BHAGYANAGAR GAS LIMITED
(A JOINT VENTURE OF HPCL & GAIL)

BID DOCUMENT FOR

Procurement of 400 SCMH CNG Booster Compressor Packages on ARC basis for period of 01 year for BGL authorized GA's along with O&M for 05 years

UNDER OPEN DOMESTIC

COMPETITIVE BIDDING

Bid Document No.: BGL/683/2025-26

VOLUME-II of II

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ELECTRIC MOTOR DRIVEN 400 SCMH HYDRAULIC CNG BOOSTER COMPRESSOR

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INTRODUCTION

Bhagyanagar Gas Limited (BGL), (hereinafter referred as Owner), has been authorised by PNGRB for setting up infrastructure and operation of City Gas Distribution Network in Hyderabad, Vijayawada and Kakinada GAs. Natural gas will be transported to residential, commercial, industrial (PNG) and automobile consumers (CNG) in the city.

BGL is now inviting tenders on Competitive Bidding basis for procurement of "Electric Motor Driven Hydraulic Booster Compressor Packages – 400 SCMH" for this project.

The present document covers the technical specifications for the tender.

1.0 GENERAL

OWNER is responsible for distribution of Natural Gas for household/commercial sectors including setting up CNG refueling stations for vehicles etc.

2.0 SCOPE

The intent of this tender is to outline minimum requirement for Design, Engineering, Manufacturing, Assembly, Inspection, Testing, FAT, painting, Packaging and forwarding, Insurance, customer clearances, Supply, handling and unloading, Erection & Commissioning including Performance Acceptance Test at site along with Operation during One (1) year warranty period and Operation & comprehensive AMC during subsequent four (4) years including supply of all spares and consumable items for " 400 SCMH ELECTRIC MOTOR DRIVEN (22KW) HYDRAULIC BOOSTER COMPRESSORS PACKAGES" as required for dispensing CNG to vehicles at various locations in allotted GA as per this technical specification and applicable codes as referred.

Note:

Maintenance carried out during warranty period including supply of all spares and consumable items etc. shall be in bidder's scope.

2.1 The Booster compressor packages shall be identical in all technical respects. Various parts of these specifications shall be read in conjunction with each other and in case where the different parts of this specification differ the more stringent requirement shall govern.

2.2 Any additional work / equipment or technical requirement not mentioned in the specification but required to make the offered system complete in accordance with the specification and for safe and proper operation, shall be deemed to be included in the scope of work by the Bidder.

2.3 Booster Compressors have to be installed at the CNG outlets of OWNER and Oil and Marketing Company (OMC) retail Outlets located in allotted GA as per the instructions of Engineer in charge to increase the pressure of natural gas for dispensing in vehicles.

2.4 Bidder shall also be responsible for supply, erection, commissioning and field trial run. Noise level test and performance test of all packages at sites. The field trial run of the compressor will be for minimum of 4 hours (can be in multiple runs) and the package should be kept under observation for 72 hours for stable operation and no major breakdown in which satisfactory performance of the package together with all accessories auxiliaries and controls shall be established for satisfactory performance for specified operating conditions. In case of any detect, discrepancies under specified site conditions. Supplier shall first rectify the same and repeat the field trial run.

2.5 It will be the endeavor of all the parties to get the performance acceptance test (PAT) at site conducted within a period of 30 days from the start of commercial operation of a particular package. The bidder has to keep the compressors operational round the clock (i.e. 24X7) as defined by EIC and all the expenditures including spares and consumables, oil etc. to make the compressors operational shall have to be borne by the bidder. The power required to run the compressors will be provided by OWNER/ OMC. The contractor shall maintain the compressors in sound mechanical condition at all times. The contractor shall rectify the defects notified by OWNER immediately and should submit all the history log sheets and spares availability status along with the report in the format mutually agreed between OWNER and the bidder.

2.6 The bidder shall depute adequate numbers of qualified, experienced and competent persons and supervisors for smooth maintenance of the compressors and installation and commissioning of the compressor packages . The maintenance staffs have to be available round the clock daily (i.e. 24X7) throughout the year.

2.7 Periodic inspections of Safety Valves, Transmitters, Pressure vessel gauge and any other equipment as per statutory norms of State Factory Rules. SMPV and Gas Cylinder Rules shall have to be carried out by the bidder at his own cost during the period of maintenance by the bidder. The inspections have to be carried out by competent persons as per advice of Engineer-in-Charge and certificates have to be submitted to OWNER

2.8 The bidder has to maintain an office at site with telephone facility and keep his services personnel ready to attend problems any time of the day. Name and mobile phone number of in-charge of the services team has to be provided to Engineer-in-Charge / his representatives.

2.9 The bidder shall allow weekly rest and restrict daily working hours of his workmen as per relevant Act/Law and Rule made there under. However, no work shall be left incomplete/ in dismantled condition on any holiday/weekly rest. Technician provided shall have minimum qualification of ITI. The bidder in person or his authorized representative shall be available on regular basis to interact with Engineer –in-charge. Bidder has to plan their maintenance activities in non-peak / night hours only. Accordingly, bidder has to make necessary arrangements complying with necessary guidelines.

2.10 The bidder has to keep his services personnel ready to attend problems any time of the day. Name and mobile phone number of in-charge of the services team has to be provided to Engineer-in-Charge / his representatives.

2.11 The work force deployed by the bidder for the maintenance services at site shall be of sound relevant technical professional expertise which is otherwise also essential from the safety point of view of the personnel of the contractor as well as for the installation.

2.12 All personnel of the bidder entering on work premises shall be properly and neatly dressed while working on premises of the company including work sites.

2.13 Bidder shall maintain proper record of his working employee's attendance and payment made to them.

2.14 The bidder's representative/supervisor shall report on regular basis to the Shift-in-charge at OWNER control rooms for day to day working.

2.15 All the safety rules and regulations prevailing and applicable from time to time at the installations as directed by OWNER will be strictly adhered to by the Contractor and his workforce.

2.16 The bidder shall plan schedule maintenance in consultation and prior permission of Engineer in-charge or his representatives.

2.17 The bidder shall be responsible for the discipline and good behaviour of all his personnel deployed to carry out the services. In case of any complaint received against any of his employee, he shall arrange to replace such persons within 24 hrs of notice issued by the Engineer-in-charge. The decision of the Engineer-in-charge in this matter shall be final and binding on the Contractor.

2.18 The bidder shall arrange to supply/renew identity cards to his workforce at his own cost. The contractor's personnel shall be required to carry their respective identity cards while on

duty and produce on demand. Without valid identity cards, they will not be allowed to enter into the CNG station.

2.19 Engineer-in-charge shall have authority to issue instructions to the Contractor from time to time during the contract period necessary for the purpose of proper and safe execution of the contract and the Contractor shall carry out and bound by the same. In case of non-fulfilment of any obligations under the contract and /or non- execution of any instruction issued by Engineer-in-charge as per terms and conditions of the contract, Engineer-in-charge shall have power to withhold payment for an amount equivalent to the amount to be spent for execution the obligations/instructions issued by him. The decision of engineer-in-charge in this regard will be final and binding to the Contractor.

2.20 Receipt at site, storage in warehouse as per manufacturer's recommendation and safety and security from theft and breakage during transportation, handling including security guard at site.

2.21 Submission of drawings & documents.

2.22 Erection, O&M and all others relevant manuals for compressor & its accessories, priority panel, electrical motor & all instrumentation.

2.24 GENERAL

2.24.1 The contractor must follow the OPERATION & MAINTENANCE REQUIREMENT as stated below but not limited to and ensure to provide trouble free services as defined in the bid documents.

A. ACCOMMODATION/ TRANSPORTATION/ MEDICAL

The contractor shall make his own arrangement for the accommodation of his personnel at respective locations and subsequent transportation arrangement for them from their place of residence to work place or any other place as required and owner shall have no obligation in this respect.

B.DISCIPLINE

The contractor shall be responsible for the discipline and good behaviour of all his personnel deployed in the services contracted out and should any complaint be received against any of his employee, he shall arrange to replace such persons within 24 hours of notice issued by the Engineer-in-Charge. The decision of the Engineer –in-Charge in this matter shall be final and binding on the contractor.

C.GATEPASS / IDENTITY CARD

The contract shall arrange to supply / renew identity card to his workforce at his own cost, if so required by OWNER for security or for any other reasons. Those contractor's personnel shall be required to carry their respective identity cards while on duty and produce on demand. Without valid identity cards, they will not be allowed to enter into the CNG station.

D. RIGHT TO GET SERVICES CARRIED OUT THROUGH OTHER AGENCIES

Nothing contained herein shall restrict OWNER from accepting similar service from other agencies, at its discretion and at the risk and cost of the contractor, if the contractor fails to provide the said services any time.

The maintenance services shall be provided in terms of shift pattern or the round-the-clock basis as mentioned in the bid document.

E. OWNER will notify the start date for operation and Comprehensive Maintenance services

- After the successful completion of test run & commissioning, system taking over certificate shall be issued by the owner.

2.25 Operation and Maintenance of Compressor Packages

i. The contractor shall deploy adequate number of technicians / supervisors / Engineers / helpers as well as tools, spares, consumables and equipment for smooth and proper maintenance of the Compressor supplied in terms of the contract. In case required to meet operational requirements, the contractor shall augment the same as per direction of Engineer–in-Charge. Contractor to submit a detailed organogram with key person details before starting maintenance of the compressor package.

ii. No operator is required. BGL Intends to operate the booster compressors without operator ensuring package remains in good condition. Therefore, the bidder is required to supply booster compressors that are capable of autonomous operation without the need for operator intervention.

iii. Bidder has to supply the PLC based machine with Internet of Things (IoT) capabilities to access the data through cloud. Bidder has to consider all necessary requirements completely in his scope to run the compressor package on IoT system. BGL shall not pay any additional payment for the operation of compressor package. Bidder has to provide the login details to BGL and access to 03 members from Client side.

iv. The contractor is required to carry out all services as mentioned in the Scope of Services and Schedule of Rates on all the 365 days including Sunday and all Holiday & around the clock.

v. The contractor shall follow Central/State guidelines for labour laws, rules and regulations. However, no work shall be left incomplete/unattended on any holiday/weekly rest. Technicians provided shall have minimum qualification of ITI. Contract in person or his authorized representative shall provide the services on daily basis to interact with Engineer-in-charge and deployed workman.

vi. The work force deployed by the contractor for maintenance service of Compressors, shall be of sound relevant technical professional expertise which is otherwise also essential from the safety point of view of the personnel of the contractor as well as for the installation.

vii. Contractor has to ensure the safety of man and machine all the times. Damages of equipment due to negligence will be recovered as per the decision of Engineer-in-Charge, which will be final.

viii. Regarding work completion, the decision of the Engineer-in-Charge will be final and binding.

ix. The contractor shall make his own arrangements to provide all facilities like boarding and transport etc. to his workmen.

x. All personnel of the contractor entering on work premises shall be properly and neatly dressed and shall wear uniform, badges while working on premises of the Owner including work sites.

xi. Contractor shall maintain proper record of his working employee's attendance and payment made to them.

xii. The contractor's representative/supervisor shall report daily to the Shift-in-Charge for day to day working.

xiii. All the safety rules and regulations prevailing and applicable from time to time at the installations as directed by OWNER will be strictly adhered to by the contractor.

xiv. It will be the responsibility of the contractor to pay as per the minimum wages of the appropriate government applicable under the Minimum Wage Act 1948.

xv. The services shall be provided in terms of shift pattern on the round the clock basis. The contractor is responsible to provide effective and efficient services in all shifts and assure that there is no disruption in the services for want of any resources.

xvi. The contractor shall establish a central control room to operate 24 hours, seven days a week where complaint regarding non-performance of the Compressors in terms of the contract can be lodged. Further, the contractor shall deploy adequate number of technicians/ supervisors / engineers at various site offices in consultation with Engineer-in-Charge to provide trouble free maintenance of the Compressors. Supplier to establish the Control room within 15 days of supply of booster compressors covered in 1st lot,

location of control room shall be such that all compressor locations can be catered.

xvii. All arrangements for communication from control room to the contract person working on job under the services shall be the responsibility of the contractor, viz. cell phone / walky-talky.

xviii. The successful bidder shall indemnify the Owner from any claim of the contract labour.

xix. The successful bidder shall comply to all the rules regarding PF, ESI etc. as stated in the tender document

xx. The bidders / contractor who fail to furnish any proof in respect of separate PF Code/No of the concerned RPF Commissioner / Authority their bids shall be liable for rejection.

xxi. All the jobs mentioned under scope of services shall be carried out as per sound engineering practices, work procedure documentation, recommendation of the manufacturer and as per the guidelines/direction of engineer-in-charge of authorized representative.

xxii. Summary of breakdown hour's station wise with analysis shall be submitted to CNG control room on a fortnightly basis both in hard and soft form as per OWNER format.

xxiii. The contractor has to submit the following documents on monthly basis along with the bill:

a) Preventative maintenance compliance report for that month along with the detailed service report.

b) Details of the compressor breakdown, summary of break down hours for that month and the cumulative break down hours along with breakdown response time.

c) Response time is should not be more than 20 minutes and bidder should respond and immediately deploy the team along with required spares to restore the package at the earliest.

d) Compressor parameter log book for the month.

e) Certificate to be given by the bidder stating that they have complied with all the labour regulations and are following the minimum wages act.

xxiv. Maintenance of compressor packages during the warranty period.

xxv. All spares, consumables, lubricating oil, coolant required for carrying out preventive / any type of maintenance shall be in the scope of supplier during the warranty period. The warranty spares shall be supplied by the vendor during the warranty period as per warranty clause.

xxvi. All tools, tackles and fixtures required for carrying out the above maintenance of the compressor shall be in scope of the bidder. The scope will also include handling equipment's like crane, forklift, chain pulley block, etc required during the any

maintenances activity.

xxvii. Any correspondence required to be made with the principal company or OEM or various offices shall be made by the bidder or bidder's agent. All arrangements like phone, fax, computer, Internet etc required for above correspondences shall be arranged by the bidder at his own cost.

xxviii. The periodic maintenance required to be done as per OEM recommendation shall be taken up promptly. The bidder shall provide the detailed preventative maintenance schedule along with

a) Estimated down time required for each type of maintenance schedule.

b) List of spares and their quantities required for each type of maintenance schedule per compressor.

c) Type and number of man days required for each type of maintenance schedule per compressor.

xxix. The bidder shall plan such maintenances during non-peak hours and in consultancy with the Engineer In Charge (EIC) of OWNER. Any maintenance that needs to be taken up shall be well planned in advance with due approval of the EIC.

xxx. The bidder shall use only OEM's certified spares during maintenances. All spares shall be kept in sealed OEM stamped packages. The packages shall be opened in front of OWNER representative during maintenance. In case, the schedule maintenance of the OEM manual recommends to check and replace parts like valve spring, valve plates, piston rings etc. after certain time interval, same shall replaced or used further only on approval from the OWNER's representative. However any untoward consequences for non-replacement of such parts shall be the responsibility of the bidder and spares, repair required to put back the unit into operation will be to bidders account.

xxxi. All routine and periodic checks / inspections required to be done as per OEM recommendation shall be done by the bidder. Instruments required for above inspection like Vernier calliper, micrometre screw gauge, fill gauges, bore gauge etc shall be in scope of the bidder and these instruments shall be calibrated every year.

xxxii. All parts replaced by the bidder during the above contract period shall be disposed off periodically with permission from OWNER.

xxxiii. The contractor shall submit a copy of the daily / weekly / fortnightly / monthly / bimonthly / quarterly and yearly performance report to the EIC in both soft and hard form. All stationery including the printed material such as compressor parameter log book, complaint log book, service report, break down summary report etc. shall be in scope of the bidder.

xxxiv. All the maintenance / inspection job carried out by the bidder shall be recorded in a service report and the report of the same shall be jointly signed by OWNER

representative and submitted immediately after carrying out the maintenance. Service report format shall be approved by OWNER.

xxxv. The EIC will be final authority to take decision with regards to maintenance or replacement of parts or any disagreement between the bidder and OWNER, during the execution of the contract.

xxxvi. The bidder shall carryout calibration of gas detectors and flame detectors every six months or earlier as per requirement or instruction of EIC of OWNER. Also yearly calibration of all instruments such as pressure gauges, transmitters, switches, etc shall be in the scope of the bidder. In addition to the above all safety relief valves shall also be tested and calibrated every year. Zero calibration Mass flow meters is in the scope of the bidder. BGL will provide the FCRI calibrated mass flow meter for cross verification, bidder to check the accuracy of the mass flow meter installed in the package and maintain the accuracy as per OEM recommendation.

xxxvii. Calibration shall be done from government-approved laboratories and shall be carried out at least 15 days prior to the calibration due date.

xxxviii. The bidder shall keep 1 set of safety relief valves in spare for the purpose of calibration.

xxxix. The bidder shall carry out retesting of pressure vessels periodically i.e. every year or earlier as per Gas Cylinder rules 2016 / Static & Mobile Pressure Vessels Rules.

3.0 CODES AND STANDARDS:

3.1 The design, construction, manufacture, supply, testing & other general requirements of the compressor package equipment shall be strictly in accordance with the data sheets, applicable API codes, and shall 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.

3.2 Any modification suggested by statutory bodies either during drawing approval or during inspection, if any, shall be carried out by the bidder without any additional cost and delivery implications.

The following National & International Codes & Standards of Latest editions shall be applicable.

- OISD 142:
- IS 5572
- OISD 179, NFPA-52: 2006, NFP-496, NFPA-68, NFPA-70 or equivalent
- NFPA – 37
- NFPA – 12- CO_2 Flooding system
- IS: 325/ IEC or International standards. – Standards for electric Motor

- IS: 6382
- Applicable ANSI, ASTM, NEC, NEMA code
- API – 618/API 11 P
- EURO EAN NORM P.E.D., Italian NOR M D.P.R. 47/55
- EURO EAN NORM P.E.D , D.M. 24.5.02 - D.M. 2 8 .6.02
- D.M 2 4.11.84 parte prima - sez. II° , D.M . 24.5.02 - D.M. 28.6.02, DIN 2413, S AE J 514
- EURO EAN NOR MS, CEI N 60079- 0/CEI EN 60079-14/ CEI, EN 60204-1/ CEI EN 60439-1, ATEX STAN DARD
- API – 661 : Specifications for Air cooled exchangers
- ASME Section – VIII Div. – 1/2 Design codes for pressure vessels.
- Gas Cylinder Rules 2016.
- Standard Specifications of Bureau of Indian Standards (BIS).
- Specifications/Recommendations of IEC.
- Indian Electricity Rules.
- Indian Explosives Act.
- State Factory Rules
- TEMA – C - Water cooled heat exchangers
- ASME / ANSI – B-31.3 Code for Process Piping
- DIN 2413-This standard covers the design of steel bends and bent pipes of circular cross section used in pressure pipelines.
- SAE J 514-Standard for CNG hydraulic tube fittings and O-ring
- CEI EN 60079-10-Classification of area for explosive gas atmosphere
- CEI EN 60079-14-Design, selection and installation of electrical systems for areas with potentially explosive atmosphere.
- CEI, EN 60204-1-Standard for safety of machinery — Electrical equipment of machine
- CEI EN 60439-1-Standard for safety of electrical equipment
- ATEX-Standard for describing electrical equipment and work space is allowed in an explosive atmosphere.

3.3 Precedence

In case of any conflict among the various documents of this requisition the following preferential order shall govern:

1. Data sheets/drawings
2. Technical Specification
3. International standards/codes as applicable
4. Indian Standards / codes as applicable

In case of any conflict among the various documents of this requisition the more stringent requirement shall govern.

Compliance with these specifications shall not relieve the bidder of the responsibility of furnishing equipment and accessories of proper design, material and workmanship to meet the specified operating conditions.

No deviations to the technical requirements and to the scope of supply specified in this enquiry document shall be accepted and offers not in compliance to the same shall be rejected. In case a deviation is required due to inherent design of the equipment offered, the bidder shall list all such deviations at one place giving reasons thereon**.**

3.4 Document /Data Required along with Bid

Bidder shall necessarily furnish the following along with the bid, without which the offer shall be considered incomplete:

(1) Proven Track Record Formats, duly filled in along with general reference list shall be submitted for the earlier supplied CNG compressor packages as per the BEC requirements.
(2) Checklist duly filled in with regards to scope of supply
(3) Completely filled in Data Sheets of compressor, motor
(4) Deviations if any to this Technical Specification
- Tentative Lay out/key plan/General Arrangement Drawing indicating size of skids, center distance between skids and space required along with maintenance requirements,
- The Design of trenches for installation of interconnecting pipeline, cables if any

(5) (a) Utilities requirements (b) Electrical Load summary
(6) Datasheet of compressor, motor, instrumentation & controls.

3.5 Gas Composition

	Normal Gas Composition	Design Gas Composition
C1	82.43- 99.10	91.01
C2	7.27- 0.90	5.23
C3	3.47- 0.00	0.88

i-C4	0.65-0.00	0.08
n-C4	0.78-0.00	0.09
i-C5	0.17-0.00	0.03
n-C5	0.13-0.00	0.01
C6	0.10-0.00	0.05
C7	0.00-0.00	0.00
N2	0.06-0.00	0.22
CO2	4.93-0.00	2.4
H2O	0.01-0.00	0.00
TOTAL	100.00	100
Average Calorific Value (Kcal/SCM)	9350- 8150	

3.6 Climate:

- Ambient temperature min/max ^{0}C : 2 ^{0}C / 47.5 ^{0}C
- Design wet bulb temp (WBT), ^{0}C : 27 ^{0}C
- Design relative humidity % : 90
- Altitude above MSL, M : 650
- Wind velocities km/hr (max) : 160
- Air Cooler Design 0C : 47.5°C DBT, 27°C WBT & 90% RH

4.0 SCOPE OF SUPPLY FOR EACH COMPRESSOR PACKAGE

The scope of Supply to be provided by the bidder shall be inclusive of but not limited to:

4.1 Design, Engineering, Manufacturing, Assembly, Inspection, Testing, FAT, surface preparation and Painting, Packaging and forwarding, Insurance, customer clearances, Supply, handling and unloading, Erection & Commissioning including Performance Acceptance Test at site along with operation and comprehensive AMC including supply of all spares and consumable items along with associated electrical, instrumentation etc. as per bid document.

