out let pressure	:	0.1 barg-4 bar (Variable)
Operating temp	:	0 – 45^{0}C
Design Pressure	:	19 barg
Design temp. (min/max)	:	0/+60^{0}C
Hydro test Pressure (MRS)	:	1.5 x Design Pressure (Hydrostatic Test) with minimum test duration of 4 hrs.
Pneumatic Leak Test	:	6 bar for minimum 4 hrs.
Flow (m^3/hr)	:	Up to 250 m^3/hr (at 2 barg 750 SCMH)
Process Fluid	:	Natural Gas

5.0 MATERIAL SPECIFICATION OF PIPING SYSTEM

Materials to be used for piping system shall comply with the minimum requirements of relevant standards & codes.

Pipes	ASTM A106 Gr. B (Seamless)/API 5L Gr.B/ IS-ASTM A 53/A53 M Gr.B/ 1239Heavy
Flanges	ASTM A105/ A 105
Restricting Orifice* plate	SS 304
Rubber Gasket (washer)	High Nitrile Synthetic Rubber Grade 215
Fittings	ASTM A234 Gr WPB
Ball Valves	A 105/A 216 Gr WCB
Insulation	NA
Insulating gasket	Same as Pipe (Ring A 105)
Spiral Wound Gasket (washer)	ANSI B 16.20
Nuts and Bolts	AS per PMS
Rubber hose	Type-4 as per IS:9573
Painting	As per enclosed "

The size of orifice of restricting orifice plate shall be 11 mm for G10/G16/G25, 13mm for G40 and 15mm for G65 RPD meter.

The size of orifice of rubber gasket (washer) shall be 5mm for G4, 8mm for G6, 10mm for G10 & G16 and 13mm for G25 Diaphragm meter.

Note: - Over and above these specifications and materials, Please refer below the specifications.

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1. For Piping material refer " PMS-1C1"
2. All stud bolts and nuts shall hot dipped galvanized as per ASTM A53.

6.0 SITE ENVIRIONMENTAL DATA/CONDITIONS

Environmental/ climatic conditions for various sites are given below

Typical	:	
Temperature	:	(Min/Max.)^{0}1.7^{0}C/48.5^{0}C
Rain fall	:	*
Wind	:	*
Seismic Zone	:	*
Relative humidity	:	90%
Elevation from Mean Sea Level	:	205 met.
Hazardous Area Classification	:	*

7.0 PIPE DESIGN/ SIZING

8.1 Coding of Piping Classes

Each Class is named by a code consisting in three of four parts:

First parts:

A figure designating the material:

- 1= 150 lbs ANSI - PRESSURE – 18.75 bar g
- 3= 300 lbs ANSI - PRESSURE – 49.00 bar g
- 6= 600 lbs ANSI - PRESSURE - 98.00 bar g

Second part:

A letter designing the material:

- A= Alloy steel
- C= Carbon steel
- F= Fiberglass reinforced plastic/epoxy (FRP)
- G= Galvanized
- P= Plastic (HDPE)
- S= Stainless steel
- V= PVC

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Third part:

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

Fourth part:

A letter designing the underground:

- U= Underground
- AG= Above Ground

8.2 Wall Thickness

The wall thickness of pipe shall be as follows:

Wall thickness of pipe shall be calculated as specified in the applicable sections of:

- ANSI B 31.8 for classes covering the main process and auxiliary gas lines.
- ANSI B 31.3 for classes covering utilities lines.

8.3 Corrosion Allowance

The minimum corrosion allowances used to calculate wall thickness as follows:

- Carbon steel and ferrite alloys in classes calculated following ANSI B 31.8 : 1.6 mm
- Carbon steel and ferrite alloys in classed calculated following ANSI B 31.3 : 1.6 mm
- Stainless steel : 0 mm
- Plastic and PRP pipes : 0 mm

8.4 Wall Thickness Calculation

a) Pipes for natural gas shall comply with ASME/ANSI B 31.8 code. Pipe wall thickness will be calculated as follows:

$$t = \frac{PD}{2xSxFxExT} + C$$

T = nominal wall thickness (mm)
P = design pressure (MPa)
S = minimum yield strength (Mpa)
F = design factor = 0.40
E = longitudinal joint factor
= 1.0 for API 5L (seamless or ERW or SAW)

T = temperature de-rating factor = 1.0
C = corrosion allowance (mm)

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b) Pipes for Utilities lines have a wall thickness complying with ASME/ANSI B 31.3 code:

$$t = \left\{ \frac{PD}{2xSxFxExT} + C \right\} x (1+a)$$

T = Nominal wall thickness (mm)
S = Allowable stress (MPa)
P = Design pressure (MPa)
E = Longitudinal joint factor
Y = Coefficient as per table 304.1.1 of ANSI 31.3
C = Corrosion allowance (mm)
A = Negative fabrication tolerance (%)

8.0 Wall Thickness Calculation

1.0 Nitrogen at 7kg/cm2

2.0 Above utility data may change according site condition and availability of resources.

9.0 SAFETY

All required Personal Protective Equipments (PPEs) for carrying out the jobs safely to be provided to the workers.

The agency has to ensure that potential safety factors, health and environment effects are assessed before execution of the job and necessary actions required for ensuring safety of human and environment are taken care of.

Jobs at customer locations are to be carried out as per safety Work Permit System of GNGPL- i.e., permit will be issued at site every day after ensuring all safety precautions and execution of the job to be done in presence of representatives of GNGPL's Technical, Fire & Safety and designated Contract Supervisor.

10.0 FABRICATION OF MRS AND INTERNAL PIPING:

This part covers fabrication, erection and installation of MRS, Common header for MRS installation, internal pipeline with fittings for supply natural gas to commercials and Industrial units from MRS till customer's appliances. Work for internal Piping shall be carried out as per instructions and after allotment of work by EIC. The Indicative diagram is shown in bid documents.

On allotment of work, Contractor shall carry out join survey along with GNGPL / GNGPL's representative of the customer's premises for finalization of location of MRS/Common header

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or route of internal Piping and as per requirement and shall subsequently submit construction plan to GNGPL for Procurement of material (Pipe, fittings, consumables etc.), Inspection, Fabrication Erection Installation Testing and Commissioning of MRS, Common header & Internal Piping as enclosed at Annexure – 3. The material procurement plan includes make of pipes & fittings to be procured as per the approved make list (enclosed in tender document) for approval from EIC.

After approval of plan from EIC and before start of fabrication, Contractor shall procure material and submit material test certificates (MTC'S) of all materials including pipes, fittings ball valves, consumables (incl. Electrodes) etc. for review of EIC and shall subsequently arrange their physical inspection. Contractor shall also submit documents for welding procedure specifications (WPS) for the similar kind of job for GNGPL's approval.

GNGPL may instruct the contractor to carry out survey of proposed customer and shall in turn submit the estimate for material and execution along with drawing without any changes Welder shall be qualified for proposed WPS according to the applicable codes. If the same welder is doing the similar kind of job continuously for the last six months and qualified by reputed consulting organizations like EIL/MECON/TEPL, the welder shall be allowed to work on submission of welders' qualification Certificate.

Only E6010/E7018 electrodes of reputed make (LINCOLN, ESAB etc.) shall be used for welding of piping joints. The electrode E7018 shall be baked in mother oven before usage at site. All flanges used shall be of welded neck type. No plate flanges made by Gas cutting shall be used. Flanges dimensions, ratings, facing, face finish and manufacturing shall be as per ANSI B16.5 unless otherwise specified. All fittings shall be seamless in construction unless otherwise specified. All fittings of size 1" and above shall have butt-welded ends and shall comply with attached piping class.

Mitre joint shall not be used and the same shall be replaced with a Standard Elbow with short radius (<_1D). Piping Spools (If required), Supports etc. shall be pre-fabricated or shop fabricated. Pipe shall be supported on walls or Suitable supports (clamps, steel supports etc.) (refe drawing in tender document at Annexure – 4) and at adequate interval of space not less than 2 metres. The material and size of angles shall be MS and of minimum size 75 x 75x 8 mm.

End Preparation, alignment and fit up of the pipe length to be welded, pre heating, welding, post heating and heat treatment (if required) shall be as per GNGPL welding specification/design codes and standards. Pipe joints shall be butt-welded. However as per site requirement, flanged joints (if necessary) may also be used Contractor to ensure provision for locking/sealing arrangement for meter/valves to avoid misuse.

All (100%) root joints alignment & fit up shall be witnessed by GNGPL/GNGPL representative followed with a mandatory DP (Dry penetrate) test. In addition to the DP test. RT will be carried out in presence of GNGPL's representative on at least 10% of joints in single MRs using unique joint no. The dimension tolerances for piping fabrication shall be as per GNGPL's standards design codes and standards.

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Contractor shall carry out Hydro test for each MRS in their factory and shall carry out installation only after duly certification from GNGPL/GNGPL's representative. The test reports/certificates (DP test RT, Hydro test, NDT) issued against a single MRs shall be presented to GNGPL's site representative for verification and before start of installation. The format FPR DPT, RT, Hydro test, Welding inspection & NDT is attached at Annexure – 5, 6, 7, 8 & 9 respectively.

For MRS, dimensions tolerance of 100% both ways against pre-defined length (refer drawings attached in tender) shall be included in fabrication & installation rates and no separate charges shall be claimed in case of any additional joints, fittings etc.. used for completion of installation. The bidder shall quote rates against each SOR in correlation with drawings, tentative BOM (Bill of Materials) attached in tender document. Any installation/piping in excess/ short to predefined length of MRS shall be payable/deductible through relevant SOR itemas per size of pipe used. The length of the MRS shall be measured after installation and RFC and shall duly be certified in RFC card for payments. Contractor shall provide suitable locking arrangement in MRS with isolation valve by wire sealing as per instruction of Engineer In-charge.

The rates for internal piping (downstream of MRS) are payable through SOR item nos. 3 and includes procurements, fabrications, welding and installation till commissioning. No separate charges are payable for any repair & modifications (on customer's request) even after installation & testing however before commissioning and are inclusive in rates. The ball valves installed in common header/Internal piping shall be payable separately through relevant SOR item, depending upon the size of pipeline.

Laying of concealed pipeline in the cavity of the walls/ceiling/basement shall be avoided. In locations where the pipeline has to be laid in a covered trench or below ground level, it should be avoided however considering the minimal alternatives/ constraints at site, the laying is possible after written approval from EIC, cold wrap & coating shall be applied on the surface of the pipe followed by Holiday test. The pipe shall be properly supported on clamps/I supports with minimum clearance of 4" from ground level. GNGPL may also instruct the contractor for installation/laying of MDPE pipeline and transition fittings for such below ground sections which shall be laid in correlation of technical specification of MDPE pipeline laying and payable as per the respective pipe SOR's.

In case where MRS fabrication & installation is carried out considering twin metering and single regulation (in a single MRS), the payment against the installation of both streams shall be made as per relevant SOR item for one of the stream and for the other stream depending upon the type and size of the CS Pipeline used for MRs fabrication. Also, in case of twin metering and twin regulation, the payment against the installation of either of the streams shall be made as per relevan SOR item and for loop line connecting both streams in running meter as per relevant SOR item depending upon the type and size of the CS pipeline used for MRS fabrication.

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Any preparation of the threads for installation, completion of MRS, common Header & internal piping is inclusive in rates. All the MRS shall be fabricated in the Contractors workshop and tested in presence of GNGPL's representative before installation. After complete installation of the MRS at the allocated locations; the flange joints shall be tested online along with Meter & Regulator before commissioning.

The branches of the pipeline shall be using standard fittings. Also, branching on common header will be payable in running meters.

11.0 ERECTION OF MRS SKID

11.1. Cleaning of piping before erection.

Before erection, all pre-fabricated spool pieces, pipe, fittings etc. shall be cleaned inside and outside by suitable means (Mechanical or chemical). The cleaning process shall include

- Removal of all foreign materials such as scale, sand, weld spatters, cutting chips etc. by wire brush, cleaning tools and blowing out the foreign material with compressed air and/or flushing out with water.

- Special cleaning requirements (if any), shall be carried out as per GNGPL specification/piping design codes/standards.

11.2. Pipe routing and Layout

Pipe routing and lay-out shall be as per GNGPL approved pipe route, GAD, P&IDs and piping support drawings and applicable design code and standards. In case of fouling of a line with other piping, structure, equipments etc. The matter shall be brought to the notice of Engineer-in-charge and corrective action shall be taken as per his instructions. Above ground pipeline shall be laid either on MS clamps fixed on the wall or on the pipe supports with BOP more than 2 mtr. height.

The selection of route of installation gas pipeline connection in the premises of the industry/ commercial establishment is key to safety and integrity of gas installation and public. It should be installed above ground having in well-ventilated area and having easy approach.

All risers and lateral piping should be clamped to the building at intervals not exceeding one meter. Laying of concealed pipeline inside the cavity of the walls, ceiling, basement etc. should be avoided, Platform and cross-over shall be provided for ease of operation and maintenance of pipeline if required. All supports shall be installed strictly as per approved support drawing/instruction of engineer- in-charge.

While laying the pipeline, care should be taken that valves installed on the pipeline

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should be approachable for easy operation and maintenance.

11.3. Flanges Connections

While lifting up mating flanges, care shall be taken to properly align the pipe and to check the flanges for trueness so that the faces of the, flanges can be pulled together without inducing any stresses in the pipe and the equipment.

The assembly of the flange joint shall be done in such a way that the spiral wound gasket between the two flange faces is uniformly compressed to achieve this bolt shall be tightened in a proper sequence. Copper strips/ jumpers shall be installed on all flange joints in order to provide earth continuity to MRS & internal piping.

11.4. Vents

Venting facilities shall be provided for any emergency evacuation of gas from the pipeline. Vent line shall be fitted with a flapper and shall be at 3 meter height from the nearest operating platform, with ends at open space.

11.5. Painting

Alter installation of the above ground MRS & Internal piping system, painting of MRS/piping shall be done after RFC with propel' surface preparation and application of primer and finish coat of paints as per GNGPL painting specifications enclosed in Annexure I, to prevent atmospheric corrosion, The standard color code for Natural gas piping shall be 'Canary yellow'. The gas flow direction shall be marked "in Red" on the MRS or Internal Piping.

11.6. Valve Installation

Valve shall be installed in a position as specified in the valve manufacturer installation and O&M manual. Care shall be exercised to ensure that all hL11 bore ball valve shall be installed with the "Gas now direction arrow" marked on the valve body pointing in the right direction after written consent from EIC.

11.7. Instruments

All the required instruments (PG, TG, flow control valves, interlocks, control panel etc..) shall be installed on the pipeline as per attached MRS Drawings, Owner's approved installations procedure, applicable design code and standards, manufacturer's installation, O&M Manual after proper calibration, testing and inspection of the instruments as per manufacturer's calibration procedures. It is mandatory to install pressure gauges on the downstream internal piping at start and end point. Any installation of additional pressure gauge will be payable as per relevant SOR item and subsequent fillet welding of sockets & installation of pressure gauge will be payable as per relevant SOR item.

11.8. Rubber Hose

The Steel Pipe and Appliances connect to Hose shall be in the same 1'00111. The length of

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hose should be kept minimum but shall not exceed 1.50 meters. Hose shall be easily accessible to inspect. Hose shall not be used in conditions where ambient temperature exceeds its design temperature. Hose shall be so installed that it is not twisted, looped or kinked in and should be free from external pressure. Design and Construction of Hose shall be Type IV as per IS: 9573 (Latest revision).

11.9. Supports

Pipeline for PNG supply to Commercial/Industrial connection shall be adequately supported at suitable intervals as per piping design code and standard and good engineering practices. There are various types of clamp supports for supporting and suspending horizontal as well as vertical/riser pipes. The support's schematic drawing for piping are attached with the tender documents at Annexure -- 4. The material & size of the angle shall be MS & minimum size ---75 x 75 x 8 mm.

11.10. Electrical Equipments

All the required Electrical equipments shall be installed as per Owner's approved installation procedure, applicable design code (OISI). 149) and standards, manufacturer's installation / O&M Manual after proper calibration, testing and inspection of the equipments as per manufacturer's calibration procedures.

12.0 INSPECTION AND TESTING

12.1. Material Inspection

All materials, items and their parts shall be subjected to all mandatory as well as supplementary (wherever specified) inspection, testing and checks called for in the respective codes/standards/data sheets/ GNGPL approved manufacturer's QAP of Vendor at manufacturer's workshop/factory as well construction site. All fit-ups shall be checked for proper Root gap, surface cleaning and orientation etc. before starting the welding and inspected by GNGPL/ GNGPL's representative.

Dye-penetrate test shall be done after root welding for all the butt & Socket weld joints. As per the instruction of EIC/PMC, Radiography test may be performed randomly on joints for 10% (percentage) on random selection basis.

12.2. Execution Inspection

- Ensure availability of Work Permit and Fire permit
- Visual Inspection of installation of carious equipments, instruments and their associated components, electrical equipments, pipe fitting and valves etc..
- Dimensional checking of equipment, pipe, fitting and valves etc..
- Inspection of Calibration of instruments
- Inspection of testing and commissioning or pipeline system
- Inspection and checking of DFT of painting of equipment, pipe, pipe supports etc..

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- Inspection and checking of Mechanical completion of pipeline system with the approved construction drawing and work procedures for installation and erection of various equipment/pipeline
- Ensure availability of First AID Box, PPE and fire extinguishers.
- Inspection of flushing, cleaning and Hydro testing of Piping system
- All welded joints shall be subjected to visual inspection according to ASME 1.3/31.8 and radiography according to API1104.
- Inspection test plan shall be as per ANNEXURE-2
- Verification/Inspection of all the mill and workshop test certificates applicable to related material. spare, equipment, pipe, fittings, valves, supports, paints, IJ etc..
- The entire piping system shall be subjected to hydrostatic testing or pneumatic strength testing.
- 10% RT shall be done for all the Butt joints on random selection basis. Overall decisions rests with the EIC to increase %(percentage) of RT on joints, in case of any additional RT (on instruction of EIC) rates shall be payable as per SOR item no. 2.
- The test pressure should be 1.5 times of design pressure in case of Hydrostatic testing or 1.1 times or the design pressure in case of Pneumatic testing. However test pressure and time duration may vary depending upon the application and flow.
- Before commencement of strength Test, calibration reports of pressure gauges and equipments shall be reviewed by GNGPL/ GNGPL's representative.
- Pressure gauge range shall be minimum 1.5 times and maximum 4 times of test pressure.
- Before starting hydrostatic testing, testing and inspection reports shall be submitted to GNGPL for verification and only after getting formal clearance from GNGPL, testing shall be carried out.
- The test pressure for the piping system shall be kept on hold for 4 hr with no pressure drop. For internal piping with pipe length less than 25 meters, the test pressure shall be kept on hold for 4 hrs. Whereas if length more than 25 meters, minimum test pressure duration shall be minimum 12 hrs. to max. 24 hrs. depending upon customers/ site requirement.
- After hydro testing proper dewatering and purging shall be carried out.
- Care should be taken to ensure that the purge outlet is so located that vent gas cannot drift in the building.
- The method of purging should be such that no pockets of air left in any part of the piping.
- It should be ensured that the area is well ventilated and free from ignition source.
- Inspection and testing of Electrical, Civil and Instrumentation work shall be carried out by quality control inspector of related Engineering disciplines.
- All the MTC/TC, Inspection and test reports for mandatory as well as supplementary (wherever specified) shall be submitted to GNGPL.

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13.0 PRE-COMMISSIONING AND COMMISSINING

The various acceptance criteria and handover of the MRS system shall comprise of the following 2 stages.

- Pre commissioning
- Commissioning/Start-up

13.1. Pre-Commissioning

GNGPL representative shall carry out the following minimum check (including other relevant checks as may consider describe by manufacturer of meter, regulator, valves, etc.. to ensure that the MRS has been mechanically completed in all respect for pre-commissioning.

- A schedule of required activities for pre- commissioning /commissioning/ performance guarantee test/handover shall be readily available.
- Prior to pre-commissioning of MRS and associated facilities (piping, valves, instrumentation, electrical system) shall be mechanically completed to be ready for commissioning
- All the consumables, tools and tackles, utilities, etc. bare available.
- Firefighting system and PPE are readily available.
- All the statutory permits are available.
- The emergency management plan is available.

Following are the minimum required pre-commissioning checks but not limited to:

13.2. System Check

Checking of piping /Mechanical System

The entire facilities/system shall be checked against the GNGPL's/ GNGPL's representative latest approved P & Id, GADs and other relevant design specified and codes.

Checking of utilities

Checking of all relevant utilities like, service water, compressed air, nitrogen, power, power back-up system etc. to facilitate commissioning and safety.

13.3. Pneumatic testing

Air Flushing

The entire MRS and associated facilities shall be flushed and air cleaned to ensure

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readiness of the system for pneumatic test. Chemical cleaning may also be considered as per site requirements

Pressure Testing

Pneumatic testing shall be carried out a pressure of 6 bar g by mean so of compressed air. The test pressure shall be maintained to permit through inspection of all joints for leakage or signs of failure.
Any joint found leakage during the pressure test shall be re-tested to the specified pressure after repair.

13.4. Completion of Testing and Drying

After pneumatic test are completed, the pressure is released gradually without damaging the equipment, facilities and maintaining personnel safety measures. All vents and drains shall be kept opened till the entire system is completely drained. After draining, the system shall be completely dried using dry air.

13.5. Insertion

The insertion operation should start immediately after drying is complete. The contractor shall submit a detailed purging procedure for approval of GNGPL/GNGPL's representative prior to its implementation. During the insertion operation, the air left in the piping system shall be replaced by nitrogen before admitting the natural gas into the pipe system. The maximum allowable oxygen content inside the piping system shall be less than 1% by volume. No extra payment shall be made for nitrogen cylinders and is included in SOR.

13.6. Test Records

Records in triplicate shall be prepared and submitted by the contractor to the GNGPL /GNGPL's representative for each piping system/ facilities for the test performed.

13.7. Safety Review before start-up of commissioning

A pre-start up safety review shall be carried out of the entire piping system before permitting natural gas into the new facility.

The following minimum safety review is envisaged: Availability of all relevant design documents, welding

Availability of all relevant design documents, welding.

13.8. Commissioning

Once all pre-requisite activities (safety and pre-commissioning) test have been completed, clearance for commissioning the system shall be obtained from

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GNGPL/GNGPL's representative.

- The commissioning operation shall be controlled and supervised by authorize personnel who are fully known to their responsibilities during commissioning.

- The pipeline system shall be slowly charged with natural gas and pressurized gradually up to its operating conditions/parameters.

- The contractor shall obtain the GNGPL/GNGPL's representative approval of his commissioning procedure prior to starting commissioning operation.

- The pipeline system shall be slowly charged with natural gas and pressurized gradually up to its operating conditions / parameters.

- Commissioning of MRS system shall be considered completed and acceptable when the piping system is charged with natural gas at operating pressure and the MRS system is operated at normal operating conditions with all instruments/controls working satisfactorily at normal operating conditions.

GAS CHARGING IN INTERNAL PIPING

From safety point of view gas should be taken to the burners, section wise namely:

- Gas charging in internal piping
- Gas Charging in gas train burner

Sr. No	Activities	Precautions
1	Confirm the closure of gas train inlet	Observe carefully closing mark
2	Crack open the MRS outlet valve and raise the section pressure to 1 or 2 bar g or as required	Keep valve key ON position and a man with walky-talky
3	Crack open the pressure gauge tapping valve near gas train Intel valve and vent out nitrogen	Do not inhale nitrogen gas Ensure No spark. No naked flame. Methane concentration in atmosphere should not increase more than 2% if required, do venting/draining intermittently

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Sr. No	Activities	Precautions
4	Measure methane percentage. It should match feed gas composition	
5	Close the pressure gauge tapping valve completely	
6	Open the MRS outlet valve fully and observe the system for 5-10 minutes	

14.0 CONVERSION

Conversion of Burners & supply of Rubber Hose

The work in this section shall be carried out along with the internal piping or on request i.e. case to case basis and includes:

The changing of nozzles and associated controls in accordance with manufactures instructions for canteen, T-type, RV, imported burners/ovens/grills/hotplate etc.. the and imported burners/ovens/grills/hotplate. The contractor shall supply the Reinforced rubber hoses at the time of conversions, Minimum size 8 mm dia. per connection -- 1.5 meters with fixing clamps, however the size may vary for type of burners converted on NG. The contractor has to supply all types of nozzles/jets required for all types or appliances including canteen, T-type, RV, imported burners, Grills, Ovens, without any extra charges to GNGPL, All activities arc inclusive and arc payable through **as per relevant SOR.**

Cleaning and performing minor maintenance of appliances, during the tenure of the contract. Attend all complaints related to propel' working of appliances, testing for gas escapes, soundness and performance of appliances. Instructing & educating customer for safe use of natural gas and for fixing of safety and conversion labels. Contractor must attend the complaints regarding appliances, leakage, fire etc. till the total area is handed over to Owner’s operation and maintenance.

