GAIL GAS LTD

(A wholly owned subsidiary of GAIL (India) Limited)

CNG AND CITY GAS DISTRIBUTION PROJECT

BID DOCUMENT
FOR
ODORISING UNIT
VOLUME – II OF II (TECHNICAL)

(BID DOCUMENT NO: 110290/WGI/GAIL GAS/12-R1)

LIMITED INTERNATIONAL COMPETITIVE BIDDING

DELIVERS. EVOLVES.

WHOLE LIFE SOLUTIONS FOR PIPELINE AND SUBSEA SYSTEMS

ISSUED BY

J P KENNY

WOOD GROUP

J P KENNY / WG WOOD GROUP	GAIL GAS LIMITED CITY GAS DISTRIBUTION PROJECT	GAIL gas

TECHNICAL SPECIFICATION FOR ODORIZING UNIT				CLIENT JOB NO.		-
				TOTAL SHEETS		09
DOCUMENT NO	11	0290	02	09	02	007

0	16/04/10	ISSUED FOR TENDER	AS	DDS	PKS
C	18/03/10	CLIENT'S COMMENTS INCORPORATED	AS	DDS	PKS
B	04/03/10	ISSUED FOR APPROVAL	AS	DDS	PKS
A	02/02/10	ISSUED FOR IDC	AS	DDS	PKS
REV	**DATE**	**DESCRIPTION**	**PREP**	**CHK**	**APPR**

CONTENTS

1.0 GENERAL

The intent of this requisition is to outline minimum requirement for design, engineering, manufacturing, assembly, testing, supply, testing at site, and commissioning of odorizing system complete with all auxiliaries and features required for efficient and safe operation as per technical specification, at five cities Dewas, Meerut, Sonipat, Kota, & Vadodara.

2.0 SCOPE OF WORK

2.1 Odorizing Unit

Scope of work shall include but not limited to complete odorizing unit including odorant storage container with odorant, automated loading to containers, automated unloading, Pneumatic Panel, Electronic Control unit, dosing system with stand by injection units(one working & one stand by), necessary pipe, valves, fittings and instruments.

Scope shall start from connection of natural gas from main gas pipe line with necessary valves, tubing, fittings for operation of system of gas actuation, PRS (if necessary), dosing point connection tubing, valves and fittings to the main gas pipe line. Electrical /Control cables including laying in pipe conduit, connection to control room and locating electrical panel in control room including necessary cabling.

The distance between control room and pipeline is around 50 meter. Vendor shall also quote the per meter price of cabling for regularization if needed.

Vent connection from odorizing unit with scrubber, flame arrestor, valves, protection cover with odorant neutralization system and vent stack 3 m above the unit top also included in scope of work.

The unit shall be skid mounted and shall be complete with foundation bolts, which shall be grouted by vendor at site.

For blanketing purpose vendor shall also provide Nitrogen cylinder arrangement.

Any additional requirement necessary for smooth operation of the system will be in Bidder's scope. Bidder shall provide warning instruction on each container for safe use.

Bidder shall quote for recommended spares for two- year operation and maintenance with unit price of the each item along with the offer.

All the necessary Valves / RO etc required to be mounted in the main pipeline shall be provided with Companion flanges, necessary gasket, and bolts complete ready to installed condition. The bidder shall Inform the scheme and the space requirements along with the offer.

If more than one inlet tapping is required then the client will provide only tapping in the pipeline and the necessary isolations valves will be in the scope of Bidder. Bidder shall provide the minimum distance to be maintained between the tapping.

Bidder shall categorically confirm all the clauses of job specification & technical specification in the offer. Any deviation shall be indicated with proper reasoning and if necessary with supporting documents.

A Spool piece will be provided in the main line, for odorant connections to be done by vendors.

NO. OF UNITS

CITIES	NO OF ODORISING UNIT
DEWAS	1
MEERUT	1
SONIPAT	1
KOTA	2
VADODARA	2

3.0 ODORIZING SYSTEM DESCRIPTION

3.1 Operations & Control Philosophy

The Odorizing System should be designed with minimum operator intervention. The maintenance frequency of the system shall be 18 months or better.

3.2 Design Philosophy

It is anticipated that the natural gas feed composition, flow rate and pressure will be fluctuating. Hence, Vendor should design the Odorizing System with optimum degree of flexibility, reliability, and operability to accommodate the varying composition of feed, other unexpected contaminants, flow rate and pressure.

The odorizing system facilities should consist of standardized modules, which are assembled into a complete system. Each system should be designed in packaged frame, housing, etc.

The design life of the odorizing system shall be 30 years (minimum).

For the Odorizer auto mode operation flow signal shall be provided in the form of analogue 4-20 mA from each existing flow computers / metering device by GGL. The metering system is in dual redundant mode (Two Metering System). Hence the offered electronic control unit is able to accept two nos. of 4-20 mA Signals corresponding to instantaneous flow rate from each flow computers. Electronic control unit should be able to process the flow signals (4to20mA) from two meters simultaneously. If the flow has been changed from stream 1 to 2 (or if both the stream operates), the ECU should recognize the stream changes through totalizer or signal adder. Also ECU should display the gas flow of two streams separately. The supply, laying, termination of signal cables from flow computer panel of each metering stream to odorizer control unit is in the Bidder's scope.

3.3 Design Basis

The Vendor should prepare the design basis required to meet the demands mentioned in Datasheet and liaise with GGL/WGI to obtain necessary confirmation and approval.

3.4 Applicable Standards and Codes

The design, construction, manufacture, supply, testing and other general requirements of the odorizing system should be strictly in accordance with the data sheets, applicable codes, and should comply fully with relevant national / International standards, Indian Electricity Act, Indian Electricity Rules, regulations of Insurance Association of India and factories Act while carrying out work as per this specification.

