



Bhagyanagar Gas Ltd.

**BHAGYANAGAR
GAS LIMITED**

**Tender for Mechanical & Electrical Works for construction of
CNG DBS at M/s GMR Filling Station, IOCL, Mylaradevpally
in Hyderabad
Bid Document No. BGL/313/2016-17**

**VOLUME
II OF II**



Bhagyanagar Gas Ltd.

BHAGYANAGAR GAS LIMITED

(A JOINT VENTURE OF HPCL & GAIL)

BID DOCUMENT FOR

**TENDER FOR MECHANICAL & ELECTRICAL WORKS
FOR CONSTRUCTION OF CNG DBS AT M/s GMR
FILLING STATION, IOCL, MYLARADEVPALLY IN
HYDERABAD**

**UNDER LIMITED DOMESTIC
COMPETITIVE BIDDING**

Bid Document No.: BGL/313/2016-17

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SECTION – 7(A)

TECHNICAL SPECIFICATIONS - MECHANICAL



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SECTION A : SS TUBE LAYING AND TESTING

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1.0 SCOPE OF WORK AND TECHNICAL SPECIFICATION

1.1 LAYING OF SS TUBE

Laying, testing and commissioning of SS tubes and fittings complete with all supports. Whereas the tubes & fittings shall be free issued by BGL. The MS Angle and U-clamps (galvanised) / other fixing arrangement shall be procured and installed by the contractor. Payment shall be at the rate for the work set out in the agreed Schedule of Rates.

Contractor shall engage BGL approved sub-contractor for this specialized work. The list of parties are enclosed in Annexure-I.

1.2 SCOPE OF WORKS: FOR LAYING, TESTING & COMMISSIONING OF SS TUBING

Generally the following shall constitute the Contractor's scope of work but not limited to as given herein:

- 1.2.1 Receipt of tubes, fittings and other free issue items from BGL's stores, loading, transportation and unloading at project sites. Proper storing, stacking, identification, providing security and insurance during and before erection, and commissioning.
- 1.2.2 SS tubes shall be clamped to the MS Angle at every 1000 mm using P-clamps of SWAGELOK make / any other approved make / SS – 308 clamps with EPDM cushion. **The practice of flattening tubes for clamping purposes shall not be permitted.**
- 1.2.3 MS Angle and U-clamps (galvanised) shall be procured from approved manufacturers and through a QAP including stage inspection and pre-dispatch inspection of the materials by BGL. (To be isolated by rubber gaskets).
- 1.2.4 Tubes shall be bend using tube benders only and any hot bending will be totally rejected. Tubes shall be cut using pipe cutting device. **Hot cutting is not allowed.**
- 1.2.5 Carrying out pneumatic testing and purging with nitrogen as per approved procedures; providing all tools, tackles, instruments, manpower and other related accessories for carrying out the testing of tubes.
- 1.2.6 Submission of final material appropriation statements for all the materials issued by BGL. Returning surplus material to BGL stores, reconciliation of

free issue material / consumables and obtaining 'No Objection Certificate' from BGL .

- 1.2.7 Start-up and commissioning assistance.
- 1.2.8 Handing over the completed works to BGL for their operation/ use purposes.
- 1.2.9 Any other work not specifically mentioned herein, but required for the satisfactory completion/ operation/ safety/ statutory/ maintenance of the works shall also be covered under the scope of work and has to be completed by the Contractor within specified schedule at no extra cost to BGL.

2.0 **INSTALLATION PROCEDURE**

2.1 **TUBE END PREPARATION**

- 2.1.1 Cut the ends square with a hacksaw and a suitable guide. Tube cutters are satisfactory for most tube materials but tend to work harden stainless steel. As such proper care shall be exercised while cutting the SS tubes to avoid the hardening.
- 2.1.2 Burrs must be removed inside and outside for proper entry into fitting to prevent contamination and/ or *restricted flow*. **'Swagelok' deburring tool shall be used.**
- 2.1.3 Remove all fittings, chips, and grit before attachment of fittings.

2.2 **ASSEMBLY**

- 2.2.1 Tube line fabrication must be accurate so that the tube end easily enters the fitting in proper alignment. Do not force an improperly fitted tube line into the fittings.
- 2.2.2 Ensure that the tube end is bottomed against the shoulder in the fitting body. This is necessary to prevent movement of the tube while the nut forces the ferrule to grip the tube and to seal through any imperfections that may exist on the outside tube surface.
- 2.2.3 Never permit the fitting body to rotate during tube end make-up, use two wrenches. Assemble port connectors to components first and hold with a wrench while making up the tube joint. All types of union bodies must be held while each of the tube ends is made up.
- 2.2.4 Never attempt to make up by torque.

2.2.5 Always turn the nut the prescribed amount regardless of torque required. Fitting end plugs required only 1- ¼ turn from finger tight make up in all sizes.

3.0 **REMAKE OF FITTINGS**

A disassembled joint can be remade, simply by retightening the nut to the position of the original make up. For maximum number of remakes, mark the fitting and nut before disassembly. Before retightening, make sure the assembly has been inserted into the fitting until the ferrule(s) seats in the fitting. Retighten the nut by hand. Rotate the nut with a wrench to the original position as indicated by the previous marks lining up. (A noticeable increase in mechanical resistance will be felt indicating the ferrule is being re-sprung into sealing position.) Then snug the nut 1/12 turn (1/2 hex flat) past the original position.

4.0 **REFERENCE SPECIFICATION, CODES AND STANDARDS**

The Contractor shall carry out the work in accordance with this specification, Engineering Standards, ASME B 31.8 - Gas Transmission and Distribution Piping Systems, Oil Industry Safety Directorate (OISD) norms.

Should the Contractor find any discrepancy, ambiguity or conflict in or between any of the Standards and the contract documents, then this should be promptly referred to the Engineer-in-Charge (EIC) for his decision, which shall be considered binding on the contractor.

5.0 **SCOPE OF SUPPLY**

5.1 **SUPPLIED BY BGL**

Unless otherwise specified BGL will supply the contractor free of charge all tubes and fittings necessary to complete the laying at CNG stations. The Contractor shall not use material from any other source of supply other than BGL except with written approval from the EIC.

In general the following tubes & fittings shall be supplied as free issue items :

- i 1" OD SS Tube of 0.12" wall thickness
- ii ¾" OD SS Tube of 0.095 wall thick min.
- iii ½" OD SS Tube of 0.083 wall thick min.
- iv Double Compression Ferrule Fittings of sizes 1", ¾", ½", 3/8" & ¼".
- v SS Valves of suitable sizes.

5.2 **SUPPLIED BY THE CONTRACTOR AT HIS OWN COST AS PART OF THIS SPECIFICATION:**

The procurement and supply of MS Angle with U- clamps at the appropriate time of all the materials and consumables except for the materials specifically enlisted under Owner's scope of supply, shall be entirely the Contractor's responsibility

and its rates of execution shall be inclusive for all these items, as follows but not limited to these:

- i Bolts and nuts for supports, U-bolts with nuts, P-clamps for tubes, anchor bolts of various sizes for fixing to concrete structure.
- ii Bitumen paints primer and solvents.
- iii All material for minor civil works like grouting etc.,
- iv Minor structural steel for fabrication of tube/ tray supports like MS plates, GI plates, flats, pipe etc.,
- v Pumps, compressor, Corrosion Inhibitor for water used for hydrostatic testing, including water for testing, inert gas for purging.
- vi All items not expressly mentioned in the Contract but which are necessary for the satisfactory completion and performance of the Work under this Contract.

Note: Samples of all the consumables items / test certificates required to be approved by EIC.

