



AAVANTIKA GAS LIMITED
(A JOINT VENTURE COMPANY OF GAIL & HPCL)

**CITY GAS DISTRIBUTION PROJECT IN INDORE,
UJJAIN, PITHAMPUR AND GWALIOR**

**PROCUREMENT OF
CNG CAR DISPENSER PACKAGE**

VOL II OF II – TECHNICAL

**TENDER NO. AGL/284/CNG CAR DISPENSERS/10-18
LIMITED DOMESTIC COMPETITIVE BIDDING**



DELIVERS. EVOLVES.

WHOLE LIFE SOLUTIONS FOR PIPELINE AND SUBSEA SYSTEMS

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1.0 INTRODUCTION:

Aavantika Gas Limited (AGL) is a joint venture of GAIL & HPCL. Aavantika Gas Limited (AGL) is in the process of installing CNG outlets across Indore, Ujjain, Pithampur and Gwalior cities. For this AGL proposes to procure Car dispensers to cater to the requirement.

2.0 SCOPE OF WORK:

2.1 The intent of this technical specification is to outline the requirement under which the vendor shall Design, Engineering, Manufacture, Inspect & Test the equipments at Works, Painting, Packaging & forwarding, Insurance, supply to Sites/Stores, Installation testing, trial run, Commissioning and Performance Testing at Sites, with all auxiliaries & features required for efficient & safe operation. The quantities of dispensers required shall be as per SOR (Schedule of Rates) cited elsewhere in the tender document.

2.2 Since It is not possible to specify every piece of equipment/item, any item not specifically mentioned but required as per Good Engineering Practice and for the safe & trouble free operation of the dispensers shall deemed to have been specified & shall be in the scope of Vendor without any cost or time implication.

2.3 SCOPE OF SERVICES

2.3.1 Design & Engineering.

2.3.2 Manufacturing & Assembling.

2.3.3 Procurement from Sub-vendors.

2.3.4 Inspection & Testing at Works Internal as well as third party certifications.

2.3.5 Documentation and obtaining statutory approvals from the country of origin and in India.

2.3.6 Packing, Forwarding and Transportation up to Job Sites/ AAVANTIKA GAS stores.

2.3.7 Testing and commissioning, of each Car Dispenser, individually.

2.3.8 Post-order action for obtaining weight & measure certificate and CCOE clearance for offered dispenser unit's model, from Govt, if not obtained.

EXCLUSION: - Civil Foundation & Trenches for pipes / Tubes.

2.4 INSTRUCTIONS TO VENDOR

2.4.1 The Vendor shall carry out modification required by the statutory bodies either during the approval or during inspection of the installation. All expenses shall be borne by the vendor. Unless the above formalities are cleared, supply part shall be deemed incomplete.

2.4.2 Any work, which is considered to be unsatisfactory and of poor workmanship shall be rectified by the vendor without any extra cost and time implications.

2.4.3 The approval from concerned Govt. bodies in respect of complete installation of a CNG Dispensing Station shall be obtained by the AAVANTIKA GAS. Necessary Information /

data as may be required by Govt bodies shall be furnished by vendor to facilitate AAVANTIKA GAS LTD in obtaining approval without any cost implication to the owner.

- 2.4.4 The bidder shall provide necessary manpower, tools & tackle, transport, communication, cranes, scaffolding etc. required for simultaneous working at any site or more than one site to suit overall erection program within the scheduled time.
- 2.4.5 All safety and warnings notices, barriers, padlocks etc required during installation testing and commissioning for the safety of all site personnel and equipment shall also be provided by the bidder.
- 2.4.6 The bidder shall provide civil foundation drawing and Base frame within two weeks of placement of order.
- 2.4.7 The Bidder shall not vary the scope of work as detailed in tender and approved drawings without written permission of owner.
- 2.4.8 Loading, unloading, transportation to AGL store are in the bidder's scope. Receipt and storage maintenance by AGL including watch and ward of material. Supervision of installation and erection of dispensers shall be in the bidder's scope.

2.5 PROJECT DETAILS & GUIDELINE FOR EQUIPMENT:

2.5.1 Feed Gas Specification

2.5.1.1 Gas Composition

The expected gas composition of the feed gas to the CNG dispenser is given below. The CNG equipment shall be designed to meet the changes in the gas compositions from gas fields, India.

S. No.	Component	% Mole
1	Methane	85-93
2	Ethane	4-7
3	Propane	0.8-3.8
4	Butane	0.04-1.4
5	Pentane	0.2-0.3
6	Nitrogen	0.05-0.15
7	Carbon Dioxide	3-4
	Total	100
8	Gross Calorific Value (Kcal/SCM)	9128.77-9733.378
9	Specific Gravity	0.5769-0.60810
10	Net Calorific Value (Kcal/SM3)	8225.66-8787.13

Gas Delivery Parameter

1	The inlet gas pressure to the CNG dispenser is as follows	Maximum 250 bar (g)
2	Gas Delivery Temperature	Maximum 70 ⁰ C Dependent on ambient temperature

CNG SPECIFICATION

The CNG specification should meet the IS 15403:2000 (E) natural gas quality designation for use as a compressed fuel for vehicles.

The proposed specification of the CNG is as follows:

Gas Temperature	:	-10 °C to 70 °C
Oil Content	:	10 ppm
Particulate Matter	:	< 5 microns
Odorant	:	≤10 mg/sm ³ (Ethyl Mercaptan)

2.5.2 CLIMATIC CONDITIONS

Maximum Wind Velocity: 160 Km/Hr
Minimum ambient temperature: 2 °C
Maximum ambient temperature: 47 °C
Design Temperature: 50 °C
Maximum relative humidity: 98 % Non-condensing

All Electrical devices shall meet the requirement for the area classification specified in tender. Tubing & other devices shall be so arranged that there is proper access for operation & maintenance. All the dispensers shall be suitable for Outdoor installation without roof/shed.

2.5.3 Utility Specification

Electric Power Supply

230 Volt, 1 phase, 50 Hz AC

Note: Vendor shall confirm that supplied dispensers are suitable with the above power supply and indicate the maximum and minimum tolerable values of voltage for accurate metering and safe operation of dispenser. Vendor has to provide AC / DC convertor.

Vendor has to provide & install Surge Protection device at the Junction Box of each Dispenser where 230-volt AC UPS incoming power supply through UPS ACDB shall be terminated in case of any out of range voltage fluctuations. The Dispenser equipment should be protected from any problem in the input supply. The surge protection device shall be pluggable and Testable with Thermal Disconnection and Indication facility.

Pneumatic Control

Natural Gas shall not be used for pneumatic controls of Dispenser and Instrument, Exe proof electronically controlled solenoid shall be used for such purpose. Instruments Air if required for pneumatic operation of Solenoid Valve suitable of Dispensers has to be provided by the Client at Dispenser end at a pressure of 5 to 9 kg/cm²g. The end connection for instruments air line will be ¼" Further tubing with necessary pressure reduction (if required), one pressure gauge with isolation valve for inlet pressure of instruments airline shall be provided by the bidder.

2.5.5 Operations & Control Philosophy

The CNG dispensing facilities shall be designed with minimum operator intervention. Routine maintenance work will be carried out during normal working hours and outside the scheduled refuelling activities. The control system will be fully automated, only requiring manual intervention for connection of the hose and to initiate the filling operations. The dispensing facilities shall be designed to operate for a six-years or 48,000 Hours whichever comes first, without major overhaul of the gas dispensers.

Design Philosophy: It is anticipated that the natural gas feed composition, flow rate and pressure will be fluctuating. Hence, Supplier shall design the CNG dispensing facilities with optimum degree of flexibility, reliability, and operability to accommodate the varying composition of feed gas, other unexpected contaminants, flow rate and pressure. The CNG dispensing facilities shall consist of standardized modules, which are assembled into a complete system. Each system shall be designed in packaged frame, housing the dispensing system. The design life of the CNG dispensing facilities shall be 20 years as minimum.

Applicable Standards and Codes

The design, construction, manufacture, supply, testing and other general requirements of the dispenser equipment shall be strictly in accordance with the data sheets, applicable 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.

The Vendor without any additional cost and delivery implications shall carry out any modification suggested by the statutory bodies either during drawing approval or during inspection, if any. The following codes and standards (versions/ revisions valid on the date of order) are referenced to & made part of specification:

1. NFPA 52 Standards for CNG vehicular fuel systems
2. NGV 4.1/ AGA 2-92 Requirements for CNG Dispensing Equipment for vehicles
3. NGV 4.2/ AGA 1-93 Requirement for Hoses for NGVs and fuel dispensers
4. ANSI / NGV1 Compressed Natural Gas Fuelling Connection Devices: Standard for fuelling nozzles receptacles.
5. NGV4 / AGA Requirements for Breakaway devices for CNG vehicle Fuelling dispensers and fuelling hoses.
6. IS 5572 Classification of hazardous areas (other than mines) for electrical installations.
7. IS 5571 Guide for selection of electrical equipment's for hazardous area
8. OISD 179 Safety requirements for compression, storage, handling and refuelling of CNG for use in automotive sector.
9. OISD 113 Classification of areas for electrical installations at hydrocarbon processing and handling facilities

10. NFPA-52: 1992, ANSI, ASTM, NEC, NEMA, ASNZ, OIML, Indian Electricity Rules, Indian Explosives Act, Australian / New Zealand Refuelling Standard. AG901 / NZS 5425
11. OIML TC8/SC7 Recommendation with regards to CNG dispensers, December 2000.
12. The Standards of Weights and Measures Act 1976.
13. The Standards of Weights and Measures (Enforcement) Act, 1985.
14. The Consumer Protection Act, 1986.