1.	IS 5572	:	Classification of hazardous areas (other than mines) for electrical installations.
2	IS 5571	:	Guide for selection of electrical equipments for hazardous area
3	OISD 113	:	Classification of areas for electrical installations at hydrocarbon processing and handling facilities.
4	OISD-STD-220	:	For restricted circulation
5	ASME, ASTM, NEC, NEMA, Indian Electricity Rules, Indian Explosives Act.		
6	PNGRB Technical Standards.		

3.5 Electronic Control Unit

The supply to Electronic Control Unit of the Odorizing System will be by an external power source. Power supply (UPS) Single Phase AC. 230 V ±10%, 50Hz. ±5%,

Note:

Vendor to confirm that the supplied Electronic Control Unit is suitable for the above power supply and indicate the maximum and minimum tolerable values of voltage for safe operation of Odorizing System. Vendors must include suitable voltage conditioning system in their scope to prevent failure from voltage fluctuations.

Electronic Control Unit should have the following specifications as minimum.

3.5.1 Electronic Control Unit should be provided with a liquid crystal display (LCD) for ongoing flow monitoring, operation modes etc. It should be easy to read lighted display. Displays must remains active for at least 15 minutes after power failure.

3.5.2 Physical design should be of steel body with doors/ panels with suitable paint to minimize corrosion and ongoing wear and tear. The electronic Control Unit should have locking arrangement. The panel/cabinet should be suitably designed to accommodate all required electronic equipment.

3.5.3 Electronic Control Unit shall be mounted on a wall.

3.5.4 The Protection Class of Electronic Control Unit shall be weather proof to IP 65/NEMA 4.

3.5.5 Odorizing System should not be shut off in case of:

i) Power failure
ii) Failure of throttling valve/regulator
iii) Low Flow
iv) Failure of any field instruments (Transmitters, temp. element, etc.)

3.5.6 The Electronic Control Unit should be capable of storing odorizing data and such data should be downloaded frequently into another portable computer to store the data. In order to meet the above requirement, 2 Nos. of RS232/RS485 Serial Communication ports shall be included in the Electronic Control Unit. One Port will be utilized for Portable Computer and another port will be utilized for future SCADA application. For this application, Vendor shall include in the scope all relevant software, together with the license, compatible to Microsoft Windows XP/VISTA software. Odorizer Electronic controller unit shall be provided with inbuilt GSM modem. Vendor shall demonstrate the communication (read & write) from master control room (CGO) to odorizer control unit installed at site. The vendor shall provide the necessary accessories required for proper GSM communication.

3.5.7 All Signal / Control Cable shall be armored type.

3.5.8 The control unit should be complete with internal pulse generator, pulse scalar and automatic /manual change over switch.

3.6 Storage Container

Vendor shall supply 1 no. of 500 Liters capacity storage containers for Odorant. Container should have positive pressure of Inert Gas, the storage container should be made up of stainless steel tanks complete with inlet, outlet, drain valves, level indication local and low level alarm switch with hooter, Y strainer at outlet, suitable odorant filters, non return valves, pressure regulation valves with safety and alarm, pressure relief valve along with manual gas vent valve. Vent should be only for Inert gas. No Odorant shall be vented in any case. Vent should have neutralizer container in case if there is a possibility of odorant being vented out.

3.7 Odorant Unloading Pump

Odorant Unloading Pump - Pneumatic or Exp. Proof electrically controlled Pump (portable type), operated pump to unload to storage containers. System shall have Nitrogen Blanketing to avoid leakage of odorant to atmosphere. Necessary Nitrogen Cylinder shall be provided for blanketing by nitrogen. Suitable Provision of locating odorant drum close to Container and easy handling of pump with flexible hose along with necessary valves, tubes, Hydro chloride solution for neutralizing, fire extinguisher, Mask, gloves, goggles, & eye washer for safety, Active carbon saw dust as an odorant absorber etc. to unload odorant to any of the storage containers to be provided.

3.8 Pneumatic Panel

All transmitters & temperature element should be intrinsically safe “exia” as per IEC 79-11 and solenoid valves, switches and related junction boxes should be flame proof “Exd” as per IEC 79-11. Flying leads from any of the instrumentation items are not acceptable.

The odorizing system shall be shipped in fully assembled condition. The equipment shall operate on gas .The equipment shall be located close to line pipe. Vendor shall take necessary connection from existing pipe, provide necessary valves and pressure reducing station for operation of odorizing unit. Dosing point connection to line pipe with necessary valves are also in vendor’s scope of work. Exhaust from the system should be vented 3 meters above equipment level with valves, flame arrestor and rain protection cover.

Electrical point shall be available at control room. Vendor shall provide and lay electrical and control cables from control room to the equipment through underground GI pipes.

Vendor should include in his scope provision of base frame to be embedded in the foundation. Vendor shall supply base frames in separate packing, if required.

The pneumatic panel shall have cabinet and it shall be installed in the Hazardous area and with necessary safety measures.

If compressed air is required the bidder should arrange the same. Vendor cannot use Natural Gas for actuation of Solenoid Valves etc.

Odorizing system should have the provision of automatic washing in order to prevent smell during dismantling of equipments for maintenance i.e. sending odorant from the system equipments, tubing etc back to odorant tank.

3.9 Pipe work, valves and fittings

Pipe work should be designed, tested and installed to ensure its safe operation at the worst conceivable conditions of flow, pressure and temperature.

All high pressure SS tubing work should be fully annealed (Bright annealed) seamless conforming to ASTM A-269, SS-316. The piping / tubing shall be of Tubacex, Parker, Sandvik, Centravis, Hoke make. Valves shall be of Swagelok, Parker, OMB make & fittings shall be of Parker, Swagelok, Hoke, Whitey, Cajon, Nupro make.