4.2 Hydraulic booster with lube oil system and cooling system as required.

4.3 Flame proof Electric motor as compressor driver.

4.4 01 no. mass flow meters to measure the Natural Gas consumption at packages discharge (Coriolis type) with online test arrangement. Mass flow meters should be of same make and should have local integral display and should be Ex proof &

weatherproof. The flowmeters should be enabled with MODBUS/ RS 485 communications port.

4.5 PLC based control system with HMI. PLC shall be provided with mounting rack, CPU, Input output cards, Power supply card, communication card. Failure alarm of CPU shall be provided in HMI. A dedicated modbus (RS 485) slave communication port shall be provided for Remote terminal unit (RTU) interface. A separate communication ports shall be provided for GPRS modem for communicate on with SCADA system. Note: One spare CPU module shall be kept ready in all GA at all times. IOT integration is required and PLC based control panel HMI with IoT compatible. PLC based machine with Internet of Things (IoT) capabilities to access the data through cloud. Bidder has to consider all necessary requirements completely in his scope to run the booster compressors on IoT system.

4.6 PLC shall be mounted in EX proof enclosure. Cabinet specification with Statutory certificate shall be submitted during engineering stage for approval.

4.7 Instrumentation and control system as per P&ID. All the transmitters shall be Ex proof or intrinsically safe. PESO certificates shall be submitted.

4.8 Pressure Transmitter and Temperature Transmitters shall be used for CNG Gas application with 4-20 mA output signals to PLC. Ex proof enclosure, The units of measurement for flow shall be Kg/hr, for pressure shall be Kg/cm2 (g) or and for temperature shall be degree C. Pressure and temperature switches are not acceptable.

4.9 Block & bleed valves/Two valve SS316 Manifold to be provided for Pressure gauges and pressure Transmitters.

4.10 Single acoustic enclosure for Compressor package, with One number IR type point gas detectors, one number Flame detector UV type inside the enclosure.

4.11 Vendor shall submit documents during engineering stage for review & approval to client/consultant. Document are specification /data sheet with statutory approval certificate, W&M certificate, PESO certificate of all the instruments as per P&ID, instrument index, input output list, power consumption calculation, cause & effect cables specification, cable schedule with termination details, operation & control philosophy, and PLC specification & architecture..

4.12 5 no. Emergency stop button (push type) along with one hooter in office/customer interface room. Emergency stop button shall be provided at below locations. Hazardous area push buttons shall be mounted in ex proof enclosure with break glass & hammer. Push button shall be push to lock type. Unlock will be done by operator after ensuing the safe & normal situation.

a. Outside compressor enclosure

b. CNG unit area Fencing/ FIELD

c. Electrical room

d. Control room/office room/sales room

e. Near process area (near CNG dispenser)

4.13 P&ID shall be submitted along with tag numbers for each item, line size, valve size, type of connection, instrument symbol connectivity with PLC, interlock number.

4.14 Single acoustic enclosure for Compressor package.

4.15 Common structural steel skid for the compressor- Motor combination and for all auxiliary systems

4.16 Air-cooled heat exchanger for inter stage and discharge gas.

4.17 6 line Priority Panel at Package Discharge as per priority fill system.

4.18 Selector switch at Booster Compressor panel for valve positioning to automatically switch over the inlet i.e. to to take suction from LCV cascade or from Stationary cascade.

4.19 All interconnecting oil, gas, water, air piping within the compressor package.

4.20 Impulse and pneumatic piping/Tubing for all valves, fittings as specified & required for mounting the instruments.

4.21 Cables

a) Main incoming Power cable from owners Power Distribution Board (PDB) to main control panel of the compressor through heavy duty GI conduit or trenches, all inter connecting cables in compressor package, including complete erection accessories like double compression cable gland, ex proof gland in hazardous area, cable tags, lugs etc. as required.

b) Electrical/Control Cables required for providing connectivity to Co2 system and emergency switches.

c) Supply, laying, glanding, lugging, ferruling, clamping, terminal of Instrumentation cable (signal, control, communication, ethernet & Power) from instrument to junction box/PLC inside enclosure, PGD, flame detectors to PLC, PLC to HMI. Emergency push button outside compressor enclosure to PLC.

d) Supply of signals and power cable from Emergency push button (field and control room) to PLC and RS 485 port cable of PLC to RTU. Vendor shall provide all the RS 485 configuration details to RTU vendors/client/consultant required for configuration. Vendor shall also provide their support during configuration.

Note -FRLS (Fire resistant low smoke) cables shall be used for gas detectors, flame &multisensory detectors and emergency push buttons.

Complete scope of supply, erection and commissioning of all electrical cables will be in the scope of vendor. Actual length will vary as per site conditions & drawings . It is bidder's responsibility to provide required length of cable including the loop of approx.15 mtrs arrangement.

4.22 NRV as required for smooth operation.

4.23 Structural supports within the compressor package for all piping, electrical, instruments etc.

4.24 One no. relief valve at each stage discharge, first (1st) stage suction.

4.25 Mechanical Float to be provided in Water tank for provision of Automatic water filling.

4.26 Coupling/V-belts/pulleys.

4.27 Common automatic CO2 extinguishing system consisting of two cylinders, piping, valves and control systems as per details given in this specification.

4.28 Inlet and outlet manual and automatic isolating valves for maintenance & emergency.

4.29 The provision for overhead mounting of cascade (3000 Water Liter capacity with approximate weight of 7.5 tons) should be there & same should be of enough strength having working space of 0.6 mtrd, safety grills and with ladder arrangement.

However, cascade supply shall be in scope of purchaser. Structure Stability compliance Certificate of the unit where cascade will be mounted to be submitted during detail engineering.

4.30 LCV filling hose (Synflex / Parker / Eaton) with Breakaway (OPW/PARKER/Staubli) & Quick Release Coupling (QRC) (01 set per compressor package) shall be in bidder's scope of supply. LCV filling Hose shall be of minimum 4.5 mtrs. long and shall have ½ "Parker make Quick Release Coupling (QRC) connected to it to be provided by the bidder. Long refilling Hose (3.5 Mtr. before Break Away + 1 Mtr. after Break Away) should be provided with protective guard. Hose crimp to be provided with protective sleeve. Hose crimp should be of SS and have protection Sleeve. Filling post to be supplied with 4" Pressure Gauge for pressure monitoring of CNG. Supply & Installation of Filling Post (150 MM wide & 3mtr in height) and Hose Assembly with Breakaway / QRC shall be in bidder's scope. Cost of these items shall be included in supply cost of the booster compressor and no separate payment shall be given for these items. Hose will be installed with a ¾" OD Three Way Ball Valve. Bidder to select end connection of Hose accordingly.

If any item such as fittings/valves is not listed above i.e. required to complete the assembly of LCV fill post, same shall be supplied by bidder. Bidder to submit P&ID of LCV post assembly for approval.

4.31 Complete Erection, Testing & Commissioning of compressor packages.

4.32 Field Performance test at site.

4.33 Supply of all essential spares as specified, erection & commissioning spares.

4.34 One set of spare parts catalogue along with the un priced bid, as built drawings and

Operation & Maintenance catalogue with each compressor package.

4.35 Closed circuit cooling water system (console type)/Air cooled as required including heat exchangers, coolant circulation system, fan operated radiator, etc. for inter stage and final cooling of compressed gas, lubrication oil and hydraulic oil.

4.36 Priority refueling system outside of the package or as per vendor's design.

4.37 Drive belt, if used shall be anti-static fire-retardant type.

4.38 Wires mesh type guard for heat exchanger fan.

4.39 Erection, O&M and all others relevant manuals for compressor & its accessories, priority panel, electrical motor & all field instruments.

4.40 CAMC during one year warranty & comprehensive Maintenance services for a period of four (4) years after the warranty period including supply of all spares and consumable items.

4.41 Exclusions

The following are excluded from the scope of the bidder:

- All civil works, however the bidder shall furnish all the relevant data for design of any pedestal/foundation. Grouting of equipment including supply of material is a part of erection and is in scope of bidder/Supplier.
- CNG Storage cascade.
- CNG Dispensers

5.0 BATTERY LIMITS

5.1 All customer interface connections (i.e. Gas inlet & gas outlet) shall be brought out to the package edge. Gas inlet shall be terminated in nozzles with isolation valves having flange connections and gas outlet (priority panel outlet connection) shall be terminated through high pressure ¾" full flow ball valves with 3/4" end connectors.

5.2 As and where specified on the data sheets all vents (i.e. Relief valve, distance piece, packing and starting air) shall be manifolded and terminated at skid edge outside the enclosure and vented to safe height 3Mtrs at package roof. Silencer has to be provided in the starting air vent line.

5.3 All drains from different process equipment's, shall be manifolded and terminated as single point for customer interface duly flanged with isolation valve. Drains should be through a common header and discharge to be allowed in a pit to avoid spillage around compressor package.

5.4 Electronics/Instrument earth pit shall be constructed by Owner. Owner shall give instrument earth in UPS DB in separate core of cable. Wherever the UPS supply is given, instrument earthing shall be given by third core. For body earthing of compressor and its equipment's; Earthing shall be given from earth grid. Earth gird

shall be in scope of owner. Owner's earthing main ring shall be made available at compressor foundation for equipment earthing. Electrical earthing for motor shall be done through Cable and the body earthing to be done through GI strip of 25 x 3 inside the compressor package shall be in the bidder's scope.

6.0 UTILITIES

6.1 Bidder to provide Instrument air with an electric motor driven air compressor with a suitably sized receiver & Refrigerant/ Heatless type air drier system. The instrumentation air shall also be used for CNG Dispensers if required. Hence the system to be designed considering the same.

6.2 Air Compressor with discharge pressure of 10 kg/cm2 suitable for 1.5 KW electric motor rating with dryer shall be supplied by the bidder.

6.3 Air Compressor to be supplied along with air receiver of min. 100 water litre capacity.

6.4 Air dryer suitable for automatic operation shall also be supplied along with all accessories.

6.5 Air compressor, drier and air receiver for instrument air, shall be kept off the package in safe area or owner's building, however if it is placed inside the canopy of Booster compressor then same shall have flameproof equipment's approved from PESO. In both the cases bidder has to supply flameproof motor and equipment's approved from PESO.

In case, Air compressor is placed outside Booster compressor package canopy then separate Canopy shall be provided to cover the complete Air compressor assembly including Air dryer, Air receiver etc.

6.6 Drain should be through a common header and discharge to be allowed in pot outside the package (capacity not more than 2.5 litres) to avoid spillage around the compressor package.

6.7 Manual drains and automatic moisture trap shall be provided in the system.

6.8 Air receiver shall be provided as provided with SRV, Pressure switch and pressure gauge shall have isolation valve. Air dryer shall be with bypass pass arrangement.

6.9 Tapping from air receiver and dryer shall be provided as follows;

For dispenser: one ½ "tapping with isolation valve from air receiver

For booster compressor: one ½ "tapping with isolation valve from air receivers.

6.10 Cooling water is not available as utility and the package shall be provided with self-sufficient cooling water system for compressor as required, with makeup tank.

6.11 All electrical and instrumentation terminals shall be as specified.

6.12 Electric Power shall be made available by Purchaser.

6.13 Purchaser shall provide 415 V, 3Ph, 50Hz, 4 wire electric power for running the

compressor and illumination in the electrical room. Supplier shall indicate power/ Feeder (KW/Amp) requirement in the offer, if different. All cabling (supply & laying) from electrical room to booster compressor shall be in bidder's scope. Bidder shall indicate power /Feeder (KW/Amp) requirement in the offer and shall supply power KWH meter for power consumption of the complete package including all accessories to be installed in the control panel. KWH reading shall be available at HMI.

6.14 Bidder has to provide UPS (230±5%V, 50±1%Hz) for control supply requirement at single point (Control Panel). Supply of suitable UPS considering load of 02 CNG dispensers along with 01 hour back up is in the scope of the bidder.

6.15 All cabling (supply & laying) from electrical room (BGL's SDB panel) to booster compressor shall be in bidder's scope. Bidder shall indicate power Feeder (KW/Amp) requirement in the offer. Surge protection devices of Schneider/MTL/Phoenix make shall be provided in the control panel.

7.0 GENERAL DESCRIPTION

A. GENERAL DATA

1.1	Compressor type	
1.1.1	Oil lubricated	
1.2	Type of cooling	Gas cooling and cylinder cooling should be as per manufacturer design. Ref. cl.no.4.35 & 9.6
1.3	No of compression stages	02
1.4	Cylinders	As per manufacturer design
1.5	Intake temperature	35°C- 45°C
1.6	Compressor package BKW at Specified flow including all losses such as mechanical, leakage, transmission & power absorbed by compressor driven and other electric driven auxiliaries.	To be indicated in KW Detailed break up to be given as per Annexure –I
1.7	Maximum motor power	To be indicated with 10 % margin over BKW as per Annexure –I

B. COMPRESSOR PERFORMANCE DATA

2.1	Gas pressure at compressor inlet	Refer below Section 2.5
2.2	Compressor Discharge Pressure	250 Kg/Cm² g at 52 deg. C (Max)

		Compressor Discharge temperature 52 ºC (After cooler) with max. ambient air temperature of 47.5ºC and gas inlet temperature of 35ºC-45 ºC (max.).	
2.3	Compressor speed	To be indicated by bidder.	
2.4	Ambient Conditions		
2.4.1	Ambient temperature	2 ºC to 47.5 ºC.	
2.4.2	Maximum relative humidity	90 %	
2.5	Required guaranteed capacities of electric motor driven compressor packages at rated suction pressure and discharge pressure as mentioned below:		
	Rated Suction pressure at which guaranteed flow is required, and at 35-45 deg. C (MAX), in Kg/Cm^2 g.	Rated Discharge pressure in Kg/Cm^2 g and at 52 deg C (MAX.)	Guaranteed capacity at rated suction and discharge pressure in Sm3/hr (SCMH)
	30 to 200	**250**	**400**

Hereinafter the rated suction pressure, where guaranteed flow is required, will be referred to as Rated Suction Pressure range from 30 to 200 Kg/Cm^2g at varying on continuous compressors. Suction pressures will be measured at inlet flange of the compressor package. Bidder has to ensure that compressors are designed such that the desired flow is achieved (without any negative tolerance) at Rated Suction Pressure.

Note:

a) No advantage shall be given in case bidder offers compressor with flows higher than as detailed above for various types.

b) Bidders offer shall be based on firm and final compressor model on which basis the offer shall be evaluated and no alternate compressor model or change of model, after submission of bid shall be entertained / considered. This is very important, and all bidders shall take full cognizance of this matter before submitting the bid.

c) Bidder to indicate the capacity and absorbed power of the offered compressors at various suction conditions starting from 30 to 200 Kg/Cm2g (Temperature 35-45 deg C max.) and 255 Kg/Cm2g and 52 deg. C (max) discharge condition.

Performance curves and tables i.e. Flow versus suction pressure and temperature and power curves i.e. absorbed power versus suction pressure and temperature at specified discharge conditions shall be furnished. In addition to above, flow capacity and absorbed power values for suction conditions from 30 to 200 Kg/Cm2g in steps of 0.5 Kg/Cm2 shall also be given in tabular form. The graph shall be plotted at various suction pressures ranging from 30 to 200 Kg/Cm2g and at various suction temperatures ranging from 20° to 40°C.

Similarly, the graphs shall be plotted at various discharge pressures ranging from 220 Kg/Cm2g to 250 Kg/Cm2g, however at 52° C (max) discharge conditions.

d) Bidder to note that the compressor package required shall be suitable for operating at a suction pressure from 30 Kg/Cm2g to 200 Kg/Cm2g at 35-45 deg. C.

Bidder to note that negative tolerance on the guaranteed capacity will not be acceptable. Also, no advantage shall be given for positive tolerance of the capacity.

8.0 SAFETY

a) All controls shall operate in a fail-safe mode i.e. failure of any control shall not lead to running of equipment in unsafe mode. Fail safe control shall be available through hardware for all trips & also in software. The Compressor Package shall trip if any of the enclosure is opened while the machine is running.

b) The hazardous area classification Class-I, Division I, Group D as per NEC or Zone I, Group II A/ II B as per IS/ IEC. Certificate from recognized agency to the effect that equipment supplied and/or installed conform to above area classification. All Devices shall meet the requirement for the specified area classification in which they are installed, including instrumentation leads.

c) Bidder needs to submit copy of valid type approval for proposed compressor packages (Model) from PESO along with the bid.

d) All exposed rotating parts shall be provided with adequate guards of non-sparking type.

e) Driver belt if used shall be of anti-static and fire-resistant type.

f) Piping shall be arranged in a manner so as to provide clear headroom and accessibility within the package. Adequate clearances shall be provided for all the engineered components.

g) All material used in the package shall be flame retardant.

h) Relief valves shall be provided at suction and discharge and each inter stages of compressor with setting as per cl.7.20.4 of API-618 with R.V. venting as per cl. 7.20.4 of API-618. All vented to common relief valve header.

i) Provide all the required warning notices, barriers, safety boards, padlocks etc, for safe commissioning of the equipment's.

8.1 Carbon Dioxide (CO2) Flooding System

a) CO2 flooding system should be installed for the protection of CNG compressor by automatic actuation system. The package should be protected by automatic operated CO2 flooding system designed as per NFPA-12.

- Gas Detection by installation of hydrocarbon gas detector (IR type) with self-check function and transmitter with adjustable alarm levels (0-100%) with preset of 10%, 20% and 40%.
- Installation of flame detector (UV-IR type) with self-check function & transmitter and multi sensor detectors, alarm on detection shall be provided. Self-check function to generate fault alarm and trip alarm in case of flame detection Indication lamp shall be provided for fault and trip signal in PLC.
- CO2 flooding system will consist of Min 2 nos. brand new CO2 cylinders of adequate capacity (should not be less than 22.5 Kg each). However actual size of the cylinder shall be as per compressor enclosure size and necessary calculation shall be submitted and approval shall be taken before finalization / supply. One cylinder will act as main & other as stand by, which shall have identical arrangement and connected to the system.
- The cylinders should be placed in a shed raised above ground level to protect from weather and direct sunrays as per Gas Cylinder Rules, 2016.
- Cylinders shall be fitted with automatic actuated Valves, Solenoid valves for automatic actuation No extra utility as air, and inert Gas shall be made available by OWNER /used by the supplier to operate the system other than the UPS.
- Cylinder should be ISI marked as per IS: 7285 and CCOE approved.
- Control philosophy shall be such that in case detection of fire by fire detector cylinder shall discharge CO2 automatically.
- Online weight measurement system for cylinders shall be provided.

b) The System shall be designed to operate on 24 V DC supply.

c) FRLS (Fire resistant low smoke) cables shall be used for the wiring of the system.

d) Interlock of CO2 Flooding system with compressor as per following sequence:

- Compressor shall trip on detection of gas at preset level .
- Compressor shall trip on detection of flame at preset level and automatic discharge of CO2 gas shall take place from the main cylinder simultaneously. Compressor shall not start if the CO2 Flooding System is faulty, not working, SWITCHED OFF etc.
- Compressor shall not start if the CO2 flooding system is faulty, not working,

SWITCHED OFF etc. The compressor shall be able to start only when the CO2 Flooding System is in healthy working condition.

- Maintenance Override Switch shall be provided to keep the system off during maintenance.
- Selector switch shall be provided to put Main/Stand by Cylinder in line at the turn of a switch as per requirement.

e) Alarm panel for CO2 Flooding System shall be integral with the main compressor panel. Necessary displays as system ON, OFF, FAULT, RESET, Gas/ Flame indication, Remote actuation of solenoid valve, distinguished hooter etc., shall be provided for CO2 flooding system.

f) CO2 Cylinders shall be provided outside the package at a safe place, where it is not exposed to fire in case of fire in the compressor. Facility shall be made to operate the system both manually and also from remote with the help of a switch/ call point and with help of pull down lever on cylinders.

g) Suitable online weight (CO2) loss monitoring/ indication device to be provided to ascertain the health of the CO2 flooding system.

h) All installation shall be compatible for hazardous area Class 1, Division 1, Group-D for Methane Gas.

i) One Blinking aviation lamp shall be provided at the top of compressor canopy suitable for hazardous area for fire indication.

j) The system designed by the supplier shall be duly approved by Owner/ Owner's representative.

k) Technical specifications, Operation and Maintenance Manual, CCOE Certificate, Approval/ Manufacturing certificates for cylinders and cylinder valves, gas detectors, flame detectors, solenoid valves etc. shall be furnished by the supplier along with system.

l) Software and hardware, calibration procedure shall be provided by the supplier along with the supply sufficient enough to handle the system independently.

m) Necessary tools (1 set) shall be provided with the system.

n) System shall be offered for testing to OWNER by the supplier after commissioning at site by creating actual Gas leak and Gas fire situations and actual discharge of CO2 Gas from the Cylinders. This shall form a part of performance test and thereby acceptance of the package. The cylinders have to be refilled by the vendor at no extra cost to OWNER after performance test. If the system fails during testing, subsequent testing and refilling would be at vendor's cost.

o) Warning and Operating instructions to be displayed at equipment as per the statutory/

safety regulations.

p) Piping of CO2 flooding system shall be seamless high pressure pipe of Schedule 40 of 50 mm dia of appropriate length with a minimum safe distance of 4 Meter from CNG Compressor, The fittings like elbows, Tees, Union, sockets should be of same schedule and capacity for installation in a high pressure system as per NFPA-12.

q) Flameproof online weighing system, complete frame with shed and all accessories should be of good quality, weighing scale should be of reputed make.

r) Specifications:

Non Return Valve for CO2 High Pressure Hose: As per BIS specifications
Operating Media: CO2
Body Material: Brass, BIS: 319 Ball: SS 316
Pin: SS 316
Seal: Teflon (PTFE)

Working Pr.: 60 Kg/cm2
Test Pressure: 90 Kg/cm2 for 1 min Weight: 70gm
Outlet Size: ¾ BSP at manifold end
Inlet Size: ½" BSP at CO2 Discharge Hose end Temp. Range: -29° C to 66° C
Hose Adopter:
As per BIS specifications Operating Media: CO2
Body Material: Mainly Brass Test Pressure: 250 Kg/cm2
Max. Working Load: 150 Kg/cm2 Temp. Range: -29° C to 66° C Discharge Nozzle:
As per BIS specifications Operating Media: CO2
Body Material: Leaded Tin Bronze as per BIS: 318:1981 Design Nozzle Pr.: Not less than 20.6 kgf/cm2 at 27° C Test Pressure: 140 kgf/cm2
Marking for Code No. (on the basis of equivalent single orifice dia.): As per BIS: 6382:1982 Temp. Range: -29° C to 66° C
High Pressure Hoses:
As per BIS 7285:1974
Operating Media: CO2
Hose Type: Double wire breaded (perforated) rubber covered Min. Bursting Pr.: 420 kgf/ cm2 at 54° C
Length: 40 cm Cross-section: ½"
End Connection: ½" BSP (F) xW21.614 TPI End Fittings: Brass

Temp. Range: -29° C to 66° C

8.2 Following warning and caution signage shall be marked on the housing/package:

"No Smoking"

Caution notice "This Machine may automatically start at any time".