Any other Codes & Standards mentioned elsewhere in this Technical Specification / M.R. or which are required to be complied with as per the prevailing Government of India regulations shall also be followed.

Precedence

In case of any conflict between Job Specification & other documents, the following order of precedence shall apply:

- Data sheets.
- Technical Specifications.
- Indian Standards / Codes as applicable
- International Standards / Codes as applicable.

3.0 SCOPE OF SUPPLY FOR CAR DISPENSERS

- 3.1 The Car Dispensers shall be complete with all required auxiliary equipment for efficient & safe operation as a whole. Vendor shall be responsible for furnishing all electrical, instrumentation, inter connecting Piping & Safety Items as required to make the Dispensers complete and functional.
- 3.3 Supply of CNG CAR Dispensers, Double arm type- (Electronic Controller shall have dedicated communication for both arms individually so as; in case of failure of communication to one arm, other arm shall not be affected) having min. flow capacity > 15 kg/min at 250 bar inlet under discharge to atmospheric condition. Car Dispenser shall be as per the specification define in this documents.
- 3.5 Any other items required for safe and accurate operation of Dispenser shall be included by the supplier even the same is not specifically mentioned in this document.
- 3.6 To commence refuelling of CNG vehicles, the drivers / operators need to unhook the filling Probe connector from the dispenser and hook-up to the inlet of the CNG vehicles. Thereafter, the refuelling shall commence upon activation through manual reset switch. The dispenser will automatically stop the refuelling process at 200 bar (g) and all such refuelling transaction data shall be stored and subsequently downloaded into a computer.
- 3.7 Any spare required during commissioning shall be in the scope of vendor. If any spare during commissioning borrowed from Mandatory spare the same shall be replenished by vendor free of cost.
- 3.8 Mandatory spares as specified in the documents shall be supplied.

- 3.9** Supply of complete O&M manual (along with instruments datasheet & schedule, bill of materials, instrument hook-up diagram, electrical wiring diagram, control logic algorithm & flowchart and certificates & user guide of bought out items) for each dispenser for easy operation & troubleshooting.
- 3.10** Supply of application program, ladder logic, list of error codes with description for programming the dispenser parameters.
- 3.11** Supply of drawings & documents as per Drawing & documents Schedule at S.No.19.
- 3.12** Supply of Instrumentation & Electrical items required as per Specification. All cable shall be supplied with double compression type of cable glands tested & certified to be used in hazardous area classified as Zone-I. All trays, Ex. Proof JB and accessories also to be supplied and erected as per requirements.

Supply of suitable software (latest version) with suitable communication cable (To communicate in between supplied Mass Flow Meter of approved make as per Tender document with portable computer system/laptop at site). For example: ProLink III (latest version) with USB 2.0 to RS 485 converter cable for Emerson make Mass Flow Meter to be supplied in one set at the time of first delivery.

- 3.13** The supplier shall provide On-Site Training to AAVANTIKA GAS personals, the training programme should cover but not limited to the following subject areas:
 - The Physical characteristics of the gas and the procedure and precautions to be observed in handling and control.
 - Start-up, operations and maintenance procedures for the CNG dispenser and equipment.
 - CNG System Management
 - Filling procedure, safety and preventive daily maintenance.

4.0 TECHNICAL SPECIFICATIONS OF MAJOR ITEMS FOR CAR DISPENSERS

The specifications described herewith are intended to give vendor the technical & operating conditions, the Dispenser must fulfill. These are to be referred to along with relevant description including in earlier sections.

A) Each dispenser shall adhere to following specifications:

- 4.1** It should be fast fill electronically controlled operation type and display the following key information on the dispenser with - Intrinsic Safe backlighting or LED display for night viewing Display shall be visible 24 hours of the day showing:
 - Quantities of gas dispensed in kg (6 digits including 2 decimal points i.e., 000000.00)
 - Unit cost of gas dispensed in Rupees, Rs/kg (6 digits including 2 decimal points i.e., 000000.00)
 - Complete transaction value in Rs (6 digits including 2 decimal points i.e., 000000.00)
 - There should be 2 displays, one on each side of the dispenser.
 - 2 set of numeric Display along with a Keypad shall be visible in Day/Night and shall not less than 4" for car dispensers.
 - Displays must remains active for at least 15 minutes after power failure
 - Provision for adjusting the intensity of the digits in decimal points

- Easy-to-read backlit displays for maximum visibility -power conditioning and protection. Explosion proof backlighting (Intrinsic Safe Backlighting) or LED.

4.2 Non-reset-table and non-volatile totalizers' up to 999999.99 for total CNG sold in kg with an independent battery backup. Since these dispensers are used for custody transfer purpose, the totalizers shall not reset in any eventuality not even in case of electronic failure. The vendor shall provide suitable arrangement outside the flameproof electronic box (on the dispenser's body) for reading the dispenser totalizers.

Mechanical Counter to be provided at dispenser body nearby non-rest-table Totalizer which shall add on readings of each individual fill and this shall never rest even in case of electronic failure.

4.3 Physical design shall be of stainless (SS 304) steel body with doors/ panels to minimize corrosion and on-going wear and tear. The dispenser shall have tamper- proof locking arrangement of the flow meter-transmitter configuration as per requisite of W&M for any custody meter used for Public. The cabinet shall be suitably designed to accommodate all valves, fitting flow meter and all required electronic equipment.

4.4 Dispenser shall be supplied with front/side mounted nozzle fitted with lockable holder and safety lever / latch to firmly hold the nozzle when not in use.

4.5 Each dispenser side shall be equipped with authorization / on -off switch and glycerin filled 4 inches dial pressure gauge (0 -400 bar) c/w red sectors. Vendor shall provide a bypass isolation valve (2 Valve Manifold) with associated tubing to facilitate routine servicing calibration of pressure gauges without shutdown of the dispenser.

Each dispenser unit shall have 2 arms, each having 1 set of electrically conductive and CSA approved flexible main/fill hose and vent hose. Vendor shall also include supply of breakaway coupling in the hoses individually. Hoses shall be of 3/8" and 1/4" ID for Fill and Vent respectively.

4.7 One no. Manual Shut-off valve for each fill hose has to be considered.

4.8 Interconnecting 1/2" tubing / piping, fittings, high flow valves as required shall be provided for NZS/NGV type nozzles for car dispensers.

Interconnecting 1/2" tubing / piping, fittings, high flow valves are required. NRV shall be provided for NZS/NGV type nozzles for car dispensers.

4.9 Overfill protection shall be through electronically programmed hose to terminate the fill after fill pressure reaches 200 bar (g). Vendor shall include 2 nos of 6000 PSI pressure transmitter out of which the Primary sensing Pressure Transmitter shall be SIL Certified, a pressure transducer of suitable range for sensing of pressure. Pressure Safety Valve (PSV) shall be provided to avoid overfilling in case of failure of control system. PSV set pressure should be as per applicable standards.

4.10 Vendor to provide means of temperature compensation the final limit fill pressure to 200 bar (g) equivalent at 15 °C, if ambient temperature is below 15 °C. There shall be an option of activating and deactivating temperature compensation in the filling logic and the same shall be password protected.

4.11 Built-in coalescing filter with 3-5 micron element mess size with differential pressure gauge at inlet of each bank and carried over oil at the inlet with manual drain valve with locking arrangement. Vendor to provide suitable arrangement to collect the drained oil outside the dispenser by necessary tubing. Oil content shall be < 5 ppm in the filtered gas.

4.13 Separate non- resettable straight forward reading totalizers. Totalizers will be only at dispenser. (The totalizers shall be displayed on the Alpha Numeric Display at the press of a single button on

the Keypad). During design, Supplier to consider minimum usage of keypad during Dispenser normal operation so as to avoid chances of manipulation/pilferage etc.

