



GAIL (INDIA) LIMITED
(A.GOV'T OF INDIA UNDERTAKING)

**BID DOCUMENT
FOR PROCUREMENT OF
GAS METERING SKID FOR KG BASIN
CORRIGENDUM - 1**

(BID DOCUMENT NO110282B/JPK/GAIL/01-R0)

OPEN INTERNATIONAL COMPETITIVE BIDDING

ISSUED DATE: 15.01.2010



DELIVERS. EVOLVES.

ISSUED BY
JK
WHOLE LIFE SOLUTIONS FOR PIPELINE AND SUBSEA SYSTEMS



Technical Queries of All Bidders

Procurement of Metering Skid For KG Basin				
Tender No - 110282B/JPK/GAIL/01-R0				
				DATE:- 14.01.10
SI No	Section Detail	Section/Description	Bidders Queries	GAIL / JPK Replies
1	Vol I OF II	Delivery period	4 months is not sufficient and realistic delivery period. We request that the delivery period should be extended to 6 months.	Tender Condition prevails.
2	Vol II of II Page 231 of 293.	Datasheet for Single Chamber Orifice Fitting. The offered meter shall be designed as per AGA-3 and calibration certificate from the country of origin shall be supplied	We can provide AGA-3 type approval from Measurement Canada, not calibration certificate or custody transfer approval. Please confirm acceptance	TPI certificate for compliance to AGA-3 shall be considered. All 3 sections (upstream, downstream, straightener, orifice) should be sourced for OEM.
3	Vol II OF II Page 39/40 of 293	Specification of Single chamber Orifice based metering unit.	We understand that the complete metering assembly including 3 Section Meter Tube , Single Chamber Orifice Fitting & Flow straightner shall be sourced from the same OEM (Original Equipment Manufacturer) to ensure measurement integrity. Also, Offered Single Chamber Orifice Fitting & Flow straightner must be Original Design and should be in production for atleast 5 years . Any Prototype , Duplicate , Refurbished design shall not be acceptable. Please confirm our understanding is correct.	Refer S.No.2.
4	Vol I of II Page 46 of 293	LEL detectors	Required or not. Scope not clear. Please clarify	L.E.L detectors not required.
5	Vol II of II Page 46 of 293	Cable laying	We understand that the laying of cables is not in our scope of work. Please confirm	Bidders understanding is correct
6	Vol II of II Page 8 of 293	Earthing pits	We understand that making of earthing pits is not in our scope of work. Please confirm	Bidders understanding is correct
7	Vol II of II Page 7 of 293	Digital graph indicator	Please confirm if required or not	Refer Corrigendum-1
8	Vol II of II Page 9 of 293	3.2 certification	Please reconfirm the requirement of 3.2 certification. It will affect delivery period	Tender Condition prevails.
9	Vol II of II Page 14 of 293	Design data for Filtration, Letdown skid	1 bar pressure drop across filtration skid is mentioned. Kindly reconfirm pressure drop across filtration skid	Pressure drop is to be taken maximum upto 0.2 bar across the filtration skid for all customers.
10	Vol II of II Page 22 of 293	Specification for Filter unit	In specifications, DPG and level transmitter both are reqd. However, P&ID indicates DPG and Level Gauge. Kindly confirm requirement	P&ID shall be followed.
11	Vol II of II Page 22 of 293	Scope of work, Point No. 4.0	Kindly confirm requirement of Electronic controllers?	If PID controller facility is not in the flow computers, separate controllers to be provided
12	Vol II of II Page 22 of 293	Scope of work, Point No. 4.0, Datasheet Ball Valves, page no. 248 of 293 and P&ID	Specifications call for DBB valves while as P&ID indicates TMBV. Kindly confirm requirement of Double Block and Bleed inlet/outlet valves.	P&ID shall be followed. DBB Valves are not required, only TMBV valves are required.
13	Vol II of II Page 31 of 293	For SSV	Please confirm if High pressure cut off and low pressure cut off both are required	Yes required
14	Vol II of II Page 31 of 293	Specification for SSV, Point No. 4.0	The range specified is very vast. Kindly re-confirm requirement	Tender condition prevails
15	-	Calibration of Orifice Metering assembly	Kindly confirm requirement of calibration for the system. Whether metering system calibration in certified lab is required or not?	Refer S.No.2.
16	Vol II of II Page 38 of 293	Beta ratio, Point 3.1.9	Please confirm which Beta ratio to consider. Whether 0.4 TO 0.6 or 0.2 TO 0.75	0.4 to 0.6. However AGA-3 to be complied.

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SI No	Section Detail	Section/Description	Bidders Queries	GAIL / JPK Replies
17	Vol II of II Page 62 of 293	Flow computer	230 V SUPPLY is not available for Flow Computer. Please confirm acceptance of 24 V DC input	The available supply is 230V.The Vendor shall make suitable arrangement to provide power supply to its panel.
18	Vol II of II Page 42 of 293	Specification for Single Chamber Orifice Plates, Straightening vanes, Point No. 6.8	It is mentioned that the piping arrangement shall be such that Straightening vanes are not required. Kindly confirm requirement of straightening vanes.	Refer Corrigendum-1
19	Vol II of II Page 41 of 293	Specification for Single Chamber Orifice Plates, Straightening vanes, Point No. 4.6.3	Please confirm acceptance of Daniel Flow Profiler as a flow straightner. Daniel Flow Profiler plate has been sucessfully tested to the conditions set by AGA 3, 2000. We can submit the test results to substantiate our claim. Kindly confirm acceptance of plate material of SS 304	Tender Condition Prevails.
20	Vol II of II Page 41 of 293	Specification for Single Chamber Orifice Plates, MVT, Point No. 4.5.1	Please confirm requirement of Multi Varaible Transmitter (MVT). We assume that we have to supply separete PT, DPT, TT and MVT is not required. Kindly confirm our understanding is correct	Refer Corrigendum-1
21		VENDOR LIST for Flow Control Valves (FCV)	Kindly confirm acceptance of MIL as an approved vendor	Tender Condition Prevails.
22		P&ID	Kindly confirm if the sizes shown in P&ID are final or we have to size the instruments based on maximum velocity 20 m/s	Line Sizes mentioned in the tender are minimum,however bigger sizes can be supplied if required.
23		P&ID, 2" header across scrubber is shown	We understand that the header shown as 2" shall be of line size. Kindly confirm if our understanding is correct	Refer Corrigendum-1
24		How many orifice plates are required?	We recommend GAIL should keep 05 Nos. plates as spares since measurement uncertainty is highly dependant on condition of orifice plate	Not Required.
25		P&ID shows that the upstream length requirement as 10D + Flow Straightner + 10D + Orifice Meter + 5D downstream	We recommend that the configuration should be as 9.5 D + Profiler + 7.5 D + Orifice Meter + 5 D. This configuration is defined in AGA-3. Please confirm acceptance.	Bidder shall maintain minimum distance shown in P&ID. However AGA-3 shall be complied.
26		Flow Straightner	We understand that the Flow straightner must have been type tested & approved for all tests as specified in latest AGA -3 Standard & bidder need to furnish the type test report for the same from any one of the International Third Party Lab -- SWRI / Trans Canada / CEESI / NMI / PTB. Please confirm our understanding is correct.	Refer S.No.19 above.
27		Data sheets for BV,GV indicates LTCS material,Data sheets for Plug Valve and FCV indicates CS material. PMS indicates CS material.	Please clarify which material to be considered. Whether LCTS or CS?	Refer Corrigendum-1
28		What is the impact test requirement for Piping components?Since it is CS material we presume that Charpy can be done at 0 deg C for size 2"NB and above for Pipes,Flanges and BW fitting.	Please confirm acceptance	Accepted

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SI No	Section Detail	Section/Description	Bidders Queries	GAIL / JPK Replies
29		What is the %C max and CE max requirement in Piping components? We can go for 0.22 and 0.45 repectively.	Please confirm acceptance	Accepted
30		What is the painting specification for the Skid?	Please provide the same	Refer Corrigendum-1
31		You have indicated requirement of EN 10204 3.2 Certification for all items.	Please note that EN 10204 3.2 Certification has to come from foundry and be requested at the time of casting. If you require this certification, it will lead to long overall lead times in turn meaning an even much longer delivery. We suggest to change this to EN 10204 3.1 certification, so that deliveries may be shortened.	Tender Condition Prevails.
32		It is noticed on the P&ID that you would like 10D before and after the flow straightener.	This will not meet AGA 3 standards as you are required to have 14D between the plate face and downstream end of the flow straightener. A further section 5D will be upstream of the flow straightener to your 2" bypass (equalizing line) line. This orientation would still allow installation in the given 20D overall upstream length and meet AGA 3. Please confirm this is acceptable.	Refer S.No.25.
33		Monitor Regulator	Please confirm that Monitor Regulator with integral slam shut valve is also acceptable.	Accepted.
34		NSIC (Govt. of India)	We request for inclusion of clause of, price preference of upto 15% for vendor's who are registered with NSIC. This is in-line with guidelines / rules of NSIC (Govt. of India)	Tender conditions prevails
35		It is noted that on the specification, a calibration certificate is required.	This is not entirely possible as orifice meters are calibrated intrinsically due to the mechanical tolerances and construction. Supplier (Vendor) ensure that the eccentricity is adequate to meet AGA 3/ISO5167 standards which keeps the added uncertainty by the fitting to +/- 0.5%. - Please comment	Calibration is not required,However TPI certificate for compliance to AGA-3 shall be considered.
36		The supplied specification also indicates that the "cover plate" (also termed as seal bar) be made from 304SS which is unstandard.	Standard "cover plate" (seal bar) is made from zinc plated carbon steel and NACE compliant. - Please confirm acceptance.	Accepted.
37	P&ID	Separate SSV & Monitor Regulator	Since flow rate is very small (i.e. 0.35, 0.12 & 0.05 MMSCMD) for all 3 cases. We request you to accept Monitor Regulator with integral SSV. This will reduces overall skid length. Sources of potential leakage point will be minimised. Kindly confirm your acceptance.	Accepted.
38	P&ID Note 10	Spool Piece for FCV	We understand that an additional spool piece required to be supplied along with each FCV. Kindly confirm the requirement as the same is not understood.	Refer Corrigendum-1
39	Specification & Datasheet for PRS Page No. 31 of 293 & 240 of 293	SSV shall be pneumatically actuated.	We understand that Slam Shut Valve shall be self actuated and not pneumatically. Please confirm.	Refer Corrigendum-1