The system should be “go-no-go” gauge able to demonstrate that the fittings are properly tightened. Wherever possible, valves and control devices should incorporate the same end connector system. The number of fittings used should be minimized.

Vendor should also include a flexible hose of 5 meters length for connection of the odorizing unit with the odorant /loader along with necessary quick release coupling at ends.

The vendor should ensure that personnel assembling the pipe work should be competent in the system employed.

The preferred valve types for isolation are 1/4 (quarter) turn ball valves. Such valves shall have similar material as of the tube they are attached to. Ball valves must be of good quality and be appropriately selected for frequent use. Ball seats must be suitable for natural gas operation of the gas composition indicated.

Valves and fittings subject to corrosion must be either inherently resistant, or be coated with a corrosion inhibiting paint or surface treatment.

End connections including fittings & Valves shall be supplied with the unit. Details are to be confirmed at the time of detail engineering.

3.10 Hazardous Area

The Vendor should specify the hazardous area in accordance with the IS 5572.

All electrical equipment cabling and earthing should be appropriate for the zone in which it is fitted, and all cables passing from the hazardous to safe area should be equipped with appropriate barriers where necessary.

All instruments should be suitable for an area classification of “Class 1, Division 2, Group D as per NEC” OR “Zone 2, Group IIA/IIB as per IS/IEC”.

All Odorizing Unit mounted transmitters & temperature element should be intrinsic safe “exia” as per IEC 79-11 and solenoid valves, switches and related junction boxes should be flame proof “Exd” as per IEC 79-1. All other special equipments / Instruments, where intrinsic safety is not feasible or available, should be flame proof as per IEC 79-1. Flying leads from any of the instrumentation items are not acceptable.

The Electronics of the Odorizing Unit shall not be open and shall be provided within a suitable enclosure.

A complete dossier of all electrical equipment will be provided, showing area classification and certification of equipment.

3.11 Instruments

Vendor shall provide all instruments like Temperature Gauge, Pressure Gauge, differential pressure gauge, level switches, flow switches, etc. for duty condition in respective area.

4.0 INSPECTION AND TESTING

At Vendor's work :

The following activities shall be covered under inspection:

a. Review of Q.A. documents

b. Review of Calibration certificates for Odorizing unit, transmitters, gauges and all instruments.

c. Review of all statutory certificates.

d. Review of Area classification compatibility of all the items including bought out items.

e. Review of NDT reports.

f. Review of bought out sub-assemblies / major components, test / inspection certificates.

g. Dimensional checks as per approved drawing and data sheets.

h. Witness the Odorizing Units while tested to demonstrate the functioning of all the components and controls.

5.0 TESTING AND COMMISSIONING

The Equipment shall be tested at factory prior to shipment to site, FAT (factory acceptance test) should be carried out to demonstrate the functioning of all equipment trips and control system.

GGL/WGI should be given 2 weeks notice of the date and location of the tests so that the equipment may be witnessed if desired.

Upon delivery to the site, all the equipment should be assembled in a complete system. Thereafter, final site acceptance test would be carried out. Such tests should be witnessed and signed by the Company representative. The vendor should rectify and replace all defects, faults, failures, etc. and all costs should be borne by Vendor. The costs should include accommodation, traveling, expenses, etc.

All pipelines should be pneumatically tested to 1.1 times the design pressure. Such pressure shall be held for 4 hours and be witnessed by GGL/WGI.

6.0 SPECIAL CONDITIONS OF CONTRACT

The Vendor shall provide civil foundation drawing within two weeks of placement of order. In case the requisite information regarding foundation and other fixing inserts etc as required for proper installation of equipment is not indicated by the Vendor within two weeks from the placement of order, such facility shall be arranged / provided by the Vendor at their own cost.

The Vendor shall not vary the scope of work as detailed in tender and approved drawings without written permission of owner.

The supply of commissioning spares is included in the scope of Vendor. Vendor shall furnish a separate list along with offer.

7.0 DATA DETAILS

After the placement of FOI, & kick off meeting will be held at such date and at such place, as may be mutually agreed upon between the Vendor and the purchaser. The intent of this kick off meeting should be to discuss / clarify various requirements and finalize the modus operandi for execution of the contract within the scheduled delivery period.

7.1 Immediately within 2 weeks after placement of order the following documents have to be submitted

a) Process and Instrument Diagram.

b) Bill of Material. The bill of Material should indicate all items, quantity of all items, their part nos. and make.

c) General Arrangement Drawing of the Odorizing Unit giving overall dimensions along with details of inlet gas termination including X, Y, Z co-ordinates with respect to centre of Odorizing Unit or any reference and erection / shipping weight.

d) Data Sheet of Odorizing Unit along with Leaflets / catalogues for all major items.

e) Wiring Diagram of Electronic Control Unit.

f) Detailed foundation drawing of the Odorizing Unit for casting foundation giving load pattern etc.

g) Shop test procedure.

h) A Complete electrical Dossier and zone drawings of the Odorizing Unit, all certification for all components used within the hazardous areas should be provided.

7.2 Along with supply.

a) Operation and maintenance manuals–3 sets all in original pertaining to odorizing unit. The instruction manual should describe in details the construction and recommended procedure for maintaining, operating and trouble shooting of the Odorizing Unit. It should also include cross-sectional drawings, exploded views of all spare parts along with part nos., quantity installed per Odorizing unit. The manual should provide detailed catalogues for all bought out items.

b) 3 Sets of hard copies and 1 set of soft copy in CD-ROM for all the approved drawings and documents shall be included along with supply.

c) Mechanical and electrical installation drawing including interconnection.

d) Test certificates and catalogues of all major components like valves, mass flow meter, tubing etc.

e) Calibration certificates for all measuring and protection devices (e.g. Pressure transducer, pressure gauges, etc.).

f) Test records of mechanical running, performance test.

g) Complete wiring diagram of Odorizing Unit.

h) Software (logic diagram) of Odorizing Units on CD-ROM with suitable communication Protocol for communication with odorizing Unit in order to change Odorizing Unit parameters, if required.

i) Certificates from statutory authorities confirming suitability of design / construction of all electrical and electronic items for use in hazardous area. In case of foreign supply, the Vendor should get all certificates endorsed by the concerned statutory authorities, Govt. of India within one month of delivery of Odorizing Units at site.

j) One set of relevant software with license valid for 25 years including application program, compatible with Microsoft XP/ VISTA. Necessary adaptor for direct downloading into Laptop if required has to be supplied by the vendor.