All consumables (Nozzles, greases etc..), changing or repairing of any items damaged during conversion arc in contractor's scope, The contractor will have to provide both pin gauges and standard sized nozzles, The payment will be released by GNGPL only after submission of necessary documents i.e. JMR card of the individual commercial/ industrial connection.

15.0 MODIFICATION IN EXISTING MRS

It includes taking shutdown of existing MRS, dismantling meters/ regulators, replacement/Fixing of meters/regulators with associated inlet and outlet connections/fittings supply of pipes & fittings, pipe cutting, threading,

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welding & firmly fixing with approved meter clamps/ brackets and other supports by proper grouting. Restoring the area to the original condition as per the specifications and (0 complete satisfaction of consumer and me is also included in the scope.

Modifications / replacements (of meter or regulator or both) in MRS using threaded fittings/ flanged end (same size or bigger) shall be payable through relevant SOR item depending upon the types and unit of meters and regulators replaced, The rates includes all as above along with testing of joints till re-commissioning. Wherever, there is modifications in MRS which can be carried out only through welding for same length of MRS or bigger upto 3.00 mtrs in addition to MRS length, the work is payable only through no. or joints welded tor completion of modifications and no separate payments is applicable for additional pipe/fitting used and payable as per relevant SOR item. In case erected length after modification is more than
3.00 mtrs of original length of MRS, then the running meters shall be applicable and payable through relevant SOR item.

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ANNEXURE - 01

PAINT SYSTEM FOR ABOVE GROUND PIPING

Paint system Nr.	Substrate	Exposure conditions	Surface preparations	1st Coat	2 nd coat	3rd coat	4th coat	5th coat	Nominal Total DFT
201	Bare carbon steel & ferritic alloys	T up to 65^0C	Sa3	Zinc rich eithyl silicate primer 75(µm)	Epoxy Sealer polyamide/ C 50 (µm)	High Build epoxy polyamide U/C recoatable 80(µm)	PU finish recoatable 50(µm)		255µm
201P	As above but site touch-up	T up to 650C	Sa3 (spot blast)S03 only when blasting is not possible	Zinc rich two pack epoxy primer 50(µm)	Epoxy M.I.O. recoatable 80 (µm)	Epoxy HB U/C. recoatable 60 (µm)	PU finish 50µm		240µm
201 W	Bare carbon steel to be welded	T up to 650C	Sa 2.5 min.	Welding primer two components epoxy 20 (µm)	6 to 9 months after welding procedure cleaning of weld With 3rd coat Touch-up If needed	HB M.I.O Epoxy Modified U/C 80µm	HB M.I.O Epoxy Modified U/C 80µm	PU finish 50µm	230µm
202	Bare carbon steel & ferritic alloys	T up to 650C	Sa3	Zinc rich ethyl silicate primer 75(µm)	Heat resist. Silicone Acrylic White 30µm	Heat resist. Silicone Acrylic White 30µm			135µm
202 P	As above but site touch-up	T up to 65^0C	Sa3 (spot blast)	Zinc ethyl silicate primer 75(µm)	Heat resist. Silicone Acrylic White 30µm	Heat resist. Silicone Acrylic White 30µm			135µm

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ANNEXURE - 02

Sr.	Particulars	Type of Inspection	% of Inspection	Scope	
1	Material Test Certificate verification	TC verification (Raw Material)	100%	Contractor	GNGPL/TPI
2	Welding Procedure Specification	Document verification /approval	100%	P	R
3	Welders qualification Test	Document verification/ witness	100%	P	R
4	DP Test	DP rest on root	100%	P	R/W (in case of new welder
5	Welding Inspection	Visual inspection	100%	P	RW(min 10%)
6	Radiography	Review of films	100%	P	RW(min 10%)
7	Hydro/Pneumatic Testing	Hydro/Pneumatic testing of entire pipeline	100%	P	W

Legend:

P- Perform, R-Review, RW- Random Witness (min 10%), W-Witness, TPI- Third Party Inspector

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ANNEXURE – 03

ANNEXURE-3

CONSTRUCTION PLAN

S. NO	Work Allotted for	TYPE OF WORK			Route Survey Feasibility Status			Availabilty of material under contractors Scope	Any Deviation	SCHEDULE OF COMPLETION			Approval fromZonal in-charge
		PE Laying	MRS	INTERNAL LAYING	PE LAYING	MRS	INTERNAL LAYING			PE LAYING	MRS	INTERNAL LAYING	

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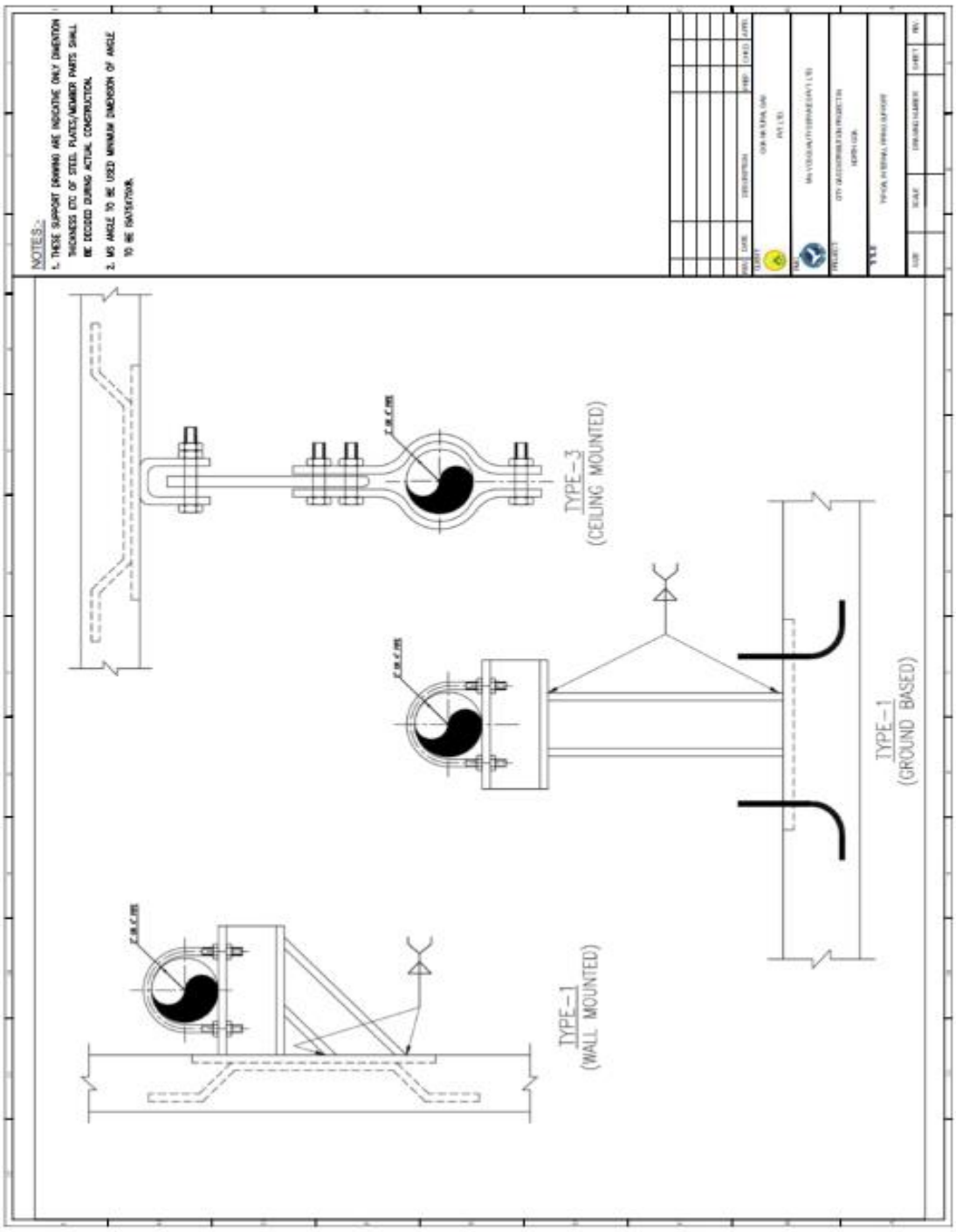
NOTES:-
1. THESE SUPPORT DRAWING ARE INDICATIVE ONLY DIMENTION THICKNESS ETC OF STEEL PLATES/MEMBER PARTS SHALL BE DECIDED DURING ACTUAL CONSTRUCTION.
2. MS ANGLE TO BE USED MINIMUM DIMENSION OF ANGLE TO BE ISA75X75X6.
TYPE-3 (CEILING MOUNTED)
TYPE-1 (GROUND BASED)
TYPE-1 (WALL MOUNTED)

ANNEXURE - 05

DP TEST REPORT					
CLIENT:				REPORT NO.	
PROJECT:				DATE	
MRS NO.				PIPE MATERIAL	
S. NO.	SIZE	JOINT NO.	SEGMENT	INSPECTED BY	REMARKS
CONTRACTOR's (NAME & SIG.)		TPIA (NAME & SIG.)		PMC (NAME & SIG.)	GNGPL (NAME & SIG.)

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ANNEXURE - 06

RADIOGRAPHY TEST REPORT					
CLIENT:				REPORT NO.	
PROJECT:				DATE	
				SITE	
S. NO.	JOINT NO.	PIPE SIZE	WELDING REPORT NO.	RADIOGRAPHY REPORT NO.	REMARKS
CONTRACTOR's (NAME & SIG.)		TPIA (NAME & SIG.)		PMC (NAME & SIG.)	GNGPL (NAME & SIG.)

ANNEXURE – 07

HYDROTEST REPORT						
Client:				REPORT NO.		
Project:				DATE		
				SITE		
S.no	TIME	PRESSURE (kg/Cm2)	TEMPERATURE (deg.C)	PRESSURE RELEASED (kg/cm2)	PRESSURE DROPPED / INC RELEASED	REMARKS
CONTRACTOR'S (Name & Signature)		TPIA (Name & Signature)			PMC (Name & Signature)	GNGPL (Name & Signature)

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ANNEXURE – 08

WELDING INSPECTION REPORT									
CLIENT:						REPORT NO.			
PROJECT:						DATE			
						PIPE MATERIAL			
S. NO.	SIZE	PIPE/FITTINGS	HEAT NO.	LENGTH	JOINT NO.	FIT UP CHECK	WELDER NO.	VISUAL INSPECTION	REMARK
CONTRACTOR's (NAME & SIG.)		TPIA (NAME & SIG.)			PMC (NAME & SIG.)			GNGPL (NAME & SIG.)	

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ANNEXURE – 09

NDT REPORT					
CLIENT:				REPORT NO.	
PROJECT:				DATE	
				SITE	
S. NO.	SIZE	JOINT NO.	SEGMENT	INSPECTED BY	REMARKS
CONTRACTOR's (NAME & SIG.)		TPIA (NAME & SIG.)		PMC (NAME & SIG.)	GNGPL (NAME & SIG.)

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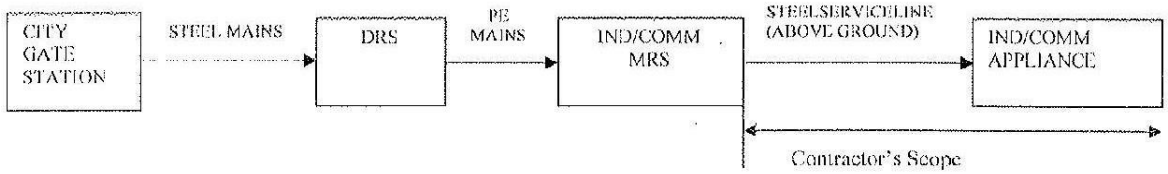
ANNEXURE -10

(TYPICAL PNG DISTRIBUTION SYSTEM FOR INDUSTRIAL / COMMERCIAL CUSTOMERS)



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	STANDARD SPECIFICATION FOR SEAMLESS FITTINGS AND FLANGES {SIZE UPTO DN 400MM(16")}

		TOTAL SHEETS	07
DOCUMENT NO	SS	PL	025

STANDARD SPECIFICATION FOR SEAMLESS FITTINGS AND FLANGES {SIZE UPTO DN 400MM(16")}

0	10.07.2017	ISSUED AS STANDARD SPECIFICATION	BS	MV	AD
REV	**DATE**	**DESCRIPTION**	**PREP**	**CHK**	**APPR**

ABBREVIATIONS:

ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
API	American Petroleum Institute
BHN	Brinell hardness number
HAZ	Heat Affected Zone
MSS-SP	Manufacturers Standardization Society - Standard Practice
RTJ	Ring Type Joint
SSPC	Steel Structures Painting Council
CE	Carbon Equivalent
LTCS	Low Temperature Carbon Steel
LPG	Liquefied Petroleum Gas

CONTENTS

1.0 SCOPE

This Technical specification specifies the minimum requirements for the design, manufacture and supply of following carbon steel flanges (such as welding neck flanges, blind flanges, spectacle blinds, spacers and blind etc) and seamless fittings (such as tees, elbows, reducers, caps, outlets etc) size DN up to 400 mm (16") to be installed in onshore pipeline systems handling non-sour hydrocarbons in liquid or gaseous phase including Liquefied Petroleum Gas (LPG).

2.0 REFERENCE DOCUMENTS

Reference has been made in this specification to the latest edition (edition enforce at the time of issue of enquiry unless specified otherwise) of the following Codes, Standards and Specification.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

B31.4	:	Pipeline Transportation system for liquid Hydrocarbon & other liquids.
B 31.8	:	Gas Transmission and Distribution Piping Systems.
B16.5	:	Pipe Flanges and Flanged Fitting.
B16.9	:	Factory made Wrought Butt Weld Fittings.
B 16.11	:	Forged Steel Fittings, Socket welding and Threaded.
B 16.48	:	Steel Line Blanks.
Section VIII	:	Boiler and Pressure Vessel Code - Rules for Construction of Pressure Vessels.
Section IX	:	Welding and Brazing Qualifications.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

A370	:	Standard Test Methods and Definitions for Mechanical Testing of Steel Products.

MANUFACTURERS STANDARDIZATION SOCIETY (MSS)

SP-25	:	Standard Marking System for Valves, Fittings, Flanges and Unions.
SP-97	:	Forged Carbon Steel Branch Outlet Fittings- Socket Welding, Threaded and Butt Welding Ends

In case of conflict between various requirements of this specification and the requirements

of above referred Codes and Standards, more stringent requirement shall apply unless otherwise agreed by Purchaser.

3.0 MATERIALS

The Material of flanges & fittings shall be as indicated in purchase requisition. In addition, the material shall also meet the requirements specified hereinafter.

3.1 The Carbon Steel used for the manufacture of flanges and fittings shall be fully killed.

3.2 The carbon equivalent (CE) shall not exceeding 0.45, based on check analysis calculated in accordance with following.

$$CE = C + \frac{Mn}{6} + \frac{Cr + Mo + V}{5} + \frac{Cu + Ni}{15}$$

3.3 For flanges and fittings specified to be used for gas service or LPG service, Charpy V-notch test shall be conducted on each heat of steel. Unless specified otherwise, the Charpy V-notch test shall be conducted at 0^0 C in accordance with the impact test provisions of ASTM A 370 for flanges and MSS-SP-75 for all fittings.

The average absorbed impact energy values of three full-sized specimens shall be 27 joules. The minimum impact energy value of any one specimen of the three specimens analyzed as above shall not be less than 22 Joules.

When Low Temperature Carbon Steel (LTCS) materials are specified for flanges and fittings in Purchase Requisition, the Charpy V-notch test requirements of applicable material standard shall be complied with.

3.4 For flanges and fittings specified to be used for Gas service or LPG service, Hardness test shall be carried out as per ASTM A 370 for each heat of steel used. A full thickness cross section shall be taken for this purpose and the maximum hardness of base metal, Weld metal and heat affected zone shall not exceed 248 HV_{10}.

3.5 In case of RTJ (Ring Type Joint) flanges, the groove hardness shall be minimum 140 BHN. Ring Joint flanges shall have octagonal section of Ring joint.

4.0 DESIGN AND MANUFACTURE

4.1 Flanges such as weld neck flanges and blind flanges shall conform to the requirements of ASME B 16.5.

4.2 Spectacle blind and spacer & blind shall conform to the requirements of ASME B 16.48.

4.3 Fittings such as tees, elbows, reducers, etc. shall be seamless type and shall conform to ASME B 16.9 for sizes DN 50mm (2") to DN 400mm (16") (both sizes included) and ASME B 16.11 for sizes DN 15mm(1½") &below.

4.4 Fittings such as weldolets, sockolets, nippolets, etc. shall be manufactured in accordance with MSS-SP-97.

4.5 Repair by Welding on flanges and fitting is not permitted.

4.6 All butt weld ends shall be beveled as per ASME B 16.5/ASME B 16.9/MSS-SP-97 as applicable

4.7 Type, face and finish of flanges shall be as specified in purchase requisition. The interpretation of range of face finish shall be as follows:

Serrated Finish/125 AARH	:	Serration with 125 to 250µ in AARH.
63 AARH	:	32 to 63µ in AARH.

4.8 Flanges and fittings manufactured from bar stock are not acceptable.

5.0 INSPECTION AND TESTS

The Manufacture shall perform all inspections and tests in accordance with the requirements of this specification and the relevant codes, at his works, prior to shipment. Such inspection and testing shall include, but not be limited to, the following:

5.1 TESTING OF MATERIALS

Chemical composition and mechanical tests including yield strength, ultimate tensile strength, impact test, elongation and hardness shall be carried out for each heat of steel used as per the applicable standard as referred to in this specification.

5.2 VISUAL INSPECTION AND DIMENSIONAL CHECK

All flanges and fittings shall be visually inspected. The internal and external surface of the flanges and fittings shall be free from any strikes, gauges and other detrimental defects.

Dimensional checks shall be carried out on finished products as per ASME B 16.5 for flanges, ASME B 16.48 for spacers and blinds and ASME B 16.9/MSS-SP-97 as applicable for fittings and as per this specification.

5.3 NON-DESTRUCTIVE EXAMINATION

All finished wrought weld ends subject to welding in field, shall be 100% tested for lamination type defects by ultrasonic test. Any lamination larger than 6.35 mm shall not be acceptable.

5.4 The Purchaser reserves the right to perform stage wise inspection and witness tests as indicated above, at the Manufacturer's works, prior to shipment. The Manufacturer shall give reasonable notice of date and time for such inspection and shall provide reasonable access and facilities required for inspection, to the Purchaser’s Inspector.

The Purchaser reserves the right to require additional testing, at any time, to confirm Or further investigate a suspected fault. All costs incurred shall be for the Manufacturer’s account. In no case shall any action of the Purchaser, or his Inspector, relieve the Manufacturer of his responsibility for material, design, quality, or Performance of the materials concerned. Inspection and tests performed/witnessed by the Purchaser's Inspector shall in no way relieve the Manufacturer of his obligation to perform the required inspection and tests.

6.0 PAINTING

Once all inspection and test have been carried out all external surface shall be thoroughly cleaned to remove grease, dust & rust. Standard mill coating shall be applied on external surface to protect against corrosion during transmit and storage. The coating shall be removable type in field.

7.0 MARKING

All Flanges & fittings shall be stamped with the requirements of applicable dimensional manufacturing standard. The marking shall also include following:

- PO Number.
- Item Code.

8.0 TEST CERTIFICATES

Manufacture who intends bidding for fittings must possess the records of a successful proof test, in accordance with the provision of ASME 16.9/MSS-SP-75,as applicable.

Manufacturer shall furnish the following certificates:

- Test certificates relevant to the chemical analysis and mechanical properties, including hardness of the materials used for manufacture of flanges and fittings in accordance with the requirement of relevant standards and this specification.
- Test reports on radiography, ultrasonic and magnetic particle examination.
- Certificates for each fitting stating that it is capable of withstanding without leakage a test pressure, which results in a hoop stress equivalent to 100% of the specified minimum yield strength for the pipe with which the fitting is to be attached without impairment of serviceability.

9.0 PACKING & SHIPPING

Ends of all fittings and weld neck flanges shall be suitable protected to avoid any damage during transit. Metallic or high impact plastic bevel protected shall be provided for flanges and fittings. Flanges face shall be suitably protected to avoid any damage during transit.

10.0 DOCUMENTATION

The Manufacturer shall supply documentation in accordance with the Vendor Data Requirements List (VDRL) as attached with Purchase Order.

VCS PROJECT CONSULTANTS PVT. LTD.

STANDARD SPECIFICATION

FOR

HEALTH, SAFETY & ENVIRONMENT

VPC – SS – PL - 0021

REV. No	DATE	Purpose	Prepared By	Checked By	Approved By
00	20.06.2018	ISSUED AS STANDARD	PK	MVK	AD

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Contents

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1. SCOPE

This specification establishes the Health, safety and Environment (HSE) aspects to be complied with by the contractor during construction at site.

2. APPLICABLE SYSTEMS ANDPROCEDURES

The reference standard for setting Quality, Health, Safety and Environment Systems and procedures will be as linked below –

- Guidelines issued by PNGRB.
- ISO 9001 – 2008 - For Quality System.
- ISO 14001 – 2004 - For Environmental Management System
- (OSHAS) 18001-2007 -For occupational health and safety management Systems.

The Occupational Health & Safety Assurance Standard (OHSAS) 18001-2007 gives requirements for an occupational health and safety (OH&S) management system. It enables an organization to control its OH&S risks and improve its performance. It provides a basis for an organization to specify its OH&S performance criteria and design the management system.

OHSAS 18001 is compatible with the ISO 9001 (Quality) and ISO 14001 (Environmental) management systems standards. This facilitates integration of quality, environmental and occupational health and safety management systems by an organization.

Organization structure of the proposed CGD project includes a position for developing, installing and maintaining (with assistance by a specialist entity) Quality Assurance (QA) and Health, Safety and Environment (HSE) systems in line with ISO 9001-2008, OHSAS 18001-2007 and ISO 14001- 2004 Standards.

Documented Standard Operating Procedures (SOP) will be prepared by the Owner/Owner's representative for CGD entity for QA and HSE, for application across the organization. Development of the SOPs and implementation of the same at construction sites, control rooms, regional and corporate offices will be followed by an internal audit to verify conformance.

The CGD Network operating entity will thereafter regularly monitor, through periodic internal and mandatory external audits, effective implementation of the SOPs at the construction sites, control rooms regional and corporate offices as per systems and procedures.

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3. REFERENCES

This document should be read in conju ion with following.

- General Condition of Contract (GCC)
- Special Condition of Contract (SCC)
- Job Specifications
- Relevant IS codes, OSHAS standard
- Reporting Formats

4. RESPONSIBILITY & ORGANISATION

Health, Safety and Environment activities at site shall be under Contractor's scope. Contractor shall be responsible for implementation of HSE provisions. The nominated or designated safety engineer/ officer shall assist and perform day to day HSE work as per his advice.

5. GENERALREQUIREMENT

5.1. The contractor should follow HSE policy of owner as applicable to construction site.

5.2. The contractor shall ensure that HSE requirements are clearly understood & faithfully implemented at all level, at each site.

5.3. The contractor shall organize safety awareness programs regularly.

5.4. The contractor shall ensure his participation in every HSE meeting called by owner/owner representative.

5.5. The contractor shall conduct daily tool box talk.

5.6. Contractor shall ensure that their safety supervisor must always be present at site.

5.7. Contractor shall take sufficient care in moving his plants, equipment's and materials from one place to another place so that they do not cause any damage to any person or the property of the owner or any third party.