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SI No	Section Detail	Section/Description	Bidders Queries	GAIL / JPK Replies
40	Specification for PRS Page No. 31 of 293	OPSO & UPSO requirement for SSV	We understand that both Overpressure & underpressure shut off is required for Slam Shut Valve. Kindly confirm our understanding is correct.	Refer S.No.13 above.
41	Specification for PRS Page No. 32 of 293	Isolation Valve & Manual throttling Valve of 2" (For Tapping Line, Vent Line & Drain Line)	As a standard practise, Isolation & throttling valves are 3/4" or 1" size Socket End Connection. Kindly confirm our understanding is correct and also provide datasheet for it.	Accepted.
42	Datasheet for Ball, Globe & Plug Valve		Kindly provide the datasheet for Ball, Globe & Plug valve for sizes less than 2".	Refer Corrigendum-1
43	Job Specification- IDB Valves at Inlet of Filtration Clause No. 3.3 Page no (20 of 293)	Inlet IDB Valves at upstream of Filtration Skid shall be supplied with limit switch	From P&ID, we understand there are IDB valves at skid inlet (1 no), inlet and bypass of scrubber (2 nos), inlets of 2 filter separators (2 nos), inlet of metering (2nos). Kindly confirm which of these valves need to be supplied with limit switches.	P&ID to be followed.
44	Process Parameter Clause No. 4.1.1 & 4.2.1 - Page no (14 & 15 of 293)	For all the three skids, the inlet pressure at filtration and inlet Pressure at letdown does not match.	Kindly confirm the correct process parameters (inlet pressures)	Refer Corrigendum-1. However, Pressure drop across the filtration skid shall be 0.2 bar.
45	QAP Clause No. 3 - Page no (287 of 293)		QAP for Filter, Scrubber, Regulator, SSV, Flow Computer, Pressure Safety Valve, Creep Relief Valve, Orifice Meter, Pressure & Temperature Transmitter is not available in the tender. Kindly provide.	Refer Corrigendum-1
46	Clause No. 2.6.1.3 - Page no (86 of 293)	Job Specification-Hand Held Configurator	Kindly confirm scope of Hand Held Configurator. We understand that we have to supply 1 No. with each SOR.	Refer Corrigendum-1
47	Datasheet for Transmitters Clause No. 16 - Page no (233/234 & 235 of 293)	Tender specifies Body MOC of Transmitters (PT, TT & DPT) as SS316.	Body MOC as Aluminum is suitable for Natural Gas Application. The same is acceptable by GAIL. Kindly confirm its acceptance.	Refer Corrigendum-1
48	PCV Data sheet Active Regulator: FO Type	In case of failure of regulator, valve should get open.	We understand that in case of failure of Both main valve diaphragm as well as failure of pilot diaphragm/ circuit, The valve should get open. Kindly confirm.	Bidder understanding is correct.
49	SSV data sheet Monitor Regulator: FC Type	In case of failure of regulator, valve should get closed.	We understand that in case of failure of Both main valve diaphragm as well as failure of pilot diaphragm/ circuit, The valve should get closed. Kindly confirm.	Bidder understanding is correct.
50	P&ID and specification for PRS Page 32 of 293	In the specs of Monitor valve, tenders calls for 1 no NRV at the outlet of the PRS. However P&ID indicates NRV at the skid outlet. This is contradictory. Similarly specs indicates 1 TG in PRS whereas P&ID indicates PG.	Kindly confirm the correct requirements.	Refer Corrigendum-1

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SI No	Section Detail	Section/Description	Bidders Queries	GAIL / JPK Replies
51	P&ID and specification for PRS Page 31 of 293	In the specs of Pressure Letdown skid, (clause 4), tender indicates that the manual actuated IDB shall be equipped with equalising valves. However P&ID does not indicate the same. This is contradictory.	Kindly confirm the correct requirements.	Refer P&ID.
52	Scope of supply Page 8 of 293. Clause 1.2.	Bidder shall quote for all cables from Control room to field. Tender indicates that even laying of the cables and earthing pits are in scope of vendor.	We understand that cable laying is not in our scope. Construction of Earthing pits are also not in our scope. Kindly confirm.	Bidder understanding is correct.
53	P&ID Note 5	Tender specifies bypass connection of 2" with one plug/globe valve and one ball valve only for 6" pipeline size.	We understand that bypass connection of 2" shall be considered for 6" line size only. Kindly confirm if our understanding is correct.	Bidder understanding is correct.
54	Page 217 of 293, Approved Vendor List	NIRMAL make regulators	Please note that while going through Approved Vendor List we observe that NIRMAL make SSV/PRV is not appearing. Please note that we are one of the approved vendor with major gas companies, Consultant/Contractor including GAIL, MECON, EIL etc. Further we have also executed orders with J P Kenny for various projects wherein we have supplied NIRMAL make SSV/PRV. We request you to kindly approve NIRMAL make SSV/PRV.	Tender conditions prevails
55	Page 248 of 293, Ball Valve Datasheet	Ball Material is Mention as A 350 LF2 / A351 Gr CF8M.	Alternatively please accept the Ball Material as SS410 / WCB + ENP as a cost effective solution for Higher size valves.	Refer S.No.27.
56	Page 246 of 293, Scrubber Datasheet	Nozzle flange rating is mentioned as 300#	As the operating class of the scrubber is 600# nozzle should be of same rating. Please confirm	Refer Corrigendum-1
57	Page 35 of 293, Spec. for Metering unit	Single Chamber Orifice metering unit	We understand that single chamber orifice meter is required not dual chamber orifice. online replacement is not required.	Bidder understanding is correct.
58	Page 4 ,IFB Clause 6	Tender Fee	Being NSIC registered firm NIRMAL is exempted from Tender Fee. Please confirm	Refer clause 6.4 of IFB (Vol I of II page 5 of 137)
59	Page 4 ,IFB Clause 4	EMD	Being NSIC registered firm NIRMAL is exempted from EMD. Please confirm	Firm register with NSIC will be exempted from earnest money deposit / bid bond provided they are registered for the item quoted against the tender. NSIC certificate is to be submitted on or before Bid due date.
60	Page 75 ,IFB Clause 2.6	LD	LD will be applicable on basic contract value. please confirm	Tender Condition Prevails.
61	Page 293 of 294	P&ID	6" upto pressure reduction & 6" downstream of pressure reduction for SILK ROAD SUGAR while as per 20 m/Sec velocity limitation line sizes are coming as 4" upto pressure reduction & 6" downstream of pressure reduction.	Tender Condition Prevails.

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				DATE:- 14.01.10
SI No	Section Detail	Section/Description	Bidders Queries	GAIL / JPK Replies
62	Page 293 of 295	P&ID	4" upto pressure reduction & 4" downstream of pressure reduction for SILICA CERAMICS while as per 20 m/Sec velocity limitation line sizes are coming as 1½" upto pressure reduction & 4" downstream of pressure reduction.	Tender Condition Prevails.
63	Page 293 of 296	P&ID	4" upto pressure reduction & 4" downstream of pressure reduction for RAK CERAMICS while as per 20 m/Sec velocity limitation line sizes are coming as 1½" upto pressure reduction & 3" downstream of pressure reduction	Tender Condition Prevails.
64		Approved Vendor List	While going through the approved vendor list we found that for Scrubbers & filter-Separators NIRMAL is not approved.Nirmal has provided Scrubber & filter Separator to Major gas companies like GAIL, GSPC etc under technical collaboration with M/s.Forain Italy.Please find attachment for NIRMAL make filter reference. Hard copy of Credentials for NIRMAL make cartridge filters is being courier to you. We request you to accept NIRMAL make scrubber & filter-separator	Tender Condition Prevails.
65		Approved Vendor List	Nirmal's name is also not appearing in the approved vendor list for regulators.Nirmal make regulators are EN approved for 600# also please find attached En certificate for 600# regulators.We request you accept NIRMAL make regulators	Tender Condition Prevails.

TENDER No. – 11/0282B/JPK/GAIL/01-R0
DATE: 15.01.2010

Sr. No.	Section / Clause No.	Tender Doc. Page No.	Clause Description	Added / Modified / Deleted
1)	Vol I of II ITB Cl.No. 38.3	26 of 137	Performance Guarantee	New Clause added: SSI units registered with the NSIC, under its single point Registration scheme shall be exempted from submission of Performance Guarantee to the Monetary limit for which the unit is registered.
2)	Vol II of II Data sheet Orifice Meter Notes No.4	231 of 293	The offered meter must be designed as per AGA3 specification and calibration certificate from the country of origin shall be supplied.	This Line is to be Modified as: Certificate of compliance to AGA-3 issued by reputed TPI shall be submitted. All 3 sections (upstream, downstream, straightener, orifice) shall be sourced from OEM.
3)	Vol II of II Cl. No.1.2, Pt.No.5	7 of 293	1 No. Flow metering and monitoring control Panel along with 2 no. flow computers, Isolators, Barriers, repeaters, Power supply unit, indication lamps etc. The panel shall also house necessary parameters, digital graph indicators , annunciation, relay logics, push buttons, lamps etc for filtration, letdown and metering skids. Bidder to provide ventilation fans to remove heat from panel.	This Clause is Modified as: 1 No. Flow metering and monitoring control Panel along with 2 no. flow computers, Isolators, Barriers, repeaters, Power supply unit, indication lamps etc. The panel shall also house necessary parameters, annunciation, relay logics push buttons, lamps etc for filtration, letdown and metering skids. Bidder to provide ventilation fans to remove heat from panel.
4)	Vol II of II Cl.No.6.8	42 of 293	The piping layout shall always be arranged such that straightening vanes are not required and gas meter runs are self-draining.	This Point is Modified as: The piping layout shall be arranged considering the suitable straightening vanes at U/S of meter.
5)	Vol II of II Cl.No.4.5.1	41 of 293	MVT Type Flow transmitter along-with control room mounted flow computer, with range / scales of process parameters – Pressure, Temperature, Diff. Pressure, Flow etc shall be as per the process	This Point is Modified as: Separate PT, DPT, FT and TT shall be supplied as per process requirement.

			requirement in Basic Bid Work / approved P & IDs.	
6)	Vol II of II	292 of 293	P&ID : 2" Header across scrubber is shown.	This is to be Modified as: Header across scrubber is similar to that of line size. Find attached copy of P&ID.
7)	Vol II of II	248 of 293	Data sheets for BV,GV indicates LTCS material.	Find attached data sheet for BV & GV for CS material.
8)	Vol II of II		Painting Specification	Find attached painting specification for the skid.
9)	Vol II of II P&ID Notes No.10	293 of 293	P&ID: Bidder shall supply control valve size spool piece for each control valves.	DELETED Find attached copy of P&ID.
10)	Vol II of II CI.No.4	31 of 293	Slam Shut Valve : SSV valve shall be pneumatically actuated and (direct spring type) of fail closed type; with closing time of less than one second.	This Point is Modified as: SSV valve shall be self actuated and (direct spring type) of fail closed type; with closing time of less than one second.
11)	Vol II of II		Datasheet for Ball, Globe & Plug valve for sizes less than 2".	Find attached data sheets.
12)	Vol II of II CI.No.4	14 of 293	Process Design Basis : For all the three skids, the inlet pressure at filtration and inlet Pressure at letdown skid.	Find attached Design Basis.
13)	Vol II of II		QAP for Filter, Scrubber, Regulator, SSV, Flow Computer, Pressure Safety Valve, Creep Relief Valve, Orifice Meter, Pressure & Temperature Transmitter is not available in the tender.	Find attached QAP
14)	Vol II of II CI.No.2.6.1.3	86 of 293	Hand Held Configurator.	Not Required.
15)	Vol II of II CI.No.4.0	32 of 293	Monitor Valve : One NRV at the Outlet.	DELETED.
16)	Vol II of II MOC Pt.4.0	246 of 293	Data sheet for Scrubber : Nozzle flange rating is mentioned as 300#	This Point is Modified as: Nozzle flange rating is to considered as 600#.