"Flammable Gas"

9.0 BASIC DESIGN CRITERIA OF COMPRESSOR

9.1 Following specification is intended to give the bidder the technical and operating conditions the compressor must fulfil. Compressor shall be hydraulic booster type suitable for variable suction pressure.

9.2 The bidder shall meet all applicable statutory codes, national law and local regulation for safety and environment protection.

9.3 The design shall conform to API 618 or other relevant reputed international standards but approved by CCOE (bidders to indicate).

9.4 Offered package shall be complete with compressor, electric motor, hydraulic pump and piping, cooling system, suction and discharge filters, controls panel safety and control devices and other accessories required for automatic and safe operation the system.

9.5 The supply shall include all interconnecting piping/tubing/cables.

9.6 Cooling system shall be of closed circuit type. Ultimate cooling shall be by air.

9.7 The compressor package control system shall be designed for unattended safe operation in automatic mode and shall unload, start, load, stop safely.

9.8 The compressor shall start in auto in case high bank pressure in dispenser falls below 200 kg/cm2 and stop once the pressure in all three banks reaches to 250 kg/cm2.

9.9 Compressor shall be suitable for continuously variable suction pressure from 200 kg/cm2g to 30 kg/cm2g, supplied through LCV mounted CNG storage cascade.

9.10 Compressor should also stops when suction pressure falls below 30kg/cm2g.

9.11 Compressor shall be suitable for discharge pressure from 250 kg/cm2 to 220 kg/cm2, corresponding to suction of 200 kg/cm2g to 30 kg/cm2g.

9.12 Compressor shall be designed to ensure flow capacity as indicated in data sheet

9.13 Due to space constraint, we will be installing the stationary cascade (capacity 3000 WL) of 7.5 tons (7500 kgs) on the top of the canopy of compressor. the bidder will therefore design the canopy to take the load of a stationary cascade of 7.5 tons. The bidder shall also provide 2 nos. stair case/ladders (in line with the gas cylinder rules) for safe climbing on the top of the

canopy along with hand railing on the top for ease maintenance and operation. Provision should be made such that, the cascade can be placed anywhere above the canopy. The bidder shall ensure that adequate space (minimum 2 feet width) walk way in front side of cascades (i.e valve mounting side) is available for carrying out routine checking/ Maintenance.

9.14 Priority Fill System:

9.15 Vendor shall provide PLC Controlled Priority fill system with compressor top-up facility inclusive of regulating valves by pass valve & liquid filled pressure gauges all mounted in a stainless steel structural.

The priority fill system is to be installed to ensure that vehicle filling takes priority over cascade filling and direct CNG TO THREE STORAGE BANKS IN CORRECT SEQUENCE.

The compressor shall shut down once all three-cascade storage banks are filled to 250 Kg/cm2 g.

Compressor shall start on pressing of manual start push button & automatically when the cascade storage high bank pressure of compressor falls to 200 Kg/cm2 g and shutdown automatically when all 3 stages of stationary cascade are filled to a pressure of 250 Kg/cm2 g

Full bore ball valves shall be provided so that compressor can take suction either from LCV cascade or stationary cascade.

All fittings and tubes used in priority system shall be of stainless steel of suitable pressure rating. End connections shall be 3\4" size pipe OD.

Priority panel shall be of 3 Bank priority panel along with emergency actuators.

9.16 CASE – I : Valves positioned to take suction from LCV cascade.

a) If the LCV cascade pressure is more than 200 kg/cm2, the gas dispensing should take place directly from LCV to dispenser bypassing booster compressor.

b) Compressor shall start on pressing of manual push button or auto start when the LCV Cascade and Stationary cascade at all banks pressure falls below 200 kg/cm2. The priority of filling shall be as follows;

- First priority: Priority panel shall first fill the vehicle through dispenser
- Second priority: If no vehicle is to be fuelled, priority panel shall fill the stationary cascade. The compressor shall shutdown automatically when either all stages of stationary cascade

are filled to a pressure of 250 kg/cm2 or pressure in mobile cascade is less than 30 kg/cm 2.

9.17CASE – II : Valves positioned to take suction from Stationary cascade.

a. Dispensing shall be done through stationary cascade without compressor running, if stationary cascade pressure is more than 200 kg/cm2.

b. Compressor shall start on pressing of manual/auto start push button if stationary cascade pressure is less than 200 kg/c m2. Dispensing into the vehicle should take place as usual. Compressor shall trip if either there is no vehicle for fuelling or pressure in stationary cascade is less than 30 kg/cm2.

Note: Automatic selector switch shall be provided at Booster compressor panel to switch valve positioning as per above Case I and Case II.

9.18 The compressor package control system shall be designed for unattended safe operation in automatic mode and shall unload, start, load, stop safely. The compressor shall start in auto in case high bank storage pressure falls below 200 Kg/cm2 g and stop once the pressure in all three banks of storage cascade reaches 250 Kg/cm2 g.

9.19 Noise level shall not exceed 75 + 3 dBA at 1m from the compressor package enclosure.

9.20 The compressor package control system shall be so designed that the first item to go into alarm condition shall "Lock out" to indicate the cause of the trip though the cause of the trip may have disappeared. The lock out condition shall be manually reset.

9.21An automatic restart shall be provided on restoration of power with a 10-second delay after temporary interruption. Existing alarm condition shall remain indicated.

9.22 Prime mover (Electric Motor)

The motor shall be flame proof/ explosion proof and confirm to IS: 2148 & IEC 60079-1 suitable for zone 1 group II area as per IS/IEC. The Motor shall be of standard frame size as per IS/IEC and rated for continuous duty with high efficiency and shall be designed for star-delta starting. The Motor shall be provided with class 'F' insulation, however, temperature rise shall be limited to the temperature specified for class 'B' insulation as per IS and shall be suitable for voltage variation of 415V+ 10%. The bidder shall indicate the guaranteed total power requirement in KW. The motor rating shall be 110% of the greatest BKW required by the compressor.

9.23 Motor Specification

Electric Motor

a) Type of drive Totally Enclose Fan Cooled (TEFC) high efficiency as per IEEMA standard-19-2000

b) Protection Flame proof & weather proof enclosure

c) Insulation Class F with class B temperature rise

d) Mounting Horizontal Foot Mounting

e) Specification standard By Bidder

f) Supply Voltage(assumed) 415+ 10% volt, 3 phases,50+ 5%Hz

g) Synchronous speed By bidder

h) Motor rating By bidder

i) Motor Efficiency By Bidder

j) Power factor By Bidder

k) Speed of motor By Bidder

l) Nos. of hot starts of motor 2 hot and 3 cold starts per hour

m) Coupling Type By Bidder

n) Torque speed cure By Bidder

o) starting torque, speed, thermal withstand curve load, current speed curve, Efficiency power factor vs load curve by Bidder

Motor Accessories

a) Compressor grooved flywheel (if any)

b) Motor grooved drive pulley (if any)

c) Drive VEE belts(if any)

d) Flexible coupling for direct drive

e) Drive guard

f) Adjustable motor slide rails for belts tensioning to be used (if any)

9.24 Cooling system

Each compressor package shall be complete with its own cooling system. The cooler shall be air-cooled heat exchanger. The gas temperature after after-cooler shall not exceed 52 degree C.

Special attention to be given while designing the gas cooler considering the local conditions. Bidders shall ensure that final delivered gas temperature is less than 520C. Cooler design shall be on the basis of 10% extra load corresponding to maximum severe operating conditions based on thermal duty. Gas cooler shall be design as per manufacturer standard.

For cooling of the heat exchanger a cooling fan to be provided.

Cooling system to be in a single enclosure. Bidder to submit cooling sizing calculation for review.

Direction of flow should be marked on the pipe line and nomenclature of all vessels (e.g. 1st stage discharge dampener etc.) should be written on them. Cross head inspection windows if applicable should be transparent for ease of inspection during running. Set values should be prominently marked on the gauges.

Packages design should be such that its vent should not go upward (package vent in vertical direction not required) i.e opening of package vent should be in horizontal directional with duct arrangement.

9.25 Oil Filter

The ingress of oil into CNG adversely effects vehicle emission and storage system. If required, Contractor to supply a proven, maintenance free oil removal system after after–cooler to remove oil from compressed gas. The offered oil mist removal system shall restrict the oil to less than 5PPM in discharge of compressor.

9.26 Gas recovery system

If required, the Contractor shall provide gas recovery system with gas recovery vessel. The gas recovery vessel shall be provided with pressure relief valve and necessary instrumentation to avoid cold flaring of gas. Gas recovery vessel shall be ASME/IBR code designed.

9.27 Piping & Appurtenances

The materials for gas piping shall be seamless carbon steel of ASTM A-106 Grade B. The piping / tubing at the outlet of the compressor and of priority fill system shall be of seamless stainless steel of proper pressure rating and specifications as under:

SS TUBING SPECIFICATIONS:

- Seamless SS Tubing
- Material of construction Stainless Steel 316L
- Tube hardness shall be less than 80 RB
- Sizes: Metric system (inch)
- Max Working Pressure: 350 Kg/cm2 g

SS FITTINGS & VALVES SPECIFICATIONS:

- Material of construction Stainless Steel 316
- Sizes: Metric/SI
- Standard: ASTM/ ASME/ DIM
- End connections: Single or Double ferrule Compression type / NPT
- Max Working Pressure: 350 Kg/cm2 g
- PSV Vent Line to be extended above the package to safe height.
- Priority system should be designed so that the gas flow from mobile cascade to dispenser is possible even with the Compressor shutdown & de-energized
- Dedicated Air compressor of adequate capacity

9.28 Electrical System

- All electrical equipment of compressor package shall be installed in accordance with NFPA 70, NEC for Class 1, Division 1, Group D, and IS 5571 and shall have approval of a recognized certifying authority.
- OWNER shall provide 415+ 10% volts, 3 phase and 50+ 3% Hz electrical supply at CNG station electrical panel only. Vendor shall take connection from CNG station electrical panel and distribute electrical power to all equipment and control system by providing cables and suitable switch-gear distribution panel.
- The electrical power supply distribution panel, switch gear panel and starter shall be in flame proof construction. Certificate from recognized agency to the effect that equipment supplied and or installed conform to above area classification. All devices shall meet the requirement for the specified area classification in which they are installed, including instrumentation leads.
- Semiconductor fuses to be provided, where applicable.

- All illumination fittings should be single phase AC supply based and LED type only.
- All wire/ cable to be used in compressor and panel shall be of copper conductor and FRLS type through proper cable tray conduit etc.
- Sufficient space to be provided for Motor JB for cable glanding work.
- Chain pulley to be provided in package for easy extraction of motor from package
- Multifunction meter to be provided for metering of package total energy and other parameters (viz; KVAH, KWH, Voltage, current, PF, Frequency, MDI (KVA), MD (KWH).
- Bidder to ensure that spares and service support of all switchgears, instruments, or meter etc. used in package/ panel, shall be available in Indian market.
- The power factor (PF) of the whole electrical system should not be below 0.95.
- Motor feeder shall be provided with energy meter, heavy duty switch, HRC link type with single phase presenter fuses, contractors (AC-3 Duty), bi-metal relay switch fuse unit, voltmeter, push buttons, earth leakage relays, indication lamps for start/stop/trip/ etc. Ammeters shall be provided for all motors above 3.7 KW rating. Stop push buttons shall be lockable and have stay put except in case of critical devices such as lube oil pumps etc.
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9.29 Earthing System

The design & installation of earthing system shall be as per IS 3043 or equivalent international specification. One or more no of earth plates with provision of inter connection to main earth grid shall be provided. All hardware used for earthing system shall be hot dip galvanized or zinc passivated.

All cables shall be terminated at equipment by means of double compression type compression glands and shall be flame proof cable glands if located in hazardous area.

9.30 Phase sequence preventer (current based) shall be provided.

9.31 Vibration

Compressor maximum vibration of cylinders shall not exceed 10 mm/sec unfiltered peak velocity. Maximum vibration level of installed compressor frame shall not exceed an unfiltered peak velocity of 5mm/sec or as per IEC Code unfiltered peak-to-peak vibration whichever is less. The bidder shall provide for all structural support within the package so that these levels can be achieved.

10.0 INSTRUMENTATION & CONTROLS

10.1 All the Instruments and Control Shall Be Suitable for Area Class I, Group D, Division1.

10.2 All package mounted transmitters & temperature elements, flow transmitter shall be intrinsic safe as per IEC 79-11 and solenoid valves, switches and related junction boxes shall be flame proof 'd' as per IEC 79-1. Other special equipment / instrument, where intrinsic safety is not feasible or available, shall be flame proof/ explosion proof as per IEC 79-1.

10.3 PG shall be Direct-mounting type having element of bourdon tube and dial size of 100 mm. It shall have shatterproof glass. Connection shall be ½" NPT (M) from bottom. Enclosure shall be weatherproof to IP65. Protection shall be 130% over range. Accuracy shall be ±1% of FSD. PG shall have blown out disc facility. For higher pressure applications (above 60 Barg), it shall be solid front type. Pressure gauge dial shall be white, non-rusting plastic with black figures. The dial face shall be marked with pressure element material. Pointers shall have micrometer adjustment. Pressure gauge sensing element shall be of SS 316 and moving elements of SS 304, as a minimum.

10.4 The temperature gauge shall be generally gas field in steel field type /bimetallic type. Capillary tubing shall be min. SS304 with SS flexible armouring. The gauge shall have an accuracy of +1% FSD and 100mm dial size. The range shall be 1.5 times of operating temperature. Skin type temperature gauges shall not be used.

10.5 Pressure Transmitter and Temperature Transmitters shall be used for CNG Gas application with 4-20 mA output signals to PLC. Ex proof enclosure. The units of measurement for pressure shall be Kg/cm2 (g)/Barg and temperature shall be degree C. Pressure and temperature switches are not acceptable.

10.6 RTDs are 4 wire type and element shall be Pt100 as per DIN 43760 & accuracy class A and thermo well's immersion length shall be suitable for the line size. All RTDs shall have duplex elements. RTDs sheath OD shall be 8 mm and material SS 316. Cable entry shall be ½" NPT (F). Enclosure shall be WP to IP-65. All RTD shall be supplied with flange or socket welded type thermowell. Thermowell shall be SS316, drilled bar stock type. 50% insertion inside the pipe from top shall be considered for calculating wake frequency calculation. This calculation shall be submitted along with data sheet for approval.

10.7 Coriolis type mass flow meter with element, transmitter and integrated display shall be provided at outlet of compressor. All the electronic shall be Ex proof or intrinsically safe. Accuracy shall be ±0.5%. Refer data sheet enclosed with tender document.

10.8 Calibration certificates required for all instruments such as Mass Flow Meter, Pressure transmitters, Pressure gauges, Temperature gauges, Temperature transmitters, Gas detectors, Flame detectors etc.

10.9 Refer data sheet of gas detectors and flame detectors enclosed with this

document. Gas detectors and flame detectors should be mounted with the canopy.

10.10 PLC CABINET

10.10.1 PLC cabinet shall be ex proof, Zone 1 & 2, gas group IIA & IIB, weatherproof min IP 65. Día cast aluminum alloy LM 6 MOC with Inside & outside epoxy powder coating, with shade RAL 7032, gasket neoprene rubber with single door, glass arrangement for HMI view. Panel shall be provided is Ex proof cable gland. 10% spare gland entry of each size with SS plug.

10.10.2 Panel shall be complete with start, stop push buttons, alarm acknowledge, alarm rest & test button for checking healthiness of annunciation system, HMI, power on, fault indication lamps, fault reset button. All necessary timers and intrinsically safe relays to control the system on an automatic starting and stopping basis shall be provided. The compressor package control system shall be designed for unattended operation in automatic mode and in case of any fault it will go in a safe mode.

10.10.3 Redundant 230 V AC to 24 V DC power supply unit shall be provided with diode circuit for auto switch over. Healthiness of both the PSUs shall be provided in front of cabinet and same shall be repeated in PLC for failure of alarm.

10.10.4 In additional to inbuild in PLC, surge protection device for 24 V DC, 230 V AC UPS power supply, 230 V AC non-UPS power supply at inlet shall be provided in cabinet.

10.10.5 Compressor package shall be provided with a PLC based local control with HMI for local operation & monitoring, which shall be mounted on the package enclosure. All the interlock, monitoring and controlling of the CNG compressor package shall be done through PLC based control system.

10.11 PLC SPECIFICATION

10.11.1 PLC hardware shall be in accordance with IEC-61131. PLC shall be 32 bit microprocessor, min 8 MB RAM, and support to protocols DNP 3.0 over TCP/IP, DNP 3.0 Over modbus, Modbus (TCP/IP).etc as min

10.11.2 PLC shall be of modular in construction, rack for mounting cards, CPU, Input output cards, Power supply card, communication card. PLC CPU shall be redundant (1 W+1S) with auto switch over without manual intervene. Failure alarm of CPU shall be provided in HMI and same shall be repeated in PLC for remote monitoring.

10.11.3 PLC shall be suitable for controlling of compressor parameters as indicated in instrumentation and all other parameters that are recommended by the compressor

manufacturer for 24x7 operation. PLC shall be suitable interfacing port for Laptop for programing, configuration and diagnosis. Type of communication with laptop shall support upto 30 mtrs distance from compressor to safe area.

10.11.4 A dedicated Modbus (RS 485) slave communication port shall be provided for Remote terminal unit (RTU) interface. A separate Modbus TCP/IP communication ports shall be provided for GPRS modem for communication with SCADA system.

10.11.5 All the parameters shall be time stamped in PLC. It shall be possible to synchronize PLC clock with GPS system.

10.11.6 PLC shall be 20% spare each type of input output channels for future use. All these IOs shall be wired upto the spare terminal block inside the PLC cabinet. Diagnosis feature shall be available in CPU and I /O used in PLC.

The PLC/RTU shall comprise the following subsystems:

- Redundant Central processor with system software.
- Power supply unit
- Analogue input
- Contact (digital) input
- Contact (digital) output
- Modbus Serial ports configurable (RS 232/485)
- Ethernet port
- Diagnostic port

10.11.7 The Digital Output shall be configured for pulse duration. No separate program or logic will be acceptable at PLC end. On restart/ power failure, PLC shall not reset the output circuit, shall not generate false control signal and shall necessarily cancel all pending control signal.

10.11.8 Configurator software licenses shall be preferred in software (software key) form instead of hardware (dongle). Multiuser software licenses shall be provided.

10.11.9 Suitable bypass for interlocks shall be provided for start-up.

10.11.10 The compressor package control system shall be so designed that the first item to go into alarm condition shall lock out to indicate the cause of the trip though the cause of the trip may have disappeared. The lock out condition shall be manually reset. A change over set of contacts shall be provided for Owner's use to give a remote indication of alarm and trip.

10.11.11 In case of fault, a warning hooter shall operate, the sound of which should be audible at distance of at least 15 meters. Further the fault alarm and emergency stop PB

shall be duplicated in the CNG station control room.

Acknowledgement/resetting of fault shall be possible only from compressor panel. Emergency stop PBs shall be mushroom head turn lockable type. Once the fault is acknowledged or compressor is under normal maintenance, the valves of priority panel shall take the position so that gas available in the stationary CNG storage cascade can be dispensed

10.11.12 Configuration and diagnostic tool should be able to connect to remotely over TCP/IP.

10.11.13 Successful bidder to include in scope live demonstration of remote monitoring of all PLC logged parameters in one machine at his works. OWNER may ask for the same. However, this may be required to be demonstrated at site.

10.11.14 The PLC System offered shall be supplied with monitor and memory card for Processing of live data and stored data. PLC shall be capable of

a) All the process parameters as per P&ID
b) Compressor Control & Emergency Shut down
c) Fire and gas detection and monitoring
d) Graphics, Data acquisition, monitoring & logging, viewing, modifying set point and range of all process parameters for which transmitters are provided.
e) Record the last 20 Alarms of abnormal operations on separate page.
f) PLC shall be capable for display of flow meter data for flow rate and flow totalizer (i.e. Gas Suction, Gas Discharge) and power consumed by the motors, compressor running hour:

10.11.15 Compressor package shall be provided with the following indicators:

a) Pressure transmitter and pressure gauge at suction, discharge, cascade bank distribution header.
b) Pressure transmitter at high bank line
c) Pressure gauge & temperature gauge at each stage of compressor
d) Temperature transmitter at discharge.
e) MFM at suction & discharge
f) Oil pressure indicator on each pressure lubrication system
g) Oil levels indicator
h) Each compressor non resettable running hours calculation in PLC. Alarm shall be generated after preset point.
i) Compressor jacket water coolant temperature indicator on local gauge panel
j) Hydraulic oil cooler inlet & outlet temperature gauge
k) Hydraulic oil pressures each stage on local gauge panel (if required)
l) Air compressor discharge pressure transmitter

10.11.16 The Compressor package shall be provided with the following trip devices:

a) Low oil level protection devices
b) High oil temperature devices
c) Low suction pressure protection devices
d) High discharge temperature protection device
e) Coolant flow low devices
f) Flame detection
g) Gas detection
h) Emergency stop devices
i) Fail safe/ wire break alarm for safe operation
j) Interlocking provision in PLC program for tripping of machine

10.11.17 Compressor package shall be furnished with the following trip logic that shall stop the compressor and suction of compressor shall be isolated:

a) On high oil temperature
b) On low suction gas pressure
c) On high discharge pressure
d) On high discharge gas temperature
e) On coolant flow low
f) On fire detection
g) On gas detection
h) On pressing manual sop button at local control panel
i) On pressing emergency stop devices

10.11.18 Compressor package shall be furnished with following tripping circuit (the motor shall stop and suction of compressor shall be isolated)

a) On actuation of gas detector alarm.
b) On actuation of flame detection alarm.
c) On pressing of manual stop button at compressor package
d) On pushing of emergency stop device

10.11.19 Bidder has to provide a RTU to connect the compressor, dispenser and cascade in SCADA / IOT / or any other automation process.