6.0 **SCRAP AND EXCESS MATERIAL**

Every month the Contractor shall submit an account for all the materials issued to him by the owner in the standard proforma prescribed for this purpose by the Engineer-in-charge.

On completion of the work, the Contractor shall submit material appropriation statements for all the materials issued by the Owner in the standard proforma. The following scrap allowances are permissible.

ITEM	UNACCOUNTABLE	SCRAP
Tube	1 %	1% (Less than 0.3 m)
Valves	0 %	0%
Ferrule Fittings	0 %	0 %

All excess materials and scrap shall be returned after duly accounting for, to the BGL stores. Where materials are to be weighed before return, the Contractor shall be responsible for making necessary arrangements for weighing etc. The contractor shall not use scrap sections obtained during the course of construction for fabrication of temporary supports or other items without prior written permission of Engineer-in-Charge.

If the Contractor fails to return the surplus material aforesaid, the Owner will charge the Contractor for such unreturned material at penal rates, which will be deducted from whatever amount is due to the Contractor. In case any material issued by the Owner deteriorates during storage by the Contractor, new material will be issued to him if available at penal rates, but delay in procuring such materials will be at the Contractor's account only. ***Any damaged valve and ferrule fittings should not be used and shall be returned to BGL stores.***



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SECTION B.

ERECTION OF MECHANICAL EQUIPMENT

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2. EQUIPMENT WEIGHTS & SIZES.

SECTION-B

LOADING, UNLOADING, TRANSPORTATION & ERECTION OF ELECTRO-MECHANICAL EQUIPMENT

1.0 SCOPE OF WORK:

1.1 Generally the following shall constitute the Contractor's scope of work but not limited to as given herein:

- i. Receiving of material from stores.
- ii. Loading of material/ equipment on a trailer / truck from stores. Safe transportation to various sites.
- iii. Unloading, placement and alignment on foundation
- iv. -on ground or above ground + 3 m at roof top (cascade only) & on LCV.
- v. Transit Insurance of equipment from stores to site.
- vi. All equipment transported shall be securely boarded and transported without causing any damage to equipment. Any damage caused during loading, transportation & unloading shall be recoverable from the contractor.
- vii. All the equipment shall be leak tested after erection as per instruction of engineering in charge and standard practice.

2.0 Equipment weight & sizes

Sl. No.	Equipment	Size	Weight/ Unit Appx.
1.	Cascade 3000 L (water capacity)	4M X 1.75M X 1.6M (H) approx	5T

All excess, unutilized or defective materials and scrap shall be returned after duly accounting for, to the BGL stores. Where materials are to be weighed before return, the Contractor shall be responsible for making necessary arrangements for weighing etc. The contractor shall not use scrapped or defective materials obtained during the course of construction for fabrication of temporary supports or other items without prior written permission of Engineer-in-Charge.

If the Contractor fails to return the surplus material aforesaid, the Owner will charge the Contractor for such un-returned material at penal rates, which will be deducted from whatever amount is due to the Contractor. In case any material issued by the Owner deteriorates during storage by the Contractor, new material will be issued to him if available at penal rates, but delay in procuring such materials will be at the Contractor's account only.



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Contractor to arrange all equipment & tools such as cranes, winch, lifting hook etc and skilled & semiskilled manpower and consumables for erection of all the electro-mechanical equipment.

ANNEXURE- I

LIST OF PARTIES FOR SS TUBING

1. M/s Aadhar Projects, New Delhi
2. M/s Khurana Engineering Works, New Delhi
3. M/s Eco Technologies, New Delhi
4. Or as approve by EIC on conditional satisfaction.



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SECTION – 7(B)

TECHNICAL SPECIFICATIONS - ELECTRICAL



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ELECTRICAL & ILLUMINATION WORKS

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ELECTRICAL WORK

01.00 GENERAL

01.01 General

These Technical Specifications are intended to amplify the General and Special Conditions of Contract and shall be read in conjunction with them. For any discrepancy between the General Conditions/Special Conditions and these Specification the most stringent shall apply.

01.02 Scope of work

The general character and the scope of work to be carried out under this contract are illustrated in Drawings, Specifications and Schedule of Quantities. The Contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the Owner's site representative. The contractor shall furnish all labor, materials and equipment (except those to be supplied by the owner) as listed under Schedule of Quantities and as specified including transportation and incidentals necessary for supply, installation, testing and commissioning of the complete electrical system as described in the Specifications and as shown on the drawings. This also includes any materials, equipment, appliances and incidental work not specifically mentioned herein or noted on the Drawings/Documents as being furnished or installed, but which are necessary and customary to be performed for completion of the specified work under this Contract. The Electrical system shall comprise of following:

- a. Design, supply, installation ,testing & commissioning of LT Panels, Main distribution/Sub distribution panels, Lighting Distribution Boards, Capacitor Banks , Pump Starter panels and any other electrical equipment as required.
- b. Design, Supply, Installation, Testing & Commissioning of building lighting system which shall include lighting distribution boards, lighting fixtures, fans, exhaust fans, power sockets, telephone sockets, MDF box (for telephone), switchboards, circuit wiring and point wiring and grounding etc. All conduit work including junction boxes, outlet boxes and wiring for lighting/fan and power.
- c. Supply, laying testing and commissioning of Cables , wires and associated cable trays, cable supports and cabling accessories and required structural steel/assemblies.
- d. Supply and installation of Earthing and Lightning protection system including all earthing materials , earthing conductors, earth pits as specified/required..

- e. Design, Supply, Installation, Testing and Commissioning of AVR (Automatic Voltage Regulator).
- f. Supply, Erection, Testing and Commissioning of external pole lights, armoured cable etc. as required and complete in all respects as specified.
- g. Supply, Erection, Testing and Commissioning of canopy underlights complete in all respects including armoured copper conductor cable and the type of lighting fixture as specified.
- h. DELETED
- i. Supply, installation, testing and commissioning of UPS System complete in all respect including battery as specified.
- j. Construction of cable trenches and laying of embedded/ exposed G.I. pipes, electrical conduits for laying of cables/wires.
- k. Supply and installation of any equipment/material as required for completeness of the electrical installations.
- l. Supply and installation of all electrical equipment/material required for erection and commissioning of BGL's technological equipment such as compressors, cascades, dispensers etc.

01.03 Bye Laws Regulation

The work shall be carried out to the satisfaction of the Owner's site representative and in accordance with the Specifications, Regulations of the Electric Supply Authority, Indian Electricity Rules and Regulations, latest Indian Standards and as per the requirements of the Chief Fire Officer and other applicable statutory authorities such as Chief Controller of Explosives, Nagpur. The application on behalf of the owner for submission to Electrical Inspector / state or central Electricity Authority along with copies of required certificates complete in all respects shall be prepared by the contractor and submitted to the Engineer-in-charge for onward transmission well ahead of time so that the actual commissioning of equipment are not delayed for want of inspection by the Electrical Inspector / CEA shall be arranged by the Contractor and necessary coordination and liaison work in this respect shall be responsibility of the contractors.

01.04 Project Execution and Management

The Contractor shall confirm in his bid that the electrical work shall be done by a licensed electrical contractor. The technicians deployed by the Contractor shall be skilled and qualified as electrical technician.

For quality control & monitoring of workmanship, contractor shall assign at least one full-time engineer who would be exclusively responsible for ensuring strict quality control, adherence to specifications and ensuring top class workmanship for the electrical installation.

01.05

Drawings

The Electrical Drawings listed under Appendix, which are issued with tenders, are diagrammatic only and indicate arrangement of various systems and the extent of work covered in the contract. These drawings indicate the points of supply and of termination of services and broadly suggest the routes to be followed. Under no circumstances shall dimensions be scaled from these Drawings. The architectural/interiors drawings and details shall be examined for exact location of equipment, electrical points & fixtures.