METERING SKID FOR KG BASIN



PROCESS DESIGN BASIS

CLIENT JOB NO.

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TOTAL SHEETS

6

DOCUMENT NO.

11

0282B

01

03

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002

REV	DATE	DESCRIPTION	PREP	CHK	APPR
1	13/01/10	ISSUED FOR CORRIGENDUM-1	MT	DDS	PKS
0	17/12/09	ISSUED FOR TENDER	MT	DDS	PKS
A	27/10/09	ISSUED FOR IDC	MT	DDS	PKS

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PROCESS DESIGN BASIS

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SHEET 2 of 6

1.0 INTRODUCTION

GAIL is in the process of procuring a packaged natural gas Metering skid along with Scrubber & Slug Catcher for the end user consumer i.e. M/s Silk Road Sugar, M/s Silica Ceramica & M/s RAK Ceramics in KG-Basin Terminal.

2.0 SCOPE

This specification defines the basic parameters required to be used for design of Metering Package with associated facilities.

3.0 GAS COMPOSITION:

GAS CONSTITUENT	SOURCE- RIL GAS (Mole %)	SOURCE-ONGC MP GAS
Methane (C1)	99.60%	93.67
Ethane (C2)	0.068%	1.77
Propane (C3)	0.015%	1.41
Butane (C4)	-----	0.42
Pentane (C5)	-----	0.43
Hexane (C6)	-----	1.98
CO2	0.16%	0.16
Nitrogen	0.15%	0.16

4.0 PROCESS DESIGN DATA

4.1 Scrubber & Filtration Skid

Configuration: The skid shall have one no. multi-cyclone type Centrifugal Scrubber & two nos. gas filters (1W+1S) as per P&ID11-0282B-02-03.....

S.No.	Location	No. of streams and capacity	Working /Standby
1.	M/s Silk Road Sugar	1x100% for Scrubber & 2X 100% for Filtration Flow Capacity: 0.35 MMSCMD	1W + 1S for Filters
2.	M/s RAK Ceramics	1x100% for Scrubber & 2X 100% for Filtration Flow Capacity: 0.12 MMSCMD	1W + 1S for Filters
3.	M/s Silica Ceramica	1x100% for Scrubber & 2X 100% for Filtration Flow Capacity: 0.05 MMSCMD	1W + 1S for Filters



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4.3.1 Design Data for Filtration Skid & Scrubber - :

Fluid- Natural Gas	M/s Silk Road Sugar	M/s RAK Ceramics	M/s Silica Ceramica
Design Flow (MMSCMD)	0.35	0.12	0.05
Inlet Pressure , kg/cm2(g)	51.2	33.5	32.6
Inlet Temperature, (°C)	5-35	5-35	5-35
Maximum Pressure, kg/cm2(g)	72	72	72
Design Temperature,(°C) (Mechanical) / (Process)	0-60 / 5-35	0-60 / 5-35	0-60 / 5-35
Design Class	600#	600#	600#

Each Filtration Skid will consist of two Coalescing type Vertical Cartridge filter assembled on a common skid. The inlet and outlet of these filters shall be connected to common header with isolation valves at inlet and outlet of each filter. The common header at downstream site shall have single outlet which in turn will be connected to Pressure Let down facilities.

4.2 Pressure Let down skid :

The Pressure Let down facilities at different locations across the tap-off line shall be provided as per the following details:

S.No.	Pressure Letdown Facility	Location	No. of streams and capacity	Working / Standby
1.	Slam Shut, Monitor, Pressure Regulator,	M/s Silk Road Sugar	2x100%	1W+1S
		M/s RAK Ceramics	2x100%	1W+1S
		M/s Silica Ceramica	2x100%	1W+1S

4.2.1 Design Data for Let Down Skid:

Fluid- Natural Gas	M/s Silk Road Sugar	M/s RAK Ceramics	M/s Silica Ceramica
Minimum Flow ,(MMSCMD)	0.17	0.06	0.025
Normal Flow, (MMSCMD)	0.35	0.12	0.05
Maximum Flow ,(MMSCMD)	0.35	0.12	0.05
Design Flow ,(MMSCMD)	0.35	0.12	0.05



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Inlet Pressure , kg/cm2(g)	51.0	33.3	32.4
Inlet Temperature (°C)	5-35	5-35	5-35
Outlet Pressure, kg/cm2(g)	25	10	5
Maximum Pressure kg/cm2(g)	72	72	72
Design Temperature(°C) (Mechanical)/(Process)	0-60 / 5-35	0-60 / 5-35	0-60 / 5-35
Design Class	600# (Upto Let Down Skid) 300# (Downstream of Let Down Skid)	600# (Upto Let Down Skid) 150# (Downstream of Let Down Skid)	600# (Upto Let Down Skid) 150# (Downstream of Let Down Skid)

4.3 Metering Skid

Configuration: The metering skid shall have 2 nos.Orifice meters (1W+1S) as per P& ID No11-0282B-00-03-01-001.

S.No.	Metering Facility	Location	No. of streams and capacity	Working / Standby
1.	Orifice Meter with isolation valves.	M/s Silk Road Sugar	2x100%	1W+1S
		M/s RAK Ceramics	2x100%	1W+1S
		M/s Silica Ceramica	2x100%	1W+1S

4.3.1 Design Data for Metering Skid:

Fluid- Natural Gas	M/s Silk Road Sugar	M/s RAK Ceramics	M/s Silica Ceramica
Minimum Flow ,(MMSCMD)	0.17	0.06	0.025
Normal Flow, (MMSCMD)	0.35	0.12	0.05
Maximum Flow ,(MMSCMD)	0.35	0.12	0.05
Design Flow ,(MMSCMD)	0.35	0.12	0.05
Pressure at skid Inlet, kg/cm2(g)	25.0	10	5
Inlet Temperature (°C)	5-35	5-35	5-35



PROCESS DESIGN BASIS

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Maximum Pressure, kg/cm2(g)	49	19	19
Design Temperature (°C) (Mechanical)/(Process)	0 – 60 / 5-35	0– 60 / 5-35	0 – 60 / 5-35
Design Class	300#	150#	150#

5.0 ENVIRONMENTAL SPECIFICATIONS:

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

Site Conditions

The entire instrumentation system shall be designed for the following site conditions:

- Max. /Min. temperature : 50 / 5 deg. Celsius.
- Design Temperature (Mechanical) : 0 °C to 60 °C
- Design Temperature (Process) : 5 °C to 35 °C
- Relative Humidity : 100%
- Hazardous Area classification : Zone 1, Gas group IIA / IIB, Temp. Class T3
- Control & Electrical Room : Safe Area

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	<p align="center">PROCESS DESIGN BASIS</p>	<p align="center">Document No.</p>	<p align="center">Rev</p>
		<p align="center">11- 0282B- 01-03- 04- 002</p>	<p align="center">1</p>
		<p align="center">SHEET 6 of 6</p>	

PAINING SPECIFICATION

- 1) All exposed carbon steel parts to be painted shall be thoroughly cleaned from inside and outside to remove scale, rust, dirt and other foreign materials by wire brushing and sand blasting as applicable. Minimum acceptable standard in case of power tool cleaning shall be St. 3 and in case of blast cleaning shall be Sa 2-1/2 as per Swedish Standard SIS 0055900.
- 2) Non-ferrous materials, austenitic stainless steels, plastic or plastic coated materials, insulated surfaces of equipment and pre-painted items shall not be painted.
- 3) Stainless steel surfaces both inside and outside shall be pickled and passivated.
- 4) Machined and bearing surfaces shall be protected with varnish or thick coat of grease.
- 5) Depending on the environment, following primer and finish coats shall be applied.

<u>Environment</u>	<u>Description</u>		
i) Normal Industrial	Surface Preparation	:	Sa 2-1/2
	Primer	:	2 coats of red oxide zinc chromate each 25 micron thick
	Finish coat	:	2 coats of synthetic enamel, each 25 micron thick.
ii) Corrosive Industrial	Surface Preparation	:	Sa 2-1/2
	Primer	:	2 coats of epoxy zinc chromate each 35 micron thick
	Finish coat	:	2 coats of epoxy high build paint, each 100 micron thick.
iii) Coastal & Marine	Surface Preparation	:	Sa 2-1/2
	Primer	:	2 coats of high build chlorinated rubber zinc phosphate each 50 micron thick
	Finish coat	:	2 coats of chlorinated rubber paint, each 35 micron thick.
iv) All Environment (80-400 ⁰ C)	Surface Preparation	:	Sa 2-1/2
	Finish coat	:	2 coats of heat resistant aluminum paint suitable for specified temp, each 20 micron thick.

(All values refer to dry film thickness).

- 6) The valves in carbon steel body shall be painted light gray (RAL 7038). Skid piping shall be canary yellow.
- 7) Vendor to ship supply of primer and the paint to permit on-site repair of shipping damage (if any) to the factory coatings.
- 8) Colour Coding

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Sr. No.	Description	Colour Code
1	Pressure Vessels	Gray (RAL7035)
2	Piping (Interconnecting spool)	Cannery Yellow
3	Isolation valves (BV, GV, NRV, PV)	Oxford Blue
4	PSV & CRV	RED (RAL 2002)
5	Supporting Structure	Gray (RAL7010)
6	Junction Box	Gray (RAL7035)
7	Cable trays, inst Boxes sunshade	White (RAL 9010)
8	Instrument air Piping	Light Blue (RAL5012)
9	Flow Control valve	Light Gray (RAL7004)
10	Control Panel	As per RAL 7035