10.12 EMERGENCY SHUT DOWN DEVICES

ESD button (5 Nos.) shall be provided (Control Room, Process Area, one side of compressor, electrical panel of compressor, electrical room, near dispenser, field/ fencing). A separate hooter for customer interface room shall be provided with annunciation window

alarm of individual protection device.
The emergency shut down (ESD) system is also in scope of vendor. A fail-safe system shall be designed and incorporated to isolate cascades storage from dispensers, stop compressor isolate the compressor suction storage line and cut off power supply on activation of ESD switch. This ESD switch shall have to be manually reset to restart the compressor package again. Red ESD button.

10.13 CABLE SPECIFICATION

Cables shall be Flame retardant low smoke (FRLS) type shall be used for all field instruments except ESD device. Voltage Grade of cables shall be 650/1100 V.
Fire resistance type for Fire detection fire detection system, ESD service, instruments used for ESD purpose, and ESD push buttons.
1T x 1.5mm² shall be used for gas detection system. Quad cable shall be used for RTD. 1P/2P x 1.5 mm2 shall be used from field instruments and 2/3 core x 1.5 mm2 /2,5mm2 for power to cabinet or SOV Multi pair cable individual and over all shielded shall be used for all the along signals and Multi pair over all shielded cable shall be used for all the digital input /output signals.

Single Pair and quad Shielded Cable:

Each core shall be 1.5 mm2 made of 7 stranded annealed electrolytic copper conductors. Each strand shall be 0.53 mm dia. For Intrinsically safe application, primary insulation shall be low density poly ethylene (LDPE). For non-intrinsically safe application, primary insulation shall be 85°C polyvinyl chloride (PVC) as per IS5831 Type C. Thickness shall be 0.5 mm minimum.
A pair shall have twisted cores and number of twists shall be not less than 10 per metre. Colour of core insulation shall be black blue in pair and black, blue and brown in triad.
Individual pair shall be shielded. Shield shall be Aluminium backed by Mylar/polyester tape with the metallic side down helically applied with either side 25% overlap and 100% coverage. Minimum shield thickness shall be 0.05 mm. Drain wire shall be 0.5 mm2 multi-strand bare tinned annealed copper conductor. The drain wire shall be in continuous contact with Aluminium side of the shield.
Inner and outer jacket shall be made of extruded flame retardant 90°C PVC to IS 5831-Type ST2. Oxygen index of PVC shall be over 30%. Temperature Index shall be over 250°C. The thickness of the jacket shall be as per IS-1554 Part 1.
Inner jacket colour shall be black. Outer jacket colour shall be black except, for cables to be used in intrinsically safe systems it shall be light blue. A rip cord shall be provided for inner jacket.
Armour over inner jacket shall be galvanized steel wire as per IS-1554 Part.
Multipair Cable with Individual Pair Shield and Overall Shield:

Generally, the cable shall be same as single pair shielded cable conductor sizes shall be 1.5 mm2 made of 7 strands of annealed electrolytic copper conductor. Each strand shall be of 0.53 mm dia.
Overall shield shall be of Aluminum backed up by Mylar/polyester tape helically applied with the metallic side down with either side 25% overlap and 100% coverage. Minimum shield thickness shall be 0.05 mm. Drain wire shall be similar to individual pair drain wire and shall be of the overall shield. Pair identification shall be with numbers at interval of not more than 250 mm as per vendor's standard.

Multipair/core Cable with only Overall Shield:
These cables shall be same as above except that the individual pair shall not have shielding.

Fire resistance cable:
Fire resistance cable will be multi core copper conductor, Mica tape with overlap as fire resistance layer Extruded XLPE insulated per IEC 60092-351, Braid of copper wires designed to act as collective screen, sheath as per 60092-359. Fire resistance cable shall be tested for fire resistant properties 750 Deg C for 3 hours as per IEC 60331-31.

Control Cable:
Single pair control cables shall be used between field mounted solenoid valves and junction boxes/local control panels. Multi pair control cables shall be used between junction boxes/local control panel and control room mounted devices in general. These cables shall have only overall shielding. These control cables shall have 1.5 sq mm conductor size with 7 stranded conductors of annealed electrolytic grade copper, with each strand of 0.53 mm diameter.

Power Supply Cables:
All power supply cables shall be as per IS-1554 Part I and shall have copper /aluminum conductors depending on conductor size. Power cables shall be 3-core, minimum 2.5 mm2 copper conductors with PVC insulation, galvanized steel armoring and overall PVC sheathing.

Earthing Cables:
Earthing cable shall be 1C x 6 mm2, outer sheet Yellow with Green strip, voltage grade 1100V. Annealed Bare Copper conductor, PVC insulated Un-armoured.

10.14 PRIORITY FILL SYSTEM

Contractor shall supply 6-line priority fill (3-bank) system with compressor top-up facility inclusive of regulating valves, check, bypass valves & liquid filled pressure gauges all mounted in a stainless-steel panel. All fittings and tubes used in priority system shall be of stainless steel of suitable pressure rating. The priority fill system is to be installed to ensure that vehicle filling takes priority over cascade filling and direct CNG to three storage banks

in correct sequence. The compressor shall shut down once all three-cascade storage banks are filled to 250 Kg/cm2 g. Compressor shall start on pressing of manual start push button & automatically when the cascade storage high bank pressure of compressor falls to 200 Kg/cm2 g and shutdown automatically when all 3 stages of stationery cascade are filled to a pressure of 255 Kg/cm2 g.

10.15 The priority fill system (In Bidder's scope) shall ensure the filling of vehicle, storage cascade in correct sequence. Control system shall be designed such that in case of any fault, discrepancy or abnormality, it will go in safe mode. All controls shall be made in fail-safe mode failure of any control shall not lead to operation of equipment in unsafe condition.

11.0 DOCUMENTS

Vendor shall submit documents during engineering stage for review & approval to client/consultant.

11.1 Specification /data sheet with statutory approval certificate, W&M certificate, PESO certificate of all the instruments as per P&ID, Bidder needs to submit copy of valid type approval for proposed compressor packages (Model) from PESO along with the all other documents.

11.2 Instrument index
11.3 Input output list
11.4 Power consumption calculation,
11.5 Cause & effect
11.6 Cables specification
11.7 Cable schedule with termination details
11.8 Operation & control philosophy
11.9 PLC specification & architecture.
11.10 Operation and Maintenance Manual (In English) – 02 Copies
11.11 Calibration certificates of all instruments & devices
11.12 P&ID with tag numbers for each item, line size, valve size, type of connection, instrument symbol connectivity with PLC, interlock number.
11.13 Bill of Material with Tag No & Technical Specifications
11.14 Wiring Diagram of Electrical & PLC Panel
11.15 Specifications of Electric Motor & Characteristic Curves
11.16 Foundation Drawings
11.17 Capacity vs. Suction Pressure curve
11.18 Capacity vs. Energy Consumption curve
11.19 List of spares for five(05) years of operation and maintenance. The list of spares should include ordering specification and manufacturer's catalogues. Bidders to keep inventory of spares as mentioned in the list in centralized stores at one or two GA's location

as finalized by the owner. The availability of the spares will be checked by the owner on regular basis.

11.20 List of special tools & tackles to be provided along with the bid.

12.0 SKID AND ENCLOSURE

The maximum allowed temperature within the enclosure shall be 5° C above ambient temperature. Adequate ventilation fans shall be provided to meet the above and also to account for heat dissipation of the coolers. Interlock shall be provided to start the exhaust fan to vent out any entrapped gases in the enclosure before starting the main compressor. In case heat exchanger fan is compressor shaft driven, the same can't be utilized as ventilation fan.

The compressor package shall consist of single enclosure for Compressor and Electric Motor. The equipment shall be mounted on one common skid. The Enclosure to restrict maximum noise level to 75+3 dB(A) at 1 meter from the enclosure.

Material used in the enclosures shall be fire retardant. Rain water should not enter into the enclosure and forced ventilation system shall be provided.

The enclosure shall have doors for normal access and removable wall panels for ease of maintenance.

All the pressure, temperature, oil level, lube oil pressure, coolant temperature, coolant level indicators shall be visible from outside of enclosures and shall be mounted on gauge panel visible from outside.

Enclosures shall have internal flame roof lighting arrangement.

For handling all heavy arts for maintenance purpose lifting arrangement i.e. beam fitted with necessary arrangement shall be provided in enclosure.

The Compressor shall be located inside an acoustic enclosure. All Coolers, Cooling System, lubrication system along with interconnecting piping shall be inside an enclosure. Enough headroom shall be made available for easy access and maintenance of all equipment. The piping layout with respect to the compressor, intercoolers, KOD and auxiliaries location shall be subject to Purchaser's approval during detailed engineering Stage.

Components such as pressure gauges, temperature, pressure switches, filter automatic ball valves, safety valves etc., which require in-situ adjustment, maintenance and reading, shall be easily accessible.

Conduits and tubing shall be arranged in orderly and systematic manner and shall be routed neatly to enter the back of display or monitoring panels

Routing service item such as, but not limited to, oil filters, inter stage gas filters, inlet and outlets gas filters and drive belt shall be located to facilitate easy one-man servicing.

One person should be able to access oil inlet and drains to allow addition or drainage of oil without removing panels or adjacent components and without the need of the pump.

Items which must be operated & monitored during operation shall be readily accessible

without opening the door
Suitable gradients shall be provided on the enclosure roof for rain drainage and to avoid water pockets.

12.1 Painting and protection:
Packing shall be sufficiently robust to withstand rough handling during ocean shipment & inland journey. Sling points shall be clearly indicated on crates.
Painting of Internal process piping should be as per international colour coding standard, e.g- Gas line-Yellow, Water line- green, Airline-Blue, Fire suppressing system – Red etc. The paint shall be chosen, primed and applied to have a service life of ten years the exterior of equipment and enclosure is required to be corrosion free for ten years.

13.0 INSPECTION & TESTING

a) Inspection shall be carried out as per Quality Control Table/ Quality Assurance Plan approved by Owner or its representative. Supplier shall submit the Quality control table (complying to tender QCT/ QAP) for approval.
b) The bidder has to provide 15 days advance notice prior to said inspection & test.
c) The bidder shall be responsible for specified inspection & testing requirements including at all sub bidders.
d) Bidder shall keep following data available for at least 5 years for examination by purchaser.
e) All necessary certification of materials, such as mill test reports.
f) Purchaser specification for all items on bills of materials.
g) Test data to verify that requirement of the specification have been met
h) Result of quality control test.
i) Pressure retaining parts including auxiliaries shall be hydrostatically tested with water at following minimum test pressure for a minimum period of 1 hour:

- Cylinder: 1-1/2 times maximum allowable working pressure.
- Cylinder cooling jacket & packing case 1-1/2 times coolant pressure but not less than 8 barg effective.

13.1 Mechanical String Test /Factory Acceptance Test

Mechanical String Test for 4 hrs. is a mandatory requirement to be performed at packager's shop before dispatch in presence of Owner's representatives (or a third party as arranged by OWNER). This test can be clubbed up with the Mechanical Run Test of compressor as specified above, provided the job driver & lube
Oil system is used for the test. String test shall be on natural gas preferably. Air/ N2 can be used for string test purpose if natural gas is not available in the shop.

13.2 Erection, Testing & commissioning at Site

The bidder shall be responsible for erection, testing, commissioning & performance test and noise level test of all packages at site. Commissioning of various equipment and

systems shall be carried out by the bidder as per the accepted procedures and as per the instruction of the manufactures of the equipment. The units will be considered commissioned only after the successful site tests are carried out by the bidder.
The bidder shall ensure integrity of compressor package and safety of electrical supply system available at back end while testing package, at site.

13.3 Field Trial Run

Bidder shall conduct a field trial run of each compressor package for 72 hrs. (can be in multiple runs) at CNG Station as per QAP in which satisfactory operation of complete package together with all accessories/auxiliaries controls shall be established for specified operating conditions without any major breakdown prior to the start of operation and maintenance period as defined in the contract. During the field trial run the bidder will be allowed a maximum of THREE attempts to complete the above specified test i.e. only for reasons not attributable to the vendor. The Equipment shall be considered commissioned after the successful completion of Field Trial Run. All punch points raised by OWNER should be completed before performing the FTR. The bidder shall record data of field trial run

13.4 Noise Level Test

During the field trial run, noise level test shall be carried out and bidder shall demonstrate /achieve the granted noise level. All necessary instruments /accessories required for fields trial run and noise level test shall be arranged by the bidder.

13.5 Performance Acceptance Test (PAT)

Before conducting performance acceptance test at site, Bidder is required to clear all punch points (if any) raised by OWNER / OWNER's authorized representative.
Compressor Package Performance test at sites shall be carried out as per ASME PTC9. All necessary instruments/accessories required for this test at site shall be arranged by the bidder and repatriated after successful performance test by the bidder.
All such instrument shall be pre-calibrated. Bidder consider the quote including quote for performance test per compressor package at site inclusive of boarding, lodging office space, local transport for bidder personnel and hiring of local contractor, crane etc. bidder shall be liable to pay all local taxes, levies applicable and strictly comply with rules, laws prevailing in India .
Performance test shall be conducted at site for minimum 4 hours continuous duration at guaranteed parameters as quoted by the bidder (PAT procedure shall be in accordance with ASME-PTC-09).

However, if load is not available at site intermittent running for 4 hours shall be permitted with maintaining minimum continuous operation of ½ hour. Bidder to submit PG test

procedure for review / approval. Complete package shall be performance tested as a module whereby along with motor & compressor performance bidder shall demonstrate all controls, shutdown, trips/alarms etc.
The test shall be the basis of, acceptance/rejection of the package thereon. Bidder shall submit the detail test procedure for the same, which shall be approved by OWNER. The test for the package shall be witnessed by OWNER/ OWNER's representatives.

14.0 GUARANTEE, LOADING AND PENALTY CRITERIA

This section described the guarantee parameters, which the booster compressor package must fulfil, the penalty for shortfall in guaranteed parameters and rejection of compressor package by the purchaser.

The guaranteed parameter shall be adjusted to account for variation in gas composition and prevailing ambient condition during testing.

Necessary calculations correction curves shall have to be furnished by bidder along with bid, which shall be final & no deviation shall be permitted afterwards.

In case of any inconsistency in manufacture and / or operation of supplied compressor package, Bidder shall at his own risk and cost, eliminate the defects to the satisfaction of owner.

For loading and compensation purpose, power consumption with suction pressure of 30 to 200 kg/cm2 and discharge pressure equal to dispensing pressure may be considered. Dispensing pressure will depend on empty vehicle pressure to be fuelled and compressor discharge pressure may not be 250 kg/cm2 continuously. For power consumption purpose discharge pressure may be taken 230 kg/cm2.

The bidder shall furnish the guaranteed value for the following:
Compressor Capacity: Compressor shall guarantee the capacity as mentioned in Guaranteed Parameters.
Compressor BKW: Bidder shall indicate guaranteed BKW including all losses such as mechanical, transmission etc.
Motor Power Output of the prime mover (KW)
Total power required for the package including power consumed by accessories.

14.1 Compressor Capacity

Bidder shall guarantee average capacity of 400 SCMH from suction pressure 30 to 200 kg/cm2 and discharge pressure of 250 Kg/cm2 at 52 degree centigrade (Max).

For calculation purpose 1kg of CNG =1.333 SCM
The same shall be used to establish the capacity at test bed during package performance test.

14.2 Loading against Energy Consumption:

The compressor package shall be designed in such a way that Energy Consumption of package (KWH/Kg) should be minimum for production of CNG. Bidder shall indicate actual energy consumption for their compressor package. This quoted figure will be used for establishing PAT at site and further penalties for evaluation. Total quoted price for all compressors towards supply, special tools & tackles, erection and commissioning, operation and maintenance will be loaded as per following formulas:
F = (G-20) x H x I
Where,
F = Loading amount in Rs.
G = Bidder's Energy consumption rate quoted in KWH
(G-20) = Bidder's Energy consumption rate over and above 20KWH
H = Cost of Energy INR 10/- per KWH for tender evaluation purpose.
I = Factor towards lifecycle in hours @ 36,500 hours (i.e.365 days*10hrs/day*10 years)
Note: Bidder shall not be given any advantage/credit for quoting power consumption below 20 KWH.
The entire equipment shall be mounted on a common skid. The electrical power consumption of the booster compressor package in kWh, shall include the consumption of the air compressor, exhaust fan motors, and all other associated auxiliaries, for the purpose of loading energy consumption and calculating the penalties.

Penalty towards Excess Energy Consumption:

At the start of the O&M period or even at any point of time during the O&M period, cost towards excess power consumption beyond the quoted figure shall be deducted from O&M bills.

The following calculations shall be used for deduction towards excess power consumption.

F = (G-Q) x H
Where,
F = Monthly Penalty in Rs.
G = Monthly Actual power consumption in Kwh
Q = (Guaranteed consumption rate quoted by supplier for every 400SCMH of CNG)x CNG produced during the month /(400scmh*0.75)
H = Actual applicable cost of power in the respective month

Note: Penalty shall be imposed only in cases where the actual power consumption exceeds

the specified limit. No additional benefit or advantage shall be granted to the bidder in case the actual power consumption is lower than the quoted value.

- **Penalty towards Package performance or gas loss:**

This penalty shall be imposed on compressor blocks not capable of delivering rated capacity of 400 SCMH, acceptable loss is 0.5%. If it exceeds 0.5% then Following calculations shall be used for penalty towards package efficiency loss:

F = 2 x {(400 x H x 0.75) – M}

Where, F = Penalty Amount in Rupees

H = Hours clocked in a month

Density of NG=0.75

M = Discharge mass flow during the month in Kgs

- **Penalty for Non-Performance during Period of Operation & Maintenance**

(a) On normal day (i.e. the day other than the schedule maintenance day):

(i) The party has to ensure that the equipment's are available for operation for minimum 22 hours per day.

(ii) The contractor has to ensure 97% availability of each package cumulative on monthly basis. The maximum allowable 3% downtime shall include cumulative downtime for preventive maintenance, predictive maintenance, breakdown maintenance and any other related activity excluding OEM recommended major and top overhauling maintenance of compressor package . Cumulative Non-availability of any machine over and above 3% will attract penalty as given below.

1) Break-down time-up to 8 hours in a month- No penalty
2) Break-down beyond 8 hours till 16 hours in a month - Rs 5,000/-
3) Break-down beyond 16 hrs till 24 hours in a month - Rs 10,000/-
4) Break-down beyond 24 hrs till 48 hours in a month - Rs 20,000/-
5) Break-down beyond 48 hrs till 72 hours in a month - Rs 30,000/-
6) Breakdown beyond 72 hrs in a month - Rs. 40,000/-
7) Continuous Break-down beyond 72 hours till 360 hrs in a month- 25% of Monthly Invoice value
8) Continuous Break-down beyond 360 hrs in a month - 50% of Monthly Invoice value

(For example in a month having 30 days (30x24= 720 hrs), Maximum allowable down time without penalty will be 3% of 720 hrs i.e. ~22 hrs.)

In case there is a continuous break down beyond 72 hrs & upto 15 days, 25 % of monthly invoice value of concerned package will be deducted from monthly invoice. In case breakdown is prolonged beyond 15 days, 50% of monthly invoice value of concerned

package will be deducted.
In any case/ any situation, total penalty will be limited to 50% of monthly invoice valve of concerned package.
The calculations for levy of penalty as mentioned above shall be calculated on CNG Compressor wise basis for each month for each locations of Bhagyanagar Gas Ltd.

(b) On schedule maintenance day:

(i)The party would be required to carry out the recommended schedule/preventive maintenance of the equipment for which the party has to indicate the time required for each type of schedule maintenance.
(ii) If the equipment is down for more than 4 hours & upto 8 hours beyond the time indicated for the agreed schedule maintenance, the party would be penalized Rs. 20,000/- and for more than 16 hours Rs. 40,000/- per day.
In any case, the maximum penalty imposed in a month for non-performance of the equipment would be limited to 50% of the amount of O&M charges to be paid to the party per month per compressor

- Non-availability of manpower in any shift/any workplace will not be tolerable.
- The BIDDER will be penalized for each such act as follows.
- For non-availability of compressor operator, PPE, Uniform = 5% of Max. Invoice value of Single Pkg. / Incident & Max. amount will be penalized up to 10% of the Max. Invoice value of each package in a month.
- If the BIDDER fails to provide PPE and Uniform to his manpower after stipulated time, BGL will provide the PPE and Uniform at his risk and cost considering original invoice value plus 20% overhead charges which will be recovered from BIDDER.
- We at BGL will not tolerate any kind of Indiscipline act at the premises from the BIDDER employee's during the service time. If any such incident happens, the BIDDER will be penalized 5% of the Max. Inv. Value / Incident & Max. amount will be penalized up to 10% of single package invoice value

- In any Case/any situation, total cumulative penalty from all accounts (i.e. from gas loss, break down time, statutory requirements etc.) will be limited to 50% of monthly invoice value of concerned package for concerned month.
- No penalty will be carried over to next month.
- For any IR (Industrial Relation) issue (like strike by operators for wages, union issues etc.) CNG station operation stopped, BIDDER will be penalized Rs. 25,000/- Incident. Max. Capping is up to Rs.1,00,000/- Month
- Non-availability of compressor due to malfunctioning or non-availability of any of its auxiliaries / part shall be considered as the non-availability of the compressor package and shall be liable for above penalty.
- The penalty clause will be put into force, immediately after successful commissioning and subsequent performance test (which will be for a minimum period of 72 hours) of

compressor packages.