The contractor shall follow the tender drawings in preparation of his shop drawings for BGL approval and for subsequent installation work.

Maximum headroom and space conditions shall be maintained at all points. Where headroom appears inadequate, the contractor shall notify the Architect/Consultant/Owner's site representative before proceeding with the installation. In case installation is carried out without notifying, the work shall be rejected and contractor shall rectify the same at his own cost.

The contractor shall examine all architectural, structural, plumbing, and other services drawings before starting the work and shall report to the Owner's site representative any discrepancies and obtain clarifications. Any changes found essential to coordinate installation of his work with other services and trades shall be made with prior approval of the BGL site representative without additional cost to BGL.

01.06

Specifications

These Specifications shall be considered as part of this contract. The Drawings indicate the extent and general arrangement of power distribution, location of lighting the fixtures, controlling switches, wiring system, cabling and Earthing. These drawings are essentially diagrammatic. The Drawings indicate the point of termination of conduit runs and broadly suggest the routes to be followed. The work shall be installed as indicated on the Drawings. However, any change found essential to coordinate the installation of this work with other trades shall be made without any additional cost to the Owner. The data given herein and on the Drawings is as exact as could be secured, but its complete accuracy is not guaranteed. The drawings are for the guidance of the contractor, exact locations, distances and levels shall be governed by the site conditions and the Architectural & Interior layouts.

01.07

Shop Drawings

The Contractor shall prepare and submit for approval the detailed drawings of building conduit layouts and G.I. pipe layouts and distribution panels, switch boards, cabinets, special pull boxes, cable trays and any other equipment to be fabricated or purchased by the contractor. The Overall General Arrangement (OGA) drawings of all the panels/boards etc. shall be furnished for approval. The weight of each panel/equipment shall be indicated in respective OGA drawings to facilitate proper civil foundation/ support design.

- 01.07.01 These shop drawings shall contain all information required to complete the Project as per contract specifications and as required by the Architect/Consultant/Owner's site representative. These Drawings shall contain details of construction, size, arrangement, operating clearances, performance characteristics and capacity of all items of equipment, also the details of all related items of work by other contractors. Each shop drawing shall contain tabulation of all measurable items of equipment/materials/works and progressive cumulative totals from other related drawings to arrive at a variation-in-quantity statement at the completion of all shop drawings.

Each item of equipment/material proposed should be a standard catalogue product of an established manufacturer strictly from the manufacturers listed in Appendix-I.

When the Architect/Consultant makes any amendments in the above drawings, the contractor shall supply two fresh sets of drawings with the amendments duly incorporated along with check print, for approval. The contractor shall submit further **twelve sets of shop drawings** to BGL's site representative. No material or equipment may be delivered or installed at the job site until the contractor has in his possession, the approved shop drawing for the particular material/ equipment/ installation.

- 01.07.02 **Shop drawings shall be submitted for approval** sufficiently in advance of planned delivery and installation of any material to allow Architect/Consultant ample time for scrutiny. No claims for extension of time shall be entertained because of any delay in the work due to his failure to produce shop drawings at the right time, in accordance with the approved programme.

- 01.07.03 Manufacturer drawings, catalogues, pamphlets and other documents submitted for approval shall be in four sets. Each item in each set shall be properly labeled, indicating the specific services for which material or equipment is to be used, giving reference to the governing section and clause number and clearly identifying in ink the items and the operating characteristics. Data of general nature shall not be accepted.

- 01.07.04 Samples of all materials like conduits, accessories, switches controls, control wires etc shall be submitted to the Owner's site representative prior to procurement. These will be submitted in two sets for approval and retention by

Owner's site representative and shall be kept in their site office for reference and verification till the completion of the Project.

01.07.05 Approval of shop drawings shall not be considered as a guarantee of measurements or of building dimensions. Where drawings are approved, said approval does not mean that the drawings supersede the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirement to furnish material and perform work as required by the contract.

01.07.06 Where the contractor proposes to use an item of equipment, other than that specified or detailed on the drawings, which requires any redesign of the structure, partitions, foundation, wiring or any other part of the mechanical, electrical or architectural layouts; all such re-design, and all new drawings and detailing required therefore, shall be prepared by the contractor at his own expense and got approved by the Architect/Consultant/ Owner's site representative.

01.07.07 Where the work of the contractor has to be installed in close proximity to, or will interfere with work of other trades, he shall assist in working out space conditions to make a satisfactory adjustment. If so directed by the Owner's site representative, the contractor shall prepare composite working drawings and sections at a suitable scale, not less than 1:50, clearly showing how his work is to be installed in relation to the work of other trades. If the Contractor installs his work before coordinating with other trades, or so as to cause any interference with work of other trades, he shall make all the necessary changes without extra cost to the Owner.

01.07.08 Within four weeks of approval of all the relevant shop drawings, the contractor shall submit four copies of a comprehensive variation in quantity statement, and itemized price list of recommended (by manufacturers) imported and local spare parts and tools, covering all equipment and materials in this contract. The Project Manager shall make recommendation to Owner for acceptance of anticipated variation in contract amounts and also advise Owner to initiate action for procurement of spare parts and tools at the completion of project.

01.07.09 **Submission of Drawings**

Upon the completion of the work and before issuance of certificate of completion the contractor shall submit to the Owner's site representative six sets of layout drawings in progressive manner for individual systems drawn at approved scale indicating the complete wiring system as installed. Soft copies of all the drawings shall be furnished in CD-ROM. No drawing shall be made in size less than A3.

These drawings/documents shall include:

- a. Electrical room layout & all panel layouts, as installed .
- b. Cable Trays/Conduit layout with number and size of cables installed.
- c. Run and size of conduits, inspection, junction and pull boxes.
- d. Number and size of conductors in each conduit with phase identification.
- e. Location and rating of sockets and switches controlling the lighting and power outlets.
- f. Location and details of distribution boards/panels, mains, switches along with phase balancing details.
- g. A complete scheme and wiring diagram as installed and single line diagrams covering the complete electrical system. Panel OGA drawings shall furnish list of all equipment/material used alongwith their make and rating.
- h. Location of all Earthing stations, routes and size of all Earthing conductors/manhole.
- i. Layout and particulars of all LT cables.
- j. Instruction, maintenance and operation manuals including maintenance schedule for all equipment. Testing & commissioning reports of all electrical equipment.
- k. Site test reports and factory acceptance report for each and every equipment/system supplied by the Contractor

01.07.10 Manufacturers' Instructions

Where manufacturer have furnished specific instructions relating to the materials used in this project and covering points not specifically mentioned in these documents, manufacturers instructions shall be followed.

01.07.11 Materials and Equipment

All materials and equipment shall conform to the relevant Indian Standards and shall be of the approved make and design. Makes shall be strictly in conformity with list of approved manufacturers as per Appendix.

The Contractor shall be responsible for the safe custody of all materials and shall insure them against theft or damage in handling or storage etc. A list of items of materials and equipment, together with a sample of each shall be submitted to the Owner's site representative within 15 days of the award of the contract. Any item which is proposed as a substitute, the contractor shall state the credit, if any, due to the Owner. In the event the substitution is approved, all changes and substitutions shall be requested in writing and approvals obtained in writing from the Owner's site representative.

01.07.12 Performance Guarantee

The contractor shall carry out the work in accordance with the Drawings, Specifications, Schedule of Quantities and other documents forming part of the Contract.

The contractor shall be fully responsible for the performance of the selected equipment (installed by him) at the specified parameters and for the efficiency of the installation to deliver the required end result.