- 4.14** The components of the flexible hoses are to be factory tested after assembly and before use to at least 5,000 psig. Copies of test certificates shall be provided together at the time of Factory Inspection before the delivery of the dispenser unit.
- 4.15** Connection for the flexible hose shall be designed with a burst pressure of at least four times the most severe pressure and temperature conditions expected.
- 4.16** ESD button to be mounted on both side of the dispenser front panel and shall be easily accessible during emergencies.
- 4.18** Refuelling procedure / instruction complete with diagram or icons type figures shall be installed on each side of refuelling hoses for each dispenser unit.
- 4.19** Electrical equipment's and instrumentations wiring shall be approved to meet the hazardous area classification Class-I, Division I, Group D as per NEC or Zone I, Group II A/ IIB as per IS/ IEC, certification required on all components.
- 4.20** Filling of vehicle from the dispenser shall follow three bank sequencing system 1st sequences from low bank 2nd sequence from medium bank and 3rd sequence from high bank for CAR dispensers.
- 4.21** Dispenser shall be automatically and immediately shut off CNG supply to each fill hose individually in case of:
 - i.** Power failure
 - ii.** Failure of metering
 - iii.** Failure of Totalizers
 - iv.** Overfill by quantity and/or pressure
 - v.** Failure of pressure sensing transmitter transducer.
 - vi.** Bursting of the Hose
 - vii.** Snapping off the filling Hose when the Break Away Mechanism comes in to effect
 - viii.** Repeated operation of reset or start/ stop switch
 - ix.** Removal of any electrical wire connected to controller
 - x.** Program step is on hold due to any error.
 - xi.** Power failure of Mass Flow Meter
- 4.22** Vendor shall indicate overall CV of dispenser from inlet of the dispenser up to outlet probe including mass flow meter, interconnecting tubing, valves, hoses, nozzles etc.,

- 4.23** Vendor shall include in his scope provision of base frame to be embedded in the foundation. Bidder shall supply base frames in separate packing. Drawing of Base Frame to be submitted along with dispenser drawing at drawing approval stage before supply.
- 4.24** Vendor shall provide facility required for calibration and fault finding diagnostics of mass flow meter and configuration of data in the electronic control unit.
- 4.25** Car Dispenser end connections shall be 1/2" tube fitted with 1/2" valve. One set of valve to be provided immediately at the inlet of the piping of each bank before the dispenser.
- 4.26** All the vents (eg. PSV, fill hose end) shall be taken out from top of the dispenser in a single header individually for each arm.
- 4.27** The Car dispensers shall be designed to handle min flow rate of > 15 kg/min under discharge to atmospheric condition. The dispensers shall be suitable for a turn down of not less than 50:1 on flow
- 4.28** The normal operating pressure of CNG at dispenser inlet shall be 250Kg/cm² (g). However, supply from dispenser to the Car shall get positively cut off at outlet pressure of 200 Kg/ cm² (g) to ensure the safety of the vehicle.
- 4.29** Once the particular-cycle of filling has been completely stopped (on achieving the maximum fill pressure and/or minimum flow rate) then next filling can be started only after initialization.
- 4.30** The normal operating temperature of wetted parts of dispenser shall be (-) 1°C to 60°C.
- 4.31** Designing of the dispensers shall take into account severity of service. The dispensers shall be designed in such a way as to operate in cyclic (start, fill, stop, start.) round the clock basis with about 1-10 seconds interval between stop and start modes. The dispenser also to work satisfactorily when the time between stop and start is indefinitely high, e.g. during full time or when the dispenser is commissioned after it was decommissioned for prolonged period or in storage after initial commissioning. For this purpose, if any specific storage facility is required, the same to be indicated by the bidder.
- 4.32** Any other item required for safe and accurate operation of Dispenser.
- 4.33** Supply of application program, ladder logic, and list of error codes with descriptions for programming the dispenser parameter.
- 4.34** Dispenser equipment such as pressure gauges, authorization switch, emergency shut-off valve, filling nozzle, ESD button shall be provided with labelling / tagging inside or outside/at outer body of Dispenser.
- 4.35 Cabinet**
- 4.35.1** Complete cabinet shall be of Stainless Steel (SS-304) and shall have tamper proof locking arrangement. Cabinet wall thickness shall be min 1.0 mm. Cabinet shall be sized to accommodate all electrical, electronic and mechanical components for metering and display within the cabinet. Cabinet shall be designed to protect all tubing, pressure gauges, valves, fittings, electrical & electronics item from tampering, rain, dust, vermin etc. Dispenser cabinet shall be provided with adequate size bottom opening for the entry of gas supply line/lines and power supply connections.

Adequate ventilation shall be provided so that there is natural convection current and cooling takes place inside. Cabinet shall be structurally robust and shall not resonate at the frequencies emanated during normal flow or during choked flow through the nozzles, breakaway coupling or valves etc.

- 4.35.2** Appropriately plugged drain valves of the filter outside the dispenser housing with suitable arrangement to collect the drained oil to facilitate the operator to drain the oil on regular basis without requiring opening the lock of the dispenser cabinet. The layout of tubing and other component shall be such that it gives unhindered access to all parts and maintenance becomes easy.
- 4.35.3** AAVANTIKA GAS LIMITED Logo and name shall be displayed on both sides of dispensers, design shall be made available to the vendor, on stainless steel panel with an appropriate colored background or alternatively, vendor shall provide self -adhesive PE film sheet with AAVANTIKA GAS Logo and name. The artwork shall be of three colours. The colours, Logo size and name size shall be informed to successful bidder during detailed engineering. Bidder has to submit the same along with drawing for approval.
- 4.35.4** The dispensers shall be shipped in fully wired and assembled condition. Only gas, supply and power supply connection shall be made at Site.
- 4.35.5** Wherever provided, Hi Mast shall be of appropriate height and shall allow free movement of flexible hose, prevent strain on the fill hose connection and avoid touching of ground.
- 4.36** CAR DISPENSER Fill Hose & Fill Nozzle
- a. Electrically conductive fill hose (fill & Vent) meeting the requirement of NFPA-52 and NGV 4.2. Each fill & vent hose should be 3/8" & 1/4" ID 5000 psig respectively, at least 4.0 meter long in over-all length from Dispenser end to Fill probe end.
 - b. Fill hoses of each arm shall be connected with Vent hose at vehicle end through a three way ball valve via 1/4" SS tube to vent the gas after vehicle-fill in air.
 - c. In one arm, fill end of three way ball valve shall be connected with NZS 9/16" fill probe through flexible hose pipe of at least 18" length. And in second arm, fill end of three way ball valve shall be connected with NGV 1 Type 2 Class A nozzle. NGV Nozzle shall be fitted with one detachable NGV to NZS adapter/receptacle.
 - d. Vendor should include supply of breakaway coupling in each fill & vent hose individually suitable for NGV Industry. Vendor shall demonstrate the function of breakaway coupling during performance test.
 - e. Hose end fittings/connections shall be of SS 316, suitably guarded by SS springs at ends. Hose spiral guard shall be provided for hose protection from friction & abrasion.

4.37 FILTER

Filter body/housing shall be of SS/Brass with filter element of specified mess size. Applicable Certificates/ Test Certificates shall be provided.

4.38 One number of holster/cradle for fills nozzles along with weather caps for the protection of nozzles. Front/Side mounted Nozzle with lockable holder and safety lever/latch to firmly hold the nozzle when not in use shall be provided.

4.39 Vendor has to supply the dispensers with ON-OFF control valve made of ANSI 316 SS for ON-OFF control of flow. Vendor to ensure the system design in such a way that any gas if passes, shall be recorded by mass flow meter & there shall not be any possibility of unmetered gas supply through dispenser in case of malfunctioning of control valves

The combination of control valve shall constitute power fail-safe valve. The whole system has to be very fast acting and response time fraction of second so that if the flow were terminated at any point of dispensing, the slippage shall be always within the accuracy limit.

B) Mass Flow Meter (Micro Motion, E+H & Compac make)

Mass flow meter shall be Micro Motion make, E+H or Compac make, with integral display unit shall be provided to ensure high accuracy and direct mass flow measurement approved for custody transfer metering of CNG at each of the refuelling hose. The microprocessor based control system shall be provided to sense, monitor and control complete filling operations on a continuous, uninterrupted basis. The integral display unit shall be mounted inside the dispenser body. There shall not be any difference in reading between this integral display unit and non-resettable display in the Electronic control unit.

Mass flow meter shall be designed for custody transfer metering of CNG and meet the following requirements:

- Batch Accuracy $\pm 0.2\%$ to 0.5% of Measured
- Value Repeatability $\pm 0.3\%$ of Measured Value
- Enclosure - IP65
- Pressure influence – Nil
- Surge and frequency - Shall be in compliance with ANSI/EEE(EFT) transient effect c 62.41v (1991)
- EMI effect on sensor and - To the requirement of EMC direct 89/336/
- Transmitter EEC, EN 50081-1(jan'94)
- Vibration effect - As per SAMA PM31.1-1980 condition2.
- Mass flow meter model shall have Indian W&M certification.

- Custody transfer certificate testing must be accordance with OIML.
- The offered model must have CCOE approval
- The offered model shall have digital protocol like HART / MODBUS

The flow meter shall be provided with a liquid crystal display (LCD) for ongoing flow monitoring and totalizers.

The dispenser shall have tamper- proof locking arrangement of the flow meter-transmitter configuration as per requisite of W&M for any custody meter used for Public.

C) Automatic Refuelling Data Recorder:

The dispenser shall have an automatic refuelling data recorder unit for the each independent refuelling line. The dispenser system shall be capable of storing up to 1,250 refuelling transactions data and such data shall be downloaded frequently into another portable computer with compatible Microsoft and Linux software (to be provided by Supplier together with the license) to store the transactions data. This information can either be down loaded as a report from a POS system of client through RS 485 communication.

Vendor shall provide battery backup of 72 hrs to the RAM of dispenser electronics.

Audit Trail : CNG Dispenser shall have the provision for Audit Trail for rate change for the minimum 12 months period.

Calibration Unit (Not Applicable)

Vendor to supply one number Calibration unit in the form of Master Meter (Master Mass Flow Meter) complete with electrically conductive Hose, Nozzle, and Fittings and vent valve mounted on a suitable frame/trolley. The Master meter shall be certified by recognized authority like Weights and Measures or any other statutory authorities of the Country of Origin. Vendor shall also get the Master Meter certified from Weights and Measures, India. Master Meter Shall be selected such that same meter can be used as standard meter for all dispensers. The Meter Calibration must have traceability to International Standard.