- Any reason for non-availability of compressor package and in scope of the bidder shall be liable for the above penalty.
- In case of any complaint regarding non-fulfillment of any obligation under the contract, BGL reserves the right to withhold payment to the contractor, and out of such amount and including the security deposit hold, make such payment as it may consider necessary for smooth and unhindered working of the contract.
- Bidder has to submit the supply invoices timely for release of CAMC bills , any delay beyond 15 days will attract penalty of Rs.10,000/- per instance .
- Non-Submission of RA/ CAMC bill by 15th of subsequent month will attract a penalty of Rs.10,000/- per instance and Rs. 100/- per day beyond 15 days of stipulated time for the applicable date of bill submission Same will be deducted from the running bills.
- Failure to comply with HSE requirements shall attract penalty of Rs. 5000/- per each Non-compliance.
- The BIDDER shall depute his Supervisor for supervision of the services to receive instructions from Engineer-in-Charge or his representative.
- CONTRACTOR'S RESPONSIBILITY- The contractor shall depute his Supervisor for supervision of the services to receive instructions from Engineer-in-Charge or his representative

SPECIAL TOOLS AND TACKLES

Special tools & tackles for erection and commissioning and for operation & maintenance are required to be arranged by successful bidder.
Vendor shall maintain sufficient spares to fulfill the warranty & subsequent five years period requirements. In case of additional requirement during the warranty period, if any spare part is taken from OWNER, the same shall be replaced to OWNER with new part supported by necessary document for its authenticity of being new & original spare part

15.0 DRAWING & DOCUMENTATION

- The drawings/documents to be submitted by the bidder shall be divided in three categories:

a. Drawing documents to be supplied with the offer
b. Drawing /document to be submitted for approval (After placement of order)
c. Drawing/document to be submitted for information (After placement of order)

- The bidder shall submit list of drawings, which shall be submitted by them in above three categories. All drawing /document shall be submitted in 6 sets.
- Title block of each drawing shall contain at least following information: Name of the Owner :
Name of the Consultant :
Name of the Project :

Name of Bidder :
Descriptive title :
Drg. No :
Revision No :
Sheet No./ Total No. of sheet in the drawing :

- Bidder shall furnish relevant calculation and protection relay setting table for the equipment /system being supplied by them, It shall also contain the manufacture's catalogue, operation and maintenance manuals for all types of relays/components used,
- The bidder shall submit all drawing within specified time, in requisite number, for each equipment/item for approval.
- Approval of drawings by Owner.
- The bidder shall submit furnish drawings as indicated/agreed for each item for approval of the Owner/Consultant.
- Owner/Consultant will scrutinize drawing/data furnished by Bidder and comments, if any, will be communicated to the Bidder within 2 weeks from the date of receipt.
- The Bidder shall submit all the drawings/documents in two (2) sets. All the drawing of sub-bidder/bidders etc. shall be checked by Bidder for correctness and compliance with requirement of order/contract and signed before submission to Owner.
- The drawings shall be stamped in either of following category and one print shall be returned to the Bidder.

"APPROVED"
"APPROVED SUBJECT TO INCORPORATION OF COMMENTS" "NOT APPOVED"
"FOR INFORMATION ONLY"

- Wherever drawings are returned to the Bidder with the marking "Approved subject to incorporation of comments" the bidder shall make the necessary modifications/corrections and resubmit the revised drawings and data for final approval.
- Bidder shall be responsible for correctly incorporating all the points conveyed to him and resubmit the drawings to the Owner for final approval. Specified number of copies of approval drawing and reproducible of specified quality shall be submitted after the final approval of drawings.
- Approval of drawing by owner shall not relieve the suppliers of his contractual obligations and responsibility for engineering design, workmanship, materials and performance of equipment, Work shall be carried out exactly as indicated on the approved drawings and data and no alterations shall be made without the written approval of the Owner,
- If any subsequent alterations are found necessary and approved by the Owner, all drawings and data affected by such alterations shall be duly revised and re-submitted for the approval.
- Bidder shall incorporate/cause to incorporate all change made in the drawings from approval stage to the handing over of equipment and submit as built drawings in the

requisite sets (these will be in addition to the sets submitted at the time of approval/for information and up to commissioning). The drawing to be submitted shall include all the drawings submitted for approval, information as also the drawings required for normal operations, trouble shooting repair, and maintenance and testing of equipment etc.

- Bidder shall submit the following drawings/data/document in bound volume prior to submission of final bill to the Owner in soft and hard copies (2 Sets).
- All drawings submitted to Owner for approval information
- Equipment manufacturing drawings submitted for information of Owner.
- Equipment drawings required for operation and maintenance.
- Fault calculations, protection relay setting calculations and recommended settings.
- Inspection reports, factory and site test certificates in bounded volume.
- As built drawings incorporating all site modifications.
- Instruction manuals
- List of spares for five years operation and maintenance. The list of spares should include ordering specification and manufacture's catalogues.
- Operation and maintenance procedures for individual equipment and total system.

ANNEXURES

(BIDDER TO SUBMIT FILLED UP ANNEXURES FOR 400 SCMH)

ANNEXURE – I : GUARANTEED PARAMETERS

(400 SCMH Electrical Motor Driven Booster Compressors)

Sr No.	Parameter	Bidder's data	Unit
For Basis of loading and penalty			
1	Average flow capacity (over range of suction pressure from 200 to 30 kg / cm 2 at varying on continuous basis). Bidder to confirm Min. 400SCMH.		**SCMH**
2	Electrical power consumption in KWH with no (+) tolerance with overall full range of suction pressure (from 200kg/cm2 to 30 kg/cm2 varying on continuous basis to compress 400 SM3 gas per hour with no (-) tolerance without air compressor and exhaust fan.		**KWH**
3	Electrical power consumption in KWH with no (+) tolerance with overall full range of suction pressure (from		**KWH**

	200kg/cm2 to 30 kg/cm2 varying on continuous basis to compress 400 SM3 gas per hour with no (-) tolerance with air compressor and exhaust fans, etc, other electrical loads for loading and penalty purpose.		
4	Minimum flow capacity in SM3/h corresponding to suction pressure of 200 kg/cm2		
5	Minimum flow capacity in SM3/h corresponding to suction pressure of 30 kg/cm2		
Guaranteed General Package Data			
6	Compressor BKW in KW @ Rated Conditions (No + ve tolerance		**KW**
7	Net of all auxiliaries/package ventilation loads or nay other loads in KW		**KW**
8	Total Site rated BKW considering all loads, Electric Motor (No – ve tolerance)		**KW**
9	Noise level 75 $\pm$ 3 DBA @ 1 meter from enclosure		**db**
10	Footprint area of compressor package quoted		**Mtr x Mtr**

NOTE:

1. Parameters under Sl. No. 4 and 5 are for reference only.
2. SI.No.3 Bidder must indicate the guaranteed KW including all losses such as mechanical transmission power absorbed by compressor auxiliary like cooler fan etc. including air compressor.
3. Power consumption and capacity should be indicated corresponding average discharge pressure 250 Kg/cm2
4. The above parameters shall be quoted gas against suction temperature of 35 to 45 deg centigrade at mobile cascade
5. Bidder has to fill all rows in above table. If any row is not filled by bidder or above tables are modified in any manner, bid will be rejected summarily
6. Conversion factor for Kg to SCM is 1 kg = 1.333 SCM
7. Bidder has to guarantee that offered compressor package will deliver minimum average flow of 400 SCMH under the condition described above. Delivery of less than 400 SCMH average flow is not acceptable and will be summarily rejected.

ANNEXURE – II : COMPRESSOR DATA SHEET FOR 400 SM3/HR

1	**PROJECT: CNG Expansion Project**		**DATA SHEET NO:**	
2	NO. OF UNITS		As per SOR	DRIVE: Electrical Motor
3	DUTY		Continuous	LOCATION: As per SOR
4	GENERAL		PROJECT:	
5	OWNER:		SERVICE:	
6	SITE:			
7	COMPRESSOR CAPACITY		DRIVER:	Electric Motor
8	**NOTE: ■ SCOPE OPTION / INFORMATION SPECIFIED BY PURCHASER □INFORMATION REQUIRED FROM VENDOR.**			

9	MANUFACTURER:		MODEL NO.:	
10	PLACE OF MANUFACTURE:		NO. OF STAGES:	
11	CYLINDER ARRANGEMENT:		CYLINDER LUBRICATION:	
12	DRIVER TYPE:		DRIVE:	
13	DIRECTION OF ROTATION (FACING DRIVEN END):		EARTH QUAKE ZONE	
14	WIND VELOCITY (KM/HR)		NSTALLATION:	
15	**MOUNTED ON A COMMON SKID ALONGWITH DRIVER, ENCLOSED INSIDE A ACOUSTIC ENCLOSURE**			
16	Total Utility Consumption			
17	Cooling Water (Make UP) (m3 /hr)		Power (Auxiliaries) (kW)	3.5
18	**REMARKS:**			
19	Vendor/Bidder should estimate the requirement for all the Utilities and indicate the same in tabular form.			
20	CONSTRUCTION / DESIGN FEATURES			
21	Cylinders			
22	No of Cylinders -			
23	Single Acting (SA) / Double Acting (DA)			
24	Nomenclature	Unit	**Stage#1**	**Stage#2**
25	Cylinder Bore /Stroke	mm / mm		
26	Rotational Speed of motor	RPM		
27	Linear Average Piston Speed	M/sec		
28	Piston Displacement	M3/ hr		
29	Nos of strokes per hour			
30	**Lubrication/Hydraulic oil System**			
31	Type of lube system		Piping material	
32	Quantity of Lube/Hydraulic oil for first filling		Main Oil Pump Driven By :	
33	Standby Oil Pump, Driven By :		Oil tank capacity	

34	Suction Strainer		Lube Oil Consumption	
35	Pressure Control Valve		Main Pump Make & Model :	
36	Level Sight Glass on the Crankcase		Standy Pump Make & Model :	
37	Type of Oil Cooler :		Size of Filter:	
38	Make :		Type :	
39	Model :		Material :	
40	Oil Heater (if required).		Electric Heater with thermostat (Kw) (if required).	
41	Thermostatic Valve			
42	**INSPECTION AND TESTS**			
43	Material Composition and Physical Properties Certificates Required For:			
44	Cylinder and Liner		Piston	
45	pressure Vessels		Heat Exchangers	
46	X-Ray Examination for applicable components. All applicable MTC's to be submitted			
47	*Mech. String Test with shop Driver (4 Hours min.)*	*Certificate*	*Witnessed*	
48	Performance Test at Works	Yes	Yes	
49	Functional/Continuity Tests - Control Panel.	Yes	Yes	

50	Field Trial Run 72 Hrs. under Vendor's Supervision (Package) , intermittently	Yes	Yes	
51	Valve Leak Test	Yes	Yes	
52	Lube Oil Console Run test	NA	NA	
53	Closed Circuit C.W. System test	Yes	Yes	
54	During package performance test			
55	Test Certificates Required For:			
56	Auxiliary Motor & Pumps	Yes	Safety Relief Valves	Yes
57	Safety Switches	Yes	Solenoid Valves	Yes
58	WEIGHTS			
59	Overall supply (excluding driver and gear box, if any) Kg. approx.			
60	Maximum erection weight Kg. approx.			
61	Maximum maintenance weight Kg. approx.			
62	Gear Box Kg. Approx.			
63	Driver Kg. approx.			
64	SCOPE OF SUPPLY			
65	Compressor Assembly complete with frame, cylinder			
66	Motion work lubrication system			
67	Cylinder and packing lubrication system			

68	Cooling system	
69	Process Gas system	
70	Local instrumentation	
71	Local Gauge Board	
72	Local Control Panel	
73	Main driver electric Motor	
74	V-Belts with Pulley	
75	Couplings	
76	Driver Compressor	
77	Guards for moving parts	
78	Base plate Common for Compressor and Driver	
79	Fabricated Steel skid Common for compressor, driver and accessories	
80	Special Tools -	
81	Anchor Bolts for Complete Package	
82	Piping supports and brackets : prefabricated for piping in Vendor's Scope	
83	Supports For Cylinders & Auxiliaries, Prefabricated & fitted in the Package	
84	Commissioning Spares, erection and commissioning spares	
85	Spares as specified in the Job Specification	
86	Vendor Data as specified	
87	NOTE : Refer checklist for scope of supply	

ANNEXURE - III - DATA SHEET FOR ELECTRIC MOTOR

ITEM NO.:			As per requirement
QUANTITY:			
DESCRIPTION:			
A.	APPLICABLE SPECIFICATION AND STANDARDS		IS:325 / IEC / EQUIVALENT INTERNATIONAL STANDARDS
B.	SERVICE CONDITIONS:		
		Max. Ambient Temp. (Deg. C)	
		Min. Ambient Temp. (Deg. C)	
		Design Ambient Temp. (Deg. C)	
		Altitude Above MSL (MTS)	
		Relative Humidity (Max.) (%)	
		Environment	
		Location (Indoor / Outdoor)	
		Area (Safe / Hazardous)	
C.	SYSTEM CHARACTERISTICS:		
		Systems Voltage with ± %	415 V ±10%
		Number of Phases	3
		Rated Frequency with ± %	50 Hz ±5%
		Combined Variation	±10%
		Fault Level	25 KA
		Space Heater Supply	If Required
		Low Voltage Stator Winding Heating Supply	NA
D.	Motor Rating / Details:		
		Rated Output	As per Vendor
		Rotor Type	Squirrel Cage
		Syn. Speed (RPM)	As per pump and fan vendor
		Direction of Rotation	Bi-Directional
		Insulation Class	'F', Temperature Rise Limited to 'B'
		Duty	S1, Continuous

		Winding Treatment	Moisture Protection Varnish
		Insulation Process	Anti-Corrosive Treatment
		Starting Method	Star Delta
		Starting Current	Vendor to Furnish
		Minimum Voltage Start at Terminal	80% of 415V
		Starting Torque	Min. 200% of FLT
		Pull Out Torque	
		No. of Hot Starts	2 Nos.
		No. of Cold Starts	3 Nos.
		Shaft Extension	Required
		Type of Coupling	
		Earth Terminals	2 Nos. on Body & 2 Nos. on T. Box
		Greasing Arrangement	Yes
		Name Plate	Yes, as per IS:325
		Starter Connection	Vendor to Furnish
		Efficiency at	
		100% load	
		75% load	
		50% load	
E.	ENCLOSURE:		
		Degree of Protection	EExd IP55
		Mounting Arrangement	As per requirement.
		Type of Cooling	TEFC
F.	TERMINAL BOX		
i)	Terminal Box (Main)		1 No.
		Type	
		Fault Withstand	
		No. of Terminals	6 Nos.
		Side of Terminal Box seen from the Driven End	RHS
ii)	Auxiliary Terminal Box		--
	1	Separate Terminal Box for	
		Space Heaters	--
		Thermistors	--

G.	TESTS TO BE WITNESSED		
		Type Tests	CMRS test certificate to be furnished
		Routine Tests	As per IS:325
H.	ACCESSORIES		
		Anti-condensation Heaters	Yes
		PTC Thermistors	NA
		Voltage Rating of Space Heaters	NA
		Foundation Bolt	Yes
		Cable Glands	Required
		Earthing Terminals	Body & T. Box
		Motor peak Amplitude Vibration at no Load at Bearing should not exceed	40 Microns for 1500 RPM 15 Microns for 3000 RPM
		Max. Motor Noise Level Measured at a Distance of 1. Mts. from Motor	75 $\pm$ 3 dBA
I.	CABLES		
	1	Type & Size	
		- Motor	Vender to furnish
		- Space Heater	NA
		- Thermister	NA
	2	Cable Lugs	
		- For Motor	Copper
		- Space Heater	NA
		- Control Cables	NA
	3	Cable Glands – Type Material	
		- Motor	FLS-Double Compression, Ni-Cd Plated
		- Space Heater	NA
		- Control Cables	FLS – Double Compression Ni-Cd Plated
		J. PAINTING	
		TYPE	Epoxy
		SHADE (AS PER IS:5)	692 (Smoke Grey)

Note: If required vendor may be asked to submit, Certificate from Compressor block manufacturer towards guaranteed shaft power calculation at 400 SCMH per hour compression (on given parameter) and from Motor manufacturer towards their KWh consumption (KWh on guaranteed parameters) on above guaranteed shaft power to be submitted by bidders along with bid.

ANNEXURE – IV: LIST OF MOTORS

S.No.	DESCRIPTION	KW	DUTY	QTY.

NOTE: - Motors are in hazardous area classification Zone 1 and Zone 2. Therefore, the Motors shall be flame proof. Vendor shall furnish the list of motor(s).

ANNEXURE – V: SPECIFICATIONS OF INSTRUMENTS

SPECIFICATION OF CORIOLIS MASS FLOW METER (SUCTION- Deleted)

Sl. No.	PARAMETER	REQUIREMENT
1.	Fluid	Compressed Natural Gas
2.	Measuring Principle	Coriolis Principle
3.	Operating Pressure	**250 (max.) Kg/cm2 and 8 (min.) Kg/cm2**
4.	Molecular Weight	17 – 22
5.	Ambient Temperature	0 – 6 ^{O}C
6.	Hazardous area classification	Class I, Div. I, Gas Group D as per NEC or Zone1, Group IIA/ IIB as per IS/IEC specifications
7.	Range of operation	Flow range shall be 150% of defined compressor capacity (SCMH) in tender
8.	Accuracy	± 0.5% of indicated flow accepted (over the whole operating range on gas)

9.	Rangeability for specified accuracy (Min.)	50:1
10.	Line Size	Vendor to specify
11.	Pressure drops at max. flow	< 0.2 Kg/cm²g
12	Repeatability	± 0.25% or better
13.	Material - Tube	SS 316 or Better
14.	End Connection	Vendor to specify
15	Power supply (nominal)	24 V DC or 230±10% V, 50±2 Hz, 1 Φ
16	Outputs (Active)	
16.1.	4 – 20 mA dc	Reqd.
16.2.	Frequency	Reqd.
16.3.	RS 485	Reqd.
17	Outputs Informations	Φ
17.1	Mass Flow rate	Reqd.
17.2	Mass totalizer, non-resettable	Reqd.
17.3	Temperature & density	Reqd.
17.4	Integral Display	Display all outputs with specified accuracy, programmable and sequential with password protection, Touch screen or touch keypad type
18	Communication	MODBUS with RS485
19	Mounting	Field mounting
20	Certification	Hazardous area compatibility, Weatherproof certification i.e. IP 67, Material Test, Manufacturer's certification, Custody Transfer approval, AGA 11 Conformance certification and Calibration Certificate on water and Natural Gas from accredited test labs with traceability acceptable Internationally

SPECIFICATION OF CORIOLIS MASS FLOW METER (DISCHARGE)

Sl. No.	PARAMETER	REQUIREMENT
1.	Fluid	Compressed Natural Gas
2.	Measuring Principle	Coriolis Principle
3.	Operating Pressure	**275 (max.) Kg/cm2 ,250 (Normal) Kg/cm2, 100 (min.) Kg/cm2**
4.	Molecular Weight	17 – 22
5.	Ambient Temperature	0 – 60 ^{O}C
6.	Hazardous area classification	Class I, Div. I, Gas Group D as per NEC or Zone1, Group IIA/ IIB as per IS/IEC specifications
7.	Range of operation	Flow range shall be 150% of defined compressor capacity (SCMH) in tender

8.	Accuracy	± 0.5% of indicated flow accepted (over the whole operating range on gas)
9.	Rangeability for specified accuracy (Min.)	50:1
10.	Line Size	Vendor to specify
11.	Pressure drop at max. flow	< 0.2 Kg/cm²g
12	Repeatability	± 0.25% or better
13.	Material – Tube	SS 316 or Better
14.	End Connection	Vendor to specify
15	Power supply (nominal)	24 V DC or 230±10% V, 50±2 Hz, 1 Φ
16	Outputs (Active)	
16.1.	4 – 20 mA dc	Reqd.
16.2.	Frequency	Reqd.
16.3.	RS 485	Reqd.
17	Outputs Information	Φ
17.1	Mass Flow rate	Reqd.
17.2	Mass totalizer, non-resettable	Reqd.
17.3	Temperature & density	Reqd.
17.4	Integral Display	Display all outputs with specified accuracy, programmable and sequential with password protection, Touch screen or touch keypad type
18	Communication	MODBUS with RS485
19	Mounting	Field mounting
20	Certification	Hazardous area compatibility, Weatherproof certification i.e. IP 67, Material Test, Manufacturer's certification, Custody Transfer approval, AGA 11 Conformance certification and Calibration Certificate on water and Natural Gas from accredited test labs with traceability acceptable internationally

SPECIFICATION SHEET FOR FLAME DETECTORS

Flame detector Type:	UV and IR Detector
Wavelength	UV radiation over the range of 185 to 260 nanometers (1850 to 2600 angstroms)
	IR radiation in the 4.35-micron range
Field of View	120° cone of vision (or) Better.
Sensitivity	Approved Performance Specification-50 feet (15.2m) distance for a 1 sq. ft (0.092m2) heptane fire.