5.8. Working after sunset is strictly prohibited.

5.9. Hygiene requirement must be met on site by providing fresh drinking water at each site

5.10. The contractor shall submit Monthly HSE reports (Form attached in ANNEXURES).

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5.11. The contractor shall provide one four wheeler at site during working hour to meet any contingency.

5.12. The contractor shall adhere consistently to all provisions of HSE .In case of non- compliance or continuous failure the owner/ owner representative may impose stoppage of work for the serious HSE violation. All works shall be carried out in presence of Owner/Owner's Representative only.

6. TRAINING

The Contractor duties shall include conducting HSE training for all activities and personnel involved.

The Contractor shall ensure that their Personnel have been given the necessary HSE and work-related skills training in compliance with regulatory requirements prior to engaging the personnel for the work.

7. TOOL BOX TALKS

Contractor's Site Supervisor for specific work location shall conduct a tool box at the commencement of work on daily basis. If different team is working in different area, separate tool box talk covering location and hazard involved shall be carried out.

Each toolbox meeting shall cover the following agenda:

- Discuss safety issues of previous day
- Brief description of activities planned for the day &associated hazard
- Information & resources required to put controls in place
- Location specific hazard and instructions.
- Requirements Open

It is the responsibility of supervisor to convey PPE requirement to all workers and ensure compliance of the same and shall be checked during tool box talk before embarking on work.

Tool box talk report shall be prepared and kept at site within one hour of talk and it must be signed by all attendee to ensure participation of all in the talk. Tool box report shall be submitted to CONSULTANT/ OWNER

8. INCIDENT/ACCIDENT AND NEAR-MISS REPORTING, INVESTIGATION AND FOLLOW UP

8.1. Incident/Accident and Near-Misreporting

All incidents/accidents must be reported immediately. A report should be prepared by the Supervisor and submitted to the Site Manager within 12 hours of the occurrence and shall serve as a source for education of employee to prevent reoccurrence of similar

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incident/accident.

Contractor shall submit the Initial report of all Accidents/Incidents within 12 hrs.to Owner / Consultant and detail report within 24 hrs. For serious incidents and near misses, with the potential for fatality, serious injury or significant environmental or material damage, Contractor shall notify Owner/Consultant without delay and within twenty four (24) hours.

8.2. Incident/Accident Investigation

All incidents/accidents must be reviewed and analyzed to establish root causes and type of injury, trends and practices.

Investigation shall begin promptly after the occurrence of the incidents/accidents. The completed incidents/accidents investigation report shall be submitted to the Contractor Site Manager within 7 days of the occurrence. A copy shall be submitted to Owner/Consultant.

8.3. Follow-up

All incidents/accidents, including investigation results and recommendations, shall be discussed in the Site HSE meeting and shall be brought to the notice of employees in toolbox meetings.

Key Risks Identification and Management Risks

Working at height is a critical activity. Following hazards are associated with Working at height:

- Person Fall from height
- Material falling From height
- Slips, trips and falls
- Concealed utilities (i.e. electric cable Telephone cable, water line, Drainage line}
- Electric shock

9. HAZARD IDENTIFICATION AND RISK ASSESSMENT SYSTEM (HIRA)

The Contractor shall prepare and implement comprehensive HIRA as part of the HSE Management Plan prior to Commencement of the work or services and during the execution of the work also.

10. SITE HSE INSPECTION/AUDIT

All Site HSE checklists/Inspection reports shall incorporate a follow–up procedure to ensure that any recorded HSE violations have been promptly attended to in a satisfactory manner.

The Site HSE Inspections/Audit shall be planned by the Contractor.

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11. FIRST AID FACILITY

The contractor shall provide the first aid box at all the sites. The content of the first aid box shall include the following items:

- Twenty-four small sterilized dressings.
- Twelve medium size sterilized dressings.
- Twelve large size sterilized dressings.
- Twelve large size sterilized burn dressings.
- Twelve (15 gin) packets of sterilized cottonwood.
- One (200 ml) bottle of certified solution (1 per cent) or a suitable antiseptic solution.
- One (200 ml) bottle of mercurochrome (2 per cent) solution in water. (viii) One (200 ml) bottle of salt-volatile having the dose and mode of administration indicated on the label.
- One pair of scissors
- One roll of adhesive plaster (6 cm x 1in).
- Two rolls of adhesive plaster (2 cm. x 1in).
- Twelve pieces of sterilized eye pads in separate sealed packets.
- One polythene wash bottle (500 cc) for washing eyes.
- Twelve roller bandages 10 cm wide.
- Twelve roller bandages 5 cowhide.
- Six triangular bandages.
- One tourniquet.
- A supply of suitable splints.
- Two packets of safety pins.
- Kidney tray.
- One copy of first-aid leaflet issued by the Directorate General of Factory Advice Service and Labor Institutes, Government of India, Bombay.

All the content shall be kept in clearly marked and easy to remove cartons stored in such a manner that there is no rattling or spilling over even when the container is being moved Whenever applicable the cartons shall bear instructions for use, dosage etc.

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12. FITNESS TO WORK

The objective of Medical Assessment for Fitness to Work (FTW) is to assess health of employees in relation to their specific jobs such as working at height, to ensure they could perform required task without risk to health and safety.

The Contractors workers (as per the above category) shall under go through FTW prior to start work at site. It will be the responsibility of the Contractor to ensure compliance to this requirement.

12.1. Medical Examination requirement for working at height

Below specific requirements are must for Medical examination of Contractors employees working at height:

- History of Epilepsy.
- Blood Pressure.
- ECG+ any History of any Seizures.
- Vision Check.
- Blood Sugar (fasting &PP).
- And other general tests.
- Physical Examination- to confirm the person is physically fit.
- Blood Group (One time Test).
- General check about fear of Heights.

12.2. Other Requirements:

- Contractor to ensure that persons involved in working at height are trained, certified and having Valid I Card.
- Carry out tool box talk before starting of the work.
- Carry out site specific risk assessment and identify risk control measures for specific site work. (Ref doc).
- Ensure that persons are physically & mentally fit for working at height.
- Ensure that equipment shall be used as per approved standard for working at height.
- Ensure that equipment shall have facility of emergency rescue operation.
- Ensure person involved in working at height are trained in emergency rescue

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operation.

- Ensure that all equipment and safety devices used are inspected, certified by competent authority & valid & suitable for use.
- Quality conformance shall be carried out prior to start of work for working at height equipment's.
- Life cycle of equipment shall be checked
- In case of any part of equipment is found damaged or defective, it will be destroyed. "Working at height equipment's shall never being repaired". The Records, showing reasons for all the defective and damaged material shall be available and shall be stored separately at Contractor's yards.
- Ensure that Personnel Protective Equipment are inspected & in good condition
- Ensure that equipment used is within Safe working load mentioned on equipment.
- Ensure all tools are secured or kept in Tool kit / bag and there are no loose objects or tools.

13. PERSONNEL PROTECTIVE EQUIPMENTS

The contractors shall provide sufficient numbers of following personnel protective equipment's (PPEs) to workmen and supervisors/engineers to use them properly at work site.
Following five numbers of Personnel protective equipment's are identified as MANDATORY for all.

- Safety Helmet
- Coverall
- Safety shoes/footwear
- Safety Glasses
- Hand Gloves (as per job requirement) Other PPEs shall be as per job requirementlike Work at height- Full body harness (PETZL or equivalent make), Life line, Safety Net Arc Welding – Welding face shield Grinding – Grinding face shield Height work – Full Body harness (above 2 meters) Contractor to ensureproper use and selection of protective clothing / equipment for specialized jobs.

PPE's to be used shall be as per following Specification:

IS : 2925 – 1984 : Industrial Safety Helmets.

IS : 4770 – 1968 : Rubber gloves for electrical purposes

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IS : 6994 – 1973 (Part – I)	: Industrial Safety Gloves (Leather& Cotton)
IS : 1989 – 1986 (Part – I &	: Leather safety boots and shoes
IS : 3738 – 1975	: Rubber knee boots
IS : 5557 – 1969	: Industrial and Safety rubber knee boots
IS : 6519 – 1971	: Code of practice for selection, care and repair of Safety footwear
IS : 11226 – 1985	: Leather Safety footwear having direct molding sole
IS : 5983 – 1978	: Eye protectors
IS : 9167 – 1979	: Ear protectors.
IS : 3521 – 1983	: Industrial Safety belts and harness

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Technical Standard for working at height equipment's shall be as per following standard:

Quality Standards

Sr. No.	Name of equipment's	EN Standard
1	Energy absorbers	365
2	Slings	566
3	Retractable type fall arresters	360
4	Guide Type fall arresters on a rigid	353-1
5	Connectors	362
6	Dynamic mountaineering rope	892
7	Descended device	341
8	Anchor device Type-A/B	795
9	Fall arrester harness	361
10	Sit harness	813
11	Lanyards	354
12	Pulleys	12278
13	Fall arrester system	363
14	Work positioning belt	358

14. EQUIPMENT LIST AND INSPECTION CERTIFICATE

Equipment list must be made available and must be certified for safety as per the requirement of Factory Act. Tools and Tackles should be calibrated from the approved agency only.

List of Tools and Tackles

Item	Inspection/Calibration Date
Full body harness	Once in six Month
Rope Grab fall arrestor	Once in six Month
First Aid Box	Once in Month
Fire Extinguisher (10 Kg.)	Once in a Year
Extension board(without cable Joint with Socket) with Circuit Breaker	Monthly
Nylon tie line for tools	Once in a day

15. HSE REQUIREMENTS AT SITE

Contractor may conduct survey to assess the requirement of GI riser for high rise building.

For Work at Height: Contractor shall provide PETZL or equivalent system/metallic

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scaffolding as a working platform and full body harness with self-locking arrangement. Full body harness with self-locking arrangement shall be used for ascending/descending/work rest.

PETZL system or equivalent system/metallic scaffold should comply with relevant IS/EN/BS standard.

Only certified trained plumber undergone practical training on work at height shall be deployed.

15.1. Any working at height related activities has to be carried out with Permit system.

Work at Height

Working at Height is performing work at height where workers can fall 1.8m or more from where they stand or sit to perform work. This includes gaining access to working at height if there is a risk of falling 1.8m or more.

Examples of Working at Height are:

- Working on temporary platform more than 1.8mhigh
- Working on top of vehicles/tankers or building more than 1.8 m high Risk of Working at Height
- Fall from height
- Falling objects

Safety net, fall arrest system and two lanyard full body harness when working at height While working at height, all loose tools shall be kept inside a container and good housekeeping shall be maintained.

All Working at Height shall comply with Working at Height Procedures Safety Net System.

"Safety net systems" Safety net systems and their use shall comply with the following provisions.

Safety nets shall be installed as close as practicable under the walking/working surface on which workers are working, but in no case more than 30 feet (9.1 m) below such level. When nets are used on bridges or similar kind, the potential fall area from the walking/working surface to the net shall be un obstructed.

Vertical distance from working level to horizontal plan of net	Minimum required horizontal distance of outer edge of net from the edge of the working surface
Up to 5 feet	8 feet
More than 5 feet up to 10 feet	10 feet.
More than 10 feet	13 feet

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- Safety nets shall be installed with sufficient clearance under them to prevent contact with the surface or structures below when subjected to an impact force.
- Safety nets and safety net installations shall be drop-tested at the jobsite after initial installation and before being used as a fall protection system, whenever relocated, after major repair, and at 6-month intervals if left in one place. If drop test not possible designated competent person shall certify that the net and net installation is in compliance with the requirement by preparing a certification record prior to the net being used as a fall protection system. The certification record must include an identification.
- Determined that the identified net and net installation were in compliance and the signature of the person making the determination and certification. The most recent certification record for each net and net installation shall be available at the jobsite for inspection.
- Defective nets shall not be used. Safety nets shall be inspected at least once a week for wear, damage, and other deterioration. Defective components shall be removed from service. Safety nets shall also be inspected after any occurrence which could affect the integrity of the safety net system.
- Materials, scrap pieces, equipment, and tools which have fallen into the safety net shall be removed as soon as possible from the net and at least before the next work shift.
- The maximum size of each safety net mesh opening shall not exceed 36 square inches (230 cm) nor be longer than 6 inches (15 cm) on any side, and the opening, measured center-to-center of mesh ropes or webbing, shall not be longer than 6 inches (15 cm). All mesh crossings shall be secured to prevent enlargement of the mesh opening.
- Each safety net (or section of it) shall have a border rope for webbing with a minimum breaking strength of 5,000 pounds (22.2kN).
- Connections between safety net panels shall be as strong as integral net components and shall be spaced not more than 6 inches (15 cm) apart.

15.6.1 Lifeline

- Horizontal or vertical life line shall be used while working on suspended platform or similar type of platform or working at thereof/edge
- Horizontal/Vertical lifelines shall be designed, installed, and used, under the supervision of a qualified person, as part of a complete personal fall arrest

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system, which maintains safety factor of at least two.

- Lanyards and vertical life line shall have a minimum breaking strength of 5,000 pounds (22.2kN).
- When vertical lifelines are used, each worker shall be attached to a separate lifeline.

15.6.2 Full Body Harness

- Ensure that the full body harness must be inspected prior tousle.
- Ensure that full body harness must be worn by the workmen while working at height.
- Full body harness lanyard must be anchored with a strong member.
- While climbing up or climbing down, one of the hooks of lanyard must be locked alternatively all the time.

15.6.3 Working Platform

Every working platform more than 1.8 mtr. High from which a person is likely to fall shall be of steel plates/planks/cage and shall be:

- Closely boarded, planked or plated.
- At least 700 mm wide if the platform is used as a footing only and not for the deposit/ keeping of materials.
- At least 900 mm wide if the platform is used for the deposit of materials.
- At least 1100 mm wide if the platform is used for the support of higher platform.
- Two metal/planks shall not have 25 mm gap between them the distance between two consecutive transoms or other supports on which a platform rests shall be fixed with due regards to the anticipated load and the nature of platform flooring. As a general rule such transoms shall not be placed more than 1.0 mtr. apart.

15.6.4 Scaffold

Scaffold Inspector (Project Field Officer)

This is the competent individual who shall inspect scaffolding prior to each use and perform full inspections as per the Inspection procedure. He will accept the Scaffold after ensuring the followings;

- The scaffold erected complies with legislation.

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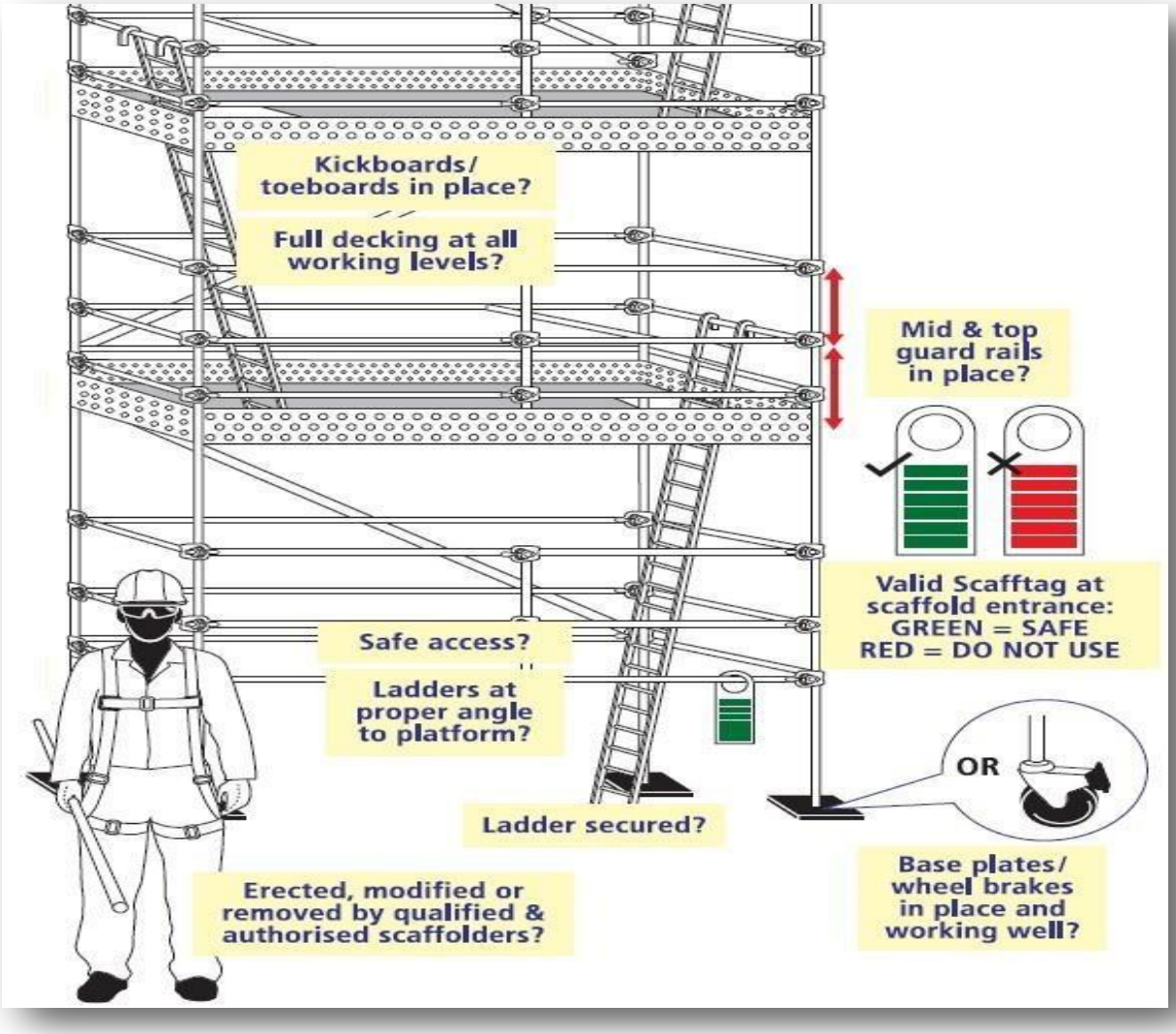
- The permissible loads per deck and the working distance between the scaffold and the work surface are examined.
- Materials used for the scaffold are in a proper condition and in throughout the time it is in place.
- Existence and proper installation of collective protective equipment and means of access.
- Clear display of details of permissible loads on the scaffold.
- Acceptance is carried out prior to the scaffold being made available for the first time and is repeated after any alterations.
- Inspection is repeated at the frequency of 7 days. Issues scaffold tag (Green Tag) before its first use.

Scaffold Contractor

This refers to the company involved in the installation (erection, dismantling and alteration) and/or design of the scaffolding on behalf of CONTRACTOR.



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- The erection contractor shall ensure that the scaffolding is erected in compliance with the OHSAS/IS standards. Worksite specifications and considerations shall be incorporated into any such plan.
- Ensure availability of competent staff and certified material all the time.
- Scaffolding may be erected, dismantled or altered only under the supervision of a competent individual who has received adequate specific training for the intended operations, specifically including the following:
- Understanding the erection, dismantling and alteration plans for the scaffolding
- Ensure PPEs and Safety at work during erection ,dismantling and alteration of the scaffolding.
- Measures designed to prevent the risk of falling person's and objects.
- Safety measures applicable in the event of a change in weather conditions.
- Permissible structural load criteria.
- Any other risk that may be entailed by erection, dismantling and alteration operations.
- Scaffold material: Safe handling, and storage.

Scaffold User

- The User shall ensure that acceptance of the scaffold has been properly carried out; green Tag is issued and provide notification of any alterations. Work from tagged scaffolds only. Comply with special conditions/additional controls noted on the access tag.
- It shall observe all restrictions on use (particularly permissible loads). Its requirements should be taken into consideration in the specifications during erection.
- Use scaffolds only for their intended purpose.
- Do not use unstable objects or makeshift devices to increase the working height of the scaffolds.
- Use portable ladders as a means of increasing the working height only after the competent person has determined that the stability of the structure has not been compromised, and adequate fall protection is in place.

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- Do not straddles, stand on, or work outside of the guardrail.
- Use designed access means to descend or ascend a scaffold (stairs, attached ladder, or specially designed end frames). Do not uses cross bracing or side rail
- Keep only the tools and materials on the platform that are necessary to perform the task. Control all slipping and tripping hazards by removing or securing the tools/materials.
- Do not modify or remove a scaffold system/component or status tag.
- Notify supervision immediately if a scaffold is damaged, weakened, or otherwise deficient.
- Scaffold users/ Scaffold erectors shall use IS and EN standard double lanyard safety harness with absorbent.

Inspection Points

To ensure the integrity and proper installation of scaffolding, a certain number of points shall be inspected. Inspection of these points ensures a basic level of safety. Following fundamental inspection points are as follows:

- Environment and location
- Supports and soleplates
- Structure and posts
- Decks
- Scaffold Capacity Standards
- Working levels
- Access
- Signs and signage

Mobile Scaffolding

- Mobile scaffolds are identical in design to fixed scaffolds, except that their tubular structure is lighter and in terms of support, the wheels do not offer the same load-bearing area as footplates on fixed scaffolds.
- Erection is simple and shall be carried out using personal protective equipment. Lastly, during erection, dismantling and use, the brakes shall also be applied. Care should be taken to ensure that mobile scaffolds are installed on flat surfaces.

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- Mobile scaffolds are highly practical for short jobs at relatively low heights.
- Acceptance is carried out after erection has been completed.
- They are moved as the work being carried out progresses. No fresh acceptance is required after each move, but the workstation shall be verified (working distance, brakes applied)
- A freestanding scaffold shall be considered safe when the total height is equal to or less than four times the minimum or least base dimension.
- Rules for use
- Do not extend the base to increase the height.
- Brace each frame level as per the manufacturer"sinstructions.
- Do not raise work surfaces by placing decks on rails or midribs.
- Do not climb on the guardrails or other structural components.
- Observe the manufacturer's guidelines governing the installation of brackets, material hoists etc.
- Stay clear of power lines and observe safety distances. (If any)

Scaffold safety

The following safety tips are as guidelines in avoiding job-site situations that could prove dangerous to scaffold workmen.

- The Scaffold to the Building: Scaffolding should be tied to the structure using heavy wire or tie-in devices. The first vertical tie should be at the maximum height of 4 times the narrowest base dimension. Additional ties are not to exceed 26 feet vertically. Maximum horizontal distance between ties is not to exceed 30feet.
- Don't Overload Scaffolding: Follow the safe load capacities as given by the scaffold manufacturer. There's a limit even to what steel cansupport.A4-to-1-safetyfactor must be figured on scaffolding.
- Use Metal Catwalks, Platforms; where available. If wood plank is used, it must be scaffold grade or better. Inspect thoroughly before every job to make sure it is free from breaks, knots, and cracks or warp age. Decking should be full width.
- All working platform must be constructed with the specific requirement of job.
- If the working platform is not permanent then safety belt must be used.
- There shall be firm foundation for all scaffoldings. All scaffolding shall be made of sound material.

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- Scaffolding material shall be inspected and used, only if found in good condition.
- Provide metal base plate is used under all upright or standard scaffoldings. Correct type of couplers shall be used for all connections.
- Plumb and level scaffoldings as erection proceeds, so that braces will fit without forcing.
- Fasten all braces securely.
- Working platforms shall be provided with guards. This should consist of top rail, mid rail, and toe board. The toe board shall be of minimum height 100 mm, while the mid rail and top rail shall be at heights of 600 mm and 1200 mm respectively.
- Do not use ladders or makeshift devices on top of scaffoldings to increase the height.
- Shall be placed at least 75 deg. to the floor.
- Fall arrestor to be used where ever applicable.
- The following safety tips are as guidelines in avoiding job-site situations that could prove dangerous to scaffold workmen.
- Don't Ride Moving Scaffold; and remember scaffold units are limited in height to 4* times
- Their narrowest base dimension (unless base is widened by outriggers or more end frames; or tied into building.) Always keep casters locked. (except tore-spot)
- Don't Climb Braces: Use the steps provided on most steel scaffolds to climb up to or down from work levels. Use scaffold climbing ladders where required.
- Protect Working Levels: Use overhead canopies to protect workers on lower work levels when work is being done overhead. Rope off un safe areas underneath scaffold or provide wire mesh around work area.
- Use Double Guard Rails; and toe board so exposed side sat platform heights of 1.8 meter or more.