ANNEXURE 1

MANDATORY SPARES LIST

S.No.	Description	Qty.
1	Spares for SA/2 regulator including filter, diaphragm, pad holder, O-rings	1 set
2	Carbon Filter Cartridge	1 No
3	Spares kit for SOV	1 set

J P KENNY / WOOD GROUP	GAIL GAS LIMITED CITY GAS DISTRIBUTION PROJECT,DEWAS	GAIL gas

DATASHEET OF ODORIZING UNIT FOR DEWAS REGION					CLIENT JOB NO.	-
					TOTAL SHEETS	06
DOCUMENT NO	11	0290A	02	09	03	007

0	16/04/10	ISSUED FOR TENDER	AS	DDS	PKS
C	18/03/10	CLIENT'S COMMENTS INCORPORATED	AS	DDS	PKS
B	04/03/10	ISSUED FOR APPROVAL	AS	DDS	PKS
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REV	**DATE**	**DESCRIPTION**	**PREP**	**CHK**	**APPR**

CONTENTS

1.0 Gas Composition

The expected gas composition is given below. The Odorizing System should be designed to meet the changes in the gas compositions from gas fields in India or R-LNG as applicable.

Component	Feed Gas (before extraction of propane and butane)
N2	0.15 - 0.20%
Methane (C1)	90 - 92%
Ethane (C2)	5 - 6%
Propane (C3)	1 - 1.3%
Carbon dioxide	2 - 2.5%
I-Butane	0.15 - 0.20%
N-Butane	0.15 - 0.20%
I-Pentane	0.005 – 0.010%
N-Pentane	0.001 – 0.003%

2.0 Gas Pressure and Temperature

The inlet gas pressure and temperature to the Odorizing System is as follows:-

Design Pressure	:	49 bar
Operating pressure	:	11 - 40 bar
Design Gas Temperature Maximum	:	60 ^{0}C
Design Gas Temperature Minimum	:	0 ^{0}C
Operating Temperature	:	5 to 44 ^{0}C

3.0 Datasheets

3.1 Datasheet of Odorizing Unit

S.No.	Technical Data	Customer Requirement
1.	Flow Rate of Natural Gas (SCMD)	690648 SCMD(Max.), 333200 SCMD(Normal)
2.	Operating Pressure at Dozing Point	11-40 bar
3.	Design Pressure	49 bar
4	Main Header manifold size	(114.3 to 406.4)mm dia where odoriser is to be installed
5.	Main Gas Line for odorizing injection	(114.3 to 406.4)mm dia, 300#, API 5L X42/52
6.	Operating Principle	Microprocessor based programmable dosing system suitable for continuous injection.
7.	Odorant Injection rate	To be adjusted automatically proportional to flow rate using 4 to 20 mA signal from Metering Device.
8.	Operating Temperature	System should be suitable for installation in open atmospheric Conditions at ambient temp. of 5-44^{0}C
9.	Odorant Concentration Rate	5PPM – 40 PPM Actual use of odorant to be monitored using an on-line separate calibration device.
10	Gas Odorant	Ethyl Mercaptan/ THT(Tetrahdrothiophene)
11.	Power Supply	230 VAC, 50 Hz, Single phase
12.	Pneumatic Panel with Cabinet Electrical Components in Hazardous Area	To be installed in hazardous area. Cabinet IP 65 Eexd IIC t4 Explosion Proof / Intrinsically Safe
13.	No. of Injection Units required	2(1W+1S) (Stand by system should work in automated mode. Stand by system is identical to main system except storage tank)
14.	Electronic Control Unit	To be installed in safe area, with RS 232/RS485 communication port, Printer port & provision for remote connectivity and must be lockable. Software to configure the odorizing system. Battery backup for memory to maintain configuration data in the event of power failure.
	Protection class	IP 65/NEMA 4
	Display	Back lit Alphanumeric LCD display
	Operating Modes	Automatic
15.	Storage containers with level gauge and level switch	500 liters – 1 No.
16.	Emergency Provision	To be provided to automatically continue Odorization if main odorizing system stops due to power / control unit failure.
17.	Maintenance Frequency	18 months or better
18.	System Features	In case of power / control unit failure, system to continue dozing at constant flow rate, till the power supply resumes.
19.	Material Specification for Storage Container	SS-304
20.	Nitrogen blanketing system	Required-Provide details
21.	Overall Size of skid, Weight	Required
22.	Activated Carbon Filter	1 No.
23.	Unloading Pump	1 No. (As per attached data sheet)
24.	Measuring Burette(stainless & glass)	1 No.
25.	Odorant Filter (installed in the suction pipe before the proportioning pump).	1 No.
26.	Odorant Filter (installed in the suction pipe before the odorant tank)	1 No.

27.	Pressure Regulator valve installed at the odorant tank	1 No.
28.	Flow Switch (For flow monitoring of the dosing pump, installation in the injection pipe)	1 No.
29.	Level Switch (Installation in odorant tank)	1 No.
30.	Option card (Installed in the control unit)	1 No.
31.	Odorant loader odorant side with NRV, Quick release coupling & stopcock	1 No.
32.	Odorant loader pressurization side with NRV, Quick release coupling & stopcock	1 No.
33.	Installation Flexible pipe for Odorant and gas (5m length with suitable quick relief coupling)	Must be installed in a cabinet
34.	First Fill of Odorant	Supplied & fill minimum 400 Ltr. of odorant as first fill in 500 Ltr. Storage Container.