Response Time:	Less than 5 seconds
Status Indicator:	LEDs indicate status of Healthy, fault, and alarm conditions
Operating Medium	Natural Gas.
Nominal supply voltage:	24 VDC
Supply voltage range:	20 to 36 VDC
Maximum output signal load:	600 Ohms
Electrical Specifications [OUTPUT: mA, Relay, Hart]	
(all 3 below mentioned outputs must be available in separate connectors/ ports)	
1. Analog (mA):	
Output signal range:	0 to 20 mA *
FAULT signal:	0 to 0.2 mA *
COPM fault signal:	2.0 ± 0.2 mA *
Ready signal:	4.0± 0.2 Ma
IR only signal:	8.0 ± 0.2 Ma
UV only signal :	12.0 ±0.2 mA
WARN signal:	16.0 ±0.2 Ma
ALARM signal:	20.0 ± 0.2 mA
2.Relay Contacts: (Alarm, Fault and Auxiliary)	Fire relay (alarm)- Both Contact output NO and NC required. Fault relay - Contact output NO and NC required. Contact rating 30 VDC, 2 A or 125 VAC, 1 A
3. HART	
Protocol	HART protocol
	External HART Port connector (without opening of Housing cover of Flame Detector) is required in transmitter for calibration and parameter accessing.
Vibration	As the detector shall be vibrations arising mounted inside CNG compressor canopy, the same shall be capable of withstanding from reciprocating compressor.
Approvals (sensor, Transmitter and Terminal box / Junction Box)	CCOE/PESO, CSA, FM, ATEX, HART Registered, and AMS Aware
	Class 1, Div. 1, groups B, C, and D (-40°C to +65°C), Type 4X, Ex d IIC, T4
WP Protection	IP54
SIL 2	IEC 61508 required
AMS Aware:	Certified by AMS
RFI/EMI Protection:	Complies with EN 50130-4, EN 61000-6-4

Accessories	Housing: Anodized aluminum with powder coated finish or equivalent (Explosion proof enclosure) Mounting: Roof mounted, or wall mounted. For threaded type detectors suitable termination box (approved for use inside hazardous area) shall be provided. The detector shall be supplied with suitable Deluge protection, Strom baffle, Weather protection, Dust barrier, Gassing Cap, etc as applicable protection against dust particles. 2 No's Cable Glands (1/2" or 3/4" Double compression)
Flame detector built-in test	Automatic and manual test
Flame detector immunity	False alarm sources like Arc welding, X-Ray's or hot vibrating object, lightening.
Manuals (soft and Hard Form)	Operation, Maintenance, Calibration and Troubleshooting
Software (soft and Hard Form)	Software or additional device, cables required for calibration or troubleshooting of instrument shall be supplied free of cost with instrument.
Flame detector calibration	Must be inbuilt or else calibration device must be supplied along with FD at free of cost.
Calibration procedure	(both zero and span) for the model quoted to be provided in detail

SPECIFICATION SHEET FOR GAS DETECTORS

Tag nos	As per P&ID

Sensor Type	Infrared Absorption, Point gas detector
Model	*
Make	As per approved/Recommended vendor list
Operating Voltage	24V DC
Range	0-100 % LEL (Low Explosive Limit)
Repeatability	Better than +/-3% of Full Scale
Response Time	T 90 < 15 second or better
Temperature Range	0 deg C to 50 Deg C
Humidity range	0 to 99 % RH
Power Consumption	Vendor to indicate
Digital Signal Outputs	Required
Current Signal Outputs	
Ingress Protection	IP 65 or better NEMA 4X
Housing Material	SS 316
Dimension	*
Cable Entry	Two entries, inch NPT (F), for one spare cable entry stop plug shall be provided
Electrical Area Classification	Zone-1,2, Gr. II A & II B, T3 or better
Enclosure Class	Explosion proof EEx'd' / Intrinsically Safe EEx'ia'
Alarm at	20 % & 40% of Range
Accuracy *	± 2% FSD or better
Calibration Kit	Required
SIL 2 Certificate	Required
Accessories	Required

SPECIFICATION FOR KWH METER

1	**Meter type**	3Phase 4 wire Static Energy meter
2	**Accuracy class**	0.5 S as per IS14697
3	**Connection**	Transformer Operated
4	**Rated Voltage**	240V(P-N), 415V(P-P) ± 10%

5	**Rated Basic current**	5A
6	**Rated maximum current**	10A
7	**Rated Frequency**	50 HZ
8	**Power Factor range**	Zero lag- Unity- Zero lead
9	**Standards compliance**	IS 14697, IEC 62052-11, IEC 62053-21, IS 15959
10	**Calibration**	Meter shall be calibrated at factory and no modifications should be permissible
11	**Energy Audit Data**	a. Meter serial number b. Date and time c. Cumulative forwarded active energy d. Cumulative reactive energy - Lag e. Cumulative reactive energy - Lead f. Cumulative forwarded apparent energy g. Cumulative Maximum Demand in kW and kVA with date and time
12	**Metering philosophy**	**Metering should be 2 quadrant lag only and programmed accordingly**
13	**Auto/Manual Scroll mode**	a. LCD test b. Date c. Time d. Cumulative Active Energy e. Cumulative Apparent Energy f. Cumulative Reactive Energy – Lag g. Cumulative Reactive Energy – Lead h. Active Maximum demand with date and time i. Apparent Maximum demand with date and time j. Active load k. Reactive load l. Apparent load m. Phase wise power factor n. Average power factor o. R phase voltage p. Y phase voltage q. B phase voltage r. R phase current (line) s. Y phase current (line) t. B phase current (line) u. Instantaneous average power factor with sign for lag/lead v. Frequency reading
14	**Maximum demand Registration**	Meter should store and display maximum demand in kW/kVA with date and time. Demand integration period should be 30 minutes. It is preferred that MD is

		computed using separate counter rather than by difference of initial and final energy counter.
15	**Auto Reset of Maximum Demand**	Meter should reset to zero and date should be customizable date

SPECIFICATIONS FOR DISCHARGE FILTER

SUPER FINE FILTER (Coalescing Filter)

Super fine filter for removal of liquid (e.g. water & oil)and solid particles down to 0.01 microns out of compressed natural gas
Residual Oil Contents less than 0.01 mg/m3. Filter Designed :
Paint Compatible
CE mark in accordance with European Directive for Pressure Equipment, PED (97 / 23 / EC)
Are Designed to meet the ATEX European Directive for Explosion Protection , (94 / 9 / EC)
All natural gas filters in accordance to CE Eex 2GD IIB T6.

Standard equipment:
Complete filter including manual drain.
Specification Filter Elements.
Filter Fabric: Borosilicate Microfibre Fabric coated with polypropylene homopolymer support - fabric.
Drainage Layer: Parafil - Fibre fabric incorporated in the filter fabric. (Without Foam Sock)

Rib Mesh : Stainless Steel VA 1.4306
Temperature: + 1 ° C to + 80 ° C
Direction Of Flow: From Inside to Outside.

NOTE: Bidder to get the inspection done by TPIA accordance with European Directive for Pressure Equipment, PED (97 / 23 / EC) if CE marks are not available.

ANNEXURE – VI: RECOMMENDED VENDOR LIST

Item code / Description	AIR FILTER REGULATORS
VENDOR NAME	Remark

ASEA BROWN BOVERI LTD.	
BLUE STAR LTD	
DIVYA CONTROL ELEMENTS PVT. LTD.	
PLACKA INSTRUMENTS & CONTROLS PVT. LTD	
SHAH PNEUMATICS	
SHAVO NORGREN (I) PVT. LTD	
VELJAN HYDRAIR PVT. LTD.	
PARKER	
SWAGELOK	
VANAZ ENGINEERS LIMITED	
Item code / Description	**COALESCENT FILTER / REGULATORS**
VENDOR NAME	**Remark**
ASEA BROWN BOVERI LTD.	
BLUE STAR LTD	
PLACKA INSTRUMENTS & CONTROLS PVT. LTD	
SHAH PNEUMATICS	
SHAVO NORGREN (I) PVT. LTD	
V AUTOMAT & INSTRUMENTS PVT. LTD.	
VELJAN HYDRAIR PVT. LTD.	
COMPAC NEWZEALAND	
ITEM CODE / DESCRIPTION	**FIELD INSTRUMENTS (P, DP, F,L,T)**
VENDOR NAME	**REMARKS**
ABB AUTOMATION LTD.	
ASHCROFT	
MURPHY	
CCS	
WAREE	
FISHER ROSEMOUNT INDIA LIMITED	
FUJI ELECTRIC CO. LTD.	
HONEYWELL INC.	
TATA HONEYWELL	
YOKOGAWA ELECTRIC CORPORATION	
YOKOGAWA BLUE STAR LTD.	
WIKA	
DRUCK	
BEKO	
FILTERATION TECHNIQUE	
ITEM CODE / DESCRIPTION	**PRESSURE GAUGES**
VENDOR NAME	**REMARKS**
AN INSTRUMENTS PVT. LTD.	

BADOTHERM PROCESS INSTRUMENTS B. V.	
BOURDON HAENNI S.A	
BRITISH ROTOTHERM CO. LTD	
BUDENBERG GUAGE CO. LTD.	
DRESSER INC.	
GENERAL INSTRUMENTS CONSORTIUM	
MANOMETER (INDIA) PVT. LTD.	
NAGANO KEIKI SEISAKUSHO LTD.	
WAAREE INSTRUMENTS LIMITED	
BAUMER	
WALCHANDNAGER INDUSTRIES LTD.	
WIKA ALEXANDER WIEGAND & CO GMBH	
WIKA INSTRUMENTS INDIA PVT. LTD.	
DRUCK	
ASHCROFT	
BEKO	
FILTERATION TECHNIQUE	
ITEM CODE / DESCRIPTION	**TEMPERATURE GAUGES & RTD**
VENDOR NAME	**REMARKS**
AN INSTRUMENTS PVT. LTD.	
GENERAL INSTRUMENTS LTD	
WIKA	
ASCHCROFT	
BAUMER	
ITEM CODE / DESCRIPTION	**PRESSURE RELIEF/SAFETY VALVE**
VENDOR NAME	**REMARKS**
ALSTHOM FLUIDS SAPAG	
ANDERSON GREENWOOD CROSBY	
BHEL (TRICHY)	
ASPRO	
DRESSER INC.	
FUKUI SEISAKUSHO CO. LTD.	
INSTRUMENTATION LTD. (PALGHAT)	
NAKAKITA SEISAKUSHO CO LTD.	
NUOVO PIGNONE SPA (ITALY)	
PARCOL SPA	
SAFETY SYSTEMS UR LTD.	
SARASIN RSBD	
SEBIN VALVES INDIA PVT. LTD.	
TAI MILANO SPA	

TYCO SANMAR LTD.	
TYCO VALVES & CONTROLS INDIA PVT. LTD	
SWAGELOK	
PARKER	
COMPAC NEWZEALAND	
FARINOSLA	
FAINGER LASER	
MERCER	
FISHER ROSEMOUNT (EMERSON)	
OFE & OE GROUP KEYSTONE VALVES PVT. LTD	
BARODA SEBIM VALVES PVT. LTD. HALOL	
HALOL	
STAUFF	
M/S NIRMAL	
ITEM CODE / DESCRIPTION	**SUCTION & DISCHARGE FILTER**
VENDOR NAME	**REMARKS**
BEKO FILTER	
ULTRA FILTER	
PARKER	
FILTERATION TECHNIQUE	
FILTERATION & SEPERATION TECHNOLOGY	
ITEM CODE / DESCRIPTION	**VIBRATION SWITCH**
VENDOR NAME	**REMARKS**
MURPHY	
METRIX	
ROBERTSHAW CONTROL	
ITEM CODE / DESCRIPTION	**CARTRIDGE FILTERS**
VENDOR NAME	**REMARKS**
BEKO FILTER	
ULTRA FILTER	
FILTRATION TECHNIQUES	
ZANDER GMBH (GERMANY)	
GRAND PRIX FAB (PVT.) LTD., NEW DELHI	
MULTITEX FILTRATION ENERGY PVT. LTD.,	
ITEM CODE / DESCRIPTION	**AIR COMPRESSOR**
VENDOR NAME	**REMARKS**
INGERSOL RAND (IR)	
ELGI	
ANESTA IWATA MOTHERSON	
EMTEX	

KPCL	
CHICAGO PNEUMATICS	
ITEM CODE / DESCRIPTION	**SELF ACTUATED PR. CONTROL VALVE**
VENDOR NAME	**REMARK**
DANIEL INDUSTRIES INC	
DRESSER PRODUITS INDUSTRIES	
ASPRO	
ESME VALVES LTD.	
FISHER ROSEMOUNT SINGAPORE PTE LTD.	
FISHER EXMOX SANMAR LIMTED	
GORTER CONTROLS B.V.	
INSTROMET INTERNATIONAL NV	
KEYE & MACDONALD INC	
NUOVO PIGNONE SPA (ITALY)	
PIETRO FIORENTINI SPA	
RICHARDS INDUSTRIES (FORMERLY TRELOAR)	
RMG REGEL + MESSTECHNIK GMBH	
VANAZ	
NIRMAL INDUSTRIES LIMITED	
COMPAC INDUSTRIES LTD., NZL.	
ITEM CODE / DESCRIPTION	**SOLENOID VALVES/ACTUATOR**
VENDOR NAME	**REMARK**
ALCON ALEXANDER CONTROLS LIMITED	
ASCO (INDIA) LIMITED	
JEFFERSONS	
ASCO JOUCOMATIC LTD.	
ASCO JOUCOMATIC SA	
AVCON CONTROLS PVT. LTD.	
BARKSDALE INC.	
BLUE STAR LTD.	
HERION WERKE	
SCHRADER SCOVILL DUNCAN LIMITED	
SEITZ AG	
ROTEX AUTOMATION LIMITED	
OPERATED VALVES ASCO	
PARKER HANIFEN	
HABONIM VASS	
FESTO	
COMPAC NEW ZEALAND	
MICROMECANICA	

ITEM CODE /DESCRIPTION	SPECIAL CONTROL VALVES
VENDOR NAME	REMARK
FISHER ROSEMOUNT SIGAPORE PTE. LTD.	
FLOWSERVE PTE. LTD. (FORMERLY DURIRON)	
HOPKINSONS LIMITED	
METSO AUTOMATION PTE LTD. (FORMERLY NELES)	
NUOVO PIGNONE SPA (ITALY)	
SPX VALVES & CONTROLS (FORMERLY DEXURIK)	
COMPAC IND. LTD. NZL	
ITEM CODE /DESCRIPTION	TWO WAY / THREE WAY VALVES/ 2-WAY DRAIN VALVES
VENDOR NAME	REMARK
SWAGELOK	
PARKER	
COMPAC	
HAMLET	
HYLOCK	
OASIS	
DK-LOK	
SSP	
ITEM CODE /DESCRIPTION	FLAME DETECTOR/SURGE PROTECTORS
MAKE	REMARK
MEGGITT AVIONICS	
GENERAL MONITORS/ MSA	
SPECTREX	
DETRONICS	
HONEYWELL	
NET SAFETY	
AMBETRONICS	
CROW ON	
SIEGER	
ISOLATORS	
BARRIERS	
ESP SAFETY	
PHOENIX	
P&F	
MTL	
ASPRO	
ITEM CODE /DESCRIPTION	GAS DETECTOR (IR TYPE)

MAKE	REMARK
DETRONICS	
SENSITRON	
HONEYWELL	
NET SAFETY	
GENERAL MONITORS/ MSA	
CROWON	
SIEGER	
ESP SAFETY	
DRAGGER	
AMBERTRONICS	
ITEM CODE /DESCRIPTION	**PLC**
MAKE	**REMARK**
SIEMENS	
SCHNEIDER	
ALLAN BRADLEY, ROCKWELL	
EMERSON	
HONEYWELL	
YOKOGAWA	
ABB	
PHOENIX	
ITEM CODE /DESCRIPTION	**COMPRESSOR MAIN MOTOR**
MAKE	**REMARK**
CROMPTON GREAVES	
SIEMENS	
WEG	
ABB	
LHP	
KIRLOSKAR	
BHARAT BIJLEE	
ITEM CODE /DESCRIPTION	**MAIN MOTOR VFD STARTER**
MAKE	**REMARK**
SIEMENS	
SCHNIEIDER	
FUJI	
ABB	
ITEM CODE /DESCRIPTION	**SOFT STARTER**
MAKE	**REMARK**
SIEMENS	

SCHNEIDER	
ABB	
FUJI	
ITEM CODE /DESCRIPTION	**CO2 CYLINDER VALVE WITH ACTUATOR FOR CO2 FLODDING SYSTEM**
MAKE	**REMARK**
GINGEKERR	
CEODUEX (ROTAREX)	
KIDDE	
FIKE	
ANSUL	
LPG	
VTI	
ROTEX	
KEW	
ITEM CODE / DESCRIPTION	**SS TUBING**
VENDOR NAME	**REMARK**
SANDVIK	
FAE	
TUBACEX (SCHOELLER-BLECKMNN)	
PARKER	
RATNAMANI	
ITEM CODE / DESCRIPTION	**SS FITTINGS & VALVES**
VENDOR NAME	**REMARK**
SWAGELOK	
PARKER	
ABAC	
M/s Fluid controls	
SSP	
STAUFF	
DK-LOK	
Astec	
SEALEXCEL	
HAMLET	
M/s SR Greentech(Manufacturer-BMT SuperLOK)	
M/s DAWSONS-TECH COMPONENTS LLP	
ITEM CODE / DESCRIPTION	**MASS FLOW METERS**
VENDOR NAME	**REMARK**
EMERSON PROCESS MANAGEMENT	CORIOLIS TYPE
ENDRESS & HAUSER CMBH & COMPANY	CORIOLIS TYPE

ITEM CODE / DESCRIPTION	FLP SWITCH
VENDOR NAME	VENDOR NAME
BALIGA	
FCG	
FPE	
FLEXPRO	
ITEM CODE / DESCRIPTION	SWITCHES/FUSES/CONTRACTORS
VENDOR NAME	REMARK
L&T	
GEC	
SIEMENS	
ITEM CODE / DESCRIPTION	CABLES & WIRES
VENDOR NAME	REMARK
INCAB	
CORDS CABLES INDUSTRIES	
ASSOCIATED CABLES	
UNIVERSAL	
ASEAN	
CCI	
FORT GLOSTER	
FINOLEX	
KEI	
POLYCAB	
HAVELLS	
ITEM CODE / DESCRIPTION	PRESSURE TRANSMITTERS
VENDOR NAME	REMARK
DRUCK	
WIKA	
HONEY WELL	
ABB	
ROSMOUNT	
WAREE	
EMERSON	
YOKOGAWA	
SIEMENS	
ITEM CODE / DESCRIPTION	RTDs
VENDOR NAME	REMARK
GENERAL INSTRUMENTS PVT LTD	
NAGMAN SENSORS PVT LTD	
PYRO ELECTRIC	

WIKA	
SIEMENS	
BAUMER	
WAREE	
ALTOP	
ITEM CODE / DESCRIPTION	**PLUG VALVE**
VENDOR NAME	**REMARK**
AIR & NORDSTROM VALVES INC	
XOMOX	
SANMAR INDIA LTD, NEW DELHI	
SERCK AUDCO VALVES	
SUMITOMO CORPORATION	
FISHER XOMOX SANMAR	
L&T (AUDCO INDIA LTD, CHENNAI)	
PARKER	
STAUFF	
ITEM CODE / DESCRIPTION	**ON OFF BALL/NEEDLE VALVE**
VENDOR NAME	**REMARK**
PARKER	
SWAGELOK	
ABAC	
SPIRAX SARCO	
WORCESTER	
WAREE	
BAUMER	
STAUFF	
SSP	
L&T	
SANKEY CONTROLS	
ROTEX	
AUDCO	
ITEM CODE / DESCRIPTION	**PRESSURE & TEMPERATURE SWITCH**
VENDOR NAME	**REMARK**
INFOS	
SWITZER	
CCS	
ASCO JOUCOMATIC LTD,UK, C/O ASCO (INDIA) LTD, INDIA	
DELTA CONTROLS LTD, UK	
INDFOS INDUSTRIES LIMITED, INDIA	

DAG PROCESS INSTRUMENTS PVT LTD, INDIA	
ITEM CODE / DESCRIPTION	**REGULATORS**
VENDOR NAME	**REMARK**
COMPAC IND. LTD.	
FISHER ROSEMOUNT SIGAPORE PTE. LTD.	
FLOWSERVE PTE. LTD. (FORMERLY DURIRON)	
SWAGELOK	
PARKER	
HYLOCK	
DK-LOK	
HAMLET	
SEALEXCEL	

Notes:

1. Above vendor list is indicative only and any other vendor(s) apart from as mentioned above may be accepted subject to approval by Owner/Owners representative based on past track record.
2. For the vendors of items not covered in above vendor list, but required for completion of project successfully, supplier shall take approval form Owner/Owners representative for the same during project execution. Bidder shall submit the required certifications, documents, PTR and Performance letters from clients for the same.

ANNEXURE – VII : VENDOR DATA REQUIRED

S. NO	DESCRIPTION	PRINTS WITH BID	CERTIFIED INFORMATION REQUIRED AFTER PURCHASE ORDER	
			FOR REVIEW	FOR RECORDS
A	GENERAL			
1	PROJECT SCHEDULE			
2	DULY FILLED-IN "CHECKLIST FOR COMPLETENESS OF BID"	YES		
3	DULY FILLED-IN "CHECKLIST FOR SCOPE OF SUPPLY"	YES		
4	DEVIATION LIST (IF ANY) TO THE APPLICABLE SPEC., DATASHEETS			
5	UTILITIES REQUIREMENT SUMMARY	YES		YES
6	FLANGE DETAILS OF PIPING CONNECTION WITH CONNECTION AT BATTERY LIMIT		YES	
7	DULY FILLED IN EXPERIENCE RECORD PROFORMA	YES		

8	GUARANTEE PARAMETERS AS SPECIFIED	YES		YES
9	TENTATIVE LOAD DATA FOR FOUNDATION DESIGN			YES
10	LIST OF SUB-VENDORS FOR ALL BOUGHT OUT ITEMS INCLUDING ELECTRICAL & INSTRUMENTATION ITEMS		YES	
11	LEAFLET, CATALOGUES FOR ALL ITEMS		YES	
12	O & M MANUAL		YES	
B	**COMPRESSOR**			
1	DATASHEETS FOR THE FOLLOWING	YES		YES
A	- COMPRESSOR	YES		YES
B	- HEAT EXCHANGERS			YES
C	- PRESSURE VESSELS			YES
D	- ELECTRIC MOTOR	YES		YES
2	CATALOGUE FOR COMPRESSOR			YES
3	TYPICAL CROSS SECTIONAL DRAWING AND LITERATURE TO FULLY DESCRIBE THE DETAILS OF			YES
	OFFERING			
A	- COMPRESSOR			YES
B	- SUCTION VALVE			YES
C	- DISCHARGE VALVE			YES
D	- PISTON ROD GLAND PACKING & PISTON RINGS			YES
E	- LUBE OIL PUMP			YES
4	V-BELT & PULLEY WITH SELECTION CHART & CALCULATION			YES
5	COOLER DATA / DRG WITH THERMAL & MECH DESIGN CALCULATION		YES	
6	DESIGN CALCULATION, GA DRGS FOR PULSATION DAMPNER		YES	
7	PIPING & INSTRUMENTATION DIAGRAMS FOR THE FOLLOWING	YES	YES	
A	- PROCESS GAS		YES	
B	- LUBE OIL		YES	
C	- COOLING SYSTEM		YES	
8	TORQUE ANGLE DIAGRAM, PISTON ROD LOAD VS CRANK ANGLE		YES	
9	TORQUE SPEED CHARACTERISTICS		YES	
10	ACOUSTIC / MECHANICAL EVALUATION REPORT		YES	
11	ITEMIZED PRICE LIST OF ESSENTIAL SPARES		YES	
12	ITEM LIST OF SPARES WITH PRICE FOR 5 YEARS		YES	
13	DRG. FOR TESTING ARRANGEMENT & TEST PROCEDURE TO BE ADOPTED		YES	