The contractor shall guarantee that the electrical system as installed shall perform to complete satisfaction of the Owner.

The Contractor shall hold himself fully responsible for reinstallation or replacement, free of cost to Owner the following:

- a. Any defective work or material supplied by the Contractor.
- b. Any material or equipment damaged or destroyed as a result of defective workmanship by the Contractor.

- 01.07.13 **Completion**
On completion of the electrical installation a certificate shall be furnished by the Contractor countersigned by the licensed supervisor, under whose direct supervision the installation was carried out. This certificate shall be in the prescribed form as required by the local authorities concerned.
- 01.07.14 **Demonstration to owner**
At completion, devices subject to manual operation shall be operated at least five times in presence of Owner's site representative to demonstrate satisfactory operation.
- 01.07.15 **Tools and tackles**
The Contractor shall provide and install all necessary hoists, ladders, scaffolding, tools, tackles, all transport for labour and materials and plant necessary for the proper execution and completion of the work to the satisfaction of the Owner's site representative.
- 01.07.16 **On site training**
Upon completion of all work and all tests, the Contractor shall furnish necessary operators, labor and helpers for operating the entire installation for a period of fifteen (15) working days of ten (10) hours each, to enable the Owner's staff to get acquainted with the operation of the system. During this period, the contractor shall train the Owner's personnel in the operation, adjustment and maintenance of all equipment installed.
- 01.07.17 **Partial Ordering**
Owner through the Architect/Consultant/ Owner's site representative reserves the right to order equipment and material from any and all alternates, and /or to order high side and /or low side equipment and materials or parts thereof from one or more tenderers.
- 01.07.18 **Inspection**
All equipment/material to be supplied by the Contractor shall be offered for inspection at manufacturer's/supplier's works before delivery at site. No

equipment shall be installed without the written clearance from BGL's representative.

The contractor shall submit Quality Assurance Plan (QAP) for respective equipments for approval. QAP shall be prepared and furnished by the contractor in form no. 11.20 (4.4) F-10 alongwith their internal in process quality checks.

All equipment/material shall be procured by the Contractor well in time to avoid the delays on account of mandatory inspection procedures.

The inspection call shall be given by the Contractor minimum one week before the proposed inspection date.

02.00.00 EQUIPMENT SPECIFICATION

02.01.01 Distribution panels/boards

Main Distribution Panels and Sub-Distribution Panels shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, neutral grounded at transformer. Distribution panels shall comply with the latest Relevant Indian Standards and Electricity Rules and Regulations and shall be as per, IS: 8623 (Part -I) 1993, IS: 13947 : 1993 , IS: 5578 – 1984, IS :11353:1985 and other related IS codes. The electrical panels shall be designed as per drawings enclosed.

02.01.02 Construction features

The distribution boards shall be non – drawout type of modular and compartmentalized construction. Distribution panels shall be of sheet steel construction suitable for indoor installation, dead front, and floor mounting type. The Distribution panels shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors, Neoprene gasket and padlocking arrangement and shall be of protection class IP:54. All distribution panel /boards shall be suitable for the climatic conditions as specified in Special Conditions and for ambient temperature of 45° C . Steel sheets used in the construction of Distribution panels shall be 2 mm thick and shall be folded and braced as necessary to provide a rigid support for all components. The general construction shall conform to IS:8623-1993 (Part-1). The boards shall be single front execution with maintenance access from the front only.

A base channel of ISMC 100 (100x50x6mm) shall be provided at the bottom for floor mounted panels. Minimum clearance of 200 mm shall be provided between the floor of Distribution panels and the lowest unit. The cable terminals in the cable alley shall start from 300mm above the gland plate.

Distribution panels shall be of adequate size with a provision of spare switchgear as indicated in the Single Line Diagram. Modules shall be arranged in multi-tier. Knockout holes of appropriate size and number shall be

provided in the Distribution panels in conformity with the location of cable/conduit connections. Removable sheet steel plates shall be provided at the top/bottom to make holes for additional cable entry at site if required.

Cable alleys shall be provided in the Distribution panels for easy clamping of all incoming and outgoing cables entering from the top/bottom. Minimum width of the cable alley shall be 250mm. Adequate supports shall be provided in cable compartment to support cables. All cable terminals/ terminations vulnerable to inadvertent contact shall be shrouded by providing transparent insulating sheet of minimum thickness of 5 mm.

Every cabinet shall be provided with engraved metal nameplates. All live accessible connections shall be shrouded and minimum clearance between phase and earth shall be 20 mm and phase to phase shall be 25 mm.

All sheet steelwork shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphating, passivating (seven tank processing) and then painted with electrostatic paint (Powder coating). The shade of colour of panel inside / outside shall be RAL 7032 and black colour for base channel.

Main horizontal busbars shall be of uniform size throughout the length.

02.01.03 Labels

Engraved metal labels shall be provided on all incoming and outgoing feeder. Circuit diagram showing the arrangements of the circuit inside the distribution panels shall be pasted on inside of the panel door and covered with transparent plastic sheet.

02.01.04 Wiring

Power and control terminals shall be segregated and shall be provided with necessary ferrule marking as per the wiring diagrams.

PVC insulated solid/stranded copper conductors of adequate size shall be used for internal wiring. The switch/MCCB of 100A or more shall be provided with busbars on incoming side.

Minimum size of the copper conductor for power shall be 4.0 mm² and that for the control wiring shall be 2.5 mm². The CT secondary wiring shall be carried out using copper stranded conductor of 2.5mm².

Ring type cable lugs shall be used for termination of wires of CT secondary circuit and wires of power circuit within the modules.

Non - current carrying metal/movable parts shall be properly grounded through flexible braided copper conductors.

Phase insulating barriers shall be provided wherever it is not possible to maintain a minimum clearance of 19mm (between phase to neutral) and 25 mm(between phase to phase.)

02.01.05 Painting

All sheet steelwork shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphating, passivating (seven tank processing) and then painted with electrostatic paint (Powder coating). The colour of panel inside / outside shall be RAL 7032 and black colour for base channel.

02.01.06 Bus bar connections

Bus bar and interconnections shall be of high conductivity electrolytic grade aluminium (E 91E) and of rectangular cross section suitable for carrying the rated full load current and short circuit current without overheating of phase and neutral bus bars and shall be extendable on either side. Bus bars and interconnections shall be insulated with heat shrinkable sleeve and shall be colour-coded. Bus bars shall be supported on glass fiber reinforced thermosetting plastic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber and all connections shall be done by bolting. Additional cross sectional area to be added to the bus bar to compensate for the holes. All connections between bus bars and breakers/MCCB/switches shall be through solid aluminium strips of proper size to carry full rated current and insulated with insulating sleeves. The distribution board shall be designed for the short circuit capacity of 35 kA for 1 sec.

Unless otherwise specified, in the case of external surface of enclosures of bus bar trunking system which shall be accessible but do not need to be touched during normal operation, an increase in the temperature rise limits of 25° C above ambient temperature shall be permissible for metal surface and of 15° C above ambient temperature for insulating surfaces as per IS 8623(Part-2) 1993.

Bus bar size for the Neutral shall be same as that of phases and Earth shall be half that of the main phase.

All joints shall be made after applying anti - oxidant petroleum jelly.

02.01.07 Meters/CTs

All currents more than 10A shall be measured through CTs. All phases shall be provided with CT of minimum burden of 10VA with 5A secondaries.

The CTs shall conform to the relevant IS. The design and construction shall be dry type, epoxy resin cast and suitable for withstanding thermal and dynamic stresses during short circuit conditions.

The secondary terminal of the CT shall be brought out suitably to a terminal block which shall be easily accessible for testing.