3.2 Datasheet of Odorant Un Loading Pump

TECHNICAL DETAILS

MODEL	
LIQUID	SUITABLE WITH SS
TEMPERATURE	AMBIENT
DENSITY / SP. GR	1 (ASSUMED)
VISCOSITY	1-10 cP
HEAD	10 meter
MAX. FLOW RATE	95 Lpm
MATERIAL OF CONSTRUCTION	
TUBE	SS
SHAFT	SS
BEARING	PURE CARBON
IMPELLER	ETFE
MECH SEAL	NONE
ACCESSORIES	
DRUM ADAPTER	PP
WALL BRACKET (LOCAL)	MS (Powder Coated)
HOSE CONNECTION 1" (LOCAL)	SS 316

HOSE CONNECTION :-

Hose connector with wing nut for connecting the hoses to the pump tube shall be used.

EMISSION PROOF DRUM ADAPTOR

To prevent emission of dangerous gases when using a drum pump, an emission proof drum adapter shall be used.

J P KENNY WG WOOD GROUP	**GAIL GAS LIMITED** **CITY GAS DISTRIBUTION PROJECT,KOTA**	GAIL gas

DATASHEET OF ODORIZING UNIT FOR KOTA REGION					**CLIENT JOB NO.**	-
					TOTAL SHEETS	06
DOCUMENT NO	11	0290D	02	09	03	010

0	16/04/10	ISSUED FOR TENDER	AS	DDS	PKS
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3.0 Datasheets

3.1 Datasheet of Odorizing Unit

S.No.	Technical Data	Customer Requirement
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2.	Operating Pressure at Dozing Point	11-40 bar
3.	Design Pressure	49 bar
4	Main Header manifold size	(114.3 to 406.4)mm dia where odoriser is to be installed
5.	Main Gas Line for odorizing injection	(114.3 to 406.4)mm dia, 300#, API 5L X42/52
6.	Operating Principle	Microprocessor based programmable dosing system suitable for continuous injection.
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13.	No. of Injection Units required	2(1W+1S) (Stand by system should work in automated mode. Stand by system is identical to main system except storage tank)
14.	Electronic Control Unit	To be installed in safe area, with RS 232/RS485 communication port, Printer port & provision for remote connectivity and must be lockable. Software to configure the odorizing system. Battery backup for memory to maintain configuration data in the event of power failure.
	Protection class	IP 65/NEMA 4
	Display	Back lit Alphanumeric LCD display
	Operating Modes	Automatic
15.	Storage containers with level gauge and level switch	500 liters – 1 No.
16.	Emergency Provision	To be provided to automatically continue Odorization if main odorizing system stops due to power / control unit failure.
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21.	Overall Size of skid, Weight	Required
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24.	Measuring Burette(stainless & glass)	1 No.
25.	Odorant Filter (installed in the suction pipe before the proportioning pump).	1 No.

26.	Odorant Filter (installed in the suction pipe before the odorant tank)	1 No.
27.	Pressure Regulator valve installed at the odorant tank	1 No.
28.	Flow Switch (For flow monitoring of the dosing pump, installation in the injection pipe)	1 No.
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30.	Option card (Installed in the control unit)	1 No.
31.	Odorant loader odorant side with NRV, Quick release coupling & stopcock	1 No.
32.	Odorant loader pressurization side with NRV, Quick release coupling & stopcock	1 No.
33.	Installation Flexible pipe for Odorant and gas (5m length with suitable quick relief coupling)	Must be installed in a cabinet
34.	First Fill of Odorant	Supplied & fill minimum 400 Ltr. of odorant as first fill in 500 Ltr. Storage Container.

3.2 Datasheet of Odorant Un Loading Pump

TECHNICAL DETAILS

MODEL	
LIQUID	SUITABLE WITH SS
TEMPERATURE	AMBIENT
DENSITY / SP. GR	1 (ASSUMED)
VISCOSITY	1-10 cP
HEAD	10 meter
MAX. FLOW RATE	95 Lpm
MATERIAL OF CONSTRUCTION	
TUBE	SS
SHAFT	SS
BEARING	PURE CARBON
IMPELLER	ETFE
MECH SEAL	NONE
ACCESSORIES	
DRUM ADAPTER	PP
WALL BRACKET (LOCAL)	MS (Powder Coated)
HOSE CONNECTION 1" (LOCAL)	SS 316

HOSE CONNECTION :-

Hose connector with wing nut for connecting the hoses to the pump tube shall be used.

EMISSION PROOF DRUM ADAPTOR

To prevent emission of dangerous gases when using a drum pump, an emission proof drum adapter shall be used.

J P KENNY WG WOOD GROUP	**GAIL GAS LIMITED** **CITY GAS DISTRIBUTION PROJECT,MEERUT**	GAIL gas

DATASHEET OF ODORIZING UNIT FOR MEERUT REGION					**CLIENT JOB NO.**	-
					TOTAL SHEETS	06
DOCUMENT NO	11	0290B	02	09	03	008

0	16/04/10	ISSUED FOR TENDER	AS	DDS	PKS
C	18/03/10	CLIENT'S COMMENTS INCORPORATED	AS	DDS	PKS
B	04/03/10	ISSUED FOR APPROVAL	AS	DDS	PKS
A	03/02/10	ISSUED FOR IDC	AS	DDS	PKS
REV	**DATE**	**DESCRIPTION**	**PREP**	**CHK**	**APPR**

CONTENTS

1.0 Gas Composition

The expected gas composition is given below. The Odorizing System should be designed to meet the changes in the gas compositions from gas fields in India or R-LNG as applicable.