PAINTING SPECIFICATIONS


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CLIENT	GAIL (India) Ltd.	PROJECT: METERING SKID FOR KG BASIN	
SIZE/QUANTITY	**		
GENERAL SPECIFICATION			
Process Fluid	NG	ANSI Rating	600# / 300# / 150#
Design Temperature	(0 to 60 deg C)	Design Pressure	98 barg / 49 barg / 19 barg
Design Standard	API 6D	Piping Class	6A1 / 3A1 / 1A1
Size, mm (inch)	2" & Above		
Body Type	Full Bore		
End Connection Type	**	Standard	ASME B16.5
Flange Finish/Pup Piece length	RF 125 AARH / 150mm	Special Requirement	Vent, drain & Sealant connection Anti Blow out system
Locking Device Req'd	As per Technical Spec.		
VALVE DESIGN CONDITIONS			
Corrosion Allowance	1.5	Design Factor	0.5
Installation	Above Ground	Stem Ext Length, mm	NA
VALVE OPERATION			
Actuation Type	As per Technical Spec.		
Type of Actuator	Not Applicable		
VALVE MATERIAL SPECIFICATION			
PART DISCIPTION	SPECIFIED	MATERIAL OFFERED (Equivalent or Higher)	
Body	A 216 Gr. WCB	*	
Ball	ASTM A105 / A 216 Gr. WCB + 0.003" ENP	*	
Seat Rings	AISI 4140 + 75 micrometer (0.003") ENP/ AISI 410	*	
Seat Seal	VITON	*	
Stem	AISI 4140 + 75 micrometer (0.003") ENP/ AISI 410	*	
Stem Seal	PTFE/ VITON	*	
Stud Bolts	ASTM A 193 Gr. B7	*	
Nuts	A194 Gr. 2H	*	
TESTING REQUIREMENT			
Hydrostatic Test Pressure	Body: 147 / 74 / 29 barg	Seat: 108 / 54 / 21 barg	
Air Test Pressure	6 barg		
Anti-Static Testing Requirement	As per API 6D Latest Edition		
Hardness Test	248 HV10		
Charpy Impact Test/ Temperature	Yes (at 0 deg C)		
	DATA SHEET FOR BALL VALVES	Document No.	Rev.
		11-0282B-01-08-03-002	1
		SHEET 1 of 2	


CLIENT	GAIL (India) Limited	PROJECT: METERING SKID FOR KG BASIN	
SIZE/QUANTITY	**		
GENERAL SPECIFICATION			
Process Fluid	NG/ R-LNG	ANSI Rating	600# / 300# / 150#
Design Temperature	(0 to 60 deg C)	Design Pressure	98 barg / 49 barg / 19 barg
Design Standard	BS 1873 / API 600	Piping Class	6A1 / 3A1 / 1A1
Size, mm (inch)	2" & above		
Valve Pattern	Regular		
Connection Type	**	Standard	ASME B16.5
Pup piece/ Flange Face Finish	N.A./ RF 125AARH	Special Requirement	Vent, drain & Sealant connection Anti Blow out system
Locking Device Req'd	*		
VALVE DESIGN CONDITIONS			
Corrosion Allowance	1.5 mm	Design Factor	0.5
Installation	Aboveground	Stem Ext Length, mm	N.A.
CONNECTING PIPE DETAILS			
Diameter, mm (inch)	**		
Wall Thck, mm/Sch	**		
VALVE OPERATION			
Actuation Requirement	As per Technical Specification		
Type of Actuator	As per Technical Specification		
VALVE MATERIAL SPECIFICATION			
PART DISCIPTION	SPECIFIED	MATERIAL OFFERED	
Body	ASTM A216 Gr.WCB	*	
Gate/Disc	316 SS + Stellite	*	
Bonnet/Cap	ASTM A216 Gr.WCB	*	
Stem	ASTM A181 Gr.CF8M	*	
Body Seat Ring	316 SS + Stellite	*	
Gasket	316 SS + SPIRALLY WOUND WITH GRAPHITE FILLER	*	
Stud Bolts	A193 B7	*	
Nuts	A194 Gr.2H	*	
TESTING REQUIREMENT			
Hydrostatic Test Pressure	Body: 147 / 74 / 29 barg	Seat: 108 / 54 / 21 barg	
Air Test Pressure	6 barg		
Anti-Static Testing Requirement	As per API 6D Latest Edition		
Hardness Test	248 HV10		
Charpy Impact Test/ Temperature	Yes (at 0 deg C)		
	DATA SHEET FOR GLOBE VALVES	Document No.	Rev.
		11-0282B-01-08-03-04	1
		SHEET 1 of 2	

CLIENT	GAIL (India) Limited	PROJECT: METERING SKID FOR KG BASIN	
SIZE/QUANTITY	**		
GENERAL SPECIFICATION			
Process Fluid	NG/ R-LNG	ANSI Rating	600# / 300# / 150#
Design Temperature	(0 to 60 deg C)	Design Pressure	98 barg / 49 barg / 19 barg
Design Standard	API 6D	Piping Class	6A1 / 3A1 / 1A1
Size, mm (inch)	2" & above		
Type	Swing check		
End Connection Type	FLG	Standard	ASME B16.5, B16.47
Flange Face Finish	RF 125AARH	Special Requirement	*
Locking Device Reqd	*		
VALVE DESIGN CONDITIONS			
Corrosion Allowance	1.5 mm	Design Factor	0.5
Installation	Aboveground	Stem Ext Length, mm	N.A.
Opening/Closing time	*		
CONNECTING PIPE DETAILS			
Diameter, mm (inch)	*		
Wall Thck, mm/Sch	*		
Out of roundness	*		
VALVE OPERATION			
Actuation Requirement	*		
Type of Actuator	*		
VALVE MATERIAL SPECIFICATION			
PART DISCRPTION	SPECIFIED	MATERIAL OFFERED	
Body	ASTM A216 Gr.WCB	*	
Wedge	ASTM A216 Gr.WCB	*	
Disc	ASTM A216 Gr.WCB	*	
Hinge Pin	ASTM A 182 F6	*	
Gasket	Graphite	*	
Stud Bolts	A193 B7	*	
Nuts	A194 Gr.2H	*	
TESTING REQUIREMENT			
Hydrostatic Test Pressure	Body: 147 / 74 / 29 barg	Seat: 108 / 54 / 21 barg	
Air Test Pressure	6 barg		
High Pressure Closure Test	API 598		
Low Pressure Closure Test	API 598		
Leak Test	API 598		
	DATA SHEET FOR CHECK VALVES	Document No.	Rev.
		11-0282B-01-08-03-05	1
		SHEET 1 of 2	

CLIENT	GAIL (India) Ltd.	PROJECT: METERING SKID FOR KG BASIN			
SIZE/QUANTITY	**				
GENERAL SPECIFICATION					
Process Fluid	R-LNG	ANSI Rating	800 #		
Design Temperature	(0 to 60 deg C)	Design Pressure	98 barg / 49 barg / 19 barg		
Design Standard	API 6D	Piping Class	6A1 / 3A1 / 1A1		
Size, mm (inch)	1½" & Below				
Body Type	Regular				
End Connection Type	Socket Weld	Standard	ASME B16.11		
Locking Device Req'd	As per Technical Spec.	Special Requirement	Floating Ball Design		
VALVE DESIGN CONDITIONS					
Corrosion Allowance	0.5 mm	Design Factor	0.5		
Installation	Above Ground	Stem Ext Length, mm	Not Applicable		
VALVE OPERATION					
Actuation Type	As per Technical Spec.				
Type of Actuator	Not Applicable				
VALVE MATERIAL SPECIFICATION					
PART DISCIPTION	SPECIFIED				
Body	A 105				
Ball	S.S.316				
Seat Rings	PTFE/ VITON				
Seat Seal	VITON				
Stem	S.S.316				
Stem Seal	PTFE/ VITON				
Stud Bolts	ASTM A 193 Gr. B7				
Nuts	A194 Gr. 2H				
TESTING REQUIREMENT					
Hydrostatic Test Pressure	Body: 147 / 74 / 29 barg	Seat: 108 / 54 / 21 barg			
Air Test Pressure	7 barg				
Anti-Static Testing Requirement	As per API 6D Latest Edition				
Hardness Test	248 HV10				
Charpy Impact Test/ Temperature	Yes (at 0 deg C)				
TESTING REQUIREMENT					
	DATA SHEET FOR BALL VALVES (1½" & Below)		Document No.	Rev.	
			11-0282B-01-08-03-011		0
			SHEET 1 of 2		

CLIENT	GAIL (India) Limited	PROJECT: METERING SKID FOR KG BASIN		
SIZE/QUANTITY	**			
GENERAL SPECIFICATION				
Process Fluid	R-LNG	ANSI Rating	800 #	
Design Temperature	(0 to 60 deg C)	Design Pressure	98 barg / 49 barg / 19 barg	
Design Standard	BS 1873 / API 600	Piping Class	6A1 / 3A1 / 1A1	
Size, mm (inch)	1 ½" & Below			
Valve Pattern	Regular			
Connection Type	Socket Welded	Standard	ASME B16.11	
Locking Device Req'd	As per Technical Specification	Special Requirement	Vent, drain & throttling	
VALVE DESIGN CONDITIONS				
Corrosion Allowance	0.5 mm	Design Factor	0.5	
Installation	Aboveground	Stem Ext Length, mm	N.A.	
VALVE OPERATION				
Actuation Requirement	As per Technical Specification			
Type of Actuator	As per Technical Specification			
VALVE MATERIAL SPECIFICATION				
PART DISCRPTION	SPECIFIED	MATERIAL OFFERED		
Body & Bonnet	ASTM A 105	*		
Gate/Disc	SS 316 + Stellite	*		
Stem	ASTM A182 F316 + Stellite	*		
Body Seat Ring	SS 316 + Stellite	*		
Gasket	SS 316 + SPIRALLY WOUND WITH GRAPHITE FILLER	*		
Stud Bolts	A193 B7	*		
Nuts	A194 Gr.2H	*		
TESTING REQUIREMENT				
Hydrostatic Test Pressure	Body: 147 / 74 / 29 barg	Seat: 108 / 54 / 21 barg		
Air Test Pressure	7 barg			
Anti-Static Testing Requirement	As per API 6D Latest Edition			
Hardness Test	248 HV10			
Charpy Impact Test/ Temperature	Yes (at 0 deg C)			
	DATA SHEET FOR GLOBE VALVES (1 1/2" & Below)	Document No.		
		11-0282B-01-08-03-012		Rev. 0
		SHEET 1 of 2		