D) PIPE WORK, VALVES AND FITTINGS

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

All high-pressure tubing work shall be of 1/2" OD (and 1/4" for vent) SS fully annealed (Bright annealed) seamless conforming to ASTM A269 TP 316L. The piping/tubing, valves, fittings shall be of Parker, Sandvik and Tubacex make. Refer Approved Vendor List for make. The system shall be "go-no-go" gaugeable to demonstrate that fittings are properly tightened. Wherever possible valves and control devices shall incorporate the same end connector system. The Supplier shall ensure that personnel assembling the pipe work shall be competent in the system employed. The preferred valve types for isolation are % turn ball valves. Such valves have similar material to the tube they are attached to. Ball valves must be of good quality and be appropriately selected frequency of use. Ball seats must be suitable for natural gas operation of the gas composition indicated. Valves and fittings subject to corrosion must be either inherently resistant, or be coated with a corrosion inhibiting paint or surface treatment.

E) ELECTRICAL SPECIFICATION

It is not intended to cover all aspects of design but to indicate the basic requirements only. Vendor shall ensure that the design and installation on the skid is carried out as per good engineering practice to meet the requirements of safety, reliability, ease of maintenance and operation, aesthetics and interchangeability of equipment.

CODES AND STANDARDS

All electrical equipment and complete package shall meet the requirement of relevant publications and Codes of Practice of Bureau of Indian Standards, statutory regulations and good engineering practices. Complete system must conform to the latest revisions of the following:

Indian Electricity Act and Rules framed there under.

- Fire Insurance Regulations.
- Petroleum Rules and any other regulations laid down by Chief Controller of Explosives.
- Regulations laid down by local statutory authorities and Electrical Inspectorate.

Vendor shall provide all assistance required for obtaining approvals from statutory authorities for materials, plant design/drawings and complete installation.

Where Indian Standards do not exist, the relevant IEC/British/ German (VDE) standards shall apply. Any Other international standard may also be followed provided it is equivalent to or more stringent than the standards specified above.

- In case of any discrepancy/conflict between the specified codes and standards, the order of decreasing precedence shall govern.
- Wiring:-All the Non Safe Wiring between the Ex'd' boxes shall be armoured wiring. The wiring between the IS Connections shall be Blue in Color

AREA CLASSIFICATION AND EQUIPMENT SELECTION

In case of storage, handling or processing of flammable materials within the battery limits of the package, area classification shall be carried out in line with IS: 5572 & Petroleum Rules and OISD-179 guidelines where applicable.

Selection of the type of equipment for use in hazardous areas shall be done in accordance with IS: 5571 and other safety regulations as applicable. The electrical equipment shall meet the requirements of relevant IS, IEC or NEC standards. Increased safety type Ex 'e' equipment shall not be permitted for use in Zone-1 areas. For Zone-2 areas, increased safety type ex 'e' or non-sparking Type Ex 'n' equipment shall be provided as a minimum, subject to the same being acceptable to statutory authorities. Ordinary safe area type electrical equipment shall not be used in Zone-2 areas (even though this may be permitted by NEC for Div.2 areas).

Electrical equipment for hazardous areas shall be certified by CMRI and approved by CCOE (or equivalent statutory authority of the country of origin) for installation and use in the specified hazardous area. Flameproof equipment of indigenous origin shall be BIS marked. Vendor shall furnish the necessary certificates indicating such approvals.

All the electrical and electronic component shall be in flame/explosion proof housing suitable for area classification: Hazardous area, Class 1, Division 1, Group D as per NEC or Class 1, Zone 1, Group IIA/IIB as per IS/IEC, Temperature Class T3, and completely enclosed in a securely

lockable dispenser cabinet. No component of the dispenser shall be installed outside the cabinet. Certificate from recognized agency to the effect is required to be produced that equipment supplied and/or installed conforms to above area classification.

EQUIPMENT SPECIFICATIONS

All equipment shall be complete with all necessary weather protection including tropicalization to prevent damage due to climate, dust and corrosive vapours. The enclosure protection of all equipments shall be IP: 55 as per IEC specifications.

All packages shall be clearly, legibly and durably marked with uniform block letters giving the relevant equipment material details. Each package shall contain a packing list in a waterproof envelope.

All electrical components and equipment shall be sized to suit the maximum load under the most severe operating conditions.

All electrical equipments shall be supplied with double-compression cable glands, made of nickel-plated brass, tested and certified to be used in zone-1, hazardous area.

We have envisaged solid earthing for the system. However, if specific earthing is required for the system -electronics, the same to be highlighted by bidder; otherwise system earthing including making of earth-pits etc. shall be provided by the successful bidder.

5.0 HAZARDOUS AREA

The Supplier shall specify the hazardous area in accordance with the IS 5572 / relevant Standard of country of origin.

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

All Instruments shall be suitable for an area classification of "Class 1, Group D, Division 1 as per NEC" OR "Zone 1, Group IIA /IIB as per IS/ IEC"

All dispenser mounted transmitters & temperature element, Solenoid Valves, SOV Coil and Electromagnetic valve shall be intrinsic safe Ex 'ia' as per IEC 60079-11 and solenoid valves, switches and related junction boxes shall be flame proof Ex'd' as per IEC 60079-1. Other special equipment's/instruments, where intrinsic safety is not feasible or available, shall be flame proof as per IEC 60079-1.

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

6.0 INSPECTION AND TESTING

- 6.1 All the dispensers shall be subjected stage wise inspection by TPI as per approved QAP by AGL. TPI shall be in the scope of the Vendor and Inspection will be witness/review by AAVANTIKA GAS. Vendor to get prior approval for TPI out of list tabulated below:

M/s International Certification Service Pvt. Ltd.
M/s Bureau Veritas (India) Pvt. Ltd.
M/s SGS India Pvt. Ltd.
M/s Certification Engineers International Ltd.
M/s Hertz Inspection & Services Pvt. Ltd.
M/s TUV India Pvt. Ltd.
M/s TUV SUD South Asia.

6.2 The following activities shall be covered under inspection:

- a) Review of Q.A. documents.
- b) Review of calibration certificates for flow meter, dispenser, pressure transmitters, pressure gauges and all instruments.
- c) Review of all statutory certificates including W &M.
- d) Review of area classification compatibility of all items including bought out items.
- e) Review of Mill Test reports.
- f) Review of NDT reports.
- g) Review of bought out sub-assemblies/major components, test/inspection certificates.
- h) Dimensional checks as per approved drawings and data sheets.

6.3 **Functional Test**

All the dispensers shall be tested to demonstrate the functioning of all the components and controls.

A. Dispenser Shut Off CNG supply Test in case of:

- i. Power failure
- ii. Failure of metering
- iii. Failure of Totalizers
- iv. Overfill by quantity and/or pressure
- v. Failure of pressure sensing transmitter transducer.
- vi. Displays test for at least 15 minutes after power failure
- vii. Snapping off the filling Hose when the Break Away Mechanism comes in to effect
- viii. Power failure of Mass Flow Meter

B. Rain Test

C. PSV Pop-up Test

6.4 Performance Test & Field Performance Test

All the dispensers shall be performance tested for flow capacity, measuring accuracy and dispenser functioning with CNG or Nitrogen. CNG or Nitrogen shall be arranged by vendor during PT at Vendor facility. CNG availability will be in AGL Scope during Field Performance Test. PT shall be undertaken after minimum 30 days after commissioning and maximum 90 days before commissioning at site.

- 6.5 During the shop test of dispenser, in case the dispenser flows capacity from inlet of dispenser to the outlet of filling nozzle is found below the specified capacity the dispenser shall stand rejected.
- 6.6 During the shop testing if the dispenser batch accuracy is found beyond $\pm 1.0\%$ dispenser shall stand rejected.

7.0 CALIBRATIONS AND THIRD PARTY CERTIFICATION

All mass flow meter supplied by the bidder shall be flow calibrated at a lab with traceability to the National Metrology Institute of the country of origin and *either approved by the Department of Legal Metrology of the country of origin or approved by the dept. of Legal metrology, India* . Calibration certificates shall be presented during factory acceptance test. Documentation and obtaining statutory approvals from Department of Legal Metrology is in Bidders scope. The offered dispenser must be approved and certified by statutory authority i.e. PESO, Weights and Measures or the other statutory authorities of the Country of Origin.

8.0 DISPENSER PERFORMANCE

The vendor shall guarantee the satisfactory performance of each dispenser as per the operating parameters indicated in data sheets. The dispensers shall be performance tested after installation at site by vendor. Vendor shall carry out tests as required.

Guaranteed performance for Dispensers shall be as follows:

1. Capacity of the CAR dispenser shall be $\Rightarrow 15$ kg/min under atmospheric discharge at inlet pressure of 250 bar (g) with design case gas composition, temperature of 150°C with no negative tolerance for errors in instruments and measurements.
2. Overall Dispensers Batch Accuracy of $\pm 1.0\%$ or better of the quantity filled In case above guaranteed parameters are not achieved at site, vendor shall carryout necessary rectification/modification to achieve the guaranteed parameters, without cost & time implication to the purchaser

After Commissioning at Site:

All the dispensers shall be tested by vendor for their function & performance in presence of AGL. Any part or component, which is not functioning to the satisfaction of AAVANTIKA GAS, shall be repaired or replaced by the vendor without cost & time implication to purchaser and performance

test again carried out. Vendor to execute performance test of all the dispenser's after commissioning for accuracy and repeatability and safety parameters. Vendor to make all arrangements for carrying out performance test viz. Std. Mass Flow Meter, Laptop etc. Vendor shall carry out tests as required by Govt. statutory agencies.