14	CERTIFICATE FOR FOLLOWING:		YES	
A	HYDRAULIC TESTING		YES	
B	NON DESTRUCTIVE TESTING		YES	
C	MATERIAL COMPOSITION & PHYSICAL PROPERTIES		YES	
D	LEAK PROOFNESS TEST OF FRAME		YES	
E	LUBE PUMP, FRAME OIL PUMP, HYD OIL PUMP		YES	
15	DESIGN / ACTUAL ASSEMBLY CLEARANCE CHART		YES	
16	TEST RECORDS OF FOLLOWING			
A	MECHANICAL RUNNING S		YES	
B	PERFORMANCE TEST / PACKAGE TEST		YES	
C	NOISE LEVEL TEST YES		YES	
17	LIST OF SPECIAL TOOLS & TACKLES FOR INSTALLATION & MAINTENANCE	YES		YES
C	**ELECTRIC MOTOR**			
1	MOTOR DATA SHEET	YES	YES	
2	TECHNICAL LITERATURE / CATALOGUE, SELECTION CHARTS, NOMOGRAPHS ETC.	YES	YES	YES
3	GA DRAWING	YES	YES	
4	TERMINAL BOX ARRANGEMENT DRAWING		YES	
5	MOTOR CHARACTERISTIC CURVES		YES	
6	TORQUE SPEED CURVES		YES	
7	CURRENT TIME CURVES		YES	
8	P.F AND EFFICIENCY		YES	
9	TYPE TEST CERTIFICATES		YES	
10	CERTIFICATE FROM THE RELEVANT STATUTORY AUTHORITY (BASED ON THE COUNTRY OF MANUFACTURE) FOR SUITABILITY OF THE OFFERED MOTOR FOR INSTALLATION IN THE SPECIFIED AREA CLASSIFICATION		YES	
11	PRE-COMMISSIONING AND COMMISSIONING PROCEDURE		YES	
D	**INSTRUMENTATION**			
1	G.A. OF INSTRUMENT PANEL WITH BILL OF MATERIAL & WIRING DIG. FOR LCP		YES	
2	INSTRUMENT DATASHEET		YES	
3	LOGIC DIAGRAM / LADDER DIAGRAM / FUNCTIONAL DIAGRAM		YES	
4	LOOP SCHEMATIC		YES	
5	INTER CONNECTING DIAGRAM		YES	
6	OPERATING / CONTROL WRITE UP		YES	
7	ALARM / SHUT DOWN LIST7		YES	

8	WIRING DIAGRAM / INTER CONNECTING PIPING		YES	
9	START UP AND SHUT DOWN WRITE UP		YES	
10	START UP AND SHUT DOWN INLET LOCK DIAGRAM		YES	
11	ALARM AND SHUTDOWN LIST WITH SET POINT		YES	
12	LOAD CONTROL PANEL LAYOUT		YES	
13	TERMINATION DIAGRAM, PANEL WIRING DETAIL		YES	
14	LOOP SCHEMATIC		YES	
15	INTER CONNECTING DIAGRAM		YES	
16	CABLE SCHEMATIC		YES	
17	BILL OF MATERIAL		YES	
18	TEST / INSPECTION CERTIFICATE		YES	
19	LIST OF RELIEF VALVES WITH SETTINGS		YES	
20	CERTIFICATE FROM THE RELEVANT STATUTORY AUTHORITY (BASED ON THE COUNTRY OF MANUFACTURE) FOR SUITABILITY OF THE OFFERED INSTRUMENTS FOR INSTALLATION IN THE SPECIFIED AREA CLASSIFICATION		YES	

1. DOCUMENT DISTRIBUTION SCHEDULE

1.1. Documents and drawings under column no. 3 shall be submitted with each copy of the bid.

1.2. Documents listed under column 4 are to be submitted in 4 copies

1.3. Documents listed in column 5 are to be submitted as hard bound indexed book containing the following details in Two (2) copies and to be submitted within 4 weeks of release note/dispatch of materials/ equipment from vendor's works.

2. DETAILS TO BE INCLUDED IN FINAL DOCUMENTS BOOKS

2.1. Copy of P.O. and all amendments.

2.2. Copy of Purchase Requisition and all amendments.

2.3. Manufacturing Data Book containing all test certificates of components, raw materials, stage manufacturing tests and inspections, final tests & inspection documents including welders' qualification & welding procedure qualification, repairs & reworking carried out in shops. All raw material test certificates must be correlated to the P.O. Item No. & component to which they relate by clear noting on the certificates.

2.4. Spares details including assembly drawings, part numbers, delivery, prices and ordering information.

2.5. All design calculations carried out by the vendor.

2.6. Final Drawing Index and all as-built drawings reduced to A3/ A4 size and wherever reduction is not possible, full size copies duly folded and placed in plastic pockets.

2.7. Catalogues/leaflets of sub-vendors/suppliers of various bought out components highlighting the components actually supplied correlated to P.O. Item Numbers.

2.8. Operating and maintenance instructions including lubrication schedules with details of suppliers for procurement by OWNER for subsequent needs.

2.9. Release Note and Packing List.

2.10. Any other documents asked for in the Purchase Requisition.

2.11. All final drawings shall also be given to purchaser in digitized form on CD-ROM compatible to AUTOCAD software.

2.12. Final documents including operation and maintenance manual should be submitted, one copy per package plus one original.

2.13. Operation and maintenance manual shall include assembly and disassembly, specification (torque chart), parts manual, complete list of bill of material, bought out spares and accessories. One original plus individual copies for the no. of compressor packages supplied.

3. SPECIAL INSTRUCTIONS FOR SUBMISSION OF DWGS./DOCUMENTS:

3.1. Fold all prints to 216 MM x 279 MM size.
3.2. Contractor to forward the drawings and documentation to OWNER (Attention vendor prints control department) clearly specifying purchasers Job no. & Req. No.
3.3. The drawing/Document no. with Rev. No. is essential. The number may be upto a maximum of 28 characters in length.
3.4. Each Drawing/Document submitted to OWNER must be checked and signed/stamped by contractor before it is submitted to OWNER.
3.5. Revision number must change during subsequent submission of vendor document.
3.6. Multi-sheet documents other than drawings must be submitted in their entirety in the event of a re-submission even if only a few sheets are revised.
3.7. Final submission in bound volumes shall necessarily have a cover page giving project title, Item name, P.O. No. particulars of owner, consultant & vendor and an index giving list of drawings & documents included (with revision no.).
3.8. All vendor drawings to be provided with a blank space measuring 75 mm W x 38 mm H for marking of review codes etc. by OWNER.
3.9. The review of the vendor drawings shall be done by OWNER, as applicable, under the following review codes:

Review Code 1	No comments.

Review Code 2	Proceed with manufacture/fabrication as per commented drawings. Revise drawings required
Review Code 3	Document does not conform to basic requirements.

3.10. Review of vendor drawings by OWNER would be only to check compatibility with basic designs & concepts & would in no way absolve the contractor/vendor of his responsibility to meet applicable codes, specifications & statutory rules/regulations.

3.11 Vendor shall submit within 10 days after placement of FOI, the complete list of drawings/ documents with submission dates against each. Critical drawings, only, the list of which will be agreed during kick-off meeting shall be reviewed jointly at OWNER's office.

ANNEXURE – VIII: DEVIATION SCHEDULE

Vendor:		
S.No.	Vendor to specify Specification number and clause number against which Deviation is sought	Description of Deviation and give reasons in support of Deviation
	----------NO DEVIATION ----------	NO DEVIATION

ANNEXURE – IX : M.R. COMPLIANCE SCHEDULE

S. No.	Requirements	Compliance By Vendor (To Be Answered By Vendor)
1	Confirm compliance individually to following clauses of Job Specification.	
	Clause no 1.0	
	Clause no 2.0	
	Clause no 3.0	
	Clause no 4.0	
	Clause no 5.0	
	Clause no 6.0	
	Clause no 7.0	
	Clause no 8.0	
	Clause no 9.0	
	Clause no 10.0	
	Clause no 11.0	
	Clause no 12.0	
	Clause no 13.0	
	Clause no 14.0	
2	Confirm that you have filled-up the following Schedules/ Annexures and enclosed these with the Bid	

	Guarantee Parameters	
	Motor Datasheet	
	List of Motors	
	Specification of Instruments	
	Vendor List	
	Deviation Schedule	
	Experience Record	
	Material Requisition Compliance Schedule	
	SCADA requirements	
3	Confirm that you have filled-up the Data Sheet and enclosed with the Bid.	
	Compressor Data Sheet	
	Motor Datasheet	
4	Confirm that following Documents have been enclosed with Bid.	
	List of components of CNG Compressor with Make &	
	Specification of components alongwith Technical Catalogues of components.	
	Battery Limit (Interface) drawing/ information.	
	Process flow diagrams (PFDs) and Piping & Instrumentation diagrams (P & Ids) of sub systems and	
	complete system with write-up on operation	
	Utility requirement	
	Detail of control wiring diagram, interlock/shutdown/ control scheme with write up on operation. Sizing	
	calculation for instrument items.	

ANNEXURE –X: EXPERIENCE PROFORMA RECORD

A) EXPERIENCE RECORD PROFORMA OF RECIPROCATING BOOSTER COMPRESSOR PACKAGE				
SR. NO	**DESCRIPTION**	**INFORMATION OFFERED COMPRESSOR**		**INFORMATION OF EXISTING COMPRESSOR**
	REQUIREMENT AS PER TENDER	**Min.: 400 SCMH**		
1	Status of bidder			
	a) Compressor manufacturer			
	b) Electric Motor manufacturer			
	c) Packager			
2	**COMPRESSOR**			

	Name of compressor manufacturer			
	Place of compressor manufacturer			
	Compressor model			
	Anticipated Life in running hours			
	Compressor max frame BKW			
	Comp Manufacturing code			
	Lubricated or non lubricated			
	Nos of stages			
	Max stage temperature ^{o}C (150^{o}C)			
	Compressor max RPM			
	Compressor operating RPM			
	Piston speed m/s			
	Vibrations at comp cylinders <10 mm / sec. Unfiltered peak velocity Vibration comp frame : Unfiltered peak velocity of 5 mm/sec or 200 micron unfiltered peak to peak vibration whichever is less			
	Material for all stages			
	Cylinder (C.S)			
	Piston Rings (PTFE)			
	Rider Rings (PTFE)			
	Piston Rod (Forged steel)			
	Valve (Rings / plates / spring) : (SS/SS/SS)			
3	**PERFORMANCE OF COMPRESSOR**			
	GUARANTEED POINT:			
A	Average Flow capacity (overfull range of suction pressure from 30 Kg/cm2 g to 200 Kg/cm2 g varying on continuous basis)			
B	Minimum Flow capacity corresponding to suction pressure of 200 to 30 kg/cm2			

C	BKW required by compressor including compressor's lube oil pump BKW			
D	Power required for all fans including radiator fan in Kw			
E	Ventilation fans for enclosure No of fans Type of fans (included or forced draft)			
F	Site Capacity of Motor (max of "B+D" above) * 1.1			
	Piston rod and cross head pin loading at any specified operating condition including the relief valve set condition shall not exceed 80% of the maximum design rod load of the offered compressor			
	---- Piston rod : max design			
	--- Piston rod: calculated at safety set pr condition			
	--- Max cross head pin loading: Design '			
	--- Cross head pin loading: calculated at safety set pr condition			
	Guaranteed gas loss through rod deals; sm3/h			
	Other information of compressor			
	a) Year of manufacturing of the compressor			
	b) Name and address of user with FAX no, phone no, E-mail address			
	c) Nos of hours the compressor have clocked on bid due date (Enclose certificate from user)			
4	**ELECTRIC MOTOR**			
	Make			

	Model			
	Rating			
	Speed			
5	**PACKAGE**			
	Name of Packager			
	Place of Packaging			
	Name of Enclosure Manufacturer			
	Palace of enclosure manufacturer			
	Sound level at 1 m distance from package in db (A) 75			
	Skid size (LxBxH)			
	Skid Gross Weight (Comp. + Motor + Aux.) Kg			
	Make and model LEL detector – 1 no. each comp			
	Make and model fire detector – 1 no. each comp			
	2 nos. min CO2 cylinder with online weight monitoring.			
	Volume of enclosure in m3			
	Nos. of explosion proof tube light in each enclosure			
	Coupling Direct / V – belt			
	Other information of complete package			
	a) Year and place of manufacturing of the package			
	b) Name and address of user with FAX no, phone no, E-mail address			
	c) Nos of hours the complete package have clocked on bid date (enclose certificate from user)			
7	**Gas recovery system**			
	Gas recovery system with pr relief valve, pr regulator, pr gauge, manual & automatic drainage system			
8	**Gas Delivery system**			

	High pr piping with SS 316, tubing, compression fittings, NRV			
	KOD			
	Coalescent filter			
	PLC based Priority panel with full bore ball valve			
	Final gas outlet connection from priority panel 3/4" SS valves and 1" OD SS compression fittings			
9	**ESD system**			
10	**Volume bottles / dampers at each compressor stage of compressor**			
	Vessels			
	Drainage system			
11	Manual double isolation valve			
12	Automatic valves			
13	**Heat exchanger**			
14	Code of construction API 661			
15	Gas sections of coolers shall be as per API – 618			
16	Tube material			
17	Piping between stages shall be continuous with flange connection			
18	Other tubing shall be SS 304/ 316 as per TS.			
19	Gas recovery vessel provided			
20	Area classification; " class 1, group D, division 1 as per NEC " OR " Zone 1, group IIA / IIB as per IS/IEC"			
21	The size of the complete package			
25	Instrumentation as indicated in TS			
30	Cabling – Double compression type cable glands and copper lugs			

31	Junction box with metallic enclosure			

ANNEXURE – XI : PARAMETERS FOR SCADA

Parameters required for SCADA

We want to monitor / control all parameters available on the IOT / PLC through SCADA system

Hardware Details: Connector Type, Communication Standard, Communication port Pin details,

Communication Port Configuration: Baud Rate, data bits, stop bit, parity

Polling Constraints: Minimum time period between two consecutive poll cycles.

Protocol Details: Protocol name and message structure for different read / write functions.

Function codes for reading digital and Analog inputs.

Function code for writing analog values in the IED registers.

List of parameters available in the IED which can be accessed from the IED through serial port.

Register address of each parameter in the IED.

A Sample of the details is given below for understanding:

PROTOCOL DETAILS:

Sr.No.	Description	Content/Details
1	Protocol	MODBUS RTU
2	Connection Type	FCC –68 RJ45
3	Communication standard	RS485
4	Signals supplied	Tx, Rx, GND
5	Baud Rate(Speed)	300, 600,1200,4800,9600,19200
6	Format	Software configurable
7	Port Configuration	Speed : 19,200 bps Data Bits : 8 Bits Stop Bit : 1 Bit Parity : None
8	Min. Time period between consecutive Query	2 Sec.

Function Code & Message Structure:

Function Code: 3 – Read Output Register Poll Format:

Address 1 Byte

Function 1 Byte
Start Item 2 Byte

No. Item 2 Byte
Response Format:

Address 1 Byte
Function 1 Byte
Length 1 Byte
Date Item 1 4 Byte Date Item n 4 Byte

Function Code & Message Structure:
Function Code: 2 – Read Input Status Poll Format:

Address 1 Byte
Function 1 Byte
Start Item 2 Byte

No. Item 2 Byte Response Format:
Address 1 Byte
Function 1 Byte
Length 1 Byte
Date Item 1 2 Byte
Date Item n 2 Byte

Memory Mapping, Data Type & Parameter Information:

A. **Digital Parameters :**

Sr. No.	Description	Address
1	Flow computer malfunction Alarm	
2	Mass Flow Low alarm	
3	Mass Flow High alarm	

B) Analog Parameters:

Parameter	Register details			
	Engineering Range and Unit	GC Register	Register Format	
Density	Kg/m3 (0.55-0.68)		Float	
Pressure			Float	
Temperature			Float	
Mass Flow Rate			Float	
Totalized mass flow			Float	
Yesterday's Total Mass flow			Float	
Today's Total Mass Flow			Float	
Corrected volumetric Flow rate			Float	
Yesterday's Total corrected Volumetric Flow			Float	

PTS - ELECTRIC MOTOR DRIVEN RECIPROCATING 400 SCMH BOOSTER COMPRESSOR

Annexure – XII

QUALITY ASSURANCE PLAN

Sr.No	Description	Quantum of Check	Reference Document	Acceptance Norms	Format Of Records	Inspection By			Remarks
						Vendor	TPIA	Owner/ Owner's Representative	
1.1	Hydrotest of Cylinder, Cylinder Heads ,Press. Vessels, Heat Exchangers		Technical Specification	Technical Specification	Test Report	W	W	R	
1.2	Electric Motor Performance Test- at Sub-Vendor's Works as per ISO Std. **Refer Note: 1**		Technical Specification	Technical Specification	Performance Test Report	R	R	R	
1.3	Material Test Certificates for :Pressure Vessels, Heat Exchanger		Technical Specification	Technical Specification	MTC	R	R	R	
1.4	Canopy Structure Painting Inspection At Works. Surface Preparation to be Inspected after cleaning and before application of First Coat of Primer.		Technical Specification	Technical Specification	Inspection Report	W	W	R	
1.5	Functional / HV / Continuty Test for Control Panel (at Sub Vendor's Works)		Technical Specification	Technical Specification	Test Report	W	W	W	
1.6	Mechanical String Test for 4 Hours of CNG Compressor		Technical Specification	Technical Specification	Test Report	W	W	W	
1.7	Test Certificates For - Safety Switches, Safety Relief Valves, Solenoid Valves		Technical Specification	Technical Specification	Test Certificate	R	R	R	
1.8	Final Mock-Up Assembly of the Package - As Per GAFD, P& I Drawings. Wiring Diagram		Technical Specification	Technical Specification	P&ID, Wiring Diagram	W	R	R	

1.9	Performance Test at site at Guaranteed Parameters.		Technical Specification	Technical Specification	Performance Test Report	W	W	R/W	
1.10	Field Trial Run for 72 Hrs.		Technical Specification	Technical Specification	Field Trial run report	W	W	R/W	

LEGENDS :	W = WITNESS, R = REVIEW OF DOCUMENTS, Y = DOC. SUBMISSION BY VENDOR / SUB-VENDOR
NOTES:	
1	Review of manufacturer's test reports/certificates of all compressor package.
2	Witness of tests by TPIA or owner/owner's representative.
3	Inspection of the components / assembly, shall be conducted as per standard Test Procedures.
4	All reference codes/ Standards, documents, P.O. copes shall be arranged by vendor/ supplier for reference of Owner / Owner's representative / TPIA at the time of inspection.
5	The owner shall submit their own detailed QAP prepared on the basis of above technical specification for approval of Owner/ Owner's representative.
6	Vendor to submit his QAP in line with above at the time of Detailed Engineering
NOTE:	TPIA (THIRD PARTY INSPECTION AGENCY WILL BE APPOINTED BY SUPPLIER AFTER DUE APPROVAL FROM OWNER.

ANNEXURE - XIII

DATA SHEET

DATA SHEET: LOW VOLTAGE SQUIRREL CAGE INDUCTION MOTO ELECTRICAL DESIGN DATA

1.	Motor tag no.			
2.	Voltage (V)	415V ± 10%	Phase 3	Frequency (Hz.) 50 Hz+3%
3.	Fault level (KA)	**NOT APPLICABLE**		
4.	Method of starting	**Star Delta**		
5.	Phase	**THREE**	Connection – **STAR-DELTA**	No. of terminal – **6**
6.	Design Ambient temp (^{0}c)	**50 ^{0}C (IN ACCOUSTIC ENCLOSURE)**		Temp. rise (^{0}c) **70 ^{0}C (Maximum)**
7.	Cable size (mm^2)	AS PER SPEC ATTACHED		Type **CU. COND. PVC INS.**
8.	Enclosure type	IP 55, Ex-d, IIA, IIB,T3		Cooling **TEFC**
9.	Insulation class	CLASS-F with temperature rise of CLASS B		
10.	Haz. Area classification/ Gas Group	ZONE-1, GROUP-IIA, IIB, Temp Class T3 as per IS/IEC		
11.	Type of explosion protection: Ex (d)		Applicable standards: **IS/IEC**	
Technical particulars from Driven equipment manufacturer				
12.	Suggested Motor Rating in KW/ Manufacturer		# / #	
13.	Shaft kw/kw at end of curve		# / #	
14.	Speed/ rotation of equipment from Coupling End		# / #	
15.	Starting/ max. Torque required (mkg)		# / #	
16.	WK^2 of equipment including/ excluding lywheel (kgm^2)		# / #	
17.	Thrust up/ down (kg)		# / #	
18.	Equipment/ coupling type		# / #	
19.	Starting Condition-On no load/ Under loaded condition		#	
Technical particulars from motor manufacturer				
20.	Manufacturer	*		
21.	KW Rating	*	No. of poles	*
22.	Frame designation	*	Mounting (Horizontal)	*
23.	Full load speed (Max. 1500 rpm)	*	Full load Torque (mkg)	*
24.	Starting torque as % of full load torque	*		
25.	Full load current (A)	*		
26.	Starting current at 100% Voltage (A)	*		
27.	Breakdown or pull out torque %	*		
28.	Rotation viewed from coupling end	*		
29.	Starting time at 75%V	* (sec.)	Starting time at 100%V	* (sec)
30.	Time (Te) for increased safety motors at 100% Voltage (secs.)		NOT APPLICABLE	
31.	Locked rotor with stand time cold/ hot at 75% V(sec)	*	At 100% V(sec)	*
32.	WK^2 of motor (kg m^2)	*		
33.	Power factor at 100% load	*	Power Factor at 75% load	*
34.	Efficiency at 100% load	*	Efficiency at 75% load	*
35.	Space heater watts/ volts	NA		
36.	Bearing type/ no. DE	*/*	Bearing type/ no. NDE	*/*
37.	Type of Lubrication	*		
38.	Weight of motor (kg)	*		
39.	Canopy required/ Not required	NOT REQUIRED		

TO BE FILLED BY BIDDER BASED ON THE PACKAGE DESIGN

* TO BE FILLED BY MOTOR MANUFACTURER

Bidder must quote for only one make of motor. The bidder shall submit filled up data sheet for the selected make of motor only.

Motor Terminal Box must be suitable for the cable size indicated on data sheet.

POWER CABLE SIZES FOR 415V MOTORS

S.No.	Motor Rating KW	CABLE SIZE mm2		No. of Cores	CABLE DIAMETER - mm (APPROX)		
		CU	AL		Overall	Under Armour	Over Armous
	Below 3.7 KW	4		3			

	3.7	6		3			
	5.5	10		3			
	7.5	10		3			
	11.0	16		3			
	15.0	16		3			
	18.5	16		3			
	22.0	16		3			
	30.0	25		3			
	37.0	25		3			
	45.0	35		3			
	55.0	50		3			
	75.0	95		3			
	90.0	120		3			
	110.0	2x95		3			
	125.0	2x120		3			
	132.0	2x120		3			

NOTES:

1. Above table is valid for 2/4/6 pole motors. For low-speed motors cable sizes shall be defined at the time of detailed engineering.
2. Cables will be 650/1100V, copper conductor, FRLS-XLPE insulated, FRLS-PVC extruded inner sheath armored with overall FRLS-PVC sheath.