Component	Feed Gas (before extraction of propane and butane)
N2	0.13%
Methane (C1)	92%
Ethane (C2)	4.15%
Propane (C3)	0.55%
Carbon dioxide	3.14%
I-Butane	0.02%
N-Butane	0.02%
I-Pentane	0.010%
N-Pentane	0.010%

2.0 Gas Pressure and Temperature

The inlet gas pressure and temperature to the Odorizing System is as follows:-

Design Pressure	:	49 bar
Operating pressure	:	11 - 40 bar
Design Gas Temperature Maximum	:	60 ^{0}C
Design Gas Temperature Minimum	:	0 ^{0}C
Operating Temperature	:	5 to 44 ^{0}C

3.0 Datasheets

3.1 Datasheet of Odorizing Unit

S.No.	Technical Data	Customer Requirement
1.	Flow Rate of Natural Gas (SCMD)	1295208 SCMD(Max.), 708100 SCMD(Normal)
2.	Operating Pressure at Dozing Point	11-40 bar
3.	Design Pressure	49 bar
4	Main Header manifold size	(114.3 to 406.4)mm dia where odoriser is to be installed
5.	Main Gas Line for odorizing injection	(114.3 to 406.4)mm dia, 300#, API 5L X42/52
6.	Operating Principle	Microprocessor based programmable dosing system suitable for continuous injection.
7.	Odorant Injection rate	To be adjusted automatically proportional to flow rate using 4 to 20 mA signal from Metering Device.
8.	Operating Temperature	System should be suitable for installation in open atmospheric Conditions at ambient temp. of 5-44^{0}C
9.	Odorant Concentration Rate	5PPM – 40 PPM Actual use of odorant to be monitored using an on-line separate calibration device.
10	Gas Odorant	Ethyl Mercaptan/ THT(Tetrahdrothiophene)
11.	Power Supply	230 VAC, 50 Hz, Single phase
12.	Pneumatic Panel with Cabinet Electrical Components in Hazardous Area	To be installed in hazardous area. Cabinet IP 65 Eexd IIC t4 Explosion Proof / Intrinsically Safe
13.	No. of Injection Units required	2(1W+1S) (Stand by system should work in automated mode. Stand by system is identical to main system except storage tank)
14.	Electronic Control Unit	To be installed in safe area, with RS 232/RS485 communication port, Printer port & provision for remote connectivity and must be lockable. Software to configure the odorizing system. Battery backup for memory to maintain configuration data in the event of power failure.
	Protection class	IP 65/NEMA 4
	Display	Back lit Alphanumeric LCD display
	Operating Modes	Automatic
15.	Storage containers with level gauge and level switch	500 liters – 1 No.
16.	Emergency Provision	To be provided to automatically continue Odorization if main odorizing system stops due to power / control unit failure.
17.	Maintenance Frequency	18 months or better
18.	System Features	In case of power / control unit failure, system to continue dozing at constant flow rate, till the power supply resumes.
19.	Material Specification for Storage Container	SS-304
20.	Nitrogen blanketing system	Required-Provide details
21.	Overall Size of skid, Weight	Required
22.	Activated Carbon Filter	1 No.
23.	Unloading Pump	1 No. (As per attached data sheet)
24.	Measuring Burette(stainless & glass)	1 No.
25.	Odorant Filter (installed in the suction pipe before the proportioning pump).	1 No.
26.	Odorant Filter (installed in the suction pipe before the odorant tank)	1 No.

27.	Pressure Regulator valve installed at the odorant tank	1 No.
28.	Flow Switch (For flow monitoring of the dosing pump, installation in the injection pipe)	1 No.
29.	Level Switch (Installation in odorant tank)	1 No.
30.	Option card (Installed in the control unit)	1 No.
31.	Odorant loader odorant side with NRV, Quick release coupling & stopcock	1 No.
32.	Odorant loader pressurization side with NRV, Quick release coupling & stopcock	1 No.
33.	Installation Flexible pipe for Odorant and gas (5m length with suitable quick relief coupling)	Must be installed in a cabinet
34.	First Fill of Odorant	Supplied & fill minimum 400 Ltr. of odorant as first fill in 500 Ltr. Storage Container.

3.2 Datasheet of Odorant Un Loading Pump

TECHNICAL DETAILS

MODEL	
LIQUID	SUITABLE WITH SS
TEMPERATURE	AMBIENT
DENSITY / SP. GR	1 (ASSUMED)
VISCOSITY	1-10 cP
HEAD	10 meter
MAX. FLOW RATE	95 Lpm
MATERIAL OF CONSTRUCTION	
TUBE	SS
SHAFT	SS
BEARING	PURE CARBON
IMPELLER	ETFE
MECH SEAL	NONE
ACCESSORIES	
DRUM ADAPTER	PP
WALL BRACKET (LOCAL)	MS (Powder Coated)
HOSE CONNECTION 1" (LOCAL)	SS 316

HOSE CONNECTION :-

Hose connector with wing nut for connecting the hoses to the pump tube shall be used.

EMISSION PROOF DRUM ADAPTOR

To prevent emission of dangerous gases when using a drum pump, an emission proof drum adapter shall be used.

J P KENNY WG WOOD GROUP	**GAIL GAS LIMITED** **CITY GAS DISTRIBUTION PROJECT,SONIPAT**	GAIL gas

DATASHEET OF ODORIZING UNIT FOR SONIPAT REGION					**CLIENT JOB NO.**	-
					TOTAL SHEETS	06
DOCUMENT NO	11	0290C	02	09	03	009

0	16/04/10	ISSUED FOR TENDER	AS	DDS	PKS
C	18/03/10	CLIENT'S COMMENTS INCORPORATED	AS	DDS	PKS
B	04/03/10	ISSUED FOR APPROVAL	AS	DDS	PKS
A	03/02/10	ISSUED FOR IDC	AS	DDS	PKS
REV	**DATE**	**DESCRIPTION**	**PREP**	**CHK**	**APPR**

CONTENTS

1.0 Gas Composition

The expected gas composition is given below. The Odorizing System should be designed to meet the changes in the gas compositions from gas fields in India or R-LNG as applicable.