Note: Percentage difference between Mass Flow Reading and non-reset-table Totalizer reading displayed at Dispenser. Bidder has to declare minimum guaranteed percentage difference in DATA SHEET OF CAR DISPENSER. Which will be needed to establish at the time of Field Performance Test at site.

9.0 TRAINING REQUIREMENTS

- The training program should be phased to suit the construction program such that the Company's personnel are fully conversant with all aspects of the operations and maintenance of the overall system including all aspects of operations, including operation, maintenance CNG, of the overall system.
- Commissioning will not be deemed to have completed and formal acceptance will not be granted until training has been completed to the satisfaction of the Client's.
- The training program should cover but not limited to the following subject areas:
 - The physical characteristics of the gas and the procedure and precautions to be observed in handling and control.
 - Start-up, operations and maintenance procedures for the CNG dispenser and equipment
 - CNG system management
 - Filling procedure, safety and preventive daily maintenance.

10.0 WARRANTY SERVICING AND SPARE PARTS

The suppliers/bidders shall provide a warranty period of 12 months from the date of final acceptance of the equipment on installation & commissioning at site OR 24 months from the date of last shipment of equipment, whichever expires first.

11.0 TECHNICAL SUPPORT

The bidder should have adequate service backup facility in the city of installation. The bidder should be able to respond customer complains within 4 hrs of lodging of complain.

12.0 DATA AND DRAWING DETAIL

A) Document with Technical bid:

1. Process Flow Diagrams (PFD) & P&ID; ½ "SS tubing & fittings, 1/4"SS tubing and fittings, Electrical components and wiring.
2. General arrangement drawing of the dispenser giving overall dimensions and erection / shipping weight of both dispensers, Minimum and Maximum thickness of body frame including body cabinets and removable cabinets inclusive of hose pipe dimensions. Including drawing with detail of Base Frame.
3. Filled in technical data sheet of both Dispensers.
4. List of commissioning spares per dispenser.

B) Post order within 4 weeks from date of PO

1. General arrangement drawing of the dispenser giving overall dimension and erection / shipping weight.
2. Detailed foundation drawing of the dispenser for casting foundation giving load pattern etc.
3. Details of inlet gas termination including X, Y, Z co-ordinates with respect to centre of dispenser or any reference.
4. Training schedule with contents.

C) With supply.

1. Operation and maintenance manuals - 3 sets all in original for each dispenser. The instruction manual shall describe in details the construction and recommended procedure for maintaining, operating and troubleshooting of the dispenser shall also include cross-sectional drawings, exploded views of all spare parts along with part nos., quantity installed per dispenser. **The manual shall provide detailed catalogues of all bought out items.**
2. Mechanical and electrical installation drawing including interconnection and wiring diagram
3. Test certificates and catalogues of all major components like valves, mass flow meter, tubing fittings, filter element/housing, PT, PG, and PSV etc.
4. Calibration certificates for all measuring and protection devices (eg. Mass flow meter, pressure transducer, pressure gauges).
5. Test records of mechanical running, performance test.
6. Complete wiring diagram of internal wiring of dispenser.
7. Software (logic diagram) of dispensers on CD-ROM with suitable communication Protocol for communication with dispenser in order to change dispenser parameters if required.
8. Supply of application program, ladder logic, list of error codes with description for programming the dispenser parameters in one CD-ROM.
9. Certificates from statutory authorities confirming suitability of design / construction of all electrical and electronic items for use in hazardous area classification.

13.0 PACKAGING

The dispensers shall be packaged to withstand rough handling during ocean shipment and in-land journey. It shall be vendor's responsibility to make good any deterioration that occurs during shipment. Sling points shall be clearly indicated on crates.

14.0 COMMISSIONING OF DISPENSERS

Vendor shall carry out commissioning of Dispensers within 2 weeks of receipt of intimation from AAVANTIKA GAS.

15.0 APPROVED VENDOR LIST

SR. NO	ITEM	PARTICULARS	APPROVED MAKE
1	MFM	Mass Flow Meter	Emerson, E+H, COMPAC
2	SS Piping/Tubing/ Fittings	1. SS Piping/Tubing	PARKER, SANDVIK, TUBACEX
		2. SS Valves and other fittings	PARKER, SWAGELOK, SSP & HAMLET
		3. NZS 9/16"	PARKER, SWAGELOK, HY-LOK, SSP, SUPERLOK, HAMLET, OEM(BIDDER)
		4. NGV to NZS adapter/receptacle	PARKER, SWAGELOK, OPW, WEH, STAUBLI
3	SS Fittings	Design components (Manifold etc)	PARKER, SANDVIK, SWAGELOK, HY-LOK, TUBACEX, SSP, SUPERLOK and OEM (BIDDER)
4	Filter	Element/Housing	PARKER, OEM (BIDDER)
5	Flexible Hose		PARKER, SWAGELOK, EATON (SYNFLEX), MAC
6	Breakaway Coupling	Fill/Vent	PARKER, OPW, WEH, STAUBLI
7	NGV Nozzle for Car	NGV1 Type 2 Class A	PARKER, OPW, WEH, STAUBLI
8	PSV	Pressure Safety Valve	BHEL, OFE & OE GROUP, KEYSTONE VALVES, SEBIM SARASIN VALVES, PARCOL SPA, NUOPIGNONE, TAI MILANO, FISHER ROSEMOUNT (Now EMERSON PROCESS), FAINGER LAISER, TYCO
9	PT	Pressure Transmitter/Transducer	WIKA, DRUCK, HONEYWELL, ABB, ROSEMOUNT, MSI
10	PG/DPG	Pressure/Differential pressure Gauge	WIKA, WAREE, GENERAL INSTRUMENTS, BAUMER,
11	Surge Protector	Surge Protection Device	MTL, PHOENIX, P&F
12	Cables and Wires		INCAB, UNIVERSAL, ASEAN, FORT CLOSTER, FINOLEX, KEI, ASSOCIATED CABLES OPVT LTD

16.0 DATA SHEET OF MASS FLOW METERS FOR CAR DISPENSERS

MASS FLOW METERS (CORIOLIS TYPE)					
Units:- Service:- Gas			Features/ Dimension	Pressure Rating	Temperature Rating
General	1	Tag No.			
	2	Line No.			
	3	Service			
	4	Overall CV			
Meter	5	Type/Make /Model			
	6	Function			
	7	Conn.Size: Size & Rating			
	8	Facing & Finish			
	9	Body Material			
	10	Wetted Parts Material			
	11	Enclosure			
	12	Conduit connection			
	13	Flow Range			
	14	Batch Accuracy			
	15	Repeatability			
	16	W&M Lockout Configuration			
Converter	17	Load Resistance - ohms.			
	18	Output			
	19	Power supply			
	20	Area classification			
	21	Intrinsically safe /Expl.Proof			
	22	Enclosure			
	23	Conduit connection			
	24	Mounting			
	25	W&M Lockout Configuration			
Options	26	Filter/Mesh Wire			
	27	Mounting Brackets			
	28	Interconnecting			
	29	Special cabling			
	30	Cable glands			
	31	Accessories for hot tap			

17.0 DATA SHEET OF SOLENOID VALVE FOR CAR DISPENSERS

Solenoid Valves					
Units:- Service:- Gas			Features/ Dimension	Pressure Rating	Temperature Rating
General	1	Tag No.			
	2	Line No.			
	3	Line Size & Sch.			
	4	Service			
Valve	5	No. of ways			
	6	Size - Body Port			
	7	End Connection			
	8	Material Body			
	9	Trim			
	10	Body rating			
	11	Operating mode NC/NO/Univ			
	12	Packing			
	13	Enclosure			
Electrical	14	Area Classification			
	15	Cable Entry			
	16	Type. Of Energisation Dropout			
	17	Power Supply			
	18	Power Consumption VAW			
	19	Inrush Current			
Options	20	Insulation Class			
	21	Voltage -Energizing -Dropout			
	22	Manual reset			
	23	Latching on Ener. /De-Energ.			
	24	Bug screen for vent port			
	25	Intrinsically safe			
Service Condition	26	Fluid			
	27	Press. Open / Max.			
	28	Temperature C-Open / Max			
	29	Maximum Flow			
	30	S.G.at open Temp.Mol.Wt.			
	31	Viscosity mPa.s (CP)			
	32	Allowable press drop			
	33	Del. P Shut Off			
	34	Valve CV			
	35	Model No.			
	36	Specification Remarks			