CLIENT	GAIL (India) Limited	METERING SKID FOR KG BASIN	
SIZE/QUANTITY	**		
GENERAL SPECIFICATION			
Process Fluid	NG/ R-LNG	ANSI Rating	800#
Design Temperature	(0 to 60 deg C)	Design Pressure	98 barg / 49 barg / 19 barg
Design Standard	BS 5353	Piping Class	6A1 / 3A1 / 1A1
Size, mm (inch)	15(1/2") to 40(1.1/2")		
Valve Pattern	Regular		
End Connection	S.W, 800#	Standard	ASME B16.11
Pup piece/ Flange Face Finish	Not Required	Special Requirement	*
Locking Device Reqd	*		
VALVE DESIGN CONDITIONS			
Corrosion Allowance	0.5 mm	Design Factor	0.5
Installation	Aboveground	Stem Ext Length, mm	N.A.
Opening/Closing time	N.A.		
CONNECTING PIPE DETAILS			
Diameter, mm (inch)	*		
Wall Thck, mm/Sch	*		
Out of roundness	*		
VALVE OPERATION			
Actuation Reqd	N.A.		
Type of Actuator	Manual		
VALVE MATERIAL SPECIFICATION			
PART DISCRIPTION	SPECIFIED	MATERIAL OFFERED	
Body	ASTM A 105	*	
Plug (Lubricated)	ASTM A 105 + 0.003"ENP	*	
Cover	ASTM A 105	*	
Stem	AISI 4140 + 0.03" ENP/ AISI 410	*	
Stem Seal	PTFE/ Graphite	*	
Lubricant Screw	Manufacturer's Standard	*	
TESTING REQUIREMENT			
Hydrostatic Test Pressure	Body: 147 / 74 / 29 barg	Seat: 108 / 54 / 21 barg	
Air Test Pressure	7 bar		
Anti-Static Testing Requirement	As per API 6D Latest Edition		
Hardness Test	248 HV10		
Charpy Impact Test/ Temperature	Yes (at 0 deg C)		
	DATA SHEET FOR PLUG VALVES (1 1/2" & Below)	Document No.	Rev.
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CLIENT:		GAIL INDIA LIMITED		METERING SKID FOR KG BASIN	
QUANTITY:		As Per P&ID			
Units:- Flow : Liquid-M3/hr Gas - Nm3/Hr. Steam-Kg/hr. Pressure>kg/cm2g Temp>0C Level/Length>mm					
1	TYPE	Direct	Diaphragm Seal	Other	
2	MOUNTING	Local	Surface		
		Flush	Other		
3	DIAL SIZE	(*)			
4	DIAL COLOUR	White	Other		
5	CASE MATERIAL	Cast Aluminium	SS	Other	
6	WINDOW MATERIAL	Shatterproof Glass	Acrylic	Other	
7	BEZEL RING	Screwed	Other		
8	ENCLOSURE	Weather Proof	Class		
9	PRESSURE ELEMENT	Bourdon	Bellows	Diaphragm	Other
10	ELEMENT MATERIAL	316 SS	Other		
11	SOCKET MATERIAL	316 SS	Other		
12	ACCURACY	, +/- 1.5 % FSD			
13	ZERO ADJUST	Micrometer Pointer			
14	CONNECTION	1/2" NPTF	Other		
15	CONN. LOC	Side / Bottom	back		
16	MOVEMENT MATERIAL	306 SS	Other		
17	OVER RANGE PROTECTION	Max Static Pressure			
18	BLOW OUT PROTECTION	(*)			
19	Options				
	a) Snubber	(*)			
	b) Syphon	(*)			
	c)Gauge Saver	(*)			
	d) Liquid filled Casting	(*)			
	e) Vaccum Protection	(*)			
	f)SS Tag Plate	(*)			
	g) 3 Way Manifold	(*)			
Notes :					
1	(*) Vendor to furnish				
2	TAPINGS (1/2" SW) FOR THE DPG CONNECTIONS SHALL BE PROVIDED ON THE INLET AND THE OUTLET NOZZLE OF THE GAS FILTERS.				
3	DIFFERENTIAL PRESSURE GAUGE SHALL BE SUITABLE FOR THE MAXIMUM STATIC PRESSURE IN BOTH THE LEGS				
4	*** Qty and Tag No.shall be as per P & ID requirement of Metering Skid				
5	Above data sheet is typical for all the DPGs used in the respective P&ID of Metering Skid.. Vendor shall submit the data sheet of DPGs & Bill of Material along with the offer.				
		Data Sheet of Differential Pressure Gauge		DOCUMENT NO.	
				11-00282B-01-08-03-006	
				SHEET 1 of 1	
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SR. NO.		DESCRIPTION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION BY			REMARKS
										M	TPI	CONSULTANT/ OWNER	
		QUALITY ASSURANCE PLAN FOR SCRUBBER & FILTER SEPARATOR						PROJECT: METERING SKIDS FOR KG BASIN CLIENT: GAIL INDIA LTD. CONSULTANT: J P KENNY QAP No.: 11-0282B-01-11-10-001 Rev. 0 Page No. 1 of 3					
1	Review of Quality Plan	Sequence of check points	Major	Review	100%	Contractual Doc/ Drgs.	Contractual Doc/ Drgs.	Internal Reports	P	R	A		
		Marking of Hold/Review/Witness Pts.	Major										
2	Approval of Drwg & Design Calculations	Code Requirements	Major	Review	100%	Design code	Design code	Internal Reports	P	R	A		
3	Review of WPS/ PQR/ WPQ	Code Requirements/ Coverage to all weld joints	Major	Review	100%	Design code	Design code	Internal Reports	P	R	R		
INCOMING MATERIAL IDENTIFICATION OF BOUGHTOUT ITEMS													
4	Material Identification & Allocation fo all Pressure Parts	Verification fo TC with material spec.and Drwg.	Major	Review	100%	Material Spec.	Material Spec.	Internal Reports	P	W/R	R		
		Coorelation of TC with Material	Major	Visual	100%	Test Certificate	Test Certificate	Internal Reports					
		Dimensions	Major	Measurement	Sample	Drawing/ TC	Drawing/ TC	Internal Reports					
		Hydrotest/ NDE/ Impact Test of Plates / Pipes at Maker	Major	Review of TC	100%	Code	Code	Internal Reports					
		Identification Stamp Transfer	Major	Visual	100%	Hard Punching	Hard Punching	Internal Reports		W			
5	Inspection of Machined & formed parts (Dish Ends/ Shell Plates/ End Plates/ Stubs/ Nozzles)	Identification	Major	Visual	100%	Drawing	Drawing	Internal Reports	P	W	R		
		Dimensions/ Profile	Major	Measurement	100%	Drawing	Drawing	Internal Reports					
		Min. Thickness/ Ovality	Major	Template	100%	Drawing/ Design	Drawing/ Design	Internal Reports					
		PT of knuckle/ Edge	Major	Visual	100%	LPE 01	LPE 01	Internal Reports					
		Heat Treatment	Major	Chart	100%	Design code	Design code	Internal Reports					
INPROCESS INSPECTION													
6	L Seam Set up for shells and Test Plates	Identification	Major	Visual	100%	Drawing/ IR	Drawing/ IR	Internal Reports	P	W	R		
		Dimensions	Major	Measurement	100%	Drawing	Drawing	Internal Reports					
		Weld Preparation	Major	Template	100%	Drawing	Drawing	Internal Reports					
		alignment/ Squareness	Major	Measurement	100%	Drawing	Drawing	Internal Reports					
		Tack Weld Soundness	Major	PT	100%	Drawing	Drawing	Internal Reports					
7	A. Welding of L Seam & Test Plates/ Pipes (above Parts)	Backchip & PT after 1st side Welding	Major	Visual	100%	LPE 01	LPE 01	Internal Reports	P	W	R		
		Weld Size/ finish	Major	Visual	100%	FPAS-001	FPAS-001	Internal Reports					
		Weld joint soundness of L-seam & Test Plates	Major	RT	100%	Design code	Design code	Internal Reports					
		Production Test Coupon	Major	Impact Test	100%	As per Code	As per Code	Internal Reports					
	B. Repair: (if any) L Seam	Defect Removal	Major	PT	100%	Design code	Design code	Internal Reports	P	W	R		
		Weld joint soundness	Major	RT	100%	Design code	Design code	Internal Reports					
8	Set-up of Nozzle pipe to Flange	Squareness	Major	Measurement	100%	FPAS-001	FPAS-001	Internal Reports	P	W	R		
		Weld Preparation	Major	Template	100%	Drawing	Drawing	Internal Reports					
9	Welding of Nozzle pipe to Flange	Weld size/ Reinforcement	Major	Template	100%	Drawing	Drawing	Internal Reports	P	W	R		
		Weld joint Soundness	Major	RT	100%	Design code	Design Code	Internal Reports					
10	Inspection of Internals of HP Separator	Dimensions	Major	Measurement	100%	Drawing	Drawing	Internal Reports	P	W	R		
		Pickling Passivation	Major	MTC	100%	Drawing	Drawing	Internal Reports					



**QUALITY ASSURANCE PLAN
FOR SCRUBBER & FILTER SEPARATOR**

PROJECT: METERING SKIDS FOR KG BASIN
CLIENT: GAIL INDIA LTD.
CONSULTANT: J P KENNY
QAP No.: 11-0282B-01-11-10-001 **Rev. 0**
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SR. NO.	DESCRIPTION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION BY			REMARKS
									M	TPI	CONSULTANT/ OWNER	
11	Welding of internals to HP Separator Shell	Weld size/ Reinforcement/ Finish	Major	Template/ Visual	100%	Drawing	Drawing	Internal Reports	P	R	R	
		Weld joint soundness	Major	PT	100%	LPE01	LPE01	Internal Reports				
12	C Seam set up for shells to Dish Ends & Test Plates	Identification	Major	Visual	100%	Drawing/ IR	Drawing/ IR	Internal Reports	P	W	R	Test Plate to be impact Tested & Shall be witnessed by TPIA
		Dimensions	Major	Measurement	100%	Drawing	Drawing	Internal Reports				
		Weld preparation	Major	Template	100%	Drawing	Drawing	Internal Reports				
		Alignment/ Squareness	Major	Measurement	100%	Drg./ FPAS001	Drg./ FPAS001	Internal Reports				
13	A. Welding of C Seam (above parts) & Test plates	Tack Weld Soundness	Major	PT	100%	Drawing	Drawing	Internal Reports	P	R	R	Do
		Backchip & PT after 1st side welding	Major	Visual	100%	LPE01	LPE01	Internal Reports				
		Weld size/ finish	Major	Visual	100%	FPAS-001	FPAS-001	Internal Reports				
		Weld joint soundness of C seam	Major	RT	100%	Design Code	Design Code	Internal Reports				
14	B. Repair: (if any) C Seam	Defect Removal	Major	PT	100%	Design Code	Design Code	Internal Reports	P	W	R	Repair RT to be Reviewed
		Weld joint soundness	Major	RT	100%	Design Code	Design Code	Internal Reports				
14	Heat Treatment of Test Plates + EQPT as per code	Time/ Temperature Charts	Major	Visual	100%	Design Code	Design Code	Internal Reports	P	R	R	
15	Testing of all Test Plates	Mech./ Physical Test Reports	Major	Visual	100%	Design Code	Design Code	Internal Reports	P	W	R	N.A.
16	Inspection of Marking for Openings on Dish Ends/ Shelf	Identification	Major	Visual	100%	IR/ Drawing	IR/ Drawing	Internal Reports	P	R	R	
		Layout	Major	Measurement	100%	Drawing	Drawing	Internal Reports				
		Orientation	Major	Visual	100%	Drawing	Drawing	Internal Reports				
		Dimensions	Major	Measurement	100%	Drawing	Drawing	Internal Reports				
		No. of holes	Major	Count	100%		Drawing	Internal Reports				
17	Inspection after opening on shell/ Dish Ends	A - Earlier Stage clearance review	Major	Review	100%	Acc. Inspn. Rep.	Acc. Inspn. Rep.	Internal Reports	P	R	R	
		B - Opened Holes Orientation	Major	Visual	100%	Drawing	Drawing	Internal Reports				
		Quadrantwise										
		H - hole finish	Major	Visual	100%	FPAS-001	FPAS-001	Internal Reports				
18	Setup of studs, nozzles, sockets and connections with Shell / Dish End / Flange	I - Final Acceptance	Major	Visual	100%	Hard Stamping of Insp.	Hard Stamping of Insp.	Internal Reports	P	RW	W/R	
		Orientation	Major	Visual	100%	Drawing	Drawing	Internal Reports				
		Weld preparation	Major	Template	100%	Drawing/ Code	Drawing/ Code	Internal Reports				
		Alignment	Major	Line thread	100%	Drg / FPAS001	Drg / FPAS001	Internal Reports				
		Squareness	Major	Right angle	100%	Drg / FPAS001	Drg / FPAS001	Internal Reports				
		Distance between connections	Major	Measurement	100%	Drg / FPAS001	Drg / FPAS001	Internal Reports				
		Tack Weld Soundness	Major	PT	100%	LPE01	LPE01	Internal Reports				
19	Welding of Nozzles, & connections to Shell/ DESCRIPTION	Weld size/ finish	Major	Visual	100%	Design Code	Design Code	Internal Reports	P	R	W/R	
		Weld Soundness	Major	RT/PT	100%	Design Code	Design Code	Internal Reports				
20	Setup of Structural Saddles & Attachments	Dimensions	Major	Measurement	100%	Drawing	Drawing	Internal Reports	P	R	W/R	
		Weld preparation	Major	Template	100%	Drawing	Drawing	Internal Reports				
		Alignment/ Squareness	Major	Measurement	100%	Drg./ FPAS001	Drg./ FPAS001	Internal Reports				
21	Welding of Structural Saddles & Attachments	Weld size/ finish	Major	Visual	100%	Design Code	Design Code	Internal Reports	P	R	W/R	
		Weld Soundness	Major	PT	Sample	Design Code	Design Code	Internal Reports				