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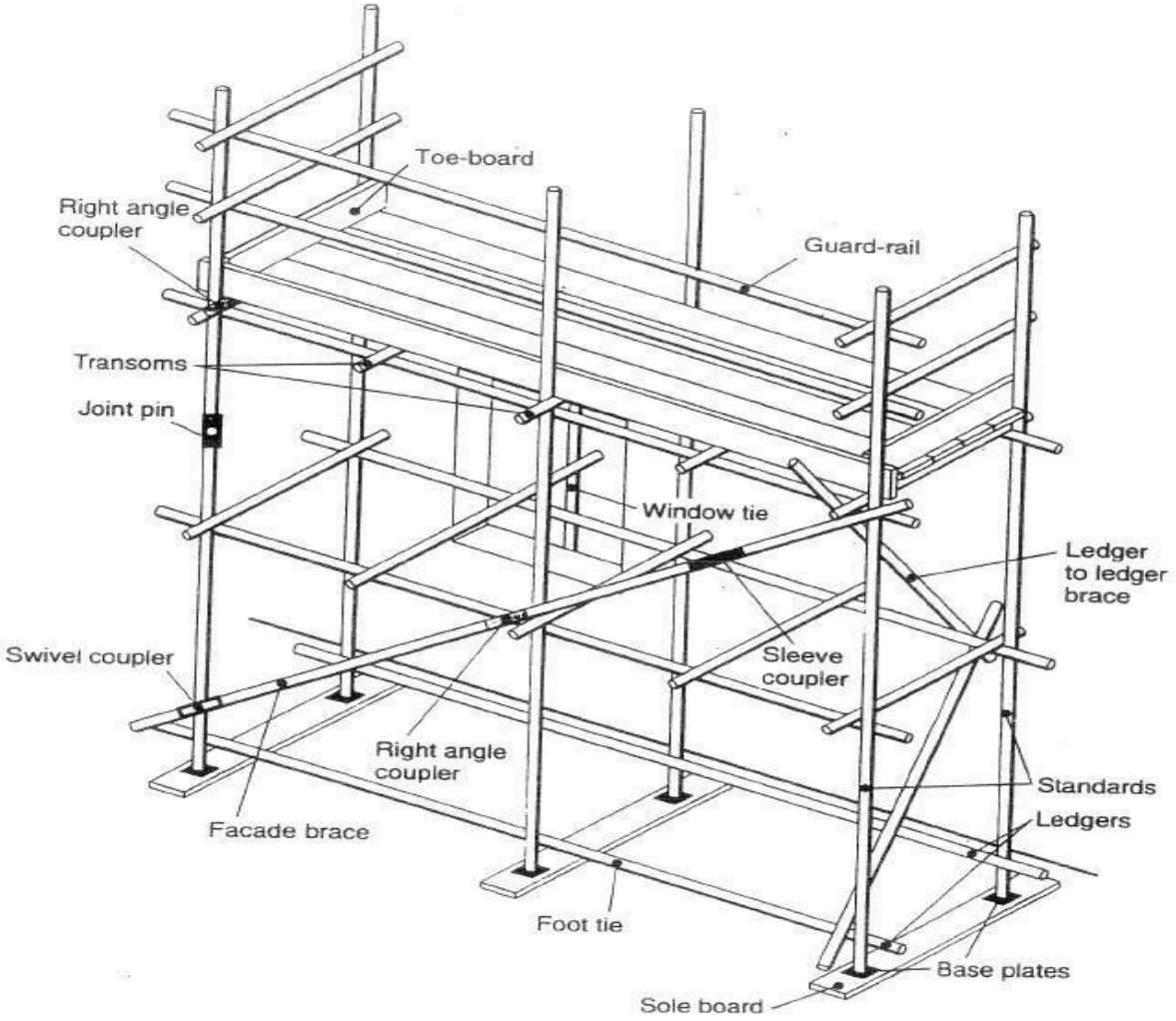
Illustration of a Sample Independent Scaffold



15.6.5 Ladders

- Fall protection is not needed when climbing up or down ladders less than 20 feet/6.1 meters, using 3 points of contacts.
- Portable ladders, steps and trestles should only be used for light duties of short duration. Otherwise, properly constructed means of access should be provided.
- Aluminum ladders can generate sparks when struck against rusty iron, so it must be used in Hazardous Areas with special care.
- Aluminum ladders must not be used in areas where they might be splashed with acids or alkalis ; e.g. Utilities Area

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- Ladders with metal reinforced, Damaged or rotten stiles, Missed footing on ladder rungs must not be used.
- Over-reaching and over-balancing is not allowed.
- Every time before use, the user will carry out inspection of ladder.
- If the work to be done necessitates the use of both hands, a safety belt must be used.
- Tools and materials must not be hand carried by persons ascending or descending ladders. Where applicable light tools should be carried in pockets, tool belts or shoulder bags, provided they do not impair movement and are held securely.
- Rungs, stiles, or treads to be checked for bending, twisting or signs of abuse or undue wear.
- Feet to be fitted with various types of bases and in good order. Synthetic non-slip, wooden or metal.
- Non-slip stair treads mats of stepladders, should be fitted and in good condition.
- In case of moving ladders fitted with wheels, Hinges and locking devices to be secure and in good working order.
- All portable ladders must be in good condition as per the site norms.
- Ladder shall extend 3' to 4'above the point of Landing and topmost 3 rungs shall not be used.
- Ladder is checked visually for defects before every use.
- Ladders shall not be used in a horizontal position as runways or scaffoldings.
- Ladders shall not be placed in front of a door that opens toward the ladder unless the door is locked, blocked or guarded.

15.6.6 User Ladder Safety Checklist

The following check list specifies the main points to remember when using ladders:

- Do not erect:
- On sloping ground
- On top of movable objects
- In high wind
- In front of a door which may be opened
- Against a slippery or unstable surface

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- At a shallow angle, or use horizontally as a plank or bridge
- Leaning to onside

15.6.7 Donor

- Drop things from ladder.
- Straddle from the ladder to a nearby foothold..
- Allow more than one person up a ladder at time.
- Use a ladder which is too short.
- Use a makeshift or „home-made „ladder.
- Over-reach (generally always keep hips within the stiles).
- Slide down ladder.
- No ladder should be used if it has: A missing, loose or defective rung or tread.
- A defective stile side member.
- A defective rope or associated fitting (rope operated extension ladders).
- Any sign of warping.
- Missing fastenings or rivets, guide or latching hooks.
- Always Return ladders to store as soon as they are finished with.
- Inspect a ladder immediately after any fall or overload.

15.6.8 Activities Allowed on Ladder

- A ladder is considered to be suitable for access of personnel to an elevated area only. No significant works may be carried out from a ladder. In particular, activities such as those below may not be carried out on ladder:
- Carrying tools (other than those which might clip onto a tool belt) up to an elevated level.
- Activities involving heavy manual labour.
- Activities requiring reaching or stretching such that the body is no longer centered over the ladder.
- For these types of jobs, a work platform such as a scaffold is required. The safe working position from a ladder is to have both thighs and hips within the styles.

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15.6.9 Color code and inspection

- Color code of the year shall be painted on one style only and equal to one rung spacing.

15.2. Roof work

- All roof-work operations should be pre-planned and properly supervised.
- Roof work should only be undertaken by workers who are physically and psychologically fit and have the necessary knowledge and experience for such work.
- Work on roofs shouldn't be carried on in weather condition that threaten the safety of workers.
- Crawling boards, walkways and roof ladders should be securely fastened to a firm structure.
- Roofing brackets should fit the slope of the roof and be securely supported. Where it is necessary for a person to kneel or crouch near the edge of the roof, necessary precautions should be taken.
- On a large roof where work have to be carried out at or near the edge, a simple barrier consisting of crossed scaffold tubes supporting a tubing guardrail may be provided.
- All covers for openings in roofs should be of substantial construction and be secured imposition.
- Roofs with a pitch of more than 10 should be treated as sloping.
- When work is being carried out on sloping roofs, sufficient and suitable crawling boards or roof ladders should be provided and firmly secured imposition.
- During extensive work on the roof, strong barriers or guardrails and toe-boards should be provided to stop a person from falling off thereof.
- Where workers are required to work on or near roofs or other places covered with fragile material, through which they are liable to fall, they should be provided with suitable roof ladders or crawling boards strong enough and
- When spanning across the supports for the roof covering to support those workers.
- A minimum of two boards should be provided so that it is not necessary for a person to stand on a fragile roof to move a board or a ladder, or for any other reason.

15.3. Electrical Safety

- Only authorized electrical engineer / electricians are permitted to do the electrical work.

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- Do not use extension cords or electric hand tools with exposed wires.
- To switch-off electrical supply in case of an emergency must be enabled at all times.
- All temporary electrical installations carried out on the site must be in accordance with the local regulations and specifications.
- The installations must be inspected regularly by a competent person (e.g. electrical engineer/supervisor) to ensure that they are in safe condition and working faultlessly.
- Each electrical power tools and electrical equipment must be under protection of earth leakage/residual current protective device(ELCB/RCCB).
- Portable power tools used on site must have protective insulation ("double insulation").
- All electrical machines, tools and appliances must be inspected by a competent person (e.g. electrician) to ensure that all equipment's are in safe condition and working faultlessly. To confirm that the inspection was conducted the equipment must be labeled or marked clearly and registered. The documentation must be submitted to TE for records.
- Assume that all circuits are live until they have been thoroughly checked and proven dead. Never work on a live circuit.
- When using electrical equipment in an environment with electrical conductivity (e.g. in confined spaces like case pipes, containers, towers) the voltage used may at maximum be 24 Volt AC. (fed from a safety low voltage transformer)
- Never use a fuse heavier than the capacity of the circuit. Also never attempt to bridge abuse.
- Never tamper with any electrical wiring or apparatus.
- Do the cable laying as per standard specifications and requirement; do not lay down power cables adjacent to secondary cables of welding machine.
- Assess overhead power line hazard and keep safe distance from it.
- All electrical equipment's, motors, transformers, welding machines, etc. to be provided with earth connections.

15.4. Power & Hand Tool Operation

- All portable tools are to be connected through control bus with ELCB.
- All contractors should ensure proper Earthling of all electrical equipment's used by

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them. Suitable earthling pits must be made if required.

- Examine electric cable for defects before use.
- Do not ever insert free ends of wires into sockets and hold them in place with matchsticks / other means. Always use industrial three pin plugs.
- Check the RPM rating of grinding wheels. The RPM rating must be greater than or same to that of the driver. Wheel guard should be used in proper position before grinding. Also proper PPEs must be ensured (goggles &hand gloves).
- Do not tie electric cords to metal rods or nails.
- No cable should run under the ground. It must run overhead at a 2 m height to avoid pinch point and creating trip hazard
- AlltoolsandTacklesmustbeexamineddailybeforecommencingworkandrecordtobemaint ain ed.
- Defective tools are to return to store.
- All electrical tools must be inspected at regular intervals by an authorized electrical person and record to be maintained.
- The weight, size & type of tool should be selected to suit the job carried out.
- The handles of tools should be intact and properly tightened. Split handles should be replaced. To avoid slippage, grease and oil should be wiped off.
- Insulated and non-conducting tools shall be tested for electrical resistance.
- Wrenches should not be pushed but pulled. Chisels struck by others should be held by tongs and not by hands.
- Chipping should always be done away from self.
- Hand tools should not be allowed to lie down on benches, scaffoldings etc. from where they can fall. They should be properly stored.

15.5. Welding

The metal frames and cases of mains-powered welding rectifiers, transformers and voltage regulators and of engine driven welding machines must be positively earthed locally throughout the work.

- Welding leads and return leads must be protected against physical damage.
- Insulated electrode holders and cable lugs / protectors must be used.
- The return lead must be attached to the work place as close as reasonably practicable to the welding point.
- If mains power is used, the work piece must be positively earthed using a well-

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protected earth wire connected at both ends by bolted lugs or secure screw clamps.

- Bolted joints in pipelines and structures must not be relied upon to provide adequate electrical continuity for welding currents.
- Electric arc welding should not be carried out on equipment suspended from a crane because of the risk of damage to lifting wires from uncontrolled stray currents.
- Welders must not wear metal rings, bracelets or necklaces during the work as induced currents from the welding equipment might heat these.
- Dry, non-conductive gloves should be worn.
- The welder must always disconnect the electrode holder from the supply before attempting to replace an electrode.
- The welder should not lean against an earthed conductor whilst manipulating live electrodes.
- Welders working with electrodes fed from different phases of a three-phase supply should not work in close proximity to one another.
- Ensure that welding machine is in order and approved by site engineer.
- Ensure that welding cables are in order.
- Remove all combustible material from welding area to avoid fire.
- Place a fire extinguisher nearby welding premises.
- Ensure welding holder, cable and its lugs in good condition and use only industrial power socket and plugs (3 Pin) to avoid electricity risk.
- Make sure that welding machine is provided with ON/OFF switch and is earthed/grounding.
- Do not over load electrical appliances and cable, shocked pined.

15.6. Gas Cutting

- Gas cylinders must be secured in the vertical position to prevent them being knocked or pulled over.
- Long lengths of hose should be avoided, but;-
- Cylindersmustbekeptfarenoughawayfromtheweldingorcuttingoperationsto prevent contact with sparks, flames and metals platter.

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- Cylinders must be placed where they are unlikely to be damaged by stray electric currents or falling objects.
- Cylinders must not be taken into confined spaces.
- The torch must always be lit from a lighter provided for the purpose. There should be no attempt to light it from hot metal.
- Check the cylinder and its valve or leakage and move out any leaking cylinder immediately.
- Ensure that flash back arresters are installed with torch and NRV (Non return valve) on the gas cylinders side.
- Ensure cylinder is far away from fall of sparks and hot metal.
- Check the regulator and torches that they are inspected prior to every use.
- Check for leaks around regulators, hoses/fittings & nozzle with soap solution.
- Check the entire hose length if it is cracked or worn out cut that length of hose or replace the hose.
- Check that flash back arrester used for the purpose is of approved make/specification only.
- Place a fire extinguisher nearby welding premises.

15.6.1. Gas Cylinders

The handling of gas cylinders must comply with local legislation and TE's regulations as per particulars given below:

- Gas cylinders must be stored protected from excessive heat, fire, dangerous corrosion, mechanical damage or access by unauthorized.
- Gas cylinders must not be stored together with flammable materials.
- Gas cylinders must be secured to prevent them from falling over.
- Gas cylinders must be capped and operated upright.
- Use cylinder trolley / cage for the transportation of gas cylinders at site.
- Never use oil or grease on the regulator of a cylinder valve.
- Store gas cylinders in ventilated area.
- Don't keep LPG cylinder in confine/below ground area.
- Gas stores must not be set up in critical areas such as stairways, corridors,

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emergency routes, garages or passages for person's or vehicles.

- Never transport by rolling them on the ground or use them as rollers or supports.
- Never attempt to repair cylinder.
- Leaking regulators, cylinder valves, hose pipes or other equipment should be taken out of service.

15.7. Grinding Operation

- Grinding wheels should be stored in dry place.
- After expiry date, grinding wheel must be condemned, broken in to pieces.
- Power supply cable of adequate current carrying capacity shall be used and it should be in good workable condition without abrasions, cuts or pu ure in outer insulation.
- Socket pin provided at supply end and On/off switch in working condition.
- Proper earthling of the body in case of metallic body.
- Wheel guard properly fitted imposition.
- Machine body without any damage like cricket.
- Moving part (wheel) must be properly fixed to the machine with the help of spanner.
- Grinding wheel must be of suitable size as per the speed of grinding machine.
- Grinding wheel without manufacturer"s stickers having size, speed and expiry date must be condemned.
- Don't use portable grinding machine as bench grinder.
- Don't fit over size wheel than recommended size by machine/wheel manufacturer.
- Don't grind small, unstable object without fixing it in the vice.
- Don't over press the grinding wheel against the job for fast removal of metal.
- Put OFF the main switch, while machine is not in use (tea breakneck.).
- Don't chip off grinding/cutting wheel for achieving fast cutting rate.

PPEs:

- Use of helmet, face shield or safety goggles (where face shield is not possible.) and hand gloves.

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15.8. Use of Power Tools and Cables

- All electrical equipment and tools used by the contractors and their employees shall be properly checked by contractor"s supervisor before use.
- All power tools must have proper guard at all-time.
- Leads /cables must be placed so that they do not create a trippig hazard.

15.9. Pressure / Leak Testing

Hydrostatic and Pneumatic Test

Access to the test area shall be limited to essential personnel only. before the test commences compliance is required with the following points:

- Persons supervising pressure or leak tests must have sufficient knowledge and experience of testing to fully understand the hazards of the activity and the precaution, which must be taken.
- Effective communication, including formal procedures, must be established between sites whenever the test envelope extends beyond one site, for example, pipelines.
- The area shall be cordoned off (using tape, shields or barriers, etc.) at an adequate distance from the equipment to be tested, as specified on the Permit to Work
- Warning signs shall be posted at access ways, at other strategic positions, and on the equipment to be tested (including the doors of test workshops or other designated areas.
- Pressuring equipment shall be provided with suitably calibrated pressure control/regulator devices
- Pressuring equipment shall not be left unattended at any time during the test.
- Pressuring equipment shall be isolated from the equipment under test and where practicable disconnected, when the test pressure has been reached.
- Care must be taken to ensure that materials of construction have the required ductility at the test temperature to prevent brittle fracture.
- A safety valve should be fitted to the equipment/system being tested, set to relieve at a pressure that will prevent over pressurization.
- Sufficient venting / draining points shall be provided in order to prevent trapping of pressurizing medium behind non-return valves, check valves, between isolation

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valves, or within dead legs of the pressure envelope.

- The equipment/plant to be pressure tested must be subjected to thorough examination prior to testing. It may be necessary to 100% inspect all welds using visual, radio graphic or other NDT techniques.
- The gas supply must be isolated when test pressure has been achieved.
- The pressure envelope must contain sufficient vents, to a safe location.
- De-pressurization after pneumatic testing must be gradual.

15.10. Barricades and Warning Signs

- Area where work is being carried out above man height or below 1' ground depth must be barricaded. Linked barrier with link chains must be provided by the contractor for cordoning the area at ground level, during GI work.
- Follow the instruction of all types of warning signs like "NO SMOKING" "NOENTRY" "DANGER" "Work at height", "Inconvenience to member of public regretted/work in progress","
- Name of the Contractor and contact details"

15.11. Basic Safety Rules For The Construction Site

- The construction site shall be considered a restricted area and unauthorized entry into the site is strictly prohibited. Anyone found trespassing should be asked to leave the site immediately.
- All persons of CLIENT/Consultant/Contractor shall be responsible for their own safety in plant or work sites.
- Nobody authorized to touch any valve, switch, or interfere with plant/site activities.
- Children below 18 years are not allowed inside plant / worksite.
- Never walk on the pipes, equipment, structure etc.
- Always use stairs, handrails & walkover platforms.
- Never carry sharp or pointed tools in pockets.
- Alcoholic beverages will not be consumed, brought into, or manufactured on the work sites or inside the plant.
- Drugs/intoxicant substances will not be used, brought into, or manufacture don't he site or plant.

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- Cigarette, beedi smoking is not allowed except in the designated smoking booths.
- Firearms, explosives, knives or other types of weapons will not be allowed on the site.
- Gambling or any other form of betting games is prohibited.
- Discrimination on the basis of race, sex or national origin is prohibited.
- Horseplay, Fight, Practical jokes, Aggressive or abnormal behavior is prohibited.
- Individuals under the influence of alcohol or drugs will not be permitted entry to the site.
- Safety helmet, safety shoes, ear plug or ear muff, hand gloves, safety goggles, safety harness &clothing for body protection are mandatory in the plant or work site.
- Use other personal protective equipment as displayed in plan/site.
- It is strictly not allowed to use non-intrinsically safe equipment or instruments in the operational area of site.
- All vehicles for use on the site shall conform to the requirements of the Vehicle Entry Permit. Maximum Speed limit inside complex is 10km/Hr.
- In case of Emergency dial appropriate agency like Fire, Hospital, Security etc as displayed.

Violation of the Rules and Regulations might result in removing the person(s) concerned from the premises and denying the person(s) concerned from any future access to the site. The site in-charge will judge whether permanent removal of the individual from the premises is justified depending on the seriousness of the violation(s). All Indian laws shall be complied with at all the time.

15.12. Site Emergency Preparedness and Response

The CONTRACTOR shall establish, what are the arrangements in the event of an emergency.

The CONTRACTOR shall ensure that their Personnel are familiar with the essential emergency equipment, the use of which shall be demonstrated and practiced in drills.

The CONTRACTOR shall check the emergency procedures and the location and condition of the emergency equipment.

The CONTRACTOR personnel will be instructed of the actions to take in the event of serious personal injury, gas or toxic release, fire, explosion, heavy rains, wind storms, chemical spillage, land slide, scaffolding or structure collapse, critical damage to operating equipment, etc. and other emergency situations during the induction training and other

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ongoing training sessions.

These situations may demand adequate rescue and relief measure to handle such events quickly and effectively.

In an emergency, or on hearing the alarm, every supervisor shall ensure the following;

- All work is stopped atone.
- All equipment vehicles and tools are shut down (all sources of ignition).
- All men are evacuated to a pre-determined Muster point.
- A roll call is taken and every man is accounted for.
- No one is permitted to return to work until notification has been received from the CONTRACTOR representative that it is safe to dose.

15.12.1. Emergency Preparedness

The basic and essential features of any emergency Preparedness are to analyses and plan for the potential risk. This includes;

- Establishing and maintaining effective communications.
- Liaison with local emergency services and authorities.
- Action Procedure (evacuation routes and assembly pointed.).
- Appointment of key personnel and specifying their duties and responsibility.
- Emergency Response Drills

15.12.2. Emergency Response Drills

Effectiveness and comprehensiveness of Emergency Response Plan must be tested on a regular basis. Drills which reflect the conditions induced from the more likely emergency occurrences must be conducted. CONTRACTOR should conduct such drill on periodic basis. All emergency drills, exercises and responses to actual incidents shall be fully documented and followed by a complete review and when necessary, procedure revision process.

Initiate any required procedural changes, and initiate the dissemination of any lessons learned through the Site HSE communication system.

15.13. Road Safety Norms

- For roadside working site to be barricaded..
- Only eligible driver can drive required vehicle inside site
- Speed limit norms of site must be followed
- No riding or travelling on the back of open end vehicle, fork lift or trailers should be done.

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15.14. Environment

The CONTRACTOR shall pay due regard to the environment by preserving air, water, soil, animal and plant life from adverse effects of the CONTRACTOR's activities and minimizing any nuisance which may arise from such operations.

All waste generated by the CONTRACTOR shall be contained and disposed of in accordance with the legal requirement on waste management.

15.15. Labor Welfare &Legal Requirement

- All mandatory provisions with regard to safety as prescribed under contract Labor (Abolition & Regulation) Act 1970 and Rules made there under are applicable.
- Workmen compensation insurance and registration under ESI should be maintained.
- Time to time, all rules and regulations suggested by safety committee of site must be followed and implemented

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ANNEXURES

ANNEXURE – A

RELEVANT IS-CODES FOR PERSONNEL PROTECTION

IS : 2925 – 1984	:Industrial Safety Helmets
IS : 4770 – 1968	:Rubber gloves for electrical purposes
IS : 6994 – 1973 (Part – I)	:Industrial Safety Gloves (Leather & Cotton)
IS : 1989–1986 (Part – I & III)	:Leather safety boots and shoes
IS : 3738 – 1975	:Rubber knee boots
IS : 6519 – 1971	:Code of practice for selection, care and repair of Safety footwear
IS : 11226 – 1985	:Leather Safety footwear having direct molding sole
IS : 5983 – 1978	:Eye protectors
IS : 9167 – 1979	:Ear protectors.
IS : 3521 – 1983	:Industrial Safety belts and harness

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ANNEXURE – B

FORMAT - 1.0

1.0 : HEALTHY, SAFETY & ENVIRONMENT (HSE) PLAN

Project :..... Contractor:.....