18.0 DATA SHEET OF CAR DISPENSERS

1	GENERAL	
2	PROJECT: CITY GAS DISTRIBUTION	
3	OWNER: M/S AAVANTIKA GAS LIMITED	
4	SERVICE: DISPENSER FOR CNG DISPENSING	
5	DISPENSER CONFIGURATION	DUAL HOSE –Fill & Vent- both arm
6	NOTE: ■ SCOPE OPTION / INFORMATION SPECIFIED BY PURCHASER □ INFORMATION REQUIRED FROM VENDOR.	
7	□ MANUFACTURER:.....	□ MODEL NO.:.....
8	□ PLACE OF MANUFACTURE:	
9	■ No OF LINES: One	FRAME MATERIAL: STAINLESS STEEL 304
10	POWER REQUIREMENTS: SINGLE PHASE AC 230 V ±15%, 50 HZ ± 3%.	□ POWER CONSUMPTION:.....
11	■ INLET GAS PRESSURE: 250 bar(g)	■ FILL PRESSURE: 200 bar (g)
12	■ METERING: CORRIOLIS MASS FLOW MTER WITH INTEGRAL TRINSMITTER & DISPLAY and HAVING W&M LOCKOUT CONFIGURATION	■ FLOWRATE: Min 15kg/min at 250 bar inlet and discharge at atmosphere.
13	■ TEMPERATURE RANGE: (-) 55°C to 70°C	
14	■ TUBE PRESSURE RATING 6000psi	
15	■ FILL NOZZLE TYPE: NGV1 Type2 Class A in one arm with adapter/receptacle (NGV to NZS) and NZS 9/16" type in second arm	■ FILL VALVE TYPE: 3-way Valve
16	■ BREAKAWAY COUPLING: YES	■ COUPLING SIZE: 3/8"
17	■ VENT RETURN COUPLING: YES	■ COUPLING SIZE: 1/8"
18	■ FILL HOSE TYPE: TWIN	■ FILL HOSE SIZE: 3/8"
19	■ FILL HOSE LENGTH: Overall length 4M	■ MAX BURST PRESSURE: FOUR TIMES THE WORKING PRESSURE
	□ SPECIFIC CONDUCTIVITY OF FILL HOSE:	
20	■ SOLENOID / PNEUMATIC VALVE: YES	■ EMERGENCY SHUTDOWN BUTTON (ESD):REQUIRED
21	■ HOSE RETRACTOR: YES	
22	■ CAPTURED VENT: YES	
23	■ TEMPERATURE COMPENSATION: YES (Selectable)	
24	■ SITE / INSTALLATION DATA	
25	DATA:	
26	■ AMBIENT TEMP.(°C):	MAX - 47 ^o C MIN - 2 ^o C
27	■ RELATIVE HUMIDITY (%)	MAX: 100
28	■ ALTITUDE (M):	
29	■ EARTH QUAKE:	■ WIND VELOCITY (KM/HR): 160 (MAX)
30	■ INSTALLATION	OUTDOOR
31	■ MOUNTED ON	DISPENSER ISLAND IN THE FORECOURT
32	■ ELECTRICAL AREA HAZARD	
33	CLASS/ZONE: CLASS I ZONE I DIVISION: I	GAS GROUP: D, GROUP IIA, IIB
34	APPLICABLE CODES AND STANDARDS:	
35	■ DISPENSER APPROVALS: AS Defined in the Technical Specification above	■ TUBING: STAINLESS STEEL 1/2" (Fill) & 1/4" (VENT)

36	<input type="checkbox"/> VALVE PRESSURE TEST:				
37	UTILITIES DATA				
38	■ Electricity: AC230 V ± 15% single phase				
39	<input type="checkbox"/> Solenoid Valves	A.C/D.C.	V	Ph	Hz
40	<input type="checkbox"/> Electronic PCBs:	A.C/D.C.	V	Ph	Hz
41	<input type="checkbox"/> Mass Flow meters	A.C/D.C.	V	Ph	Hz
42	% Diff: b/w MFM & Non re-set-table Totalizer reading after each individual fill or overall fill of any number				
43	Electrical connection (Cable gland to be provided by the vendor for 2.5mm 2 x3 Cable):				
44	<input type="checkbox"/> Total Consumption				
45	Solenoid Valves:(Watts)				
46	Electronic PCBs (Watts)				
47	Mass Flow meters: (Watts)				
48	■ MATERIALS :			Control Valve :	
49	Component Materials			(Gas Consumption)	
50	Solenoid Valve			SS/Brass	
51	Spring Loaded Regulator	SS/Brass	Nos. Transaction:		
52	Control Valve	SS	Consumption (SCM):		
53	2-way Isolation Valve	SS			
54	3-way filling valve	SS			
55	Coalescing Filter	SS / BRASS			
56	Tube 1/2"	SS			
57	Bleed Valves	SS			
58	INSPECTION AND TESTS				
59	Material Composition and Physical Properties Certificates Required For:				
60	■ Solenoid Valve	■ Spring Loaded Regulator	■ Safety Valves		
61	■ Tube	■ Hose	■ Fittings		
62	<input type="checkbox"/> Coalescing Filter..... <input type="checkbox"/> Bleed Valve.....				
63			Required	Observe	Witness
64	■ Shop inspection	by Purchaser during manufacture	■	<input type="checkbox"/>	■
65	■ Field performance test for 4 hrs and Field Trial Run 72 Hrs. Under Vendor's Supervision (Dispenser)		■	<input type="checkbox"/>	■
66					
67	<input type="checkbox"/> WEIGHTS				
68	<input type="checkbox"/> Overall supply (including, all components and packing crate) Kg. approx.....				
69	<input type="checkbox"/> Maximum erection weight Kg. Approx.....				
70	SCOPE OF SUPPLY				
71	■ Dispenser Assembly complete.				
72	■ Vendor Data as specified				
73	NOTE : Refer checklist for scope of supply				

19.0 VENDOR DATA REQUIREMENT FOR CAR DISPENSERS 1.0 DRAWING AND DATA

REQUIREMENT

1.1 The following data and information marked "X" shall be furnished by the vendor:

S. No.	Description	With Bid	After Job Award		
			For Review	For Information	Final in Book Form
1	2	3	4	5	
1.0	GENERAL				
1.1	Installation manual			X	X
1.2	Start-up, operation & maintenance manual Showing assembly details and critical tolerances. A copy of all certified drawings & documents to be enclosed.			X	X
1.3	Lubricant list with specification			X	X
1.4	Battery limit (interface) drawing/ information	X	X		
1.5	Drawing list and submission schedule		X		X
1.6	Project implementation schedule, ordering and inspection schedule for long lead and major items		X		
1.7	Pre-commissioning & commissioning procedure		X		
1.8	Performance guarantee test procedure		X		
1.9	Weights & Measures Certificates from the country of origin for offered models of Car Dispenser.	X	X		X
1.10	Dispensers unit model/mass flow meter model for dispensing specified mass flow rate at specified overall batch accuracy.	X	X		X
1.11	The "Test Certificate" for mass flow meter.	X	X		X
1.12	Weights & Measures approval From Indian Authorities of FCRI	X	X		X
2.0	DESIGN				
2.1	Process flow diagrams (PFDs) and Piping & Instrumentation diagrams (P&IDs) of sub systems and complete	X	X		X

S. No.	Description	With Bid	After Job Award		
			For Review	For Information	Final in Book Form
	system with write-up on operation				
2.2	Data sheets of Car Dispensers for, Mass flow meter duly filled up.	X	X		X
2.3	Performance data, vendor literature for equipment selection, performance curves with duty point marked for individual equipment		X		X
2.4	Specification for piping material & valves.		X		X
2.5	Utility requirement		X		X
2.6	Detail of control wiring diagram, interlock/ shutdown/ control scheme with write up on operation. Sizing Calculation for instrument items.		X		X
3.0	CONSTRUCTIONAL FEATURES				
3.1	G.A. Drawing of Dispensers showing maintenance clearances required.	X	X		X
3.2	Cross section drawings of individual equipment/ skid, material & parts list.			X	X
3.3	Termination & Wiring Diagrams		X	X	X
4.0	SPARES				
4.1	List of spares as listed in the mandatory Spares table				
4.2	Drawings, documents, data as asked under Electrical & Instrumentation specifications of this Material Requisition.		X		X

1.2 Document Distribution Schedule

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

1.2.2 Documents listed under column 4 are to be submitted in 3 copies

1.2.3 Documents listed under column 5 are to be submitted in 3 copies.

1.2.4 Documents listed in column 6 are to be submitted as hard bound indexed book containing the following details in four (4) copies & 1 transparencies and to be submitted within 2 weeks of release note/dispatch of materials/ equipment from vendor's works. All transparencies to be supplied in rolls (in two sets).

1.3 Details to be included in Final Documents Books

- 1.3.1 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.
- 1.3.2 Spares details including assembly drawings, part numbers, delivery, prices and ordering information
- 1.3.3 All design calculations carried out by the vendor.
- 1.3.4 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.
- 1.3.5 Catalogues/leaflets of sub-vendors/suppliers of various bought out components highlighting the components actually supplied correlated to P.O. Item Numbers.
- 1.3.6 Operating and maintenance instructions including lubrication schedules with details of suppliers for procurement by OWNER for subsequent needs.
- 1.3.7 Release Note and Packing List.
- 1.3.8 Any other documents asked for in the Purchase Requisition.
- 1.3.9 All final drawings shall also be given to purchaser in digitized form on CD-ROM
- 1.3.10 compatible to AUTOCAD software

1.4 Special instructions for submission of Dwgs. /Documents:

- 1.4.1 Fold all prints to 216 MM x 279 MM size & roll transparencies.
- 1.4.2 Contractor to forward the drawings and documentation to AAVANTIKA GAS clearly specifying purchasers Job no. & Req. No.
- 1.4.3 The drawing/Document no. with Rev. No. is essential.
- 1.4.4 Each Drawing/Document submitted to AAVANTIKA GAS must be checked and signed/stamped by contractor before it is submitted to AAVANTIKA GAS.
- 1.4.5 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.
- 1.4.6 Final submission in bound volumes shall necessarily have a cover page giving project title, Item name, P.O.No. particulars of owner & vendor and an index giving list of drawings & documents included (with revision no.).
- 1.4.7 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 AAVANTIKA GAS.