SR. NO.	DESCRIPTION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION BY			REMARKS
									M	TPI	CONSULTANT/ OWNER	
		QUALITY ASSURANCE PLAN FOR SCRUBBER & FILTER SEPARATOR						PROJECT: METERING SKIDS FOR KG BASIN				
								CLIENT: GAIL INDIA LTD.				
								CONSULTANT: J P KENNY				
								QAP No.: 11-0282B-01-11-10-001 Rev. 0				
								Page No. 3 of 3				
22	Full Welding Clearance	Overall Dimensions	Major	Measurement	100%	Drawing	Drawing	Internal Reports	P	W/R	R	
		Squareness of Connections	Major	Measurement	100%	Drawing	Drawing	Internal Reports				
		Distance Between Connections	Major	Measurement	100%	Drawing	Drawing	Internal Reports				
		RT Clearance/ U.T.	Major	Review of RT Rpts.	100%	Drawing	Drawing	Internal Reports				
		Code Punching Details	Major	Rub off	100%	Design Code	Design Code	Internal Reports				
Final Inspection												
23	Hydrostatic Testing	Pressure Gauge (2No.)	Major	Review	100%	Valid Cert.	Valid Cert.	Internal Reports	P	W	W/R	
		Calibration	Major	Visual	100%	No leakage	No leakage	Internal Reports				
		Leakage	Major		100%			Internal Reports				
24	Final Inspection	Document Review	Major	Review	100%	Design Code	Design Code	Internal Reports	P	W	W/R	
		Dimensions	Major	Measurement	100%	Drawing	Drawing	Internal Reports				
		Surface Preparation	Major	Visual	100%	Free from scales etc	Free from scales etc	Internal Reports				
25	Clearance for Assembly/ Dispatch (as applicable)	Painting finish	Major	Visual	100%	Drawing	Drawing	Internal Reports	P	W	W/R	
		Capping/ Blanking of all opening	Major	Visual	100%	All Opening Protected	All Opening Protected	Internal Reports				
		Code Punching Details	Major	Visual	100%	Design Code	Design Code	Internal Reports				

Legend

M	Manufacturer	P	Perform
C	Client	R	Review
TPI	Third Party Inspection Agency	W	Witness
A	For Approval	W/R	Witness for Test & Review of Certificates & Documents as per QAP
		H	Hold
		RW	Random Witness
		NA	Not Applicable

NOTES :

1. TPIA TO ISSUE 3.2 CERTIFICATE AS PER EN 10204 SPEC.



**QUALITY ASSURANCE PLAN
PRESSURE SAFETY VALVES**

PROJECT: METERING SKIDS FOR KG BASIN

CLIENT: GAIL INDIA LTD.

CONSULTANT: J P KENNY

QAP No.: 11-0282B-01-11-10-006

Rev. 0

Page No. 1 of 1

SR. NO.	DESCRIPTION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION BY			REMARKS
									M/ Vendor	TPI	CONSULTANT/ OWNER	
1	Raw Material											
1.1	Casting/ forgings for Body, Bonnet & Nozzle	Review of mfr.s Test Cert.s	Major	Visual		Material spec as per P.O	Material spec as per P.O	Mfr. Cert.	H	R	W/R	
1.2	Rods for Nozzles & Discs	Physical/ Chemical per Rod	Major	Visual, Laboratory		Material spec as per P.O	Material spec. as per P.O	Mfr / lab Cert.	H	R	W/R	
1.3	Finished Bought out components(Bellows & Springs)	Review of mfr.s Test Cert.s	Minor	Visual, Dimensional		Material spec as per P.O	Material spec. as per P.O	Mfr Cert.	H	R	W/R	
2	Hydro test for Body & Nozzle	Shell Test	Major	Strength, Laboratory	100%	ANSI B16.34 for test pr.	No leakage	Hydro Test Report	H	W	W/R	
3	Functional Test											
3.1	Cold Bench set Pressure	Popping at required cold bench set Pressure	Major	Accuracy, Laboratory	100%	As per P.O.	As per P.O./ API 526 ASME Std. VIII(Div. I)	Mfr./ Lab Cert.	H	W	W/R	
3.2	Seat Tightness Test	Hydro/ Airtest as per flow media	Major	Accuracy, Laboratory	100%	API 527	As per P.O./ API 527	Mfr./ Lab Cert.	H	W	W/R	
3.3	Back Pressure Test	Air leak Test	Major	Leakage, Laboratory	100%	ASME Sec.VIII Div I / API 520	No leakage at 6.0 Kg/cm2(G)	Mfr./ Lab Cert.	H	W	W/R	
3.4	Shell Pneumatic Test	Functional	Major	Leakage, Laboratory	100%		100 psig	Pneumatic Test Pr.	H	W	W/R	
4	Visual Examination	Surface Quality	Minor	Visual	100%	Material Speci.	Free from surface defects	Mfr. Cert.	H	W	W/R	
5	Dimensional Check up	Dimensions	Major	Dimensional	100%	ANSI B16.5/ API 526	ANSI B16.5/ API 526	Mfr. Cert.	H	W	W/R	
6	Painting Applicable	All Valves shall be painting with SM Grey	Minor	Visual	100%	--	--	Mfr. Cert.	H	R	W/R	

Outlet Flange Rating :- For Nozzle as per inlet flange rating
for S-15 model valves for body & Nozzles - 1.5 times of set pr. & rounded off to pressure corresponding to nearest ANSI Class

Cold Set Pressure = Set Pr. - Back Pr. + Recommended Temp. Correction
Recommended Temp. corrections are
67 to 120 - 1.0% 121 to 200 - 2.0%
316 to 430 - 4.0% 431 to 450 - 5.0%
In case of Bellow effect of back pressure is negligible

Seat Tightness Pr. = 90% of Cold Bench set pressure for set pressure above 3.5 Kg/cm2(g)
= Less 0.35 of cold bench set pressure if set pressure is below 3.5 Kg/cm2(g)

LEGEND: W - WITNESS, R - REVIEW, TPI - THIRD PARTY INSPECTION, RW - RANDOM WITNESS
NOTES :

1. TPIA TO ISSUE 3.2 CERTIFICATE AS PER EN 10204 SPEC.

SR. NO.		DESCRIPTION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION BY			REMARKS
										M	TPIA	CONSULTANT/OWNER	
1		Brought Out Components	Test Certificate	Major	Review	100%	Product Data Sheet	Product Data Sheet	Job Card	P	R	W/R	
			Visual	Major	Visual	100%							
			Dimensional	Major	Dimensional	100%							
2		Inprocess Inspection	Dimensional	Major	Dimensional	100%	Product Data Sheet	Product Data Sheet	Job Card	P	W	W/R	
			Functional	Major	Accuracy	100%							
			Hydrotest	Major	Strength	100%							
3		Final Inspection	Dimensional	Major	Dimensional	100%	Customer Data Product Data sheet & Job Card	Customer Data Product Data sheet & Job Card	Job Card	P	W	W/R	
			Functional										
			a) Pneumatic Test	Major	Leakage	100%							
			b) Set Point Test	Major	Accuracy	100%							

1) Pneumatic Test of body & other parts assembly shall be carried out at 110 Bar.
2) Set Point test shall be carried out at 25 Bar

Legend

M	Manufacturer	P	Perform
C	Client	R	Review
TPIA	Third Party Inspection Agency	W	Witness
A	For Approval	W/R	Witness for Test & Review of Certificates & Documents as per QAP
		H	Hold
		RW	Random Witness
		NA	Not Applicable

Notes

- Integration & Hookup SS tubing shall be done at Fabricator's works in India
- Testing with N2 shall be done to check proper tubing arrangement
- Sr. No.3 Final inspection shall be done at Manufacture's work



**QUALITY ASSURANCE PLAN
DIFFERENTIAL PRESSURE GAUGE**

PROJECT: METERING SKIDS FOR KG BASIN

CLIENT: GAIL INDIA LTD.

CONSULTANT: J P KENNY

QAP No.: 11-0282B-01-11-10-011

Rev. 0

Page No. 1 of 1

SR. NO.	DESCRIPTION	CHARACTERISTIC	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORDS	INSPECTION BY			REMARKS
									M	TPIA	CONSULTANT/ OWNER	
1	Internal Test / Inspection	General Finish Verification of	Major	Visual	100%	Job card & Product Data Sheets	Job card	R	P	W	W/R	
		-Model No. -Serial No. -Caliberation Range -Material of Construction -Customer Tag -Certification Lable -Process Connection -Asscessories -Caliberation	Critical	Electrical		Caliberation Procedure & Job Card	Caliberation Procedure & Job Card					
2	Witness Test / Inspection		Critical	Electrical	100%	Caliberation Procedure & Job card	Caliberation Procedure & Job card	Test & Caliberation Report	P	W	W/R	
			Major	Visual		As Per Model	As Per Model					
			Critical	Electrical	100%	Procedure & Job card	Procedure & Job card	Compliance Report	P	W	W/R	
			Critical	Visual	100%	Product Data Sheet	Product Data Sheet					

Legend

M	Manufacturer	P	Perform
C	Client	R	Review
TPIA	Third Party Inspection Agency	W	Witness



QUALITY ASSURANCE PLAN FOR INSTRUMENTATION EQUIPMENTS

PROJECT: METERING SKIDS FOR KG BASIN

CLIENT: GAIL INDIA LTD.