Component	Feed Gas (before extraction of propane and butane)
N2	0.13%
Methane (C1)	92%
Ethane (C2)	4.15%
Propane (C3)	0.55%
Carbon dioxide	3.14%
I-Butane	0.02%
N-Butane	0.02%
I-Pentane	0.010%
N-Pentane	0.010%

2.0 Gas Pressure and Temperature

The inlet gas pressure and temperature to the Odorizing System is as follows:-

Design Pressure	:	49 bar
Operating pressure	:	11 - 40 bar
Design Gas Temperature Maximum	:	60 ^{0}C
Design Gas Temperature Minimum	:	0 ^{0}C
Operating Temperature	:	5 to 44 ^{0}C

3.0 Datasheets

3.1 Datasheet of Odorizing Unit

S.No.	Technical Data	Customer Requirement
1.	Flow Rate of Natural Gas (SCMD)	1047720 SCMD (Max.), 733404 SCMD(Normal)
2.	Operating Pressure at Dozing Point	11-40 bar
3.	Design Pressure	49 bar
4	Main Header manifold size	(114.3 to 406.4)mm dia where odoriser is to be installed
5.	Main Gas Line for odorizing injection	(114.3 to 406.4)mm dia, 300#, API 5L X 42/52
6.	Operating Principle	Microprocessor based programmable dosing system suitable for continuous injection.
7.	Odorant Injection rate	To be adjusted automatically proportional to flow rate using 4 to 20 mA signal from Metering Device.
8.	Operating Temperature	System should be suitable for installation in open atmospheric Conditions at ambient temp. of 5-44^{0}C
9.	Odorant Concentration Rate	5PPM – 40 PPM Actual use of odorant to be monitored using an on-line separate calibration device.
10	Gas Odorant	Ethyl Mercaptan/ THT(Tetrahdrothiophene)
11.	Power Supply	230 VAC, 50 Hz, Single phase
12.	Pneumatic Panel with Cabinet Electrical Components in Hazardous Area	To be installed in hazardous area. Cabinet IP 65 Eexd IIC t4 Explosion Proof / Intrinsically Safe
13.	No. of Injection Units required	2(1W+1S) (Stand by system should work in automated mode. Stand by system is identical to main system except storage tank)
14.	Electronic Control Unit	To be installed in safe area, with RS 232/RS485 communication port, Printer port & provision for remote connectivity and must be lockable. Software to configure the odorizing system. Battery backup for memory to maintain configuration data in the event of power failure.
	Protection class	IP 65/NEMA 4
	Display	Back lit Alphanumeric LCD display
	Operating Modes	Automatic
15.	Storage containers with level gauge and level switch	500 liters – 1 No.
16.	Emergency Provision	To be provided to automatically continue Odorization if main odorizing system stops due to power / control unit failure.
17.	Maintenance Frequency	18 months or better
18.	System Features	In case of power / control unit failure, system to continue dozing at constant flow rate, till the power supply resumes.
19.	Material Specification for Storage Container	SS-304
20.	Nitrogen blanketing system	Required-Provide details
21.	Overall Size of skid, Weight	Required
22.	Activated Carbon Filter	1 No.
23.	Unloading Pump	1 No. (As per attached data sheet)
24.	Measuring Burette(stainless & glass)	1 No.
25.	Odorant Filter (installed in the suction pipe before the proportioning pump).	1 No.
26.	Odorant Filter (installed in the suction pipe before the odorant tank)	1 No.

27.	Pressure Regulator valve installed at the odorant tank	1 No.
28.	Flow Switch (For flow monitoring of the dosing pump, installation in the injection pipe)	1 No.
29.	Level Switch Type (Installation in odorant tank)	1 No.
30.	Option card (Installed in the control unit)	1 No.
31.	Odorant loader odorant side with NRV, Quick release coupling & stopcock	1 No.
32.	Odorant loader pressurization side with NRV, Quick release coupling & stopcock	1 No.
33.	Installation Flexible pipe for Odorant and gas (5m length with suitable quick relief coupling)	Must be installed in a cabinet
34.	First Fill of Odorant	Supplied & fill minimum 400 Ltr. of odorant as first fill in 500 Ltr. Storage Container.

3.2 Datasheet of Odorant Un Loading Pump

TECHNICAL DETAILS

MODEL	
LIQUID	SUITABLE WITH SS
TEMPERATURE	AMBIENT
DENSITY / SP. GR	1 (ASSUMED)
VISCOSITY	1-10 cP
HEAD	10 meter
FLOW RATE	95 Lpm
MATERIAL OF CONSTRUCTION	
TUBE	SS
SHAFT	SS
BEARING	PURE CARBON
IMPELLER	ETFE
MECH SEAL	NONE
ACCESSORIES	
DRUM ADAPTER	PP
WALL BRACKET (LOCAL)	MS (Powder Coated)
HOSE CONNECTION 1" (LOCAL)	SS 316

HOSE CONNECTION :-

Hose connector with wing nut for connecting the hoses to the pump tube shall be used.

EMISSION PROOF DRUM ADAPTOR

To prevent emission of dangerous gases when using a drum pump, an emission proof drum adapter shall be used.