1.4.8 Review of vendor drawings by AGL would be only to check compatibility with basic designs

& concepts & shall in no way absolve the contractor/vendor of his responsibility to meet applicable codes, specifications & statutory rules/regulations.

1.4.9 Vendor shall submit within 10 days after placement of FOI, the complete list of drawings/documents with submission dates against each.

20.0 CHECK LIST: CAR DISPENSER PACKAGE

20.1 Vendor shall furnish all the equipment of Dispenser, auxiliary systems, instruments and controls and safety devices as per the enquiry document. Anything required over and above what is specified, for safe and satisfactory maintenance of the equipment package shall be included by the Vendor in his scope.

20.2 Vendor to write YES/NO against each item. Vendor is required to include complete scope, as such 'NO' is not warranted. However, in case for any of the items if vendor's reply is 'NO', vendor shall give reason for the same:

20.3 Vendor's scope of supply shall include but not limited to the following:

S. No	Description	Specified by Purchaser (YES/NO)	Included by Vendor (YES/NO)	Remarks
1.1	Frame material – STAINLESS STEEL 304	YES		
1.2	Built-in Coalescing unit of 3-5 microns with manual drain	YES		
1.3	Certificate of Weight & Measure	YES		
1.4	CCOE Approval	YES		
1.5	Electronic display (2 sets of 3 rows) for Car Dispenser	YES		
1.6	Tamper proof locking arrangement for flow meter	YES		
1.7	Front/side mounted locking /latch for nozzle holding	YES		
1.8	Glycerin filled Pressure dial gauge-dial/Digital 4" with c/w Red sector	YES		
1.9	Separate non-resettable straight forward totaliser	YES		
1.10	ESD button mounted on both sides	YES		
1.11	One set of isolation valves at the inlet of the piping with venting arrangement	YES		
1.12	Electrical equipment and instrumentations wiring are provided with certificate of area classifications	YES		
1.13	Dispenser automatically stop dispensing in case of: power failure, meter failure, overfill, failure of totalizers, transducer failure etc.	YES		
1.14	AAVANTIKA GAS Logo and name displayed on both sides of dispensers	YES		

S. No	Description	Specified by Purchaser (YES/NO)	Included by Vendor (YES/NO)	Remarks
1.15	Common venting on the top of the dispenser	YES		
1.16	Overall CV is indicated of dispenser from inlet of the dispenser Upto outlet probe including mass flowmeter, interconnecting tubing, valves, hoses, nozzles e.t.c.,	YES		
1.17	Dispenser is shipped in fully wired and assembled condition only gas supply connection and power supply connection shall be made at site.	YES		
1.18	Warranty for a period of 12 months form the date of Final acceptance on Installation & commissioning at Site or 24 months from the date of last shipment ,whichever first expires..	YES		
2.0	Spares and Tools / Tackles			
2.1	All necessary spare parts to sustain the maintenance of the CNG dispenser facilities within the warranty period are supplied and stock at the supplier workshop/ warehouse located in India for immediate replacement of parts	YES		
2.2	Mandatory spares as specified in the "Mandatory Spares" (Indicate separate price for each item)	YES		
2.3	Quote for one year Normal Maintenance	Reqd.		
3.0	Inspection and Testing			
3.1	As specified on the datasheets and Technical specifications	YES		
4.0	Vendor Data and drawings			
4.1	All data & drawings are required per VDR format	YES		
5.0	Erection, commissioning and trail runs at site of the Dispenser			
5.1	Additional Items not specified by purchaser but recommended by Vendor for safe smooth and normal operation. (Vendor shall indicate separate list of such items in his proposal)	YES		
5.2	Two year maintenance contract including all operating spares including consumables applicable for dispenser.	YES		
6.0	Technical parameters to be confirmed by Vendor			
6.1	Inlet pressure Kg/cm2g or [bar(g)] - 250	YES		
6.2	Fill Pressure Kg/cm2g or [bar(g)] - 200	YES		
6.3	Operating temp range (-55 ⁰ C to 70 ⁰ C)	YES		
6.4	Power supply (Single ph AC 230V +15%, 50Hz+3%)	YES		
6.5	a) Fill nozzle: Fill hose shall be fitted with NZS-5424 (9/16") fill nozzle in one arm and NGV1 Type2 Class A in second arm with adapter/receptacle (NGV to NZS) for Car Dispensers	YES		
6.6	Flexible fill & vent Hose(twin type) : Parker/Synflex/mac	YES		
S. No	Description	Specified by Purchaser (YES/NO)	Included by Vendor (YES/NO)	Remarks
6.7	Flexi-Hose rating- 5000psi, Length – overall 4 meters	YES		
6.8	Sequential filling - Three bank	YES		

6.9	Temp compensation - 200bar (g) equivalent at 15 ^o C	YES		
6.10	Break-away coupling - 3/8" & 1/8" (Fill & Vent)	YES		
6.11	Principle of Metering-Coriolis	YES		
6.12	Flow meter with integral transmitter having display of flow rate, totalizers etc. Note: flow meter-transmitter must have tamper proof lock out Configuration as per norms of W&M for use in public transactions.	YES		
6.13	b) Minimum flow rate 15Kg/min under atmospheric discharge at 250 bar inlet pressure for Car Dispensers	YES		
6.14	Overall batch accuracy of Dispenser +1% or better	YES		
6.15	Mass flow meter accuracy +0.5% of delivered qty or better	YES		
6.16	Repeatability ±0.3%	YES		
6.17	Calibration - traceable to NIST as per ISO 5168	YES		
6.18	Enclosure weather proof to IP55 NENA4x	YES		
6.19	Pressure rating of wetted part - 5000psi at 25oC as per ASME/ANSI31.3	YES		
6.20	Process temp effect - +0.01% of nominal flow rate per degree C on zero offset	YES		
6.21	Pressure influence – NIL	YES		
6.22	Surge and frequency transient- shall be in compliance with ANSI/EEE(EFT)c62.41(1991)	YES		
6.23	EMI effect on sensor and transmitter-to the requirement of EMC directive1(jan'94)	YES		
6.24	Vibration effect - As per SAMA PMC31.1 1994	YES		
6.25	Mass flow meter model shall have Indian W&M certification	YES		
6.26	Custody transfer certificate, testing must be in accordance with OIML	YES		
6.27	The offered model must have CCOE approval	YES		
6.28	The offered model shall have digital protocol like MODBUS	YES		

Comprehensive Annual Maintenance (AMC)

SCOPE OF WORK

The scope of work under this Tender shall include, but not limited to, as below –

1. General:

This contract covers the provision of services to undertake the Comprehensive Maintenance as per Company schedule and Breakdown repair of CNG dispensers as & when complaints are received at CNG control room.

For the purpose of clarity, the agency providing maintenance services for above dispensers shall, herein after be referred to as “Contractor” and the company hiring the services of the agency will, herein after be referred to as “Company” (AGL).

2. Preventive Maintenance:

Contractor's Scope:

- To carry out the Preventive & Breakdown maintenance of dispensers strictly in accordance with the schedule provided by Company / OEM Manual. However tentative schedule for PM is mentioned later in this section.
- The Contractor shall confirm to Company their availability to carry out the Maintenance in advance.
- The spares required for carrying out preventive maintenance shall be in the scope of Contractor.
- The contractor personnel shall inform the exact time to the EIC before and after carrying out the maintenance.
- The Contractor shall ensure all required consumables such as cotton waste, cleaning solvent, insulation tapes, thinner, soap solution, Teflon tape etc. including required tools & tackles are available on site. Supply of consumables, tools & tackles etc. is in the scope of Contractor. Tools shall include multi meters, Laptop with required software (prolink etc.,) etc.
- In case of a situation, when contractor's stock has exhausted, the company will provide the spares on loan basis to the contractor, and the same shall be replenished by the contractor.

List of mandatory spares to be available with the Contractor every time (excluding Parts mentioned in Serial No. 6) strictly but not limited to are mentioned here.

- a. QRC Male/ Female (Quick Release Coupling)
- b. Probes/Probes 'O' ring
- c. Keypad with silicon cover and keypad display.
- d. 3 way ball valve (make-Parker/ Swagelok / SSP / Hamlet)
- e. Display of Rs/Kg, Rupees quantity and totalizer display. f. Red and Green signals LED.
- g. Mother Board/Electronic Control Unit
- h. Pressure Transmitter/Pressure Gauge
- i. Temperature gauge.
- j. O Ring and QRC ring
- k. Two way Ball valve seal kit (make-as per approved vendor list) with both O ring type bush and spring plate type bush.
- l. Two way ball valve assemble (make: approved make in this tender document)
- m. Vent needle ball valve repairing kit
- n. Dispenser door lock
- o. Electromagnetic valve/Control Valve SOV Coil
- p. Power supply card.
- q. Wires for electronic devices inter connection (with jacks)
- r. Quarter tubes with fittings/PU tubes.
- s. Oil filter element.
- t. Break away coupling seal kit for repair
- u. Glands for mass flow meter cable connection.
- v. Pressure gauge.
- w. Hose pipe spiral casing for protection from abrasion because of friction.
- x. AGL name and logo imprinted stickers for dispenser's bodies.
- y. TG PG/PT calibration.
- z. Pressure Safety Valve calibration.