The protection CTs shall be of accuracy class 5P10 and that for the measurement shall be of accuracy class 1.

The ammeters and voltmeters shall be of taut band of square shape with 240° deflection type. The voltmeter /ammeter for incoming circuit shall be of 144 x 144 mm and that for the outgoing feeders shall be of 96x96 mm. size. Ammeter for motor circuit shall be of suppressed scale type. Voltmeter shall be provided through protection fuses. Ammeter shall be provided in each motor feeder.

The Indication lamps shall be of LED cluster type .

02.01.08 Gland plate

Cable gland plate (3mm thick sheet steel) shall be detachable and undrilled and shall be provided at the bottom to facilitate cable entry from the bottom. The size of the gland plate shall be adequate to accommodate all the cables conveniently.

02.01.09 Safety Interlock

The feeders with rotary switches and operating handle for MCCBs shall be provided with mechanical interlock so that it will be possible to open the module only when the switch/ MCCB is in OFF position. However it shall be possible to defeat this interlock.

02.01.10 Moulded Case Circuit Breaker (MCCB)

MCCB shall be Current Limiting and shall comprise Quick Make/break switching mechanism with Double Break Contact system, arc extinguishing device and the tripping unit shall be contained in a compact, high strength, heat resistant, flame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses. All MCCB's shall be capable of variable overload adjustment at site.. All MCCB's rated 125 Amps and above shall have adjustable magnetic short circuit pick up.

The trip command shall override all other commands. MCCB shall employ maintenance free double break contact system to minimize the let thru' energies and capable of achieving discrimination upto full short circuit capacity of downstream MCCB. The manufacturer shall provide both discrimination tables and let thru energy curves.

The breaking capacity of MCCB's shall be 35kA. The breaking capacities shall be as per type-2 co-ordination as per IEC-947-2, 1989/ IS 13947 -1993

The MCCB's shall be provided with rotary handle operating mechanism. The handle position shall give positive indication of 'ON', 'OFF' or 'Tripped'.

02.01.11 Fuse Switch Unit

The fuse switch unit shall be 415V, TPN AC23 duty with double break power contacts and shall be sheet steel enclosed type and shall conform to IS 13947 – 1993. Top and bottom cable chambers shall be provided additionally in all the FSUs rated 100A and above. The operating handle shall be rotary type and padlocking facility shall be given in the FSUs. The FSUs shall be provided with applicable feeder label/markings.

02.01.12 Changeover Switch

Changeover Switch shall be ON load 415V, 4 Pole AC-23 type of ratings as given in the SOQ and shall conform to IS : 13947 –1993.

02.01.13 Miniature circuit breaker (MCB)

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 V, AC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 kA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B, C, D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP and TPN miniature circuit breakers shall have a common trip bar independent to the external operating handle.

02.01.14 Earth Leakage Circuit Breaker Current Type (ELCB)

1. System of Operation

Earth Leakage Circuit Breaker (ELCB) shall work on the principle of core balance transformer. The incoming shall pass through the toroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer. In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a predetermined critical value. ELCB shall be current operated independent of the line voltage, current sensitivity of a minimum of 30 mA and a maximum of 300 mA at 240/415 volts AC and shall have a minimum of 20,000 electrical operations.

2. Mechanical Operation

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing

/opening of all the three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under automatic tripping conditions.

3. Neutral Advance Feature

The neutral moving contact shall be so mounted on the common bridge that, at the time of closing, the neutral shall make contact First before the phases; and at the time of opening, the neutral shall breaks last after allowing the phases to open first. This is an important safety feature, which is also required by regulations.

4. Testing Provision

A test device shall be incorporated to check the integrity of the earth leakage detection system and the tripping mechanism. When the unit is connected to service, pressing the test knob shall trip the ELCB and the operating handle shall move to the "OFF" position.

02.02.0 Cables

All cables shall be PVC insulated, PVC sheathed armoured, copper conductor of the core & sizes as required and listed in the SOQ. All cables shall be of approved make as given in the " List of Approved Makes".

All control cables shall be PVC insulated , PVC sheathed , armoured and of solid copper conductor of the core & sizes as required and listed in the SOQ.

All cables shall conform to the latest version of IS:1554(Part I)

Testing of cables

Cables shall be tested at works for the acceptance tests before being dispatched to site by the Contractor/manufacturer.

Test shall also be conducted at site for insulation between phases and between phase and earth for each length of cable, before and after jointing. On completion of cable laying work, the following tests shall be conducted in the presence of the BGL site representative.

- a) Insulation Resistance Test
- b) Continuity resistance test.
- c) Sheathing continuity test.
- d) Earth test.(in armored cables)

All tests shall be carried out in accordance with relevant Standard Code of Practice and Electricity Rules. The Contractor shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests. All tests shall be carried out in the presence of the BGL's site representative.

02.03.0

Lighting Distribution Board

LDBs shall be supplied, erected, tested and commissioned by the Contractor. The lighting distribution board shall be of sheet steel construction and shall be wall recessed mounting type, double door construction and shall be dust and vermin proof. The LDBs shall be of reputed make and MCBs used shall be of reputed make as per the Approved list of the Makes. The MCBs shall be rated for 10 kA fault rating. The bus bars shall be of rating not less than 100A for phase and the neutral. Each LDB shall be provided with ELCB and MCB of adequate rating and type (TPN/DP as required) on the incoming side and required nos. of MCBs on the outgoing side. Minimum 20% spare MCBs shall be provided on the outgoing side.

02.04.0

Cabling Accessories

All cabling accessories like cable lugs, double compression cable glands, terminal blocks shall be of reputed and approved makes. The cable lugs shall be long barrel, heavy duty, solderless crimping type and shall be crimped with the help of hydraulic crimping tool.

02.05.0

Earthing

Each CNG station shall be provided with an effective earthing system **the earth resistance value of which shall be less than 1 ohm**. In case the earth resistance of 1 ohm is not achieved by one earth pit, more no. of earth pits shall be constructed in the vicinity of electrical room/electrical installations as per drawings or as directed by BGL site incharge. All the non-current carrying metal parts of electrical installations and all metal conduits trunking, cable sheaths, switchgear, distribution panels, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All metal work such as pipe lines, stairways etc shall be bonded to earth as specified. All earthing shall be in conformity with IS:3043 1987. Earth resistance value of each earth pit shall be tested individually and combined and records of the values noted shall be properly documented and submitted to BGL(in 4 sets)

Separate earth pits for the Electronic earthing shall be constructed. The earth pits for the electronic earthing shall not be connected to the electrical earthing grid.

02.05.01

Earth pits and earthing conductors

Earth pits shall be constructed at the designated locations as per the IS:3043 – 1987. The GI pipe shall be of 3.0 M length and 65 mm ϕ and shall be of medium duty (Class-B type) as per the IS: 1239

GI strips of 40x5mm size shall be used as earthing conductor for the main earth grid and for the earthing of main electrical equipment, compressor skid/body and cascade etc. and also as lightning down - conductor.

G.I.strips shall be used for earthing of small equipment like J.B.s, starter panel, dispenser, lighting distribution boards, lighting poles etc. The G.I. strip shall be terminated through nut/bolts using spring washers. The size of the strip to be used for different equipment is indicated against clause 03.25

G.I. strips shall be extended by brazing/welding the lap jointed strip.

Zinc to be used shall conform to minimum Zn 98 grade as per requirement of IS: 209-1992. Minimum weight of zinc coating for mild steel flats with thickness upto 6 mm in accordance with IS: 6745-19742 shall be 400 g/mm²

The Zinc coating shall be uniform, smooth and free from imperfections as flux, ash and dross inclusions, bare patches black spots, pimples, lumpiness, runs, rust stains bulky white deposits, blisters.