J P KENNY WG WOOD GROUP	**GAIL GAS LIMITED** **CITY GAS DISTRIBUTION PROJECT,VADODARA**	GAIL gas

DATASHEET OF ODORIZING UNIT FOR VADODARA REGION					**CLIENT JOB NO.**	-
					TOTAL SHEETS	06
DOCUMENT NO	11	0304	02	09	03	007

REV	DATE	DESCRIPTION	PREP	CHK	APPR
0	16/04/10	ISSUED FOR TENDER	AS	DDS	PKS
C	18/03/10	CLIENT'S COMMENTS INCORPORATED	AS	DDS	PKS
B	04/03/10	ISSUED FOR APPROVAL	AS	DDS	PKS
A	03/02/10	ISSUED FOR IDC	AS	DDS	PKS

CONTENTS

1.0 Gas Composition

The expected gas composition is given below. The Odorizing System should be designed to meet the changes in the gas compositions from gas fields in India or R-LNG as applicable.

Component	Feed Gas (before extraction of propane and butane)
N2	0.3061%
Methane (C1)	91.0227%
Ethane (C2)	5.8380%
Propane (C3)	1.5535%
Carbon dioxide	-
I-Butane	0.2864%
N-Butane	0.3939%
I-Pentane	0.0144%
N-Pentane	0.0031%

2.0 Gas Pressure and Temperature

The inlet gas pressure and temperature to the Odorizing System is as follows:-

Design Pressure	:	49 bar
Operating pressure	:	11 -40 bar
Design Gas Temperature Maximum	:	65 ^{0}C
Design Gas Temperature Minimum	:	0 ^{0}C
Operating Temperature	:	5 to 44 ^{0}C

3.0 Datasheets

3.1 Datasheet of Odorizing Unit

S.No.	Technical Data	Customer Requirement
1.	Flow Rate of Natural Gas (SCMD)	2500000 SCMD(Max.), 1604600(Normal) (for Each unit)
2.	Operating Pressure at Dozing Point	11-40 bar
3.	Design Pressure	49 bar
4	Main Header manifold size	(114.3 to 406.4)mm dia where odoriser is to be installed
5.	Main Gas Line for odorizing injection	(114.3 to 406.4)mm dia, 300#, API 5L X42/52
6.	Operating Principle	Microprocessor based programmable dosing system suitable for continuous injection.
7.	Odorant Injection rate	To be adjusted automatically proportional to flow rate using 4 to 20 mA signal from Metering Device.
8.	Operating Temperature	System should be suitable for installation in open atmospheric Conditions at ambient temp. of 5-44^{0}C
9.	Odorant Concentration Rate	5PPM – 40 PPM Actual use of odorant to be monitored using an on-line separate calibration device.
10	Gas Odorant	Ethyl Mercaptan/ THT(Tetrahdrothiophene)
11.	Power Supply	230 VAC, 50 Hz, Single phase
12.	Pneumatic Panel with Cabinet Electrical Components in Hazardous Area	To be installed in hazardous area. Cabinet IP 65 Eexd IIC t4 Explosion Proof / Intrinsically Safe
13.	No. of Injection Units required	2(1W+1S) (Stand by system should work in automated mode. Stand by system is identical to main system except storage tank)
14.	Electronic Control Unit	To be installed in safe area, with RS 232/RS485 communication port, Printer port & provision for remote connectivity and must be lockable. Software to configure the odorizing system. Battery backup for memory to maintain configuration data in the event of power failure.
	Protection class	IP 65/NEMA 4
	Display	Back lit Alphanumeric LCD display
	Operating Modes	Automatic
15.	Storage containers with level gauge and level switch	500 liters – 1 No.
16.	Emergency Provision	To be provided to automatically continue Odorization if main odorizing system stops due to power / control unit failure.
17.	Maintenance Frequency	18 months or better
18.	System Features	In case of power / control unit failure, system to continue dozing at constant flow rate, till the power supply resumes.
19.	Material Specification for Storage Container	SS-304
20.	Nitrogen blanketing system	Required-Provide details
21.	Overall Size of skid, Weight	Required
22.	Activated Carbon Filter	1 No.
23.	Unloading Pump	1 No. (As per attached data sheet)
24.	Measuring Burette(stainless & glass)	1 No.
25.	Odorant Filter (installed in the suction pipe before the proportioning pump).	1 No.
26.	Odorant Filter (installed in the suction pipe	1 No.

	before the odorant tank)	
27.	Pressure Regulator valve installed at the odorant tank	1 No.
28.	Flow Switch (For flow monitoring of the dosing pump, installation in the injection pipe)	1 No.
29.	Level Switch (Installation in odorant tank)	1 No.
30.	Option card (Installed in the control unit)	1 No.
31.	Odorant loader odorant side with NRV, Quick release coupling & stopcock	1 No.
32.	Odorant loader pressurization side with NRV, Quick release coupling & stopcock	1 No.
33.	Installation Flexible pipe for Odorant and gas (5m length with suitable quick relief coupling)	Must be installed in a cabinet
34.	First Fill of Odorant	Supplied & fill minimum 400 Ltr. of odorant as first fill in 500 Ltr. Storage Container.

3.2 Datasheet of Odorant Un Loading Pump

TECHNICAL DETAILS

MODEL	
LIQUID	SUITABLE WITH SS
TEMPERATURE	AMBIENT
DENSITY / SP. GR	1 (ASSUMED)
VISCOSITY	1-10 cP
HEAD	10 meter
FLOW RATE	95 Lpm
MATERIAL OF CONSTRUCTION	
TUBE	SS
SHAFT	SS
BEARING	PURE CARBON
IMPELLER	ETFE
MECH SEAL	NONE
ACCESSORIES	
DRUM ADAPTER	PP
WALL BRACKET (LOCAL)	MS (Powder Coated)
HOSE CONNECTION 1" (LOCAL)	SS 316

HOSE CONNECTION :-

Hose connector with wing nut for connecting the hoses to the pump tube shall be used.

EMISSION PROOF DRUM ADAPTOR

To prevent emission of dangerous gases when using a drum pump, an emission proof drum adapter shall be used.