CONSULTANT: J P KENNY

QAP No.: 11-0282B-01-11-10-012 Rev 0

INSTRUCTIONS FOR FILLING UP:

- QAP shall be submitted for each equipment separately with break up of assembly / sub-assembly & part/component or for group of equipment having same specification.
- Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & test may be added as applicable for the plant and equipments.
- Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together.
- Weight in kilogram must be indicated under column 5 for each item. Estimated weights may be indicated wherever actual weights are not available.

ABBREVIATION USED :

CONTR : CONTRACTOR
MFR : MANUFACTURER
TPI : THIRD PARTY
INSPECTION

CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS :

Code Description	Code Description	Code Description	Code Description
1. Visual	12. Routine test as per relevant IS other standard	23. Short time rating	D1. Approved GA drawing.
2. Dimensional	13. Type test as per relevant IS/ other standard	24. Operational & functional test	D2. Approved single line/ schematic diagram
3. fitment & alignment	14. Impulse Test	25. Over speed test	D3. Test certificates
4. Physical Test (Sample)	15. Partial Discharge Test	26. Flame proof Test	D4. Approved Bill of materials
5. Chemical test(Sample)	16. Heat run risc test/temper	27. Clearance and creepage distance	D5. Un-priced P.O. copy
6. Ultrasonic test	17. Enclosure protection test	28. Acceptance test	D6. Calibration certificates of all measuring instrument and gauges.
7. Megnetic particle test(MPT)	18. Calibration	29 Honing Test	
8. Radigraphy test	19. Noise & Vibration	30 Hydrotest/ Shell leak test	
9. Dye Penetrant test	20. Test certificate of bought out components	31 Pneumatic Seat leak test	
10. Measurement of IR value	21. Tank pressure test	32 Impact test	
a) Before HV test	22. Paint shed vibration		
b) After HV test			
11. High voltage test/Dielectric test			

Equipment Details							Inspection & test										Test certificate & Document to be submitted to GAIL	Acceptance Criteria standards/ IS/BS/ASM E/ Norms and documents	Remark/ Sampling plan		
Sl. No	Item	Identification No.	Quantity No./ M	Weight Kg	Manufacturer's Name and Address	Exp date of Insp	Raw material and in-process stage inspection						Final inspection & test								
							MFR		CONTR & TPI		GAIL		MFR		CONTR & TPI					GAIL	
1	2	3	4	5	6	7	8	P/W /R	9	P/W /R	10	11	P/W /R	12	P/W /R	13	P/W /R	14	15	16	
1.0	Pressure Gauge / Temper. Gauge	As per P & ID			Approved Vendor list		1,2,3, 4, 5,	P	-		-	1,2,3, 18,20	P	1,2,3,4, 5,18,20, 24	R	1,2,3, 4 5,18,20 24	R	1,2,3,4,5, 18,20,24, D3, D6	D3,D6, Tech. spec.	100%	
2.0	Resistance Temperature Gauge	As per P & ID			Approved Vendor list		1,2,3, 4,5	P	-		-	1,2,3,4, 5,18,20, 24	P	1,2,3,4, 5,18,20, 24	R	1,2,3,4, 5,18,20, 24	R	1,2,3,4,5, 18,20,24, D3, D6	D3,D6, Tech. spec.	100%	



QUALITY ASSURANCE PLAN FOR INSTRUMENTATION EQUIPMENTS

PROJECT: METERING SKIDS FOR KG BASIN

CLIENT: GAIL INDIA LTD.

CONSULTANT: J P KENNY

QAP No.: 11-0282B-01-11-10-012 Rev 0

Equipment Details							Inspection & test														
Sl. No	Item	Identification No.	Quantity No./M	Weight Kg	Manufacturer's Name and Address	Exp date of Insp	Raw material and in-process stage inspection						Final inspection & test						Test certificate & Document to be submitted to GAIL	Acceptance Criteria standards/IS/BS/ASME/ Norms and documents	Remark/ Sampling plan
							MFR		CONTR & TPI		GAIL		MFR		CONTR & TPI		GAIL				
1	2	3	4	5	6	7	8	P/W /R	9	P/W /R	10	11	P/W /R	12	P/W /R	13	P/W /R	14	15	16	
3.0	Flow Control Valves	As per P & ID			Approved Vendor list		1,2,3,4,5,8,30,32	P P P	30,32	W R	-	1,2,3,5,8,20,18,24,31	P P P	1,2,3,5,8,20,18,24,31,30,32	R R W R	1,2,3,5,8,20,18,24,30,31,32	R R W R	1,2,3,5,8,18,20,24,30,31,32	D3,D6, Tech. spec.	100%	
4.0	Orifice Meter *	As per P & ID			Approved Vendor list		1,2,3,4,5,8,29,30,32	P P P	-		-	1,2,3,18,20,24	P P	1,2,3,4,5,8,18,20,24,29,30,32	R R R R	1,2,3,4,5,8,18,20,24,29,30,32	R R R R	1,2,3,4,5,8,18,20,24,31,32	D3,D6, Tech. spec.	100%	
5.0	Flow Computer	As per P & ID			Approved Vendor list		1,2,3,12,18	P P	-		-	1,2,3,18,24	P P	1,2,3,18,24	R R	1,2,3,18,24	R R	1,2,3,18,24,31,32	D3, Tech. spec.	100%	
Remark (If any) : Legend : P : Perform, W : Witness , R : review : EN 10204, Type 3.2 certificates shall be provided for bought out items. Those shall be inspected by TPI appointed by Vendor. * All the requisite test for compliance as per AGA3 shall be conducted.																	QAP No.				
For Contractor / Sub-contractor (Stamp & Signature)																	For JPK / GAIL (Stamp & Signature)		Date	Rev.	0

- NOTES:-**
1. INLET & OUTLET MATCHING FLANGES OR BLIND, STUD, NUT & GASKETS IN VENDOR SCOPE.
 2. VENT WILL BE MIN. 3.0 MTR. HEIGHT FROM SKID BASE.
 3. 3MM THK. COPPER JUMPER WILL BE PROVIDED AT EACH FLANGES CONNECTIONS.
 4. DRAIN WILL RUN UP TO EDGE OF THE SKID.
 5. BT-PASS CONNECTION OF 2" SIZE WITH ONE PLUG VALVE/GLOBE VALVE AND ONE BALL VALVE ONLY FOR 6" PIPELINE SIZE.
 6. MAXIMUM GAS VELOCITY IN THE SKID PIPELINE SHALL BE 20M/SEC.
 7. VENDOR'S SHALL SUPPLY PACKAGED SKID CONSISTING OF FILTRATION, METERING & LET DOWN UNIT AS PER MR.
 8. CABLES FROM FIELD TO CONTROL ROOM IS UNDER VENDOR SCOPE.

(*) PROCESS CONDITIONS TABLE FOR SILK ROAD SUGAR

OPERATING PARAMETER	MIN.	MAX.	DESIGN	UNITS
FLOW	0.17	0.35	0.35	MMSCHMD
INLET PRESSURE	51.2	-	92	KG/CM2(G)
TEMPERATURE	10	35	60	C
LINE SIZE & CLASS RATING	6" & 600#			

(*) PROCESS CONDITIONS TABLE FOR M/S SILICA CERAMICA

OPERATING PARAMETER	MIN.	MAX.	DESIGN	UNITS
FLOW	0.025	0.05	0.05	MMSCHMD
INLET PRESSURE	32.6	-	92	KG/CM2(G)
TEMPERATURE	26	35	60	C
LINE SIZE & CLASS RATING	4" & 600#			

(*) PROCESS CONDITIONS TABLE FOR M/S RAK CERAMICS

OPERATING PARAMETER	MIN.	MAX.	DESIGN	UNITS
FLOW	0.06	0.12	0.12	MMSCHMD
INLET PRESSURE	33.5	-	92	KG/CM2(G)
TEMPERATURE	26	35	60	C
LINE SIZE & CLASS RATING	4" & 600#			

1	14.01.10	ISSUED FOR CORRIGENDUM-1	VSR	MT	PKS
0	22.12.09	ISSUED FOR TENDER	VSR	MT	PKS
A	03.12.09	ISSUED FOR IFC	VSR	MT	PKS
NO.	DATE	REVISION	BY	CHKD	APPD.

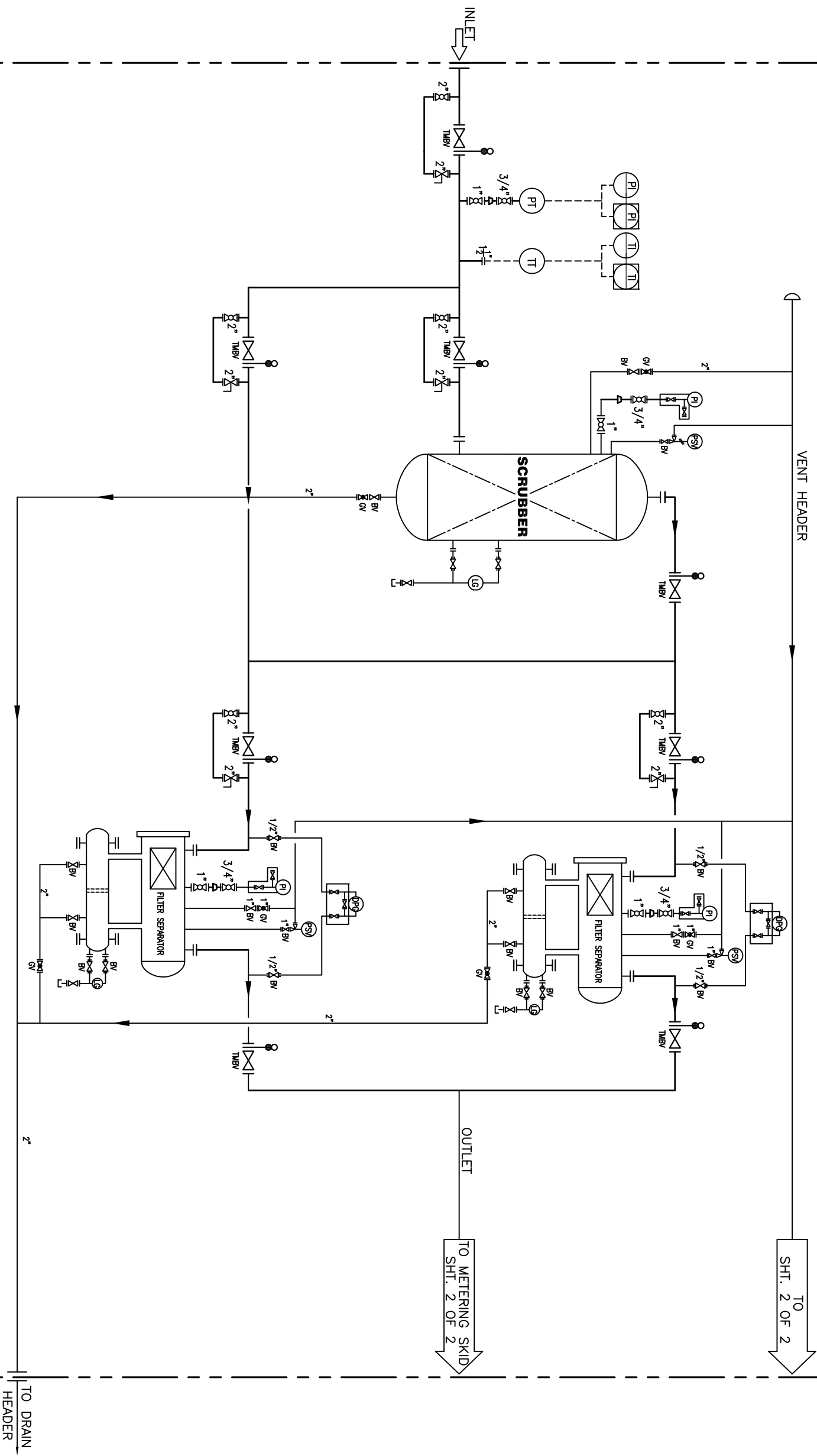
CLIENT: **GAIL (India) Limited**
(A Government of India Undertaking)