Date : ---------- Owner: .....

(To be prepared & submitted by each Construction Agency)

Activity Description	Procedure/ W.I./ Guidelines	Code of Conformance	Performing Fu ion			Audit Fu ion
			Performanc e	Checker	Approver	Customer Review/ Audit Requirements

PREPARED BY REVIEWED BY APPROVED BY

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MONTHLY CHECKLIST CUM COMPLIANCE REPORT REGARDING HSE (1/6)

Project: _____ Contractor: _____

Date: _____ Owner: _____

Inspection By: _____

Note: write „NC' (Not Concern) wherever any of the items are not applicable

Item	Yes	No	Remarks	Action
HOUSEKEEPING				
Waste containers provided and used				
Sanitary facilities adequate and Clean				
Passageways and Walkways Clear				
General neatness of working areas				
Proper Material Storage				
Wooden Boards properly stacked and nails removed				
Cords, leads out of walk and traffic ways				
Scraps removed from the work site				
Other				
PERSONNEL PROTECTIVE EQUIPMENT				
Goggles : Shields				
Face protection				
Hearing protection				
Safety Shoes provided				
Hand protection				
Respiratory Masks etc.				
Safety Belts				
Safety Helmets				
Other				
EXCAVATIONS / OPENINGS				
Excavation permit				
Excavated earth kept away from edge				
Dewatering pump kept away from edge				
Safe access into excavated area				
Opening properly covered or barricaded				
Excavations shored				
Excavations barricaded				
Overnight lighting provided				
Other				

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MONTHLY CHECKLIST CUM COMPLIANCE REPORT REGARDING HSE (2/6)

Item	Yes	No	Remark	Action
Welding Cutting				
Valid not work permit				
Flashback arrester provided for cylinders				
Power cable not crossing the welding cable				
Adequate earthing provided				
No combustible materials kept near welding & cutting works				
Gas cylinder chained upright & kept in trolleys				
Cables and hoses not obstructing				
Screens or shields used				
Flammable materials protected				
Fire extinguisher (s) accessible				
Other				
SCAFFOLDING				
Fully decked platform				
Guard and intermediate rails in place				
Toe boards in place & tied properly				
Adequate shoring				
Adequate access				
Other				
LADDERS				
Extension side rails I m above				
Top of landing				
Properly secured at top & bottom				
Angle $\pm$ 70° from horizontal				
Other				

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MONTHLY CHECKLIST CUM COMPLIANCE REPORT REGARDING HSE (3/6)

Item	Yes	No	Remark	Action
HOISTS, CRANES AND DERRICKS				
Condition of cables and sheaves OK				
Condition of slings, chains, hooks and eyes OK				
Inspection and maintenance logs maintained				
Outriggers used				
Singh/ barricades provided				
Signals observed and understood				
Qualified operators				
Other				
MACHINERY, TOOLS AND EQUIPMENT				
Proper instruction				
Saftey devices				
Proper cords				
Inspections and maintenance				
Other				
VEHICLE AND TRAFFIC				
Rules and regulations observed				
Inspection and maintenance				
Licensed drivers				
Others				

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MONTHLY CHECKLIST CUM COMPLIANCE REPORT REGARDING HSE (4/6)

Item	Yes	No	Remark	Action
TEMPORARY FACILITIES				
Emergency instruction posted				
Fire extinguishers provided				
Fire-aid equipment				
Secured against storm damage				
General nemeses				
In accordance with electrical requirements				
Other				
Fire Prevention				
Personnel instructed				
Fire extinguishers checked				
No smoking in prohibited areas				
Hydrants clear				
Other				
ELECTRICAL				
Proper wiring &earthing				
ELCB's provided				
Ground fault circuit interruptors				
Protection against damage				
Prevention of tripping hazards				
Proper electrical cable joints				
Light poles secured				
Clear way to power distribution board				
Proper rating of fuses				

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MONTHLY CHECKLIST CUM COMPLIANCE REPORT REGARDING HSE (5/6)

Item	Yes	No	Remark	Action
HANDLING AND STORAGE OF MATERIALS				
Properly stored or stacked				
Passageways clear				
Other				
FLAMMABLE GASES AND LIQUIDS				
Containers clearly identified				
Proper storage				
Fire extinguiHSErs nearby				
Other				
WORKING AT HEIGHT				
Erection plan				
Safety nets				
Safety belts tied properly				
Illumination				
No loose material at height				
No body under working area				
All openings covered				
Other				
ENVIRONMENT				
Chemical and other Effluents properly disposed				
Cleaning liquid of pipes disposed off properly				
Seawater used for hydrotesting disposed off as per agreed proceeding				
Lubricant Waste/ Engine oils properly disposed				
Waster from Canteen office, sanitation etc. disposed properly				
Disposal of surplus earth stripping materials, Oily rags and combustible materials done properly				
Green belt protection.				

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MONTHLY CHECKLIST CUM COMPLIANCE REPORT REGARDING HSE (6/6)

Item	Yes	No	Remark	Action
HEALTH CHECK				
Hygienic conditions at labour camps OL				
Availability of First Aid facilities				
Proper sanitation at site, office and labour camps				
Arrangements of medical facility				
Measures for dealing with illness				
Availability of potable drinking waters for workmen & staff				
Provision of cretches for children				
ERECTION				
Slings/ D shackle checked				
Signal Man				
Tag line for guiding the load				
Protecting the slings from sharp edges				
No loose materials at height				
Ladder & platform welding inspected				
No one under the suspended load				
Stay rope				
SWL				

.....

Signature Of Resident Engineer with Seal

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Monthly Health, Safety & Environmental (HSE) Report
(To be submitted by each Contractor)

Actual work start date :_____for the month of:_____

Project:_____Report No : _____

Name of the Contractor:_____Status as on:_____

Name of work:_____

Name of safety officer_____

Item	This Month	Cumulative
Total strength (Staff – Workmen)		
Number of HSE meeting organised at site		
Number of HSE awareness programs conducted at site		
Whether workmen compensation policy taken	Y/N	
Whether workmen compensation policy valid	Y/N	
Whether workmen registered under ESI Act	Y/N	
Number of Fatal Accident		
Number of Loss Time Accident (Other than Fatal)		
Other accident (non loss time)		
Total No. of accident		
Total man-hours worked		
Man-hour loss due to fire and accident		
Compensation cases raised with insurance		
Compensation cases resolved and paid to workmen		

Remark

Date:_____/_____/_____ Safety Officer/RCM

(Signature and Name)

To: OWNER…… 1 COPY
1 COPY RCM/SITE-IN-CHARGE 1 COPY

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SUPPLEMENTARY ACCIDENT, INCIDENT&NEAR MISS REPORT

Project:_____ Supplementary to report No._____

Site :_____ Date:_____

Contractor: _____

NAME OF THE INJURED……

FATHER'S NAME……

SUB-CONTRACTOR M/S……

DATE & TIME OF ACCIDENT……

LOCATION……

BRIEF DESCRIPTION & CAUSE OF A ACCIDENT

NATURE OF INJURY / DAMAGE

COMMENTS FROM MEDICAL PRACTITIONER WHO ATTENDED THE VICITIM/INJURED

SUGGESTED IMPROVEMENT IN THE WORKING CONDITION IF ANY

LOSS OF MANHOURS AND IMPACT ON SITE WORKS

ANY OTHER COMMENT BY SAFETY OFFICER

Date:_____/_____/_____ SIGNATURE OF CONTRACTOR WITH SEAL

To : OWNER .....1 COPY

: RCM/SITE-IN-CHARGE .....1 COPY

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ACCIDENT REPORT

(To be submitted by Contractor after every accident within 2 hours of accident)

Report No._____Date:____
Name of Site:_____COTRACTOR_____

NAME OF THE INJURED……..
FATHER'S NAME ……SUB-CONTRACTOR M/S…….

DATE & TIME OF ACCIDENT……
LOCATION…….

BRIEF DESCRIPTION OF ACCIDENT

CAUSE OF ACCIDENT

NATURE OF INJURY / DAMAGE

MEDICAL AID PROVIDED / ACTIONS TAKEN

INTIMATION TO LOCAL AUTHORITIES

Date :_____/_____/_____ SIGNATURE OF CONTRACTOR WITH SEAL

To : OWNER…… 1 COPY
: RCM/SITE-IN-CHARGE 1 COPY

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PIPING SPECIFICATION

SPECIFICATION NO
1C1
SHEET 1 OF 6
REV 0

BASIC PIPING SPECIFICATION DATAS		MAXIMUM DESIGN CONDITIONS			
		TEMPERATURE ° C		PRESSURE bar g	
PRIMARY FLANGE RATING	150#-RF	**NG**	**0 to 60**	**NG**	**19.00**
		AG	**60**	**AG**	**19.00**
BASIC MATERIAL	CARBON STEEL				
CORROSION ALLOWACE	1.6 mm				
X-RAYS	100%				
SIZE RANGE	1/2"-12"				
CODE	**ANSI B 31.8**				

FLUIDS

NG : NATURAL GAS

AG : ACTUATING GAS

REV	DESCRIPTION	DATE	AUTHOR	CHECKER	APPROVED
0	**FIRST ISSUE**	**20.06.2017**	**MD**	**ADE**	**AD**

	PIPING SPECIFICATIONS						SPECIFICATION NO 1C1 SHEET 2 OF 6 REV 0
ITEM	**SHORT CODE**	**SIZE FROM-THRU**	**END CONNECTION**	**RATING AND/OR SCHED.**	**DIMENSION STANDARD**	**MATERIAL**	**REMARKS**
PIPES	**P**	1/2" - 2" 3" - 12"	BE-ANSI B16-25 BE-ANSI B16-25	40 40	ANSI B36-10 ANSI B36-10	ASTM A 106 Gr. B ASTM A 106 Gr. B	SEAMLESS SEAMLESS
ELBOWS 90 LR	**E**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 46 LR	**E46**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 30 LR	**E30**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 22.5 LR	**E22.6**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
ELBOWS 16 LR	**E16**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
REDUCERS	**RC**	3/4"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
REDUCERS	**RE**	3/4"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
TEES EQUAL	**T**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
TEES RED	**TR**	3/4"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
WELDOLETS	**WEL**	1.1/2"-12"	BW - ANSI B16-25	SEE PIPE	MANUFACTURER	ASTM A 105	SEAMLESS
CAPS	**C**	1/2"- 12"	BW - ANSI B16-25	SEE PIPE	ANSI B16-9	ASTM A 234 WPB	SEAMLESS
NIPPLES	**NBEP** **NOET** **NBET**	1/2" - 1.1/2" 1/2" - 1.1/2" 1/2" - 1.1/2"	BOTH ENDS PLAIN ONE END THRD-MNPT OTH ENDS THRD-MNP	80 80 80	ANSI B36-10 ANSI B36-10 ANSI B36-10	ASTM A 106 Gr. B ASTM A 106 Gr. B ASTM A 106 Gr. B	SEAMLESS-LG=100mm SEAMLESS-LG=100mm SEAMLESS-LG=100mm
FULL COUPLINGS THRD	**CF**	1/2" - 1.1/2"	FNPT ANSI B1-20-1	1500#	ANSI B16-11	ASTM A 105	SEAMLESS
CAPS THRD	**C2**	1/2" - 1.1/2"	FNPT ANSI B1-20-1	1500#	ANSI B16-11	ASTM A 105	SEAMLESS
PLUGS THRD	**PL**	1/2" - 1.1/2"	MNPT ANSI B1-20-1	1500#	ANSI B16-11	ASTM A 105	SEAMLESS

	PIPING SPECIFICATIONS						SPECIFICATION NO 1C1 SHEET 3 OF 6 REV 0
ITEM	**SHORT CODE**	**SIZE FROM-THRU**	**END CONNECTION**	**RATING AND/OR SCHED.**	**DIMENSION STANDARD**	**MATERIAL**	**REMARKS**
WN FLANGES	**F**	1/2"-12"		150# RF SEE PIPE	ANSI B16-5	ASTM A 105	WN to match with 1C1 pipe
ORIFICE FLANGES	**FO**	1" - 12"		150# RF SEE PIPE	ANSI B16-36	ASTM A 105	COMPLETE WITH GASKET BOLTS, NUTS JACK-SCREWS AND PLUGS
BLIND FLANGES	**FB**	1"-12"		150# RF	ANSI B16-5	ASTM A 105	
DRIP RINGS	**DR**	1" - 12"		150# RF	MANUF STD.	ASTM A 105	3/4" FNPT OUTLET CONNECTION
SPECTACLE BLINDS	**SB**	1" - 12"		150# RF	ANSI B16-5	ASTM A 515 GR 70	
RESTRICTION ORIFICES	**RO**	1" - 12"		150# RF	ANSI B16-5	ASTM A240 GR 304	
MONOLITHIC INSULATING JOINTS	**IJ**	2"-12"	BW - ANSI B16-25	150#	ANSI B16-5	PIPE PUPS: ASTM A 106 Gr.B	REFER DATA SHEET
STUD BOLTS	**B**	1/2" - 12"		150# RF	ANSI B18.2.1 ANSI B18.2.2	ASTM A 193 B 7 HEXAGONAL NUTS ASTM A194 GR 2H	
GASKETS SPIRAL WOUND	**G**	1/2"-12"		150# RF	API 601 MSS SP 44	WINDING ANSI 304 FILLING PURE GRAPHITE CENTERING RING CS	4.5 mm THK

PIPING SPECIFICATIONS

SPECIFICATION NO
1C1
SHEET 4 OF 6
REV 0

ITEM	SHORT CODE	SIZE FROM-THRU	END CONNECTION	RATING AND/OR SCHED.	DIMENSION STANDARD	MATERIAL	REMARKS
BALL VALVES	**VBA**	1/2" - 11/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 BALL: ASTM A218 WCB / A 234 WPA / A 395 WITH ENP (75 microns)	FULL BORE WRENCH OPERATED. FIRE SAFE
		2"- 3"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB BALL: ASTM A 216 WCB / A 234 WPB / A 395 with ENP (75 microns)	FULL BORE WRENCH OPERATED. FIRE SAFE
		4"- 8"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB BALL: ASTM A 216 WCB / A 234 WPB / A 395 with ENP (75 microns)	FULL BORE GEAR OPERATED FIRE SAFE
GLOBE VALVES	**VGL**	1/2"-1 1/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 TRIM: ASTM A182 F6	HANDWHEEL FIRE SAFE
		2" - 8"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB TRIM: ASTM A 182 F6	HANDWHEEL FIRE SAFE
SWING CHECK VALVES	**VCH**	1/2" - 11/2"	FLGD RF:ANSI B16-5	600#	ANSI B16-10	BODY: ASTM A 105 TRIM: ASTM A182 F6	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS
		2"-18"	FLGD RF:ANSI B16-5	150#	ANSI B16-10	BODY: ASTM A 216 WCB TRIM: ASTM A182 F6	HORIZONTAL INSTALLATION VERTICAL INSTALLATION FLOW UPWARDS

REDUCERS CHART

SMALL SIZE

LARGE SIZE	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"
1/2"																				
3/4"	X																			
1"	X	X																		
1.1/2"	X	X	X																	
2"		X	X	X																
3"				X	X															
4"				X	X	X														
6"						X	X													
8"							X	X												
10"							X	X	X											
12"								X	X	X										
14"																				
16"																				
18"																				
20"																				
24"																				
28"																				
30"																				
32"																				
36"																				
42"																				

LEGEND

X :CONCENTRIC AND ECCENTRIC REDUCERS-BW

BRANCH CHART

BRANCH SIZE

HEADER SIZE

	1/2"	3/4"	1"	1.1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"	24"	28"	30"	32"	36"
1/2"	T																			
3/4"	TR	T																		
1"	TR	TR	T																	
1.1/2"	W	TR	TR	T																
2"	W	W	TR	TR	T															
3"	W	W	W	TR	TR	T														
4"	W	W	W	W	TR	TR	T													
6"	W	W	W	W	W	TR	TR	T												
8"	W	W	W	W	W	BW	TR	TR	T											
10"	W	W	W	W	W	BW	BW	TR	TR	T										
12"	W	W	W	W	W	BW	BW	BW	TR	TR	T									
14"																				
16"																				
18"																				
20"																				
24"																				
28"																				
30"																				
32"																				
36"																				

LEGEND

T : TEE EQUAL-BW

TR : REDUCING TEE-BW

W : WELDOLET- BW

BW : BRANCH WELD-CHECK IF REINFORCING PLATE IS NECESSARY ACCORDING ANSI B 31.8

I. PROCESS DATA

- PIPE CLASS : 1C1
- FLUID : Natural Gas Fluid Symbol :NG
- OPERATING CONDITIONS
  - Pressure (barg) : 4 Barg
  - Temperature (°C) : 03 to 48 (°C)
- DESIGN CONDITIONS
  - Pressure (barg) : 19 Barg
  - Temperature (°C) : -20 to 60 (°C)

II. VALVE DATA

- CONSTRUCTION DESIGN : BS 1873
- TYPE : HIGH RESISTANCE TO VIBRATIONS AND HIGH DIFFERENTIAL PRESSURE
  : UNIDIRECTIONAL
  : GLAND TYPE-BOLTED BONNET-NON ROTATING STEM
  PATTERN : STRAIGHT THROUGH GLOBE
- END CONNECTION : FLANGED RF - ANSI B16.5, 150#
- FACE TO FACE : ANSI B16.10
- BODY MATERIAL :

Below 2"	2"& above
ASTM 105	ASTM or ASTM A 216 Gr WCB

- DISC MATERIAL : ASTM 216 Gr. WCB +STELLITED or Equivalent/Superior
- SEAT : ASTM 216 Gr. WCB +STELLITED or Equivalent/Superior
- TRIM : ASTM A182 F6 or Equivalent/Superior
- STEM : ASTM A182 F6 or Equivalent/Superior
- GASKET : GRAPHITE or Equivalent/Superior
- PACKING : GRAPHITE or Equivalent/Superior
- OPERATOR : Wrench Upto 4", Gear for above 4"
- EXTENSION STEM : NO
- **PAINTING**
  - Surface preparation : SA 2.5
  - Primer : 30 - 40 µm
  - Finish : 30 - 40 µm
  - Final Paint DFT : 300 µm (min.)
- INSULATION : No

III. VALVE INSPECTION AND TESTING

- SHELL TEST : SEE API 598
- BACKSEAT TEST : SEE API 598
- LOW -PRESSURE CLOSURE TEST : SEE API 598
- HIGH-PRESSURE CLOSURE TEST : SEE API 598
- VISUAL EXAMINATION OF CASTINGS : SEE API 598
- HIGH-PRESSURE PNEUMATIC SHELL TEST : SEE API 598
- FIRE SAFE TEST : N/A

IV. QUALITY CONTROL

- MATERIAL CERTIFICATES : EN 10204 - 3.1
- ALL NECESSARY CERTIFICATES : ALL TEST CERTIFICATE INCLUDING FIRE SAFE. ANTISTATIC, PHYSICAL, IMPACT, CHEMICAL, PAINTING ETC.

NOTE :

1 Unless otherwise stated, all tests will be witnessed by the purchaser.

2 For detail of Painting, refer Painting Table

I. PROCESS DATA

- **FLUID**	:	Natural Gas
- **FLUID SYMBOL**	:	NG
- **OPERATING CONDITION**	:	A/G
- **TEMPERATURE (˚C)**		0-50 °C
- **PRESSURE (Barg)**		04 barg
- **DESIGN CONDITION**	:	A/G
- **TEMPERATURE (˚C)**		0-60 °C
- **PRESSURE (Barg)**		19 barg

II SPECIFICATION

- **DIMENSIONAL STANDARD**		ANSI B 16.10
- **CONSTRUCTION DESIGN**	:	API 6D
- **PIPE CLASS**	:	1C1
- **RATING**	:	150#
- **TYPE**	:	SWING CHECK
- **END CONNECTION**	:	FLANGED (RF) ANSI B 16.5
- **BODY MATERIAL**	:	ASTM A 350 Gr. LF2/ASTM A352 or LCB or Equivalent/Superior
- **WEDGE**	:	ASTM A 350 Gr. LF2/ASTM A182 F6 or Equivalent
- **DISC**	:	ASTM A 350 Gr. LF2/ASTM A182 F6 or Equivalent
- **HINGE PIN**	:	ASTM A 182 F6
- **GASKET**	:	GRAPHITE
- **PUPS (Applicable only for BW end)**		
- **LENGTH**	:	At least 2.0 D for size below 6" & 300mm for 6" and above size valves
- **MATERIAL OF CONSTRUCTION**		Suitable to Connecting pipe material in terms of strength and thickness
- **PAINTING (Refer Annexure II of PTS)**		A/G
- **SURFACE PREPARATION**	:	SA 2.5 Type of paint, DFT and total DFT shall be as per paint system number
- **PRIMER**	:	Choose from table AS ISO 12944-5 suitable for highly corrosive environment
- **FINISH**	:	Final shade of valve shall be as per atached painting table. Final Paint DFT - 300 microns minimum
- **INSULATION**	:	NO

III. TEST :

- **HYDROSTATIC SHELL TEST**
- Test pressure : 1.5 x Design Pressure

- **HYDROSTATIC SEAT TEST**
- Test pressure : 1.1 x Design Pressure

- **AIR SEAT TEST :**
  Test pressure : 6 barg

- **HIGH PRESSURE CLOSURE TEST** : API 598
- **LOW PRESSURE CLOSURE TEST** : API 598
- **LEAK TEST** : API 598
- **FIRE TEST** : API 6FA
- **VISUAL AND DIMENSIONAL EXAMINATION TEST** : YES

IV. QUALITY CONTROL :

- **MATERIAL CERTIFICATES** : EN 10204-3.1
- **ALL TEST CERTIFICATES** : TEST CERTIFICATES INCLUDING, FIRE SAFE, ANTISTATIC, PHYSICAL IMPACT, CHEMICAL, PAINTING

CLIENT : GOA NATURAL GAS PRIVATE LTD	DATA SHEET (1C1) Y-TYPE STRAINER FOR ABOVE GROUND (A/G) SERVICES	DATA SHEET No. : VCS-DS-PL-023 Page 1 of 2

I. PROCESS DATA:

- FLUID	:	Natural Gas
- FLUID SYMBOL	:	NG

- OPERATING CONDITION

- FLOW RATE (m^3/hr)	:	NA
- TEMPERATURE ($^{\circ}$C)	:	0 to 60
- PRESSURE (Barg)	:	04

- DESIGN CONDITION

- FLOW RATE (m^3/hr)	:	
TEMPERATURE ($^{\circ}$C)	:	-20 to 65
- PRESSURE (Barg)		19

II. STRAINER DATA :

- DIMENSIONAL STANDARD	:	ASME B16.5, B16.9, B16.11, B16.20, B18.2.1 & B18.2.2
- CONSTRUCTION DESIGN	:	AS PER CODES AND TECHNICAL SPECIFICATION DOC. NO. 14588-CD-SS-001, PMS
- PIPE CLASS	:	1C1
- ANSI PRESSURE RATING	:	150#
- TYPE	:	Y-TYPE
- SIZE	:	1"
- END CONNECTION	:	FLANGED (RF) AS PER ASME B16.5
- BODY MATERIAL		ASTM A 216 Gr. WCB
- CAP / PLUG	:	ASTM A105
- SCREEN MESH		SS-304, CYLINDRICAL WIRE MESH WITH PERFORATED SHEET
- FILTRATION SIZE		100 MICRON
- STUD BOLTS / NUTS		ASTM A193-B7 / ASTM A194 2H (GALVANISED)
- GASKET		SS-304 SPIRAL WOUND, GRAPHITE FILLED, 4.5MM THK. WITH CS OUTER RING

III TESTS

- HYDROSTATIC BODY TEST :

Test pressure	: 1.5 x Design Pressure
Test Duration	: 1/2 HR

NOTES:-

1 Unless otherwise stated, all tests will be witnessed by the purchaser/authorised inspector
2 Net opening area of element shall be minimum 3 times X sectional area of inlet
3 Strainer body casting shall be defect free and shall be MPI/DP tested.