Mild steel flats shall undergo a process of degreasing pickling in acid, cold rinsing and then galvanizing. All joints and cut ends shall be properly painted with aluminum paint.

02.05.02 The earthing connections inside the electrical room and near the CNG compressor shall be terminated to the respective equipment through a G.I. plate of size 300x100x8mm thick with 10 nos. of holes suitable for 8mm dia nut and bolts. All terminations shall be done through spring washers.

02.05.03 Connection of earthing conductors

Two runs of Main earthing conductors (40x5mm G.I. strip) shall be taken from the earth grid outside the electrical room to inside the electrical room. These earth conductors shall be terminated to three nos. of G.I. earth plate which shall be mounted onto the wall. The earth conductor of the specified size for earthing of all the electrical equipment inside the electrical room shall be taken from these earth plates the respective equipment. All joints in the G.I. strip shall be brazed. All joints through nut & bolts shall have spring washers.

Metal conduits, cable sheathing and armoring shall be earthed at the ends adjacent to distribution panel at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing with the current carrying conductors within the flexible cord.

02.06.0 Street Light Poles

Steel tubular street light pole shall be swaged and welded construction as indicated in the schedule. Each pole shall be comprising of a looping/terminal box clamped with top level 550 mm above ground level along with a suitable earth terminal. A base plate 300 x 300 x 10 mm shall be welded to the bottom of the pole. The looping box shall be provided with a suitable busbar

arrangement to loop 2 cables of size as specified elsewhere. The pole shall be of the size/profile as given in the lighting pole drawings.

The steel tubular pole shall be suitable for mounting on concrete foundation, painted with black bituminous paint internally and externally upto the portion which goes inside the concrete and remaining part of exterior shall be painted as mentioned elsewhere in this specification. The civil work for street light pole foundation forms a part of erection. The street light poles shall be as per the drawings approved and accepted by Engineer- In Charge.

03.0 ERECTION SPECIFICATIONS

03.01 Electrical Panels/Dist. Boards etc.

All electrical panels/distribution board/AVR /electrical equipment/cables and other material shall be inspected again after receipt at site and shall be checked for completeness and damage etc.. Discrepancies if any shall be made up before taking up the erection.

All electrical panels shall be properly installed as per the applicable layout drawings. The installation shall be as per the applicable standards and Indian Electricity Rules . Panels shall be properly grouted/fixed to the base channel. The panels/switchboards/AVR shall be erected under the supervision of the manufacturer's supervisor and BGL's representative. The manufacturer's supervisor shall be arranged by the Contractor. The panel shall be charged only after written clearance from manufacturer and BGL. The site tests for all equipment shall be conducted as per the recommendation of the respective manufacturer.

Alignment/leveling etc. shall be thoroughly checked before fixing the panel permanently. The panel shall be fixed to the supporting channel through tac welding.

Bi-metallic washers shall be used at the points wherever Aluminum/Copper joints are involved.

All the meters and the protective relay and the associated CTs shall be tested and calibrated in the presence of BGL's authorized representative and manufacturer's representative. The test and calibration reports thereof shall be documented and submitted to BGL.

All the unused cable entries shall be properly plugged using brass nickel plated plugs.

The panels/boards shall be tested as per the relevant norms before charging.

The cables inside the panel shall be terminated through the double compression cable glands and cable lugs.

- 03.02 Cabling**
The cables shall be supplied, inspected, laid, tested and commissioned in accordance with drawings/ specifications and manufacturer's recommendations.
- 03.02.01 Cable terminations**
Cable termination shall be done in cable terminal box using solderless, heavy duty, long barrel type crimping lugs and proper size of glands of double compression type with earthing facility. All crimping shall be done by hydraulic crimping tool.
- 03.02.02 Bonding of cables**
Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of armor clamp and gland. The clamps must grip the armoring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors and terminals.
- 03.02.03 Laying of cables**
Cables shall be laid by skilled and experienced workmen using adequate rollers to minimize stretching of the cable. The cable drums shall be placed on jacks before unwinding the cable. Great care shall be exercised in laying cables to avoid forming kinks. The relative position of the cables, laid on the cable tray shall be preserved and the cables shall not cross each other. At all changes in direction in horizontal and vertical planes, the cable shall be bent smooth with a radius as recommended by the manufacturers. All cables shall be laid with minimum one diameter gap and shall be clamped at every meter to the cable tray and shall be tagged for identification with aluminum tag and clamped properly.
- 03.02.04** The cabling shall be done as per the approved cable layout drawings.
- 03.02.05** All cables passing through walls or coming out of ground shall run through GI Pipes of adequate diameter and length for protection.
- 03.02.06** The cables while running on the exposed surface shall be laid on perforated G.I. cable trays and shall be properly fixed using cable clamps.
- 03.02.07** Cable tags shall be provided at every 10M interval along the cable length and also at the end points of the cable and in the cable pits. The cable tags shall be made of aluminum strip. The cable tags shall be assigned to each cable. The nomenclature for the cable tags shall be furnished to the Contractor by BGL.
- 03.02.08** The GI pipes when used for laying the cables shall be amply dimensioned . The power and control cables shall not be taken in the same conduit. Similarly the instrument cables shall not be laid along with power and control cables.

- 03.02.09 GI wire of minimum 3mm dia shall be left in the GI pipes while laying the pipes to pull the cable later.
- 03.02.10 All pipe ends shall be duly protected against ingress of mortar/debris etc.
- 03.02.11 Termination of the cables shall be carried out using heavy duty long barrel solderless crimping type cable lugs. All cable crimping shall be done with help of hydraulic crimping tool.
- 03.03 Earthing**
- 03.03.01 Earth pits shall be constructed as per IS:3043 (1987) and as per the approved and accepted drawing by Engineer-In Charge.
- 03.03.02 G.I. Strip of 40x5mm size shall be used as the main earthing ring conductor. The G.I. strip shall be extended lengthwise through a lap joint which shall be brazed/welded. The earth strip shall be covered under the topmost screed concrete. The earth strip when laid exposed on wall/floor shall be clamped properly at regular intervals.
- 03.03.03 The earth strip shall be made available inside the cable pits and near the equipment (to be earthed) for further extension/ terminations.
- 03.03.04 All terminations shall be through Galvanised/ passivated nut & bolts using spring washers and check nuts.
- 03.03.05 Earth pit and Earth strip layout shall be as per the approved drawing.
- 03.03.06 All equipment shall be grounded using earth conductor of sizes as indicated below:-
- | | | |
|--|---------|----------------------------|
| Electrical Panel/Distribution Board/ | - | Earthing at 2 points using |
| AVR/Electrical Switch box/Capacitor Bank | 25x4 mm | G.I.strip |
| DG Set | - | Earthing at 2 points using |
| | | 25x4 mm G.I.strip |
| Pump Starter Panel | - | Earthing at 2 points using |
| | | 25x4 mm G.I.strip |
| Lighting Distribution Board / | - | Earthing at 2 points using |



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		25x4 mm G.I.strip
Compressor Skid	-	Earthing at 2 points using 25x4 mm G.I.strip
Building structure/columns	-	Earthing at 1 point using 25x4 mm G.I.strip
Cascade/Dispenser	-	Earthing at 2 point using 25x4 mm G.I.strip
Lighting Pole	-	Earthing at 2 point using 25x4 mm G.I.strip
Electrical Motors	-	Earthing at 2 point using 25x4 mm G.I. strip
Lightning down conductors	-	25x4 mm G.I. strip

LIST OF APPROVED MAKES
(ELECTRICAL)