CONSULTANT: **J. P. KENNY PTY. LTD.**

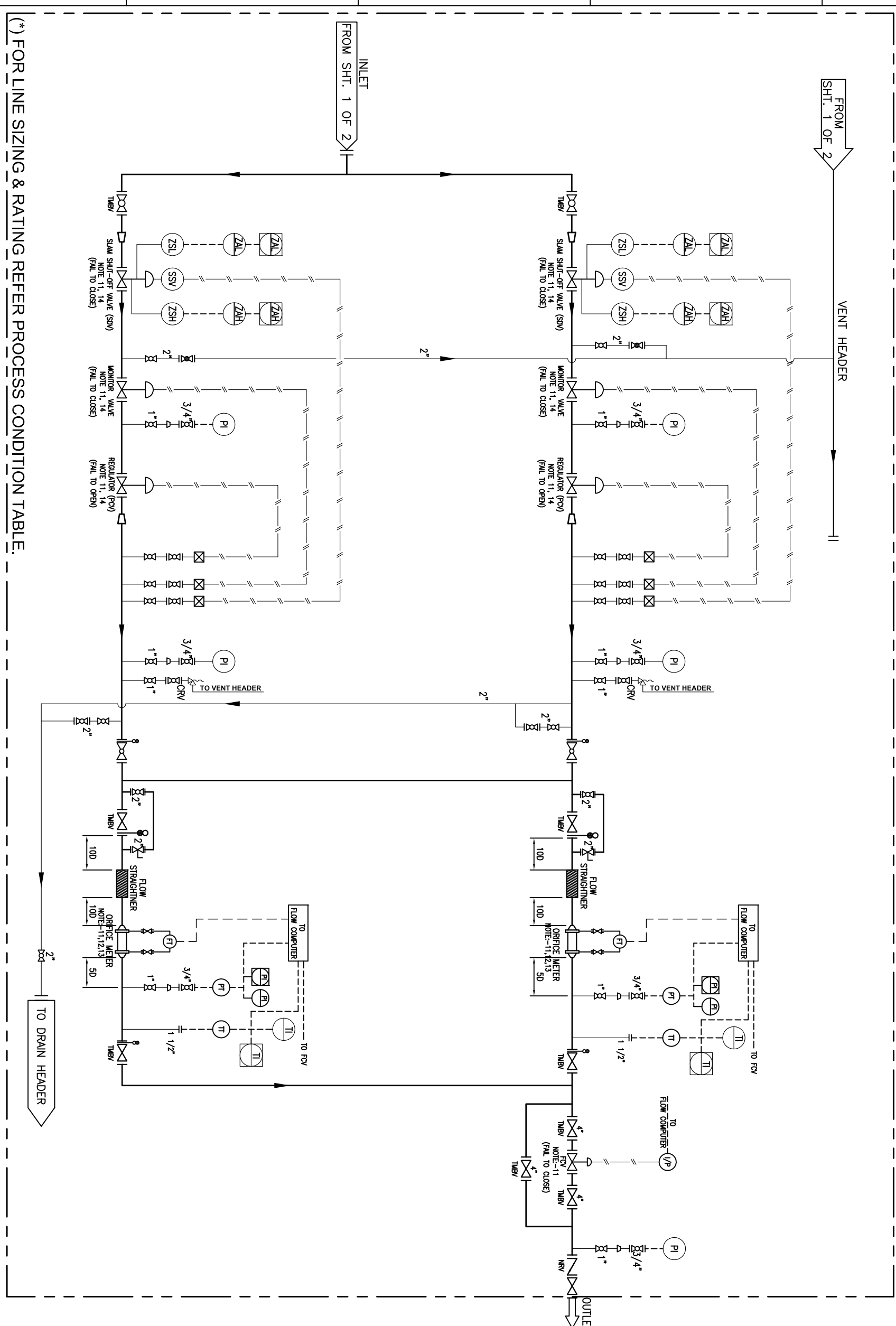
PROJECT: **PROCUREMENT OF PACKAGED METERING SKID IN KG BASIN**

TITLE: **PIPING & INSTRUMENTATION DIAGRAM FOR PACKAGED METERING SKID AT M/S SILK ROAD SUGAR, SILICA CERAMICA & RAK CERAMICS**

SCALE	SIZE	JOB NO.	DRAWING NUMBER	SHEET	REV
N.T.S.	A3	1102828	11-02828-00-03-01-001	1 OF 2	1



(*) FOR LINE SIZING & RATING REFER PROCESS CONDITION TABLE.



(*) FOR LINE SIZING & RATING REFER PROCESS CONDITION TABLE.

NOTES:-

1. INLET & OUTLET MATCHING FLANGES OR BLIND, STUD, NUT & GASKETS IN BIDDER SCOPE.
2. VENT WILL BE MIN 3.0 Mtr HEIGHT FROM SKID BASE.
3. 3MM THK. COPPER JUMPER WILL BE PROVIDED AT EACH FLANGES CONNECTIONS.
4. DRAIN WILL RUN UP TO EDGE OF THE SKID.
5. 8Y-PASS CONNECTION OF 2" SIZE WITH ONE PLUG VALVE/GLOBE VALVE AND ONE BALL VALVE ONLY FOR 6" PIPELINE SIZE.
6. MAXIMUM GAS VELOCITY IN THE SKID PIPELINE SHALL BE 20M/SEC.
7. VENT & DRAIN LINES SHALL BE CONNECTED TO COMMON VENT HEADER & TERMINATE ALONG THE SKID BOUNDARY WITH FLANGE CONNECTION.
8. VENDOR'S SHALL SUPPLY PACKAGED SKID CONSISTING OF FILTRATION, METERING & LET DOWN UNIT AS PER MR.
9. PRESSURE TAPPING LINES FOR ACTUATION OF SDV, MONITOR REGULATOR & FCV SHALL BE FITTED WITH SUITABLE TEMPERATURE CONDITIONER TO MAINTAIN ACTUATION GAS TEMPERATURE > 20°C.
10. DELETED.
11. SKID SIZING SHALL BE DONE BY THE BIDDER.
12. BIDDERS SHALL SUPPLY THE UPSTREAM & DOWNSTREAM PIPE SPOOLS WITH THE ORIFICE METER WITH THERMALLY INSULATED TRANSMITTER SHALL BE INSTALLED IN A WEATHER PROOF ENCLOSURE IP-65.
13. METERS PT & TT SHALL BE INSTALLED IN ENVIRONMENTAL ENCLOSURE.
14. SDV SHALL BE OF SLAM SHUT VALVE & SHALL BE CLOSED IN EVENT OF HIGH PRESSURE DISCHARGE FROM PRESSURE CONTROL VALVE. PCV & MONITOR VALVE SHALL BE OF SELF-ACTUATED. PCV & MONITOR SHALL BE CONFORMING TO EN 334 AND SDV SHALL BE CONFORMING TO EN 14382. STATUS SIGNAL OF PCV, SDV, DPT & LT SHALL BE PROVIDED IN FLOW COMPUTER.
15. METERING TUBE IS IN CONFORMANCE WITH AQA 3 LATEST EDITION, UPSTREAM & STREAM PIPE LENGTH IS MAINTAINED ACCORDINGLY.
16. CABLES FROM FIELD TO CONTROL ROOM IS UNDER BIDDER SCOPE.

(*) PROCESS CONDITIONS TABLE FOR SILK ROAD SUGAR

OPERATING PARAMETER	MIN.	MAX.	DESIGN	UNITS
FLOW	0.17	0.35	0.35	MMSCMD
INLET PRESSURE	51.2	-	92	KG/CM2(G)
OUTLET PRESSURE	-	25	49	KG/CM2(G)
INLET TEMPERATURE	10	35	60	°C
OUTLET TEMPERATURE	8.2	10	-	°C

(*) PROCESS CONDITIONS TABLE FOR M/S SILICA CERAMICA

OPERATING PARAMETER	MIN.	MAX.	DESIGN	UNITS
FLOW	0.025	0.05	0.05	MMSCMD
INLET PRESSURE	32.6	-	92	KG/CM2(G)
OUTLET PRESSURE	-	5	19	KG/CM2(G)
INLET TEMPERATURE	26	35	60	°C
OUTLET TEMPERATURE	7.1	26	-	°C

(*) PROCESS CONDITIONS TABLE FOR M/S RAK CERAMICS

OPERATING PARAMETER	MIN.	MAX.	DESIGN	UNITS
FLOW	0.06	0.12	0.12	MMSCMD
INLET PRESSURE	33.5	-	92	KG/CM2(G)
OUTLET PRESSURE	-	10	19	KG/CM2(G)
INLET TEMPERATURE	26	35	60	°C
OUTLET TEMPERATURE	16.8	26	-	°C

LINE SIZE & CLASS RATING 4" & 600# UP STREAM OF PRESSURE REDUCTION & 150# DOWN STREAM OF PRESSURE REDUCTION

1	14.01.10	ISSUED FOR CORRIGENDUM-1	VSR	MT	PKS
0	22.12.09	ISSUED FOR TENDER	VSR	MT	PKS
A	03.12.09	ISSUED FOR IDC	VSR	MT	PKS
NO	DATE	REVISION	BY	CHKD	APPRD.

GAIL (India) Limited
(A Government of India Undertaking)

J.P. KENNY PTY. LTD.

JMK
CONSULTANT

PROJECT: PROCUREMENT OF PACKAGED METERING SKID
IN KG BASIN

TITLE: PIPING & INSTRUMENTATION DIAGRAM FOR PACKAGED METERING SKID AT M/S SILK ROAD SUGAR,
SILICA CERAMICA & RAK CERAMICS

SCALE: SIZE JOB NO. DRAWING NUMBER SHEET REV
N.T.S. A3 110282B 11-0282B-00-03-01-001 2 OF 2 1