DATE	REV	BY	CHK	APP	REMARKS
17.07.2018	0	ADE	RNR	AD	ISSUED FOR REVIEW

GOA NATURAL GAS PRIVATE LTD

MRS FABRICATION AND INTERNAL PIPING WORK FOR INDUSTRIAL & COMMERCIAL CONNECTIONS IN OF NORTH GOA

INSTRUMENT DATASHEETS

		SOLENOID VALVE		Rev.
GENERAL	1	Tag Numbers	To be provided later (Note-2)	
	2	Quantity	As per SOR	
	3	Service	Natural Gas	
	4	Enclosure Certification	IP65	
	5	Operation: Direct/Pilot	Direct	
	6	Operating Mode NC/NO/UNIVERSAL	NO	
	7			
PROCESS DATA	8	Max. operating pressure (Kg/Cm2g)	*	
	9	Design Pressure (Kg/Cm2g)	*	
	10	Design Temperature (Deg.C)	-20 to 60	
	11	Ambient Temperature (Deg.C)	- 5 to 50 Deg C	
	12			
	13			
	14			
	15			
VALVE	16	Body Size/ Rating	As per SOR / 150#, Socket Weld	
	17	Body Material	SS 316 / Brass*	
	18	Trim Material	SS 316 / Brass*	
	19			
	20			
SOLENOID	21	Style of Coil	*	
	22	Coil Voltage	230 VAC	
	23	Coil Insulation Class	H	
	24	Electrical Connection	Required	
	25	Cable Entry	1/2" NPTF	
	26	Manual Reset	Required	
	27	Close Time	< 1 sec	
	28			
	29			
	30			
	31			
MISC.	32	Make	*	
	33	Model No.	*	
	34			
	35			
	36			

Notes:

1 **As per site requirement

2 Vendor to specify *

3 Tag no. is to be finalised later.

4 Tagplate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm).

	CLIENT:	GOA NATURAL GAS PRIVATE LTD (GNGPL)					
	PROJECT:	MRS FABRICATION AND INTERNAL PIPING WORK FOR INDUSTRIAL & COMMERCIAL CONNECTIONS IN OF NORTH GOA	0	30.07.2018	ND	UM	KP
			REV.	DATE	PRPD	CHKD	APPD

		SLAM SHUT VALVE				Rev.
GENERAL	1	Tag No.		To be provided later (Note-3)		
	2	Inlet Line No.		-		
	3	Outlet Line No.		-		
	4	Line Size & Schedule		**		
	5	Service		Down stream pressure protection		
	6					
	7					
PROCESS DATA	8	Fluid	State	Natural Gas	Gas	
	9	Flow Gas : Min. / Nor. / Max.		**		
	10	Inlet Pressure		4 barg		
	11	Pressure Drop at Various Flow Rates		**		
	12	Shut Off Pressure		**		
	13	Temperature : Operating / Maximum		**		
	14	Oper S.G	Mol Wt.	**		
	15	Cp/Cv	Compress. Factor	**		
VALVE DATA	16	Kg or Cg Min.	Kg or Cg Max.	*		
	17	Kg or Cg Selected		*		
	18	Predicted Sound Level (dBA)		* Less than 85 dBA		
	19	Valve Setpoint	Adjustable Range	*	*	
	20	Inlet Velocity (meters/second)		* Less than 40 m/sec		
	21					
VALVE BODY	22	Type of Valve		Slam Shut		
	23	Body Size	Port Size	*	*	
	24	End Conn: Flgd. Size & Rating		*, As per PMS		
	25	Facing & Finish		RF, 125 - 250 AARH		
	26	Body Material		ASTM A216 Gr. WCB or better		
	27	Trim Material		SS 316 / Brass*		
	28	Other Wetted Parts		SS 316 / Brass*		
	29	Leakage Class		Class VI as per FCI 70.2		
	30	Closing Time		Less than 2 secs		
	31					
	32					
OPTIONS	33	Pilot Operated		Integral Pilot Required		
	34	Manual Reset		Required		
	35	Failure Position		Close		
	36	Limit Switch		-		
	37	Valve Position Indicator (Local)		Required		
	38	Radiography		Not Required		
	39	Charpy V-Notch		Required		
	40	Impulse Tubing/Fittings		Required		
	41	Pressure Indicator		-		
	42	Installation		Horizontal / Vertical		
MISC.	43	Make		*		
	44	Model No.		*		
	45					
	46					
	47					

Notes:

1 ** As per site requirement.
2 Vendor to specify *
3 Tag no. is to be finalised later.
4 Tagplate (SS 316) stamped with instrument tag number and service in 10mm characters shall be attached via SS wire (1 mm).
5 Vendor shall provide detailed GA drawing along with all parts name and MOC for the slam shut valve along with data sheet.

	CLIENT:	GOA NATURAL GAS PRIVATE LTD (GNGPL)					
	PROJECT:	MRS FABRICATION AND INTERNAL PIPING WORK FOR INDUSTRIAL & COMMERCIAL CONNECTIONS IN OF NORTH GOA	0	30.07.2018	ND	UM	KP
			REV.	DATE	PRPD	CHKD	APPD

DATA SHEET-PRESSURE GAUGE

UNITS: Flow<-> Liquid- m*3/hr Gas- Sm*3/hr Steam- kg/hr Pressure-> kg/cm*2 G Temperatu**re<-> oC Level/Length<-> mm**

1	Type:-	Direct	
2	Mounting:-	Local	
3	Dial Size:-	150 mm	
	Colour:-	White with black inscriptions	
4	Case Material:-	SS316	
5	Bezel Ring:-	Beyonet type SS316/Screwed	
6	Window Material:-	Shatterproof glass	
7	Enclosure:-	WP to IP 65 as per IEC 60529 / IS 2147	
8	Pressure Element:-	Bourdon	
9	Element Material:-	SS316	
10	Socket Material	SS316	
11	Accuracy:-	+/-1% of FSD	
12	Zero adjustment:-	Micropointer	
13	Connection:-	1/2" NPT(M)	
	Connection Location:-	Bottom	
14	Movement:-	SS316	
15	Diaphargm Seal:-	--	
	Type:-	--	
	Wetted Parts Material:-	--	
	Others Material:-	--	
	Process Connection: Size & Rating	--	
	Facing & Finish:-	--	
	Capillary Material:-	--	
	Armour - Flexible Material:-	--	
	Capillary Length:-	--	
	Flushing/Filling connection with:-	--	
16	Over Range Protection:-	130% of FSD	
17	Blow Out Protection:-	Yes	
18	Options :-	a) Snubber	
	b) Syphon	c) Gauge Saver	
	d) Liquid Filled casing	e) Vaccum Protection	
	f) Solid front		
	g) Two valve manifold	Yes	
19	Quantity :-	*	

SL. NO.	TAG NO.	RANGE	PRESSURE kg/cm2			TEMPERATURE ºc			SERVICE	OPTIONS
			OP.	MAX.	DES.	MIN	MAX	DES.		
	*	*	0-40	-	49	-	65	-	Natural Gas	e,f,g

NOTES:

'*' Venodr to furnish

1 Since the natural gas is saturated with water and has corrosive constituents CO2-2.08%, the wetted parts of the instruments shall be suitable for that accordingly.
2 Vendor shall furnish Make and Model No. with product catalogues along with the offer.
3 Above data-sheet is typical for all Pressure Gauges used in the respective P&ID.Vendor shall submit the individual data sheet of each pressure gauge .
4 Make of the PG shall be Waree / A N Instruments / General Instruments.

☐ DEVIATION ☐ NO DEVIATION ☐ VENDOR'S SIGNATURE WITH SEAL

DATE	REV	BY	CHK	APP	REMARKS	
18.06.2018	0	PK	MD	AD		ENERGISING QUALITY
						DATA SHEET FOR PRESSURE GUAGE

INSPECTION AND TEST PLAN – FLANGES SPECTACLE BLINDS & DRIP RINGS

0	24.05.2017	ISSUED AS STANDARD	GS	ADE	AD
REV	**DATE**	**DESCRIPTION**	**PREP**	**CHK**	**APPR**

ABBREVIATIONS

CE	Carbon Equivalent	NPSH	Net Positive Suction Head
DFT	Dry Film Thickness	PO	Purchase Order
DPT	Dye Penetrant Testing	PESO	Petroleum Explosive Safety Organization
DHT	De-hydrogen Heat Treatment	PQR	Procedure Qualification Record
ERTL	Electronics Regional Test Laboratory	PR	Purchase Requisition
FCRI	Fluid Control Research Institute	PMI	Positive Material Identification
HT	Heat Treatment	RT	Radiography Testing
HIC	Hydrogen Induced Cracking	SSCC	Sulphide Stress Corrosion Cracking
ITP	Inspection and Test Plan	TC	Test Certificate
IP	Ingress Protection	TPI or TPIA	Third Party Inspection Agency
IHT	Intermediate Heat Treatment	UT	Ultrasonic Testing
IC	Inspection Certificate	VDR	Vendor Data Requirement
IGC	Inter Granular Corrosion	WPS	Welding Procedure Specification
MRT	Mechanical Run Test	WPQ	Welders Performance Qualification
NDT	Non Destructive Testing	MPT / MT	Magnetic Particle Testing

1.0 SCOPE:

This Inspection and Test Plan covers the minimum testing requirements of Flanges, Spectacle blinds& Drip Rings.

2.0 REFERENCE DOCUMENTS:

PO/PR/ Standards referred there in/ Job specifications /Approved documents.

3.0 INSPECTION AND TEST REQUIREMENTS:

SL. NO.	STAGE/ ACTIVITY	CHARACTERISTICS	QUANTUM OF CHECK	RECORD	SCOPE OF INSPECTION		
					SUB SUPPLIER	SUPPLIER	TPIA
1.0	**Procedure**						
1.1	Heat Treatment, NDT and Other Procedures	Documented Procedures	100%	Procedure Documents	-	H	R
1.2	WPS,PQR & WPQ	Welding Parameters & Qualification Record	100%	WPS,PQR &WPQ	-	H	W- New R- Existing
2.0	**Material Inspection**						
2.1	Raw Material Inspection	Chemical & Mechanical Properties	100%	Test Certificates	-	H	R

3.0	**In Process Inspection**						
3.1	Welding / Forging	Forging /Welding Parameters	100%	Inspection Reports	-	H	-
3.2	Heat Treatment	Stress Relieving, Normalising, Tempering, Solution Annealing, Stabilization Heat Treatment etc. as applicable	100%	HT chart	-	H	R
3.3	Identification of Test Samples	Product Chemical, Mechanical, Impact, IGC and Other test as applicable	100%	Test Reports	-	H	H(Note-1)
3.4	Product Analysis (As applicable	Chemical Composition	As per PR/Purchase Specification	Test Reports	-	H	R
3.5	Destructive Testing	Mechanical, Impact, IGC and Other test as applicable	100%	Test Reports	-	H	H(Note-1)
3.6	NDT as applicable	Surface & Internal Imperfections	As per PR/Purchase Specification	NDT Reports	-	H	R
3.7	Galvanizing (If Applicable)	Integrity Of Galvanised Coating	100%	Inspection Report	-	H	-
4.0	**Final Inspection**						

4.1	Final Inspection	1. Visual 2. Dimensions 3.Hardness 4. Marking etc	100%	Inspection report	-	H	H(Note-1)
4.2	PMI Check	Chemical Check	As Per VCS Spec.	Inspection report	-	H	RW
4.3	Final Stamping	Stamping of accepted Items	Stamping of Items which are witnessed by TPIA.	Inspection report	-	H	H(Note-1)
5.0	**Painting**						
5.1	Rust Preventive Coating & Colour Coding	Visual Inspection & Colour Coding as applicable	100%	Inspection report	-	H	-
6.0	**Documentation & IC**						
6.1	Documentation & Inspection Certificate(IC)	Review of Stage Inspection Reports / Test Reports & Issue of IC	100%	Supplier TC & IC	-	H	H

Legend:

H - Hold (Do not proceed without approval),

P - Perform,

RW - Random Witness (As specified or 10% [min.1 no. of each size and type of Bulk item]),

R - Review,

W - Witness (Give due notice, work may proceed after scheduled date).PR- PURCHASE REQUISITION

NOTES (As applicable):

1. For Non NACE & Non Hydrogen service Carbon Steel Flanges, Spectacle Blinds & Drip Rings up to size 24"-300ANSI Class Will be accepted on review of Supplier Test Certificates. Supplier Test Certificate to be reviewed by TPIA.

2. This document describes the generic test requirements. Any additional test or Inspection scope if specified in contract documents shall also be Applicable (unless otherwise agreed upon).

3. Acceptance Norms for all the activities shall be as per PO/PR/STANDARDS referred there in /Job Specification /Approved Documents.

4. For orders placed on stockist, items shall be accepted based on manufacturer's TC with EN310204 type 3.2 certification from VCS / OWNER approved suppliers.

	LIST OF RECOMMENDED VENDOR FOR BOUGHT OUT ITEMS FOR MRS		
		TOTAL SHEETS	28
DOCUMENT NO	VCS	VL	001

LIST OF RECOMMENDED VENDORS FOR BOUGHT OUT ITEMS FOR MRS

INDEX

LIST OF SUPPLIERS OF MAJOR BOUGHT-OUT ITEMS

(MECHANICAL & FIRE FIGHTING EQUIPMENT)

A) Mainline & Mechanical

i) Pipe Carbon Steel To Indian Standards

1. A.S.T. Pipes Pvt. Ltd. (AST Group)
2. Advance Steel Tube Ltd.
3. Apl Apollo Tubes Ltd. (Er. Bihar Tubes Ltd.
4. Asian Mills Pvt. Ltd.
5. Asrani Tubes Limited
6. Dadu Pipes (P) Ltd.
7. Essar Steel Limited(Er Hazira Pipes Mill)
8. Gaurang Products Pvt Ltd. (Ast Group)
9. Goodluck Steel Tubes Ltd.
10. Hi-Tech Pipes Limited
11. Indus Tube Limited
12. Jindal Industries Ltd
13. Jindal Pipes Ltd.
14. Jindal Saw Ltd (Kosi Works)
15. Jotindra Steel & Tube Ltd
16. Lalit Pipes And Pipes Ltd.
17. Maharashtra Seamless Ltd.
18. Man Industries (India) Ltd. – Pithampur
19. Man Industries (India) Ltd. Anjar
20. Mukat Tanks & Vessels Ltd.
21. Nezone Tubes Limited
22. North Eastern Tubes Limited
23. Pratibha Industries Limited
24. Pratibha Pipes & Structural Ltd.
25. Psl Ltd (Chennai)
26. Psl Ltd (V1, V2 & Nc)
27. Rama Steel Tubes Ltd.
28. Ratnamani Metals And Tubes Ltd.
29. Ravindra Tubes Limited

30. Samshi Pipe Industries Limited
31. Surya Roshni Ltd.
32. Swastik Pipes Ltd.
33. Utkarsh Tubes & Pipes Ltd. (Formly Bmw)
34. Welspun Corp. Limited (Dahej)
35. Zenith Birla (India) Limited

ii) Pipe & Tubulars To A.P.I. Standards

1. Arcelormittal Tubular Products Roman Sa, Romania
2. Bhel (Trichy),India
3. Dalmine Spa (Enquiry To Tenaris),Uae
4. Eewkorea Co. Ltd (Germany), Korea
5. Eew Korea Co. Ltd. (Korea), Korea
6. Eisenbau Kramer Gmbh, Germany
7. Hyundai Rb Co. Ltd. South Korea
8. Ilva Lamiere E Tubi Srl (Enq To Ilva Spa, Italy
9. Inox Tech. Spa, Italy
10. Ismt Ltd. Ahmedngr, India
11. Ismt Ltd. Baramati, India
12. Jindal Pipes Ltd., India
13. Jindal Saw Ltd. (Kosi Works), India
14. Jindal Saw Ltd. (Nashik Works), India
15. Lalit Pipes And Pipes Ltd. India
16. Maharashtra Seamless Ltd., India
17. Man Industries (I) Ltd. (Pithampur), India
18. Mukat Tanks & Vessels Ltd., India
19. Pratibha Industries Limited, India
20. Ratnamani Metals And Tubes Ltd., India
21. Siderca S.A.I.C (Enquiry Totenaris), Uae
22. Sumitomo Metal Ind. Ltd., India
23. Surya Roshni Ltd., India
24. Swastik Pipes Ltd, India
25. Tata Steel Uk Limited (Formerly C702)
26. Tubos De Acero De Mexico Sa (Enq. Tenaris), Uae
27. Tubos Reunidos Sa Spain

28. Umran Steel Pipe Inc (Turkey), Turkey
29. Valcovny Trub Chomutov, Czech Republic
30. Vallourec And Mannesmann Tubes, France
31. Welspun Corp Limited (Dahej), India

iii) Pipe/Tube CS (Seamless) To ASTM Stds

1. Arcelormittal Tubular Products Roman Sa, Romania
2. Bhel (Trichy), India
3. Changshu Seamless Steel Tube Co. Ltd., China
4. Dalmine Spa (Enquiry To Tenaris, Uae
5. Heavy Metals & Tubes Limited (Mehsana), India
6. Ismt Ltd. Ahmedngr, India
7. Ismt Ltd. Baramati India
8. Jfe Steel Corporation, Uae
9. Jindal Sdaw Ltd (Nashik Works) India
10. Klt Automotive And Tubular Products Ltd., India
11. Mahalaxmi Seamless Limited, India
12. Maharashtra Seamless Ltd, India
13. Products Tubulares S.A.U, Spain
14. Ratnadeep Metal Tubes Ltd., India
15. Staineest Tubes Pvt Ltd., India
16. Sumitomo Metal Ind. Ltd., India
17. Tubos Reunidos Sa Spain
18. Valcovny Trub Chomutov, Czech Republic
19. Vallourec Andmannesmann Tubes France
20. Yangzhou Chengde Steel Pipe Co. Ltd Dubai (UAE)

iv) Pipe Carbon Steel (Welded) To ASTM Stds

1. Eew Korea Co. Ltd. (Germany), Korea
2. Eew Korea Co. Ltd. (Korea), Korea
3. Eisenbau Kramer Gmbh, Germany
4. Hyundai Rb Co. Ltd., South Korea
5. Inox Tech. Spa, Italy
6. Jindal Saw Ltd (Kosi Works), India
7. Lalit Pipes and Pipes Ltd., India

8. Man Industeries (I) Ltd.(Pithampur), India
9. Man Industries (India) Ltd. Anjar, India
10. Mukat Tanks & Vessels Ltd., India
11. Ratnamani Metals And Tubes Ltd., India
12. Sumitomo Metal India Ltd., India
13. Tata Steel Uk Limited

v) Valve

a) Globe Valves

1) M/S BDK (New Delhi)
2) M/S Datre Corpn (Calcutta)
3) M/S KSB Pumps (New Delhi)
4) M/S L&T (New Delhi)
5) M/S Neco Schuber & Salzer Ltd. (New Delhi)
6) M/S Niton Valve (Mumbai)
7) M/S Ornate Valves (Mumbai)
8) M/S Panchavati Valves (Mumbai)
9) AV Valves Ltd.
10) BHEL (Trichy), India
11) Econo Valves Pvt Ltd, India
12) Fouress Engg (I) Ltd (Aurangabad)
13) Guru Industrial Valves Pvt Ltd
14) Leader Valves Ltd, India
15) NSSL Ltd. (Neco Schubert & Salzerltd)
16) Oswal Industries Ltd, India
17) Petrochemical Engineering Enterprises, India
18) Sakhi Engineers Pvt Ltd
19) Shalimar Valves Pvt Ltd
20) Steel Strong Valves India Pvt Ltd, India
21) Petro Valves Pvt. Limited, Ahmedabad
22) Fluid chem Valves (I) Pvt. Ltd.
23) Hawa Engineers Limited, Ahmedabad

b) Check Valves

1. M/s Advance Valves Pvt. Ltd., Noida

2. M/s Aksons & Mechanical Enterprises, Mumbai
3. M/s Larsen & Toubro Limited (M/s Audco India Limited, Chennai)
4. M/s AV valves Ltd., Agra
5. M/s BDK engineering India Ltd., Hubli
6. M/s BHEL,OFE&OE Group, New Delhi
7. M/s Datre Coroportion Limited, Calcutta
8. M/s Leader Valves Ltd., Jalandhar
9. M/s Neco schubert &Salzer Ltd., New Delhi
10. M/s Niton Valves Industries (P) Ltd., Mumbai
11. M/s Precision Engg.Co., Mumbai
12. Econo Valves Pvt Ltd, India
13. Fouress Engg (I) Ltd (Aurangabad)
14. KSB Pumps Ltd (Coimbattore), India
15. NSSL Ltd. (Neco Schubert & SalzerLtd)
16. Oswal Industries Ltd, India
17. Panchvati Valves & Flanges Pvt Ltd, India
18. Petrochemical Engineering Enterprises, India
19. Sakhi Engineers Pvt Ltd
20. Shalimar Valves Pvt Ltd
21. Steel Strong Valves India Pvt Ltd, India
22. Hawa Engineers Limited, Ahmedabad

c) Plug Valves

1. M/s Breda Energia Sesto Industria Spa, Italy
2. M/s Fisher Sanmar Ltd., Chennai
3. M/s Larsen & Toubro Ltd., New Delhi
4. M/s Nordstrom Valves, USA
5. M/s Serck Audco Valves, UK
6. M/s Sumitomo Corporation India Pvt. Ltd., New Delhi
7. M/s Z Corporation, Korea
8. M/s Hawa Valves (India) Pvt. Ltd., Mumbai
9. M/s Steel Strong Valves India Pvt. Ltd., Navi Mumbai
10. M/s Econo Valves
11. M/s Flow-Serve PTE (Mfr. SERCK), India

d) Ball Valves

1. M/s Hawa Valves (India) Pvt. Ltd, Navi Mumbai
2. M/s Larsen & Toubro, Delhi
3. M/s Microfinish Valves Pvt. Ltd., Noida
4. M/s Oswal Industries Ltd., Gandhi nagar
5. M/s Virgo Engineers Ltd., Delhi
6. M/s Boteli Valve Group Co. Ltd., China
7. M/s Cameron (Malaysia) SDN BHD, Malaysia
8. M/s Dafram S.P.A., Italy
9. M/s Fangyuan Valve Group Co. Ltd., China
10. M/s Franz Schuck GmbH, Germany
11. O.M.S. Saleri (Italy)
12. Pibi Viesse S.P.A (Italy)
13. Nuovo Pignone (Italy)
14. Perar S.P.A (Italy)
15. Pietro Fiorentini (Italy)
16. Cooper Cameron Valv Italy SRL-FRM, Itly
17. Petrol Valves SRL
18. Tormene Gas Technology S.P.A (VALVITALIA)
19. Petro Valves Pvt. Limited, Ahmedabad
20. Fluid chem Valves (I) Pvt. Ltd.
21. Hawa Engineers Limited, Ahmedabad

vi) Flow Tee

1) M/s Coprosider SPA, Italy
2) M/s GEA Energy System India Limited, Chennai
3) M/s Multitex Filteration
4) M/s Pipeline Engineering, UK
5) M/s Scomark Engg. Limited (U.K.)
6) M/s Skeltonhall Limited, Engaland(U.K.)
7) M/s Technospecial SPA, Italy
8) M/s Tectubi SPA, Italy
9) M/s RMA Germany
10) M/s Pipefit Engineers Pvt. Ltd.

vii) Split Tee

1) M/s Ipsco, Canda
2) M/s TD Willamsons, USA

viii) Flanges

1. M/s Aditya Forge Ltd., Vadodara
2. M/s Amforge Industries Ltd., Mumbai
3. M/s CD Engineering Co., Ghaziabad
4. M/s Echjay Forgings Pvt. Ltd. (Bombay), Mumbai
5. M/s Echjay Industries Ltd., Rajkot
6. M/s Forge & Forge Pvt. Ltd., Rajkot
7. M/s Golden Iron & Steel Works, New Delhi
8. M/s JK Forgings, New Delhi
9. M/s Metal Forgings Pvt. Ltd., Mumbai
10. M/s Perfect Marketings Pvt. Ltd., New Delhi
11. M/s Sky Forge, Faridabad
12. M/s S&G, Faridabad
13. Chaudhry Hammer Works Ltd, India
14. JAV Forgings (P) Ltd, India
15. Kunj Forgings Pvt Ltd, India
16. MS Fittings
17. R.N. Gupta & Co. Ltd, India
18. R.P. Engineering Pvt Ltd, India
19. Sanghvi Forgings & Engineering Ltd
20. Shri Ganesh Forgings Ltd., India
21. Uma Shankar Khandelwal & Co., India
22. Sawan Engineers, Baroda
23. Stewarts & Lloyds of India Ltd., Kolkata
24. Engineering Services Enterprises
25. Pipefit Engineers Pvt. Ltd.