DATA SHEET: PRESSURE, VESSEL

(To be filled in by the Vendor)

PROJECT UNIT ITEM NO.

EQUIPMENT CLIENT

JOB NO. PACKAGE MR. NO.

CODE FOR DESIGN AND CONSTRUCTION ASME SEC-VIII DIV1

DESIGN CONDITION

PRESSURE (kg./ cm2g) TEMPERATURE (0C)

OPERATING CONDITIONS

PRESSURE (kg./ cm2g)

TEMPERATURE (0C)

CORROSION ALLOWANCE 3 MM

SERVICE CNG LETHAL [X] OTHERS CO2

LIQUID LEVEL (mm)

SPECIAL SURFACE FINISH INSIDE VESSEL REQD. [ ] NOT REQD. [ ]

TYPE OF VESSEL HORIZONTAL [ ] VERTICAL [ ] DIAMETER (mm)

HEIGHT TL TL (mm)

SKIRT/ LEG HEIGHT

JOINT EFFICIENCY SHELL 1.0 HEAD 1.0

RADIOGRAPHY SHELL100% HEAD 100%

POST WELD HEAT TREATMENT

MATERIALS OF CONSTRUCTION SA 516 GR 60/70

SHELL, REINFORCEMENT PADS

HEADS/ CONES

SHELL FLANGES

NOZZLE FLANGES

NOZZLE NECK

MAN-WAY NECK

PIPE FITTINGS

GASKETS (EXTERNAL)

GASKET (INTERNAL)

SKIRT/ LEG SUPPORT

INTERNAL PARTS

EXTERNAL PARTS

INTERNAL BOLTS/ NUTS

CLIP ATTACHMENTS (EXTERNAL)

ANY OTHER GENERAL REQUIREMENT

NOTE: VENDOR SHALL SUBMIT COMPLETED DATA SHEET ALONG WITH OFFER WHEREVER ENGG. DRAWING IS NOT ATTACHED FOR THE VESSEL.

SECTION- 8
SPECIAL CONTRACT CONDITIONS

SPECIAL CONDITIONS OF THE CONTRACT (SCC)

The following Special Conditions of Contract shall supplement the General Conditions of Contract. Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of the Contract. The corresponding clause number of the GCC is indicated in parentheses.

1.0 DEFINITIONS

The Purchaser is: (C&P Department), Bhagyanagar gas Limited having their office at 2nd floor TSIDC buildings, Parishrma bhavan, Basheerbagh, Hyderabad-500004

FOT shall mean sum of Ex-works price including packing and forwarding, TPIA, GST, Transit insurance, transportation, and unloading at site.

2.0 PRICE REDUCTION SCHEDULE (PRS)

In case supplier fails to complete the supply within stipulated period then unless such failure is due to force majeure as defined in Bid document, there will be reduction in order value @ 0.5% of the total order value for every week or part thereof of the delay, subject to maximum of 5% of the total order value. Owner may without prejudice to any methods of recovery, deduct the amount of such PRS from any money due or which may at any time become due to supplier from its obligations or liabilities under the contract or by recovery against the performance bank guarantee. Both owner and supplier agree that the above percentage of price reduction are genuine pre-estimates of the loss/ damage which Owner would have suffered on account of delay/ breach on the part of supplier and the said amount will be payable on demand without there being any proof of the actual loss/ damage caused by such delay/ breach. Owner decision in the matter of applicability of price reduction shall be final and binding.

Value considered for PRS as per above clause shall be excluding taxes and duties.

All sums payable by way of compensation shall be considered as reasonable compensation without reference to the actual loss or damage which shall have been sustained.

3.0 DELIVERY AND DOCUMENTS

Bidder to note that delivery shall be as per followings:

For Hyderabad: The basis of delivery for all items shall be FOT, BGL Site/OMC site/ Store at Hyderabad GA

For Vijayawada & kakinada: The basis of delivery for all items shall be FOT, BGL site at Vijayawada/ Kakinada GA

Upon delivery of the Goods to the transporters/ carriers, the Supplier shall notify the Purchaser/ Consultant and fax/ mail the following documents to the Purchaser/ Consultant:

(a) LR or GR
(b) Packing List showing weight and dimension of each package
(c) Manufacturer's factory inspection complying the technical specification as per tender.
(d) Inspection release note issued by Purchaser/ Consultant/ TPIA
(e) Cargo Insurance
(f) Dispatch clearance issued by Purchaser/ Consultant.
(g) Likely date of arrival.
(h) Invoice

The above documents shall be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.

Final original documents for release of payment shall be submitted at BGL, Hyderabad Head Office and transport copy shall be submitted at the time of delivery at BGL designated store/ office.

4.0 SHIPMENT

The Bidder shall make shipment only after obtaining dispatch clearance from Purchaser. For getting dispatch clearance, bidder has to submit inspection release note issued by Third Party Inspection agency/ Purchaser"s authorized representative to the Purchaser.

The bidder shall provide details of adequate coverage of transit insurance along with dispatch documents.

5.0 PAYMENT TERMS

PAYMENT TERMS & MODE OF PAYMENT
[APPENDIX – I TO SPECIAL CONDITION OF CONTRACT]
PAYMENT TERMS & MODE OF PAYMENT
1. PAYMENT TERMS
A. Supply Portion

i. 85 % of the total supply order price (per compressor package) will be paid against receipt of ordered item(s) by Owner at site upon receipt and acceptance of bills at site against relevant documents as mentioned in order, payment will be through e-banking (in case of Domestic bidder)

Document Requirement

a. Inspection release note by issued by inspection Agency appointed by owner / consultant.
b. GR / LR.
c. Packing List
d. Insurance cover note covering transit insurance
e. Dispatch Clearance by Owner / Consultant.
f. Documents as specified in the Technical Specifications.
g. Copy of valid Performance Bank Guarantee as per tender terms & conditions
h. Invoice in triplicate (as per GST Act/ Rules)
i. A certificate from manufacturer that the all items/ equipment under supply including its component or raw material used with manufacturing are new and conform to the tender requirement. In case manufacturer is not the contractor this certificate will duly be endorsed by the contractor owning overall responsibility.
j. Indemnity Bond

ii. 15 % of the total supply order price (per compressor package) will be paid within 30 days of successful completion of Installation, Testing, Commissioning and Field Performance test (4 hours) and Field trial run(72 hour) at site and acceptance thereof by Owner and submission of all technical documents as per tender requirement.

However, if erection is not started within 120 days after supply due to non-availability of site / gas, balance payment of 15% of the total supply part shall be processed for release to the successful bidder. In case of delay in receipt of material at site the invoice value shall be reduced to take care of stipulation of PRS clause of the contract.

C. Payment for Maintenance

Monthly Maintenance charges shall be payable from the date of compressors are taken under commercial operation by CLIENT after submission of PBG as per tender terms & conditions.

D. General Notes

i. Invoice shall be raised on the basis of not less than one fortnight interval.

ii. PRS amount pertaining to supply part shall be deducted from 85% of the total supply order price to be paid against Sl. no. i) of Payment Terms.

iii. EIC needs to verify and certify the compliance as per clause no 14(2) of tender document (Penalty towards excess energy consumption & package performance or gas loss etc) on monthly basis before certifying contractor bills. If penalty is applicable, adjustment shall be made to invoice value while processing the bill.

iv. All efforts shall be made to release the payment within 30 days after receipt of relevant documents complete in all respects.

v. All bank charges incurred in connection with payments shall be to vendor"s accounts.

vi. Unless otherwise specifically stated in bid document, all payments shall be made in the currency quoted.

vii. No interest charges for delay in payments, if any, shall be payable by Owner.

viii.. Penalty/ deductions for non-performance, if any, shall be applicable as per provisions stipulated in technical volume (Vol.-II).

ix. The rates quoted for Annual comprehensive repair & Maintenance shall be inclusive of cost of relievers, fulfillment of statutory compliances and meet all the contractual obligation as defined in the bid document.

Comprehensive Annual maintenance services i.e. Servicing, Repair & maintenance charges (preventive, breakdown, etc) after successful completion of Warranty Period.

Monthly comprehensive maintenance charges shall be paid on pro-rata monthly basis, within 30 days on receipt of correct invoices duly certified by Engineer In-Charge.

6.0 DISPATCH INSTRUCTIONS

Seller shall obtain dispatch clearance from the Purchaser prior to each dispatch.

Copy of Inspection Release Certificate, Dispatch Clearance and Statement showing the name of the vessel / transporter, description and weight of material and shipping marks etc. to be submitted along with the documents.

7.0 REJECTION

Any materials/goods covered under scope of supply, which during the process of inspection by appointed third party, at any stage of manufacture/fabrication and subsequent stages, prior to dispatch is found not conforming to the requirements/specifications of the Purchase Requisition/Order, shall be liable for immediate rejection.

Supplier shall be responsible and liable for immediate replacement of such material with acceptable material at no extra cost or impact on the delivery schedule to OWNER.

8.0 LIMITATION OF LIABILITY

Notwithstanding anything contrary contained herein, the aggregate total liability of Supplier under the Contract or otherwise shall be limited to 100% of contract value. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.

9.0 QUALITY ASSURANCE/QUALITY CONTROL

The Bidder shall prepare a detailed quality assurance plan for the execution of Contract for the various supplies for approval of BGL/ BGL PMC Consultant.

The Bidder shall establish document and maintain an effective quality assurance system outlined in recognized codes.

The Purchaser, while agreeing to a quality assurance plan shall mark the stages for witness of Tests, review at any or all stages of work at shop/site as deemed necessary for quality assurance.

10.0 INSPECTIONS AND TESTS

Inspection and tests prior to shipment of Goods and at final acceptance shall be as per Technical Specifications, Quality Control Table and approved Inspection & Test Procedure. However, without prejudice to the provisions of technical specifications following shall hold good:

The Purchaser or its representative shall have the right to inspect and/ or to test the material to confirm their conformity to the specifications.

The inspections and tests may be conducted on the premises of the Seller or his subcontractor (s) at point of Delivery and/or at the destination. When conducted on the premises of the Seller or his subcontractor(s), all reasonable facilities and assistance including access to the production data shall be furnished to the Purchaser's representatives at no charge to the Purchaser.

The Purchaser's right to inspect, test and wherever necessary reject the material after the material‟s arrival in the Purchaser‟s country shall in no way be limited to or waived by reason of the material having previously been inspected, tested and passed by the Purchaser or their representative prior to the material shipment from the country of origin.

Supplier shall hire Third Party Inspection Agency (TPIA) for carrying out the inspection at supplier‟s works as per approved ITP. TPIA charges shall be borne by Supplier. Approved TPIA are Moody International (India) Pvt. Ltd., Dr. Amin Controllers Pvt. Ltd., Certification Engineers International Ltd., International Certification Service Pvt. Ltd., Bureau Veritas (India) Pvt. Ltd., Hertz Inspection & Services Pvt. Ltd., Meenar Global Consultant, Quality Evaluation and Systems Team Pvt. Ltd. TUV SUD South Asia, Vincotte International India Assessment Service Pvt. Ltd., TUV India Pvt. Ltd., SGS India Pvt. Ltd. Supplier shall obtain BGL /BGL‟s Consultant's approval before finalizing the TPIA.

11.0 REPEAT ORDER

PURCHASER reserves the right, within 06 months of order to place repeat order upto 50% of the original ordered quantity (s) without any change in unit price or other terms and conditions.

12.0 MODE OF PAYMENT

Payment will be released through E-payment as detailed in ITB Taxes & duties (GST) shall be paid in Indian Rupees only. For reimbursement of taxes & duties the currency exchange rate as mentioned in GST Invoice shall be considered.

The payment shall be released within 30 days from the date of receipt of invoice, if found to be in order and duly certified by PMC/EIC.The Payment shall be released through RTGS only.

13.0 DEDUCTION AT SOURCE

Purchaser will release the payment to the Seller after effecting deductions as per applicable law in force.

Purchaser will release payments to the Bidder after offsetting all dues to the Purchaser payable by the Bidder under the Contract.

Notes: - All Invoices shall be raised in line with the GST Act/rules in vogue.

14.0 GUARANTEE/ WARRANTY

Warranty shall remain valid for twelve (12) months from the date of successful commissioning of supplied material or Eighteen (18) Months after the date of receipt of last shipment whichever is earlier. However, if these 18 months‟ period exceeds due to any defect observed in the supplied material at site in that case supplier to replace the material without any extra cost to owner and the warranty will stand extended for another 12 months from the date of supply of replaced material.

15.0 PACKING

The SCC provisions shall supplement GCC Clause 11.0 as detailed below.

Packing shall be capable of withstanding rough sea weather for a minimum period of 2 to 3 months and shall be commensurate with the best commercial export practice in case of sea freight.

Fragile articles shall be packed with special precaution and shall bear the marking like 'Fragile Handle with Care' and' or 'This side Up' etc. Items shipped in bundle must be securely tied with steel wire or straps at suitable intervals.

All delicate surface on equipment' materials shall be carefully protected and painted with protective paint compound and wrapped to prevent rusting and damage.

Attachments and parts of equipment and small pieces shall be packed in wooden cases with adequate protection inside the case and wherever possible should be sent along with the major equipment. Each item shall be tagged so as to identify it with the main equipment and part number and reference number shall be indicated.

All protrusions shall be suitably protected, and openings shall be blocked by wooden covers.

Wherever required, equipment' material shall be packed in polythene bags and silica gel or similar dehydrating compound shall be put inside the bags for protecting them.

16.0 CONTRACT PERFORMANCE BANK GUARANTEE

FOR SUPPLY:
SD/CPBG @ 5% of Total order/Contract value within 30 days of FOA/notification of award

FOR CAMC:
SD/CPBG @ 5% of Total order/contract value in case contract period is less than one year or 5% of Annualized order/contract value in case contract period is more than one year.
OR
Initial security deposit (ISD) @ 2.5% of total order/contract value in case contract period is less than one year or 2.5% of annualize order/contract value in case contract period is more than one year within 30 days of FOA/notification of award and deduction @ 2.5% of the RA bill subsequently from RA bills till the total amount of security deposit (including ISD and deduction amount) reaches 5% of Total order/contract value in case contract period is less than one year or 5% of annualized order/ Contract value in case contract period is more than one year.

The Contract Performance Guarantee will be obtained for a period of 90 days beyond the contract period/duration and applicable Warranty/Guarantee/Defect Liability Period(if any)

17.0 CORRESPONDING ADDRESS PURCHASER:

C&P Department
Bhagyanagar Gas Limited
2nd floor , TSIDC buildings,
Parishrma Bhavan, Basheerbagh,
Hyderabad-500004

18.0 CONTRACT VALIDITY AND DELIVERY SCHEDULE

The Contract shall be valid for a period of 01 (one) year from the date of FOA/LOA for supply portion . & for CAMC: 05 years from the date of FOA/LOA.

Sr.No	Location	Description	Quantity	Delivery schedule
1	Hyderabad, Vijayawada and Kakinada	400 SCMH Booster Compressor	22	Within 02 (Two) months from the date of intimation by EIC. However, the maximum quantity in a single lot shall be 10 nos.

19.0 **Commissioning shall be carried out within 01 (one) week from the date of EIC's intimation, subject to readiness of the site.**

20.0 BGL Intends to operate the booster compressors without operator ensuring package remains in good condition and should run in auto mode. Therefore, the bidder is required to supply booster compressors that are capable of autonomous operation without the need for operator intervention.

21.0 Bidder has to supply the PLC based machine with Internet of Things (IoT) capabilities to access the data through cloud. Bidder has to consider all necessary requirements for this

requirement completely in his scope. Bidder has to provide all necessary requirements for IOT system without any additional expenses to BGL . Bidder should provide the logins to BGL for operating the CNG compressor package remotely without any additional cost to BGL.

22.0 Bank guarantee for O&M shall start from the date of commercial operation by the purchaser which will be 7.5% of total cost of O&M services.

23.0 The installations where job is to carried out are live and have hydrocarbon environment. Bidder shall comply with all safety and security rules and regulations and other rules laid down by purchaser for its operation. It shall be the duty/ responsibility of the bidder to ensure the compliance of fire, safety ,security and other operational rules and regulations by his personnel. Dis regards to these rules by the bidders personnel will lead to the termination of the contract in all respects and shall face penal / legal consequences.

24.0 The bidder shall arrange insurance of all this workers engaged on the job as per the relevant acts, rules and regulations, etc. In case by virtue of provisions of workers compensation Act, or any the law in forces. Purchaser has to pay for compensation for a workman employed by the bidder due to ant cause whatsoever the amount so paid shall be recovered from the dues payable to the bidder and / or security deposit/ Contract performance security guarantee (CPBG).

25.0 BGL shall reserves the right ant any time during the currency of the contract . to terminate it by giving 30 days notice to the bidder, and upon expiry of such notice period the bidder shall vacate the site/office occupied by him immediately.

26.0 The bidder shall ensure and will be solely responsible for payment of wages and other dues latest by 7th of the following month to the personnel deployed by him in the presence of the company's representative.

27.0 The bidder shall be directly responsible for indemnify the company against all charges, claims, dues etc. arising out of disputes relating to the dues and employment of personnel deployed by the bidder.

28.0 The contractor shall maintain the compressors in sound mechanical condition at all times. The contractor shall rectify the defects notified by Client immediately and should submit all the history log sheets and spares availability status along with the report in the format mutually agreed between Client and the bidder.

Section 9: SCHEDULE OF RATES

BHAGYANAGAR GAS LIMITED

SCHEDULE OF RATES

SUBJECT: SUPPLY OF 400SCMH BOOSTER COMPRESSOR FOR BGL LOCATED IN HYDERABAD & VIJAYAWADA AND KAKINADA

TENDER NO: BGL/683/2025-26

Name Of Bidder											
Sr. No.	**Description**	**Unit**	**Quantity**	**Unit Rate (Exworks price including packing and forwarding) (including all taxes & duties except GST)**	**Unit Inland transportation upto delivery (BGL - Hyderabad / Vijayawada/ Kakinada) location and other costs incidental to delivery of goods (including all taxes & duties except**	**GST on finished Good (5)**		**GST on inland transportation**		**Unit FOT site price and inland transportation (incl. all taxes ,duties& GST)**	**Total FOT site price and inland transportation (incl. all taxes ,duties& GST)**
1	2	3	4	5	6	7(a)	7(b)	8(a)	8(b)	9= 5+6+7(b)+8(b)	10=9*4
						%	Amt	%	Amt		

1	**400 SCMH ELECTRIC MOTOR DRIVEN CNG BOOSTER COMPRESSORS**										

1.1	Design, Engineering, Manufacturing, Supply (including packaging and forwarding, insurance, custom clearance, handling, loading and unloading at port and delivery & unloading at Client's store / site of skid mounted 22 KW electric motor driven hydraulic CNG Compressor Package of Average 400 SM3 / hr capacity (PLC based) with IOT at suction pressure of 30 kg/cm2and discharge pressure 220 / 255 kg/cm2 (variable suction pressure range 30 to 200 kg/cm2). The package shall be inclusive of: A) String test of complete compressor package with air/nitrogen along with electric motor and accessories at packagers' factory. B) Special tools & tackles C)Design, Engineering, Manufacturing, Supply (including packaging and forwarding, insurance, custom clearance, handling and unloading at port and delivery & unloading at Client's store/site of air compressor of capacity approx 1.5 kW (flame proof motor) , discharge pressure approx 10 kg/cm2g , min 100 water liter air receiver and air dryer along with all accessories, shed and auxiliaries as per technical volume of tender document complete in all respects including special tools & tackles with the list . c)Installation, commissioning & Field performance test of Compressor	Nos	22				-		0	-	-

	Package including air compressor system at site. d)In case Booster Compressor(s) is delivered to stores due to non-readiness of site, loading, Re-transportation from stores to unloading at site within the same city. Bidder has to consider all in his scope .										

2	**Lump sum operation, repair & comprehensive maintenance etc.**										
2.1	Lump sum Repair & Comprehensive Maintenance charges (excluding the scope covers under warrantee) per Compressor Package including air compressor For 1st year during warrantee period in all Geographical Areas of BGL inclusive of all manpower, spare parts, lubricants and consumables, etc. including the Preventive Maintenance at regular interval by as per recommendation of OEM, Breakdown Maintenance as and when required for (22 Packages X 12 Months) The quoted rate (for 1 Machine Month) for this item must be equal to or more than 0.40% (maximum 1.5%) of unit price (sl.no A1) quoted by the bidder.	Machine Months	264		0		-	0	0	-	-
2.2	For 2nd Year The quoted rate (for 1 Machine Month) for this item must be equal to or more than 0.50% (maximum 1.5%) of unit price (sl.no A1) quoted by the bidder .	Machine Months	264		0		-	0	0	-	-
2.3	For 3rd year The quoted rate (for 1 Machine Month) for this item must be equal to or more than 0.55% (maximum 1.5%) of unit price (sl.no A1) quoted by the bidder.	Machine Months	264		0		-	0	0	-	-

2.4	For 4th Year The quoted rate (for 1 Machine Month) for this item must be equal to or more than 0.61% (maximum 1.5%) of unit price (sl.no A1) quoted by the bidder.	Machine Months	264		0		-	0	0	-	-
2.5	For 5th Year The quoted rate (for 1 Machine Month) for this item must be equal to or more than 0.67% (maximum 1.5%) of unit price (sl.no A1) quoted by the bidder.	Machine Months	264		0		-	0	0	-	-
										GRAND TOTAL INCLUSIVE OF ALL TAXES AND DUTIES	-

Note: 1. BGL Intends to operate the booster compressors with out operator ensuring package remains in good condition. Therefore, the bidder is required to supply booster compressors that are capable of autonomous operation without the need for operator intervention and bidder has to provide the login ID's and its access to run and monitor the machine remotely.

2. Bidder has to supply the PLC based machine with Internet of Things (IoT) capabilities to access the data through cloud. Bidder has to consider all necessary requirements completely in his scope to run on the package on IoT system.

3.The Location wise quantities may vary considering project requirement.