S. No.	Details of Materials/Equipment	Manufacturer's Name
1.	Moulded Case Circuit Breaker (MCCB)	Larsen & Toubro Schneider Electric GE Power Controls
2.	Switch Fuse Unit (HRC Type)	Larsen & Toubro Siemens GE Power Controls Bhartia (BCH)
3.	Miniature Circuit Breaker (MCB)	Larsen & Toubro (Hager) Groupe Schneider MDS Indokopp Havell
4.	Earth Leakage Circuit Breaker (ELCB)	Larsen & Toubro (Hager) Groupe Schneider MDS Indokopp
5.	Power/Aux. Contactor	Larsen & Toubro Siemens Telemecanique GE Power Controls Bhartia (BCH)
6.	Change Over Switch	CGL Larsen & Toubro Siemens HPL SOCOMEC
7.	Control Transformer/Potential Transformers	Automatic Electric Kappa Voltamp
8.	Current Transformer (Epoxy Cast Resin)	Automatic Electric Kappa Voltamp
9.	Ammeter, Voltmeter, PF.KW,HZ Meter	Rishabh (L&T) Automatic Electric MECO

S. No.	Details of Materials/Equipment	Manufacturer's Name
11.	Indicating Lamps, Push Button	Larsen & Toubro (ESBEE) Siemens ESSEN Bhartia (BCH)
12.	Overload relays with built in Single Phase Preventor	Larsen & Toubro Siemens Bhartia (BCH) Groupe Schneider
13.	Terminal	Connect well Phoenix contact WAGO & Control
14.	KWH meter (Flush Type)	Larsen & Toubro ALSTOM Simmco
15.	Digital Meters (A/V/PF/Hz/KW/KWH)	Enercon System Pvt Ltd Meco Automatic Electric
16.	Electronic Energy Meter	ABB CG Schumberger Secure Meters Larsen & Toubro
17.	Power Capacitor	Universal Cables ALSTOM ABB Madhav
18.	Automatic Power Factor Correction Relay.	ALSTOM Syntron Phasitron
19.	Power and control cables upto 1100 V grade	HAVELLS, POLYCAB, CCI NICCO UNIVERSAL Torrent KEI

S. No.	Details of Materials/Equipment	Manufacturer's Name
20.	LT jointing kit/Termination	Raychem Denson
21.	Cable Glands Double Compression	Baliga Comet Dowell
22.	Cable Lug	Dowell's Jainsons
23.	PVC insulated copper conductor stranded wire	Universal Plaza Finolex Havell
24.	M S Conduit (ISI approved)	B E C AKG
25.	Accessories for MS Conduit (ISI approved)	Sharma Sales Corp. Rama
26.	Switch & Socket	Crabtree Anchor Avanti Kopp M K India
27.	Splash proof metal clad industrial socket.	Crompton Greaves Bhartia (BCH)
28.	Exhaust Fan	ALSTOM Crompton Greaves
29.	Ceiling Fan	ALSTOM Crompton Greaves Usha
30.	Lighting Fixtures a. General	Philips Crompton Greaves Ltd. Wipro
	b. Flameproof	Flexpro Baliga Philips Govan
31.	Selector Switch, Toggle switch	Salzer (Larsen & Toubro) Kaycee



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S. No.	Details of Materials/Equipment	Manufacturer's Name
32.	Timer	Larsen & Toubro Siemens General Electric Telemechanique GE Power Controls Bhartia (BCH)
33.	Batteries Lead Acid (VRLA Type) 20 year s life	Exide Amara Raja HBL – NIFE
34.	Batteries – Ni – Cd	Punjab Power Packs Sabnife Tamilnadu AMCO
35.	Battery Charges	Amara Raja Automatic Electric Chhabi Electrical HBL – NIFE
36.	Automatic Voltage Regulator	Selvon Automatic Electric SAI Electrical
37.	Panels	Controls & Switchgear Bhartia (BCH) Venus Control Siemens L&T Or as approve by EIC
38.	Lighting Distribution Boards	MDS Indo Asian Siemens Havells Schneider Electric
39.	UPS	HI-REL Electronics Emerson Network Power DB Power Electronics Kerala State Electronics APLAB Ltd.



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SECTION – 8

SPECIAL CONDITIONS OF CONTRACT

SOECIAL CONDITIONS OF CONTRACT

LOCATION/ SITE INFORMATION:

- a) It is understood that before quoting the rates, the contractor will make him/ herself acquainted fully and understand the nature and quantum of the job to be carried out. Retail outlet is at M/s GMR Filling Station, Mylaradevpally, IOCL RO in Hyderabad, Telanagana. Ignorance of this will not be considered after award of work. The contractor will be responsible to complete the entire job in all respects.
1. **Electrical & Mechanical jobs for construction of Daughter Booster station at M/s GMR Filling Station, Mylaradevpally, IOCL RO in Hyderabad is to be done on urgent basis and the work shall be done continuously.**
 2. **The bidder must mobilize adequate manpower for/ at all the sites and as and when desired by BGL.**
 3. **The quantities given above against individual items/ SORs are indicative and shall not be considered to be binding. The quantities may increase or decrease at site at the time of actual execution and as per the discretion of Owner/ Engineer-in-charge. The unit rate shall be operated to work out the final payment due to Contractor.**
 4. **BGL reserves the right to operate any SOR for the full quantities or part quantities or nil quantities as per the site conditions. In this case; BGL's decision will be final and binding.**
 5. **Transportation of all material: Shall be arranged by the contractor on his own and no separate payment shall be paid. it should be included in the offered rate**
 6. **All manpower, machineries Tools and tackles,**
Equipments, tools/ tackles, machinery, roller, leveler, labour, manpower etc for the work shall be in the scope of contractor.
 7. **Validity of contract period:**
1 year from date of award of work, which may be extended by another 1 year with same rates, terms & conditions upon satisfactory performance of the contractor upon mutual agreement.
 8. **COMPLETION TIME:**
Total duration for completing the SOR jobs as directed by EIC is 2 months from the date of handing over of site by BGL to be intimated through letter or email.
 9. **MOBILIZATION PERIOD:**
One week from date of intimation by BGL –EIC excluding the completion time.
 10. **MOBILIZATION ADVANCE:** Nil

11. **DEFECT LIABILITY PERIOD:**
One year from the date of completion of entire work at RO.
12. **Price reduction Schedule (LD):**
The price reduction schedule to be made applicable against individual work order with specific completion period of each RO. In case the CONTRACTOR fails to complete the WORK within the stipulated period, then, unless such failure is due to Force Majeure as defined in Clause 26 of GCC; or due to EMPLOYER's defaults, the Total Contract price for each WO shall be reduced by ½ % of the final executed amount by the contractor per complete week of delay or part thereof subject to a maximum of 5 % of the final executed amount by the contractor, by way of reduction in price for delay and not as penalty. The said amount will be recovered from amount due to the Contractor/ Contractor's Contract Performance Security payable on demand.
The decision of the ENGINEER-IN-CHARGE in regard to applicability of Price Reduction Schedule shall be final and binding on the CONTRACTOR.
13. **Security Deposit:**
10% of work order for electrical & mechanical works which the contractor has to submit BG or DD within 15 days from Work Order.
14. **Water and power water charges:**
Water and power shall be arranged by the contractor on his own .No separate payment shall be paid for arranging the water and power.
15. **Safety rules and regulation:**
Contractor shall adopt the safety rules and regulation as per the prevailing practices .
16. **Payments :**
Payments of Single and Final bill shall be made after completion of respective works of SOR after acceptance /approval of Engineer-In Charge.
17. **Terms of Payments:**
Payment shall be made within 15 days of receipt & acceptance by Engineer-in-Charge for the actual quantities of work executed as per the schedule of rates issued along with the work order, against cenvatable invoice supported by work measurement sheets duly signed by EIC or his representative. The payment shall be released through cheque.
18. **Abnormally high rated items (AHR) :**
In then schedule of Rates (SOR) ,where the tenderer's quoted rate(s) for the items exceeds 50 % of the Owner's estimated rate such rate shall be considered as abnormally high rates (AHR) and payments of the AHR items, beyond the SOR quantity, shall be made at the least of the following rates.
 - 19.1) **Rates as per schedule of rates**
 - 19.2) **Rate of the item, which shall be derived as follows:**