ix) Fittings

1. M/s Commercial Supplying Agency, Mumbai
2. M/s Dee Development Engineers Ltd.
3. M/s Eby Industries, Mumbai

4. M/s Flash Forge Pvt. Ltd., Vishakhapatnam
5. M/s Gujarat Infra Pipes Pvt. Ltd., Vadodara
6. M/s M.S. Fittings Mfg. Co. Pvt. Ltd., Kolkata
7. M/s Stewarts & Lloyds of India Ltd., Kolkata
8. M/s Teekay Tubes Pvt. Ltd., Mumbai
9. M/s Pipe Fit,Baroda
10. M/s Sky Forge, Faridabad
11. M/s S&G, Faridabad
12. M/s Sawan Engineers, Baroda
13. Eby Fasteners, India
14. Leader Valves Ltd, India
15. R.N. Gupta & Co. Ltd, India
16. Exten Engg Pvt Ltd
17. Sivananda Pipe & Fittings Ltd

x) MDPE Fittings & MDPE Valves,

1. M/s. AliAxis,
2. M/s. Geroge Fischer,
3. M/s. Al-Aziz,
4. M/s. Kimplas,
5. M/s. Banides,
6. M/s. Agru,
7. M/s. Friatech,
8. M/s. Plasson.

xi) Brass Valves

1. M/s Universal srl, Italy
2. M/s Tiemme Raccorderie Sede, Italy
4. M/s Enolgas Bonimu s.a.s., Italy
5. M/s Fratelli Fortis s.r.l, Italy
6. M/s Giacomo Climbrio, Italy
7. M/s Parker Hannifin S.P.A., USA
8. M/s Singapore Valve & Amp; Fittings Pte Limited, Singapore /Bengaluru
9. M/S Rubinetterie Utensilerie Bonomi (RUB), Italy
10. M/s Zhegiang Valogin Technology Co. Ltd., China,
11. M/s. Ningbo Zhiqing Industrial Co. Ltd., China,

12. M/s. Zhegiang Dunan Valve Co. Ltd.,
13. M/s. Ningbo Huaping, China.

xii) Gaskets

1. IGP Engineers (P) Ltd., Madras
2. Madras Industrial Products, Madras
3. Dikson & Company, Bombay
4. Banco Products (P) Ltd., Vadodara
5. Goodrich Gaskets Pvt Ltd
6. Starflex Sealing India Pvt Ltd, India
7. Teekay Meta Flex Pvt Ltd
8. UNIKLINGER Ltd
9. HEM Engg. Corp.
10. Unique Industrial Packing Pvt. Ltd.

xiii) Fasteners

1. Nireka Engg. Co. (P) Ltd., Calcutta
2. Precision Taps & Dies, Bombay
3. AEP Company, Vithal Udyoug Nagar
4. Fix Fit Fasteners, Calcutta
5. Precision Engg. Industries, Baroda
6. Echjay Forgings Pvt. Ltd., Bombay
7. Capital Industries, Bombay
8. Boltmaster India Pvt Ltd, India
9. Deepak Fasteners Limited, India
10. Fasteners & Allied Products Pvt Ltd, India
11. Hardwin Fasteners Pvt Ltd, India
12. J.J. Industries, India
13. Multi Fasteners Pvt Ltd, India
14. Nexo Industries, India
15. Pacific Forging & Fasteners Pvt Ltd, India
16. Pioneer Nuts & Bolts Pvt Ltd, India
17. Precision Auto Engineers, India
18. President Engineering Works, India
19. Sandeep Engineering Works, India

20. Syndicate Engineering Industries, India

xiv) Welding Electrodes

1. For Mainline – Lincon make
2. For Terminal – For root pass - Lincon Make
3. Esab India Limited

For other passes – Lincon, D&H or equivalent make

xv) Strainers

1. Bombay Chemical Equipments
2. Gujarat Auto filed
3. Multitex Filtration Engineering Limited
4. Grand Prix Engineering Limited

xvi) Cold Applied Tapes

1. Denso GmbH
2. Raychem

xvii) Stud Bolts with Nuts

1. Multi Thread Fasteners, Baroda
2. Darukhanwala
3. Precision Engineers, Baroda
4. Unbrako
5. TVC

xviii) Warning Mat

1. M/s Sparco Multiplast Pvt. Ltd., Ahmedabad
2. M/s Singhal Industries , Ahemdabad
3. M/s Puja Packing, Mumbai
4. M/s Bina Enterprises, Mumbai

xix) HDPE PIPES

M/s Climax Synthetics (P) Ltd., Vadodra

M/s Indian Poly Pipes, Calcutta

M/s Jain Irrigation Systems Ltd., Jalgaon

M/s Kirti Industries (India) Ltd., Indore

M/s Ori Plast Limited, Calcutta

M/s Phoel Industries Limited, Delhi

M/s Sangir Plastics (P) Ltd., Mumbai

M/s Veekay Plast,Jaipur

M/s Kisan Irrigation

M/s Dutron Polymers Ltd.

M/s Manikya Plastichem (P) Ltd

DRY GAS FILTER & FILTER SEPERATOR

- Grand Prix Fab (Pvt.) Ltd.(New Delhi)
- Perry Equipment, USA
- Faudi Filter, Germany
- Forain S.r.l., Italy
- ABB, Faridabad
- Burgess Manning, USA
- Multitex Filtration Engineers India
- Triveni Plenty Engg. Ltd. (New Delhi)
- Siirtec International Contractor S.P.A (Italy)
- Flashpoint, Pune india
- Filteration Engineers (I) Pvt Ltd, India
- Gujarat Otofilt, India
- Tormene Gas Technology
- Ultrafilter (India) Pvt Ltd, India
- Ravi Techno Systems Pvt Ltd, India
- Siirtec Nigi S.P.A
- Filtan Filter Anlagenbau Gmbh
- Fairley Arlon BV
- PECO Facet
- EPE Epenstenner GMBH
- Filtrex srl
- Petromar Engineered Soln
- Plenty Filter
- Eurofiltec
- PTI Technologies Inc

FILTER ELEMENT

- Peco – Facet
- Velcon
- Pall – Filterite
- Burgress Manning

NDT Agency

1. NDT Services, Ahmedabad
2. GEECY Industrial Services Pvt. Ltd., Mumbai
3. Corrosion Control Services, Mumbai
4. Perfect Metal Testing & Inspection Agency, Calcutta
5. Inter Ocean Shipping Co., New Delhi
6. RTD, Mumbai
7. Sievert, Mumbai
8. X-Tech, Vizag

1) For procuring bought out items from vendors other than those listed above, the same may be acceptable subject to the following: -
   a) The vendor/ supplier of bought out item(s) is a manufacturer/ supplier of said item(s) for intended services and the sizes being offered is in their regular manufacturing supply range.
   b) The vendor / supplier should not be in the Holiday list of CLIENT / VCS / other PSU.
   c) Should have supplied at least one single random length (i.e. 5.5 meters to 6.5 meters) for item assorted pipes / tubes and for other items, which are to be supplied in quantity on number-basis (other than assorted pipes / tubes) minimum 01 (One) number of same or higher in terms of size and rating as required for intended services. The bidder should enclose documentary evidences i.e. PO copies, Inspection Certificate etc. for the above, along with their bids.

2) For any other item(s) for which the vendor list is not provided, bidders can supply those item(s) from vendors/ suppliers who have earlier supplied same item(s) for the intended services in earlier projects and the item(s) offered is in their regular manufacturing/ supply range. The bidder is not required to enclose documentary evidences (PO copies, Inspection Certificate etc.) along with their offer, however in case of successful bidder, these documents shall required to be submitted by them within 30 days from date of Placement of Order for approval to CLIENT / VCS.

3) The details of vendors indicated in this list are based on the information available with VCS, Contractor shall verify capabilities of each vendor for producing the required quantity with. PMC does not guarantee any responsibility on the performance of the vendor. It is the contractor's responsibility to verify the correct status of vendor and quality control of each parties and also to expedite the material in time.

LIST OF MATERIALS OF RECOMMENDED BRAND AND/ OR MANUFACTURE (STRUCTURE)

Unless otherwise specifically mentioned in the Schedule of Items, Contractor has to use materials as listed below, of only these brand names/Company's names, which are mentioned in the RECOMMENDED list for structural items thereon.

1. STRUCTURE

Sl. No.	Items/Name of Products	Makes/Brands/Manufactures
1	Structural Steel	SAIL / TATA / RINL / IISCO / ESSAR / ISPAT
2	Structural Steel Tubes ISI Marked	TATA / JINDAL / SURYA / SWASTIK
3	Synthetic Enamel Paint Ist Quality only	ICI Paint (Deluxe), Asian Paint (Apcolite), Shalimar Paint (Superlac), Goodlass,Nerolac Paint(Nerolac), Berger Paints

Any materials not fully specified in these specification and which may be offered for use in the works shall be subject to approval of Engineer, without which it shall not be used anywhere in the construction works.

ELECTRICAL

LIST OF SUPPLIERS OF MAJOR BOUGHT-OUT ITEMS (ELECTRICAL)

Cable – LT Power and Control

1. Cords Cable Industries Ltd.
2. Universal Cable Ltd.
3. KEI Industries Ltd.
4. Havells.
5. Delton
6. Elkay Telelinks
7. Evershine Electricals
8. Ecko
9. Ravin
10. Rallison.
11. Suyog
12. Netco
13. Uniflex
14. Paramount
15. Gloster
16. Associated cables Pvt Ltd.
17. CMI
18. Gemscab
19. Industrial cables
20. NICCO
21. Polycab
22. Torrent

Cable – Gland

1. .Baliga
2. .Comet
3. Flexpro
4. Flameproof
5. FCG
6. Electro Werke
7. Dowels

8. CCI

Cable – Lugs

1. Dowels
2. Jainson
3. Ismal

Cable – Tray

1. Ercon Composites
2. Yamuna Power & Infrastructure Ltd.

Cable Termination and Jointing Kit

1. CCI
2. Raychem
3. M-Seal

Earthing Materials

1. Rukmani Electrical & Components Pvt Ltd.
2. Indiana Grating Pvt Ltd.
3. Jef Techno Solutions Pvt Ltd

Flame proof LDB's/ JB,s/Control Station/ switches

7. FCG
8. Sudhir
9. Prompt Engineering Works
10. Flame Proof equipments pvt. Ltd.
11. Baliga Lighting Equipments Pvt. Ltd.
12. Flexpro Electricals Pvt. Ltd.

Indicating Lamps

1. Alstom Ltd.
2. BCH
3. L&T Ltd.
4. Siemens Ltd.
5. Vaishno Electricals

Miniature Circuit Breakers (MCBs) and Lighting DB

1. ABB
2. Hagger
3. Havell's India Ltd.
4. Indo Asian Fusegear Ltd.
5. Legrand

6. MDS Switchgear Ltd.
7. Schneider
8. Siemens Ltd.
9. HPL

Moulded Case Circuit Breaker (MCCBs)

1. ABB
2. Andrew yule
3. Larsen & Toubro
4. Schneider
5. Siemens
6. Control and Switchgear

Push Buttons

1. BCH
2. Alstom Ltd.
3. L&T
4. Siemens Ltd.
5. Telemenchanique & Controls (India) Ltd.
6. Vaishno Electricals

Switches-Control

1. BCH
2. Easum Reyrolle Relays & Devices Ltd.
3. Alstom
4. Kaycee Industries Ltd.
5. L&T
6. Siemens Ltd.

Terminals Blocks

1. Connectwell
2. Controls & Switchgear Co. Ltd.
3. Elmex Controls Pvt. Ltd.
4. Essen Engineering Co. Pvt. Ltd.

NOTE:- Item/Vendor,which are not listed above,shall be subject to prior approval from Client/Consultant.

INSTRUMENTATION

LIST OF MATERIALS OF RECOMMENDED BRAND AND/ OR MANUFACTURE

(INSTRUMENTATION)

1. PRESSURE GAUGES

- AN Instruments Pvt Ltd
- Badotherm Process Instruments B.V.
- Baumer Bourdon Haenni S.A.S
- British Rototherm Co Ltd
- Budenberg Gauge Co Ltd
- Dresser Inc
- Forbes Marshall (Hyd) Pvt Ltd
- General Instrument Consortium
- H. Guru Instruments (South India) Pvt Ltd
- Manometer (India) Pvt Ltd
- Nagano Keiki Seisakusho Ltd
- Hirlekar Precision, India
- Waaree Instruments Ltd
- Walchandnagar Industries Ltd (Tiwac Divn)
- Wika Alexander Wiegand & Co GmbH
- Wika Instruments India Pvt Ltd
- Ashcroft India Pvt Ltd.

2. TEMPERATURE GAUGES

- AN Instruments Pvt Ltd.
- Badotherm Process Instruments B.V.
- Bourdon Haenni S.A.
- Dresser Inc.

- General Instruments Consortium
- H. Guru Instruments (South India) Pvt Ltd
- Nagano Keiki Seisakusho Ltd
- Solartron ISA
- Walchandnagar Industries Ltd (Tiwac Divn)
- Wika Alexander Wiegand & Co GmbH
- Wika Instruments India Pvt Ltd
- Pyro Electric, Goa
- Ashcroft India Pvt Ltd.

3. TEMPERATURE ELEMENTS, THERMO-WELLS

- ABB Automation Ltd
- Altop Industries Ltd
- Bourdon Haenni S.A.
- Detriv Instrumentation & Electronics Ltd
- General Instruments Consortium
- Japan Thermowell Co Ltd
- Tecnomatic S.P.A
- Tempsen Instrument India Ltd
- Thermo Electric Co. Inc.
- Thermo-Couple Products Co
- Thermo-Electra B.V.
- Wika Alexander Wiegand & Co GmbH
- Altop Industries Ltd., Baroda
- Nagman Sensors (Pvt.) Ltd.
- Pyro Electric, Goa

4. POSITIVE DISPLACEMENT FLOW METERS

- RMG (Germany)
- Elster Instromet
- Romet
- Dresser
- Itron
- FMG
- Common
- Metreg
- Raychem RPG
- Vemmtec

5. TURBINE FLOW METER

- Daniel
- Elster Instromet
- Itron
- RMG
- Rockwin

6. ELECTRONIC VOLUME CORRECTOR

- Elgas
- Itron
- Plum
- Pietro Fiorentini

7. ORIFICES (METER RUN, FLOW CONDITIONER, ORIFICE PLATE AND ASSEMBLY)

- Emerson
- FMC, USA
- Pietro Fiorentini S.P.A (Italy)
- Canalta Controls, Canada

8. FIELD INSTRUMENTS (P, DP, F, L, T)

- ABB Ltd
- Honeywell
- Fuji Electric Instruments Co Ltd
- Yokogawa
- Invensys India Pvt.Ltd

9. PRESSURE REGULATOR AND SLAM SHUT VALVE

- Pietro Fiorentini S.P.A. (Italy)
- Emerson

- RMG-Regel Messtechnik (Germany
- Mokveld Valves BV (Netherlands)
- Schlumberger (USA)
- Gorter Controls B V (Netherlands)
- Instromet International NV
- Nirmal Industrial Controls Pvt Ltd. (up to 6” size only)
- ESME Valves Ltd
- Kaye & Macdonald Inc.
- Nuovo Pignone S.P.A (Italy) (GE Oil Co.)
- Richards Industries (Formerly Treloar)
- Samson AG Mess-und Regeltechnik
- Tormene Gas Technology
- Dresser Inc, USA (upto 8” size, 300# class only)

10. PRESSURE SAFETY VALVES

- Keystone Valves (India) Pvt. Ltd.
- Larson & Toubro Ltd.
- Lesser GmbH & Co KG
- Mekaster Engg Ltd..
- Tyco Sanmar Ltd. (New Delhi)
- Anderson Greenwood Crosby
- BHEL (Trichy)
- Curtiss Wright Flow Control Corporation
- Dresser Inc.
- Fukui Seisakusho Co. Ltd
- Nakakita Seisakusho Co Ltd
- Nuovo Pignone S.P.A (Italy) (GE Oil co)

- Parcol S.P.A
- Safety Systems UK Ltd
- Tai Milano S.P.A
- Weir Valves & Controls France
- Bliss Anand Pvt Ltd.

11. CONTROL PANEL & ACCESSORIES

- Keltron Controls Ltd., Kerala
- Elechmec Corporation Ltd., Mumbai
- Industrial Controls & Appliances Pvt. Ltd.,
- Alstom System Ltd., Noida
- Emerson Process Management (I) Pvt. Ltd.
- ABB Instruments Ltd., New Delhi
- Larsen & Toubro Ltd.
- Control & Automation, New Delhi
- GE Fanuc Systems Pvt. Ltd., New Delhi
- Rockwell Automation (I) Ltd., Ghaziabad
- Honeywell Automation Ltd.
- Rittal
- Pyrotech Elcronics Pvt Ltd.
- Positronics Pvt Ltd.
- Electronics Corporation of India Ltd.

12. JU ION BOXES AND CABLES GLANDS

- Ex-Protecta
- Flameproof Control Gears
- Baliga
- Flexpro Electricals

13. CONTROL AND SIGNAL CABLES

- Associated Cables
- Brook
- Associated Flexibles & Wires (Pvt) Ltd
- Universal Cables Ltd,India
- Delton Cables Ltd, India
- KEI Industries Ltd INDIA
- CMI Limited
- Cords Cable Industries Ltd, India
- Elkay Telelinks (P) Ltd., India
- Udey Pyrocables Pvt Ltd, India
- Goyolene Fibres (I) Pvt Ltd, India
- Netco Cable Industries Pvt Ltd, India
- Nicco Corporation Ltd, India
- Paramount Communications Ltd, India
- Polycab Wires Pvt Ltd, India
- Radiant Cables Pvt Ltd, India
- Reliance Engineers Ltd., India
- Suyog Electricals Ltd, India
- Thermo Cables Ltd

14. SS FITTINGS , INSTRUMENT VALVES & MANIFOLDS

1. Swagelok Co.
2. Parker
3. Aura Inc.
4. Hoke
5. Excelsior Engg Works, India
6. Swastic Engineering Works, India
7. Comfit & Valves Pvt.Ltd
8. Arya Crafts & Engg.Pvt. Ltd

15. SS TUBES

1. Swagelok Co.
2. Parker
3. Sandvik
4. Heavy metal & tubes LTD
5. Nuclear Fuel Complex, India
6. Scorodite
7. Ratnamani Metal & Tube Ltd
8. Jindal Saw

LIST OF RECOMMENDED MANUFACTURERS (SHOP & FIELD PAINTING)

Indian Vendors

1.0 Asian Paints (I) Ltd.
2.0 Berger Paints Ltd.
3.0 Goodlass Nerlolac Paints Ltd.
4.0 Jenson And Nicholson Paint Ltd & chokuGu Jenson & Nicholson Ltd.

5.0 Shalimar Paints Ltd.
6.0 Sigma Coating, Mumabai
7.0 CDC Carboline Ltd.
8.0 Premier Products Ltd.
9.0 Coromandel Paints & Chemicals Ltd.
10.0 Anupam Enterprises
11.0 Grand Polycoats
12.0 Bombay Paints Ltd.
13.0 Vanaprabha Esters & Glycer, Mumbai
14.0 Sunil Paints and Varnishes Pvt. Ltd.
15.0 Courtaulds Coating & Sealants India (Pvt.) Ltd.
16.0 Mark-chem Incorporated, Mumbai (for phosphating chemicals only)
17.0 VCM Polyurethane Paint (for polyurethane Paint only)

Foreign Vendors For Overseas Products

1.0 Sigma Coating, Singapore
2.0 Ameron, USA
3.0 Kansai Paint, Japan
4.0 Hempel Paint, USA
5.0 Valspar Corporation, USA
6.0 Courtaulds Coating, UK.

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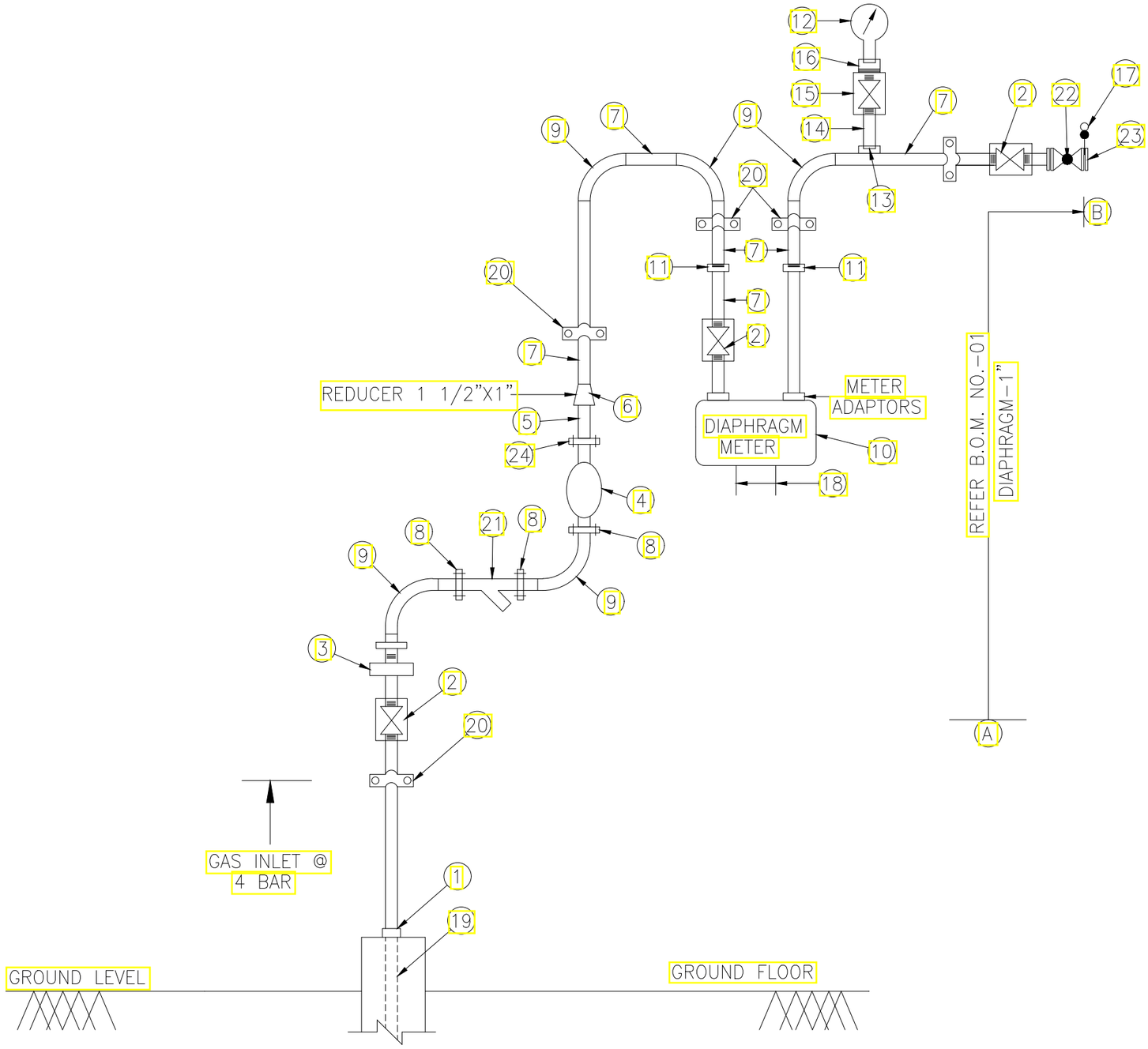
Notes:

1. Bidder can select equipment of two different makes, selected from this VENDOR LIST and mention the same in the checklist for technical evaluation attached with the tender. The offered bid must include filled datasheet indicating make, model, size, rating of offered instrument/ equipment duly supported by sizing calculation of offered equipment (wherever applicable).