- Contractor shall provide sufficient number of probe “O” Rings at all CNG Stations to ensure uninterrupted operation of Dispensers.
- Contractor shall note down the dispenser performance before and after carrying out the maintenance as per format.
- Contractor to submit report of Percentage difference between Mass Flow Meter and Non-rest-table Totalizer on fortnight or Monthly basis as per order of EIC. Later on after continuous operation, if calibration of installed Mass Flow Meter will be required Same will be executed by Contractor at site with the help of laptop and suitable software. Only in case of lab calibration, if established by Contractor in front of AGL Site Incharge through proving exercise by Standard Master Calibration Device (CNG Prover), AGL will be entitled to send the Mass Flow Meter for calibration at its own cost.
- Preventive maintenance will be carried out on Monthly basis during non-peak hours in consultation with EIC. Any maintenance that needs to be taken up shall be well planned in advance with due approval of EIC.
- The contractor shall be liable for the consequential cost, in addition to repair cost, arising out of poor workmanship e. g. failure of spare part due to improper fitment.
- The contractor shall produce the compliance report of each maintenance activity on the next Working day to the Engineer - In - Charge. Compliance report shall be descriptive in nature. Provide proper communication facilities to all contractor personnel such as engineers, Technicians etc.
- The contractor shall inform the Company, names and mobile numbers of all the service personnel who will be deployed for providing the services during the AMC. An alternate number will also be informed to the company, which can be contacted in case all service personnel’ s mobile are not reachable. Changes, if any, will be notified to the company.

Schedule for Preventive Maintenance of Dispenser: -

- a. Visual inspection of Hose assembly including in line break away couplings
- b. Check probe
- c. Check three-way ball valve
- d. Check ON/OFF KNOB & Switch
- e. Check keypad working digits
- f. Check Quick Release Coupling
- g. Check all the three display i.e. Rate, quantity, rupee and Totalizer display
- h. Check oil filter and drain accumulated oil from filter
- i. Clean Air filter and change if it is required passing.
- k. Check control valves for programmed bank wise operation.
- l. Check all the loose electrical connections
- m. Clean dispensers’ interiors and exteriors
- n. Cut off pressure transmitter to be monitored and if it is found not working then it should be replaced

3. Break down Repair:

Contractor Scope:

- On receiving information from the CNG control room/Dealer, contractor shall ensure that his team reaches the concerned retail outlet.
- Attend to dispenser breakdown service calls on 24X7 basis.
- The service personnel will report to the call site within 2 hours from the time of receiving service call in Indore, Ujjain, Pithampur and Gwalior site or at whatever site dispensers are installed (Prior Information will be provided for location of installation of Dispensers).
- Before proceeding to the outlet, the contractor personnel shall collect all necessary spares required for the repair depending on the nature of the complaints received.
- Upon reaching the retail outlet, the contractor personnel shall contact the CNG Control room to advise his attendance on site, and confirm the breakdown reporting.
- The contractor shall coordinate with the Company representative for instructions on undertaking the repair work.
- After solving the complaint, the contractor shall inform CNG control room.
- Provide proper communication facilities to all contractor personnel such as engineers, technicians etc.,
- Maintain records of the services provided, and submit the same to the company, once in a Month.

4. Reports to be submitted:

- a. Reports (in soft copy and print form) of individual equipment as and when the dispensers are undertaken for preventive maintenance/break down/on complaint service. Report shall be descriptive in nature including nature and quantity of material used or repaired.
- b. Monthly cumulative list on preventive maintenance/breakdown repair/ on complaint service of dispensers carried out with actual date and time of service.
- c. Monthly cumulative list on consumption of spares in each dispenser consumed during preventive maintenance/breakdown repair/ on complaint service attend.
- d. Separate analysis report on breakdown if anything particular occurred which needs special attention.
- e. Report of Percentage difference between Mass Flow Meter and Non-rest-table Totalizer as per guaranteed parameter declared at the time of supply.
- f. Stock list of spares duly certified by AGL Officer with monthly RA bill.

5. Minimum Manpower Requirement:

The man power setup required for carrying out preventive maintenance and breakdown repair shall be separate. The minimum man power requirement for each team is as follows:

Maintenance team:

The Maintenance team shall have minimum of one Engineer (preferably instrumentation) and one technicians (min. ITI qualification) to cover Indore, Ujjain and Pithampur site for less than 10 Dispensers. In case of more than 10 operational dispensers, two technicians of required qualification will be required.

One technician shall be deputed at Gwalior site for maintenance of dispensers during the contract Period for less than 10 operational dispensers and two technicians for more than 10 dispensers. This is the minimum manpower requirement, however Contractor shall review the manpower requirement at time to time to cover all preventive maintenance schedules and attend all breakdowns complaints.

Contractor shall maintain an office cum store room where its team shall be readily available in general shift and all the equipment shall be strictly available at this place only. Location of this establishment shall also be chosen by keeping the location of all AGL station in view.

6. Exclusions

This AMC covers Preventive and Breakdown maintenance of above dispensers, by way of repairs / replacement of defective components, except for the following items.

a. These Items are excluded from the AMC.

i) Mass Flow meter repair is exclusive. But Fault diagnosis at site including on-site calibration with suitable software via laptop is in contractor scope. Contractor has to submit proper elaborative fault diagnosis report with recommended corrective measures in case of issue in Mass Flow Meter.

ii) Flexible Hose pipe of all sizes.

iii) Supply of in line Break-away Coupling is exclusive. But repairing, inclusive of seal kit is in Contractor's scope.

7. The Company shall be responsible for the following activities as a partner in the AMC:

a. Ensure security of the dispensers in all manners. The company shall ensure that the dispenser/ its components are not subject to theft, abuse, sabotage, improper &/or unauthorized handling, and illegal usage.

b. Providing adequate (a minimum of 4 hrs., from the time the dispenser is offered to the service personnel for repairs, but can be more depending on nature of work) shut down time for preventive maintenance, acknowledging & approving the work done on record.

c. Providing shut down time for preventive maintenance, acknowledging and approving the work done on record.

d. Release payment against the invoices raised by the contractor, on a monthly basis, as per agreed payment terms of the AMC.

e. The company shall inform the Contractor, names & mobile numbers of max. two personnel from the company, who have been authorized to log a service call.

f. Before logging a service call, the company authorized person will verify that the service call is on account of dispenser, and log the call with clarity about the nature of failure. An alternate number will also be informed to the contractor, which can be contacted in case the above two persons are not reachable. Changes if any will be notified to the contractor.

Performance Indicators:

The contractor's performance shall be measured by:

1. Preventive maintenance

a. Carry out preventive maintenance in accordance with the schedule.

b. Carry out preventive maintenance as per the scheduled maintenance task (mentioned in Serial no. 2).

- c. Carry out preventive maintenance within specified down time given in the schedule.
- 2. Breakdown repair:
 - a. Achieving response time (mentioned in serial no. 3).
 - b. Correct diagnosis of the cause of breakdown and submission of correct analysis report.
 - c. Rectification of the breakdown within the acceptable timescale dictated by Contractor experience.
 - d. Spares availability at site.
 - e. Min. repairing time/day if any equipment is sent out of station for repairing.
 - f. Well-disciplined team at site and their overall cooperation with company representatives.

Break down penalty: (During AMC Period)

In case, the contractor's service personnel is unable to reach the break down site within stipulated time, or is unable to complete the maintenance within stipulated time, following penalty will be applicable. This amount will be deducted from the invoice raised by the contractor, at the end of the month.

- a. Penalty for 1 hour delay in reaching at all site (ie, within 3 hours instead of 2 hours) - Rs 500/- per arm per dispenser.
- b. Penalty for 2 hour delay in reaching at all site (ie, within 4 hours instead of 2 hours)- Rs 1000/- per arm per dispenser.
- c. If the shutdown time, which will be calculated from the time the dispenser is offered to service person on reaching site, is extended beyond 4 hours, a penalty of Rs 500/- per hour will be applicable.
- d. Rs 2500 towards non availability of mandatory spares at operational sites.
- e. Contractor shall not deploy the employee of age less than 18 years in any of the activities. If it is found, then it will be viewed seriously and heavy penalty of Rs. 20000/- per instance and also the termination/blacklist will be done from our approved vendor list.
- f. The contractor shall provide full Personal Protective Equipment (PPE) to each individual employee including, soft hat, eye protection, ear plug, and safety shoes. In case, the contractor does not provide PPE, the same will be arranged by AGL at the risk and cost of the contractor. It is mandatory for all personnel to wear said PPE whilst performing their duties, failing which a penalty @ Rs. 500/- per incidence will be levied in addition to dismissal of the person.

Note: The Vendor shall maintain spare parts inventory including proprietary items/mother boards/display units/keyboards etc, for efficient repair and AMC works.