2. Vendors who have already supplied above equipment in other terminals of GAIL (I) Ltd, shall also be considered qualified for this tender provided the supplied equipment are commissioned and running successfully and they have not been put on holiday.

3. Equipment / Instruments of any make which is offered by one bidder and acceptable to GAIL (I) Ltd shall be accepted for other bidder also. After placement of order, on request of the successful bidder list of other qualified makes for a particular item (for which successful bidder wants to change the vendor) shall be provided.

4. Bidder shall take prior approval of the make / model no of the offered item and it shall be from the list given above. However additional vendors will be considered in exceptional cases, provided they have supplied for similar application to reputed gas transmission/distribution companies, in quantities at least half the numbers being supplied for this tender, and working satisfactorily for minimum 6 months. Documentary evidence substantiating above shall be submitted for taking approval.



NOTES:-

1. CS PIPE SHALL CONFIRM TO ASTM A106 Gr B.
2. CS FITTINGS SHALL CONFIRM TO ASTM A105.
3. NPT THREADS SHALL CONFIRM TO ANSI B1.20.1
4. WELDING OF PIPES & FITTINGS SHALL BE CARRIED OUT AS PER API 1104.
5. ALL MATERIALS EXCEPT BELOW MENTIONED IS IN CONTRACTOR' SCOPE.
6. ANY ADDITIONAL ITEM REQUIRED FOR COMPLETION OF WORK SHALL BE CONTRACTOR'S RESPONSIBILITY WITHOUT ANY COST/TIME IMPLICATION.
7. ANY ADDITIONAL SUPPORT/CLAMPS REQUIRED AT THE TIME OF INSTALLATION OF MRS SKID SHALL BE CONTRACTOR'S RESPONSIBILITY.
8. GIVEN BOM IS INDICATIVE ONLY. INDICATIVE ITEM MAY VERY DURING ACTUAL CONSTRUCTION ON SITE.
9. APART FROM FREE ISSUE MATERIAL BALANCE MATERIAL SHALL BE SUPPLIED BY CONTRACTOR.
10. CONTRACTOR TO ENSURE PROVISION FOR LOCKING/SEALING ARRANGEMENT FOR METERS/VALVE TO AVOID MISUSE.
11. IN CASE OF SPACE CONSTRAINT, FLANGE END Y-TYPE STRAINER MAY BE INSTALLED VERTICALLY.

MATERIAL SUPPLIED BY GNGPL

1. METER
2. REGULATOR

1. DESIGN MAY BE CUSTOMIZED/ MODIFIED AS PER AVAILABLE SPACE AT SITE.

REV.	DATE	DESCRIPTION	PREP.	CHKD.	APPD.
A	05.03.2020	ISSUED FOR APPROVAL	DK	MD	AD

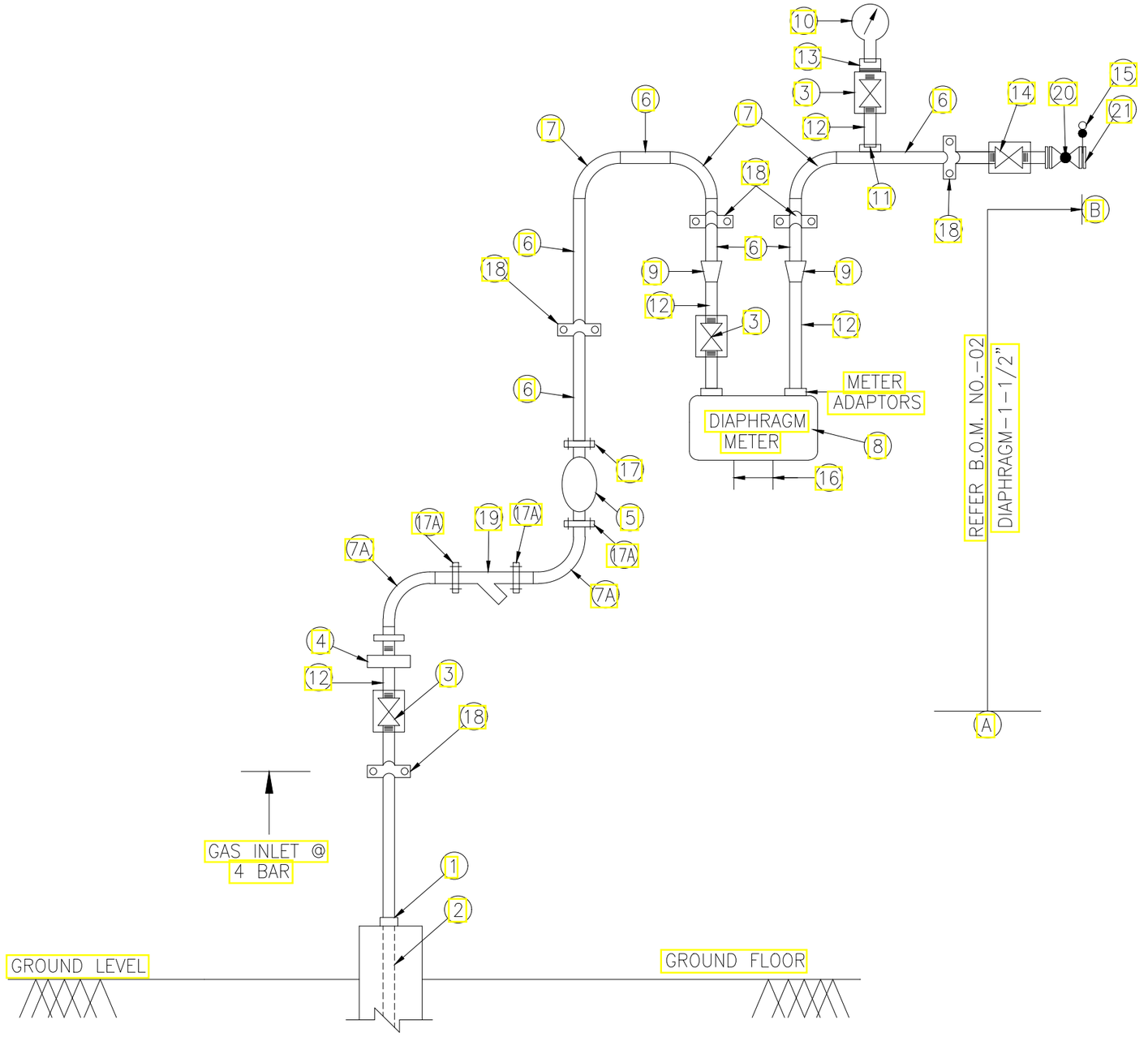
CLIENT: GOA NATURAL GAS PRIVATE LIMITED (GNGPL) NORTH GOA

PMC: M/s. VCS QUALITY SERVICES PVT. LTD.

PROJECT: INSTALLATION OF INDUSTRIAL & COMMERCIAL CONNECTION IN NORTH GOA GA

TITLE: SCHEMATIC DIAGRAM METERING & REGULATING STATION

SIZE	SCALE	DRAWING NUMBER	SHEET	REV.
A3	NTS	14588-30-05-21	1 OF 1	A



NOTES:-

1. CS PIPE SHALL CONFIRM TO ASTM A106 Gr B.
2. CS FITTINGS SHALL CONFIRM TO ASTM A105.
3. NPT THREADS SHALL CONFIRM TO ANSI B1.20.1
4. WELDING OF PIPES & FITTINGS SHALL BE CARRIED OUT AS PER API 1104.
5. ALL MATERIALS EXCEPT BELOW MENTIONED IS IN CONTRACTOR' SCOPE.
6. ANY ADDITIONAL ITEM REQUIRED FOR COMPLETION OF WORK SHALL BE CONTRACTOR'S RESPONSIBILITY WITHOUT ANY COST/TIME IMPLICATION
7. ANY ADDITIONAL SUPPORT/CLAMPS REQUIRED AT THE TIME OF INSTALLATION OF MRS SKID SHALL BE CONTRACTOR'S RESPONSIBILITY.
8. GIVEN BOM IS INDICATIVE ONLY. INDICATIVE ITEM MAY VERY DURING ACTUAL CONSTRUCTION ON SITE.
9. APART FROM FREE ISSUE MATERIAL BALANCE MATERIAL SHALL BE SUPPLIED BY CONTRACTOR.
10. CONTRACTOR TO ENSURE PROVISION FOR LOCKING/SEALING ARRANGEMENT FOR METERS/VALVE TO AVOID MISUSE.
11. IN CASE OF SPACE CONSTRAINT, FLANGE END Y-TYPE STRAINER MAY BE INSTALLED VERTICALLY.

MATERIAL SUPPLIED BY GNGPL

1. METER
2. REGULATOR

1. DESIGN MAY BE CUSTOMIZED/ MODIFIED AS PER AVAILABLE SPACE AT SITE.

REV.	DATE	DESCRIPTION	PREP.	CHKD.	APPD.
A	05.03.2020	ISSUED FOR APPROVAL	DK	MD	AD

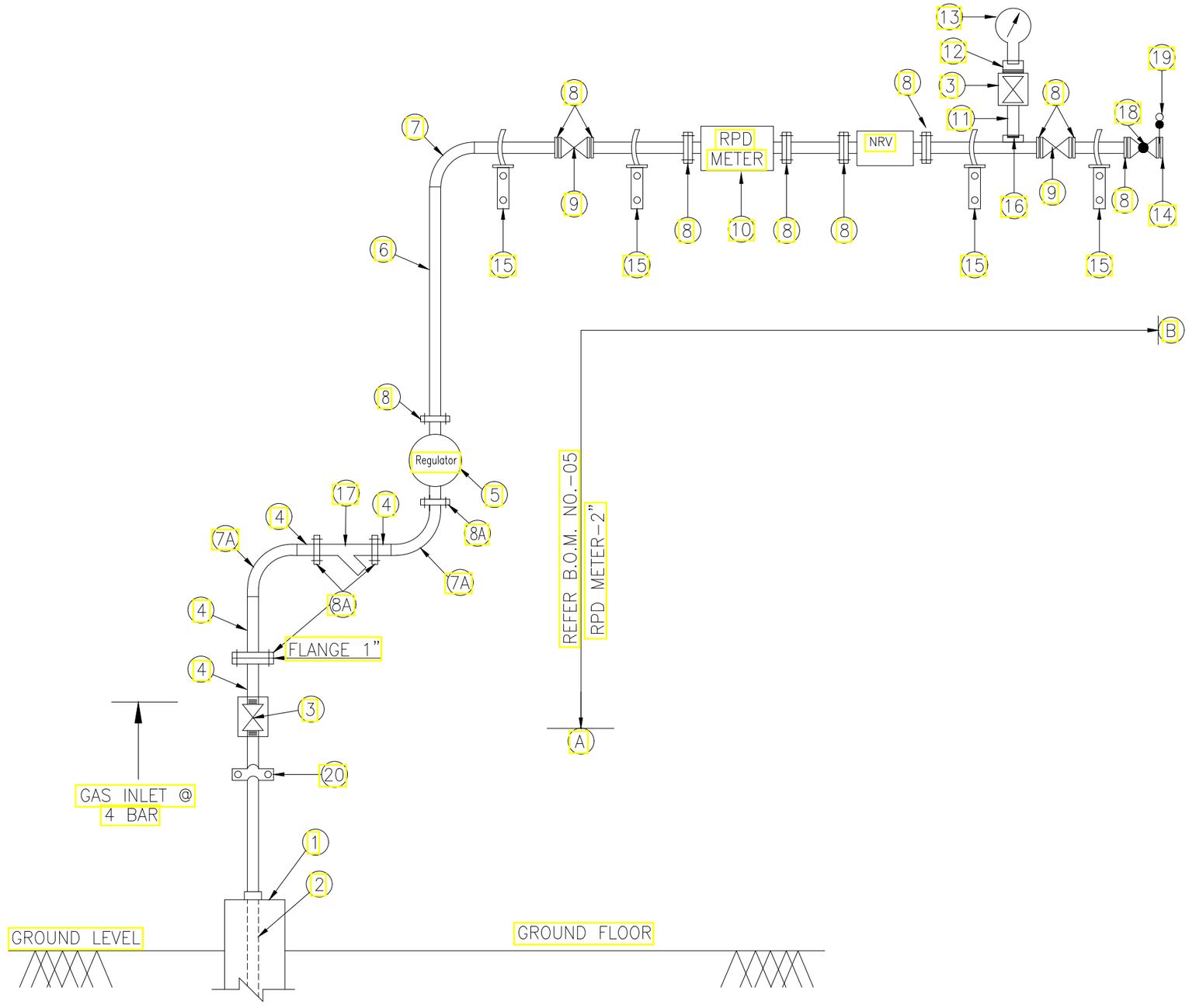
CLIENT: GOA NATURAL GAS PRIVATE LIMITED (GNGPL)
NORTH GOA

PMC: M/s. VCS QUALITY SERVICES PVT. LTD.

PROJECT: INSTALLATION OF INDUSTRIAL & COMMERCIAL CONNECTION IN NORTH GOA GA

TITLE: SCHEMATIC DIAGRAM
METERING & REGULATING STATION

SIZE	SCALE	DRAWING NUMBER	SHEET	REV.
A3	NTS	14588-30-05-22	1 OF 1	A



NOTES:-

1. CS PIPE SHALL CONFIRM TO ASTM A106 Gr B.
2. CS FITTINGS SHALL CONFIRM TO ASTM A105.
3. NPT THREADS SHALL CONFIRM TO ANSI B1.20.1
4. WELDING OF PIPES & FITTINGS SHALL BE CARRIED OUT AS PER API 1104.
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10. CONTRACTOR TO ENSURE PROVISION FOR LOCKING/SEALING ARRANGEMENT FOR METERS/VALVE TO AVOID MISUSE.
11. IN CASE OF SPACE CONSTRAINT, FLANGE END Y-TYPE STRAINER MAY BE INSTALLED VERTICALLY.

MATERIAL SUPPLIED BY GNGPL

1. METER
2. REGULATOR

1. DESIGN MAY BE CUSTOMIZED/ MODIFIED AS PER AVAILABLE SPACE AT SITE.

REV.	DATE	DESCRIPTION	PREP.	CHKD.	APPD.
A	05.03.2020	ISSUED FOR APPROVAL	DK	MD	AD

CLIENT: GOA NATURAL GAS PRIVATE LIMITED (GNGPL)
NORTH GOA

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PROJECT: INSTALLATION OF INDUSTRIAL & COMMERCIAL CONNECTION IN NORTH GOA GA

TITLE: SCHEMATIC DIAGRAM
METERING & REGULATING STATION

SIZE	SCALE	DRAWING NUMBER	SHEET	REV.
A3	NTS	14588-30-05-25	1 OF 1	A

BILL OF MATERIAL

FABRICATION OF DIFFERENT TYPES OF MRS

BOM No-01 MRS- Ref Drawing No.14588-30-05-21-Diaphragm 1"

S.no	Item Description	Size	Quantity	Procurement Scope	Length of fittings			
					1/2"	1"	1-1/2"	2"
1	TF	32mmx1"	1	GNGPL				
2	Brass Isolation Valve	1"(F)x1"(F)	3			225		
3	CS Hex Nipple /Pipe	1"(M)x1"(M)	1			150		
4	Regulator	Inlet 1" Outlet 1-1/2"	1	GNGPL		400		
5	CS Pipe	1-1/2"(Threaded on one end	1			150		
6	CS Reducer	1-1/2"x1"	1				100	
7	CS Pipe	1"	7			2100		
8	CS WNRF Flange	1"	4			325		
9	CS Elbow	1"	5			500		
10	Diaphragam Meter G-4,6,10,16,25		1	GNGPL		300		
11	CS Socket	1"(F)x1"(F)	2			150		
12	Pressure Gauge Dail 4" (range 0-1 Bar)	4"	1					
13	CS Socket	1/2"	1		25			
14	CS Hex Nipple Pipe	1/2"(M)x1/2"(M)	1		150			
15	Isolation Valve	1/2"NPT(F)End	1		50			
16	CS Reducing Bush	1/2"(M)x1/2"(F)	1			25		
17	Spectacle Blind	1"	1					
18	Angel Clamps		2					
19	GI Sleeve	1-1/2" x1FT	1					
20	MS Clamps		5					
21	Y - Type Strainer		1			127		
22	Globe Valve	1"NPT(F)End	1			127		
23	CS Blind Flange	1"	1					
24	CS WNRF Flange	1-1/2"	1					
25	NRV Assembly	1”	1					
	Total Supply Part				225	4579	100	0

BILL OF MATERIAL

BOM No-02 MRS- Ref Drawing No.14588-30-05-22-Diaphragm 1"-1/2"

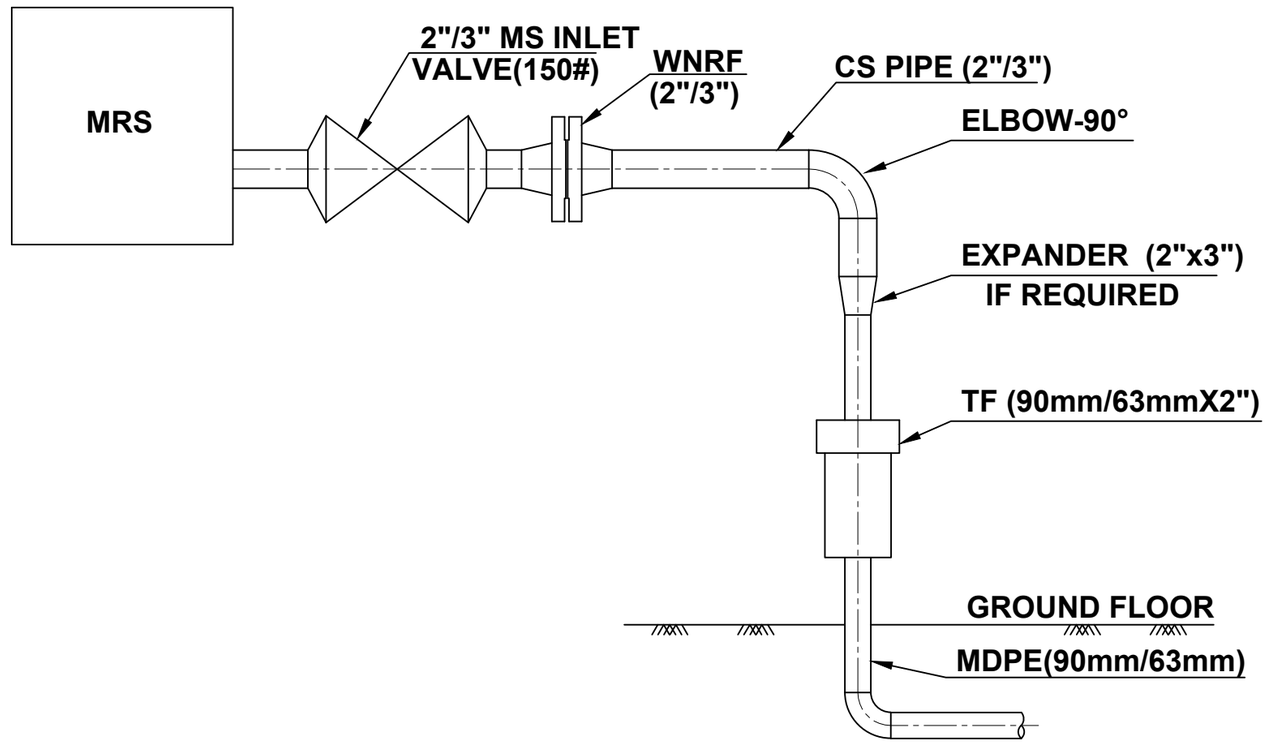
S.no	Item Description	Size	Quantity	Procurement Scope	Length of fittings			
					1/2"	1"	1-1/2"	2"
1	TF	32mmx1"	1	GNGPL				
2	GI Sleeve	1-1/2"X1ft	1					
3	Brass Isolation Valve	1"(F)x1"(F)	3			225		
4	CS Hex Nipple /Pipe	1"(M)x1"(M)	1			150		
5	Regulator	Inlet 1" Outlet 1-1/2"	1	GNGPL		400		
6	CS Pipe	1-1/2"	7				2100	
7	CS Elbow	1-1/2"	3			200		
7A	CS Elbow	1"	2					
8	Diaphragam Meter G 4,6,10,16,25		1	GNGPL		300		
9	CS Reducing Socket/Socket	1-1/2"(F)x1"(F)	2				150	
10	Pressure Gauge Dail 4" (range 0-1 Bar)	4"	1					
11	CS Socket	1"	1			25		
12	CS Pipe	1"(M)	6			900		
13	CS Reducing Bush	1"(M)x1/2"(F)	1			25		
14	Isolation Valve	1-1/2"	1				150	
15	Spectacle Blind	1-1/2"	1				100	
16	Angel Clamps		2					
17	CS Flange	1-1/2"	3				325	
17A	CS Flange	1"	2			108		
18	MS Clamps		5					
19	Y-Type strainer		1				165	
20	Globe Valve	1-1/2"NPT(F)End	1				165	
21	CS Blind Flange	1-1/2" NPT(F) End	1				127	
22	NRV Assembly	1”	1				127	
	Total Supply Part				0	2333	3282	0

BILL OF MATERIAL

BOM No-05 MRS- Ref Drawing No.14588-30-05-25- RPD 2"

S.no	Item Description	Size	Quantity	Procurement Scope	Length of fittings			
					1/2"	1"	1-1/2"	2"
1	TF	32mmx1"	1	GN GP L				
2	GI Sleeve	1-1/2" x1FT	1					
3	Brass Isolation Valve	1"(F)x1"(F)	2			150		
4	CS Pipe	1"	3			300		
5	Regulator	Inlet 1" Outlet 2"	1	GNGPL				400
6	CS Pipe	2"	6					900
7	CS Elbow	2"	1					300
7A	CS Elbow	1"	2					
8	CS WNRF Flange	2"	10					1520
8A	CS WNRF Flange	1"	5					540
9	CS Ball valve	2"	2					584
10	RPD Meter	2"	1	GNGPL				800
11	CS Hex Nipple /Pipe	1"(M)x1"(M)	1			75		
12	CS Reducing Bush	1/2"(M)x1/2"(F)	1			25		
13	Pressure Gauge Dail 4" (range 0-4 Bar)	4"	1					
14	CS Blind Flange	2"	1					152
15	Angel Clamps		4					
16	Socolet	1"	1			25		
17	Y - Type Strainer		1					219
18	Globe Valve	2"	1					203
19	Spectacle Blind	2"	1					120
20	MS Clamps	2"	1					
21	NRV Assembly	2"	1					
	Total Supply Part				0	575	0	5738

MRS INLET DRAWING



NOTES:-

1. CS PIPE SHALL CONFIRM TO ASTM A106 Gr B.
2. CS FITTINGS SHALL CONFIRM TO ASTM A105.
3. WELDING OF PIPES & FITTINGS SHALL BE CARRIED OUT AS PER APPLICABLE CODE.
4. ALL MATERIALS EXCEPT BELOW MENTIONED IS IN CONTRACTOR' SCOPE.
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6. ANY ADDITIONAL SUPPORT/CLAMPS REQUIRED AT THE TIME OF INSTALLATION OF MRS SKID SHALL BE CONTRACTOR'S RESPONSIBILITY.
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9. CONTRACTOR TO ENSURE PROVISION FOR LOCKING/SEALING ARRANGEMENT FOR METERS/VALVE TO AVOID MISUSE.

MATERIAL SUPPLIED BY GNGPL

1–VALVE

REV.	DATE	DESCRIPTION	PREP.	CHKD.	APPD.
A	14.09.2020	ISSUED FOR APPROVAL	AK	JR	HK

CLIENT: GOA NATURAL GAS PRIVATE LIMITED (GNGPL) NORTH GOA

PMC: M/s. VCS QUALITY SERVICES PVT. LTD.

PROJECT: INSTALLATION OF INDUSTRIAL & COMMERCIAL CONNECTION IN NORTH GOA GA

TITLE: SCHEMATIC DIAGRAM MRS INLET DRAWING

SIZE	SCALE	DRAWING NUMBER	SHEET	REV.
A3	NTS	14588-30-05-26	1 OF 1	A