- a. Based on rates of the machine and labour as available from the contract (which is including 15% cover towards contractor's profit, overhead and other expenses.)
 - b. In case rates are not available in the contract, rates will be calculated base on the prevailing market rates of machine ,material and labour plus 15 % to cover contractor's supervision profit, overhead and other expenses.
- 19.3)** Notwithstanding to the provisions contained in clause 19.1 & 19.2 above, BGL would have the right to negotiate all such AHR items before the award of work.

19. Extra items /Substituted items:

If any work to be executed relating to the contracted work and rate for the same is not available in the schedule of the rate then the following methodology shall be adopted .

- a. **If the item of work is similar to the item for which he has quoted rates in the Schedule Of rates, the rate will be derived from similar items of work in the SOR.**
- b. If any item of work does not appear in the SOR quoted by the contractor in that case the rates of such items shall be derived from cost of material and labour plus 15 % to cover contractor's supervision profit, overhead and other expenses. The rate shall be derived from market rate analysis.

20. SERVICE TAX:

The Quoted price/rates should be inclusive of all taxes and duties EXCEPT SERVICE TAX. It may be noted that the responsibility of payment of Service tax lies with the Service Provider only. In case of Service tax is applicable for the tendered work, the contractor shall claim the service tax indicating rate of abatement/deduction allowed as per " Service Tax Act " in the 1st Invoice itself. Contractor providing taxable service shall issue an Invoice/Bill serially numbered and shall contain the following:-

- a) Name and address and Service tax Registration No of service provider
- b) Name and address of the taxable service receiver,
- c) Description, Classification and value of taxable service provided,
- d) Service tax amount

The above details are required to enable BGL to avail Cenvat credit for the service tax payment.

Payments to Service provider for claiming service tax amount will be made provided above formalities are fulfilled only. In case of any statutory variation in Service tax during the currency of the contract, the contractor shall submit a copy of Government notification to evidence the rate as applicable on the date of submission of bid and on the date of revision. Claim for payment of service tax/statutory variation in service tax, should be raised within two(2) months from the date of issue of Government

Notification for payment of differential service tax, otherwise claim in respect of above shall not be entertained for payment of arrears.

22. Taxes, duties, octroi, levies etc.:

The quoted rates/prices shall be deemed to be including of all taxes including sales tax work contract tax ,octroi, levies ,over head charges etc till completion of the contract and contractor shall not be eligible for any compensation on this account. **Contractors are advised to quote the service tax rate, applicable at the time of submission of offer , clearly in their commercial bid/s. While arriving the lowest bidder (among the bidders who have quoted for the work), L1 , service tax shall be taken in to account while calculating the bid value.**

23. The Engineer In charge shall have the power to :-

- a. Issue the further necessary instruction to the contractor from time to time during the progress of the work for the purpose proper and adequate execution of it and the contractor shall carry out and be bounded by the same
- b. Order the contractor to remove or replace any workmen whom the company considers incompetent or unsuitable on the opinion of the company's representative as to the competence of any workman engaged by the contractor. The decision of EIC shall be final and binding on the contractor.

24. PHOTOGRAPHS/LABOUR PERMISSION/VEHICLE PERMISSION:

The contractor shall arrange to make photo gate passes/labour permissions/vehicle passes etc. for his persons/labours/vehicles for working in site plant premises at his own cost as rules of the company.

25 RESPONSIBILITIES OF THE CONTRACTOR AND COMPLIANCE WITH LABOUR/INDUSTRIAL LAWS:

- A) It shall be the sole responsibility of the contractor (including the Contracting firm /company) to obtain the and abide by all necessary licenses/permission from the concerned authorities as provided under the various labour legislations including the labour license obtained as per the provisions of the Contract Labour (Regulation and Abolition) act 1970.
- B) The contractor shall discharge obligation as provided under various applicable statutory enactments including the Employees Provident Fund and miscellaneous Provisions Act 1952, the employees state insurance (ESI) act 1948, the contract labour (regulation and abolition)act 1970, the inter state Migrant workmen (regulation of employment and conditions of service)act 1979,the minimum Wages Act, 1948 the payment of wages act 1936 ,Workman Compensation Act 1923, payment of bonus act, and various other labor legislations as in existence (at present in India) and as amended from time to time

- C) The contractor shall be responsible for required contributions towards PF . ESI, Pension or any other statutory payments to be made in respect of the contract and the personnel employed for rendering the services to BGL and shall deposit these amounts on or before the prescribed dates. Every contractor shall submit the proof of depositing the employee's and employers contributions. The contractor shall be responsible to pay any administrative /inspection charges thereof, where applicable ,in respect of the personnel employed by him for the work of BGL
- D) The contractor shall regularly submit all relevant records/documents to BGL representative for verification.
- E) The contractor shall be solely responsible for the payment of wages and other dues to the personnel, if any, deployed by him latest by 7th day of the subsequent month
- F) The contractor shall indemnify BGL against all claims, demands, actions, cost and charges etc brought by any court, Competent Authority / Statutory Authorities against any act or acts of the contractor or his worker
- G) The contractor shall ensure regular and effective supervision and control of the personnel, if any, deployed by him and gives suitable direction for undertaking the contractual obligations.
- H) The contractor is require to obtain labor license under the provisions of Contract Labour (R&A) Act, 1970 from the office of ALC (Central), Ministry of Labor, Govt. of India, HYDERABAD prior to start of work if applicable for this work.
- I) The contractor shall not employ or permit to be employed any person suffering from any contagious, loathsome or infectious disease. The contractor shall deploy the workers after verification of their character and antecedents. In case any worker is found having criminal record, he shall have to be immediately replaced without assigning any reason under intimation to Engineer-In Charge.
- J) The personal to be deployed to carry –out the job should be on rolls of the contractor/contracting firm.
26. **All the tender** papers must be stamped and signed.
27. Contract shall be of works Contract and tax statement will be provided by BGL.



Bhagyanagar Gas Ltd.

**BHAGYANAGAR
GAS LIMITED**

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SECTION – 9

SCHEDULE OF RATES (SOR)



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S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
1	2	3	4	5	6 = 4*5
1	Earthwork in Excavation				
	Earth work in excavation in all kinds of soil, PAVERS/ flexible pavements/ WBM except rock in any plan dimension up to 2.0 M depth including disposal of excavated earth up to any lead in all conditions, and disposal of surplus and unserviceable earth. Soil to be levelled and neatly dressed complete in all respect as per scope of work, detailed construction drawings, as per technical specifications and directions of the Engineer-in-charge. (Note: This is for rate contract purpose and is to be executed based on site requirement)	M	0.5		
	(The Contractor shall take into account in his rate, the provision for excess excavation for necessary working space, slope etc., required for excavation and other allied works and refilling the side slopes and working space)				
2	PCC				
	Providing, laying in position, construction and handing over of PCC in foundations, substructure, superstructure and under floor, etc complete in all respects as per scope of work, detailed construction drawings, technical specifications and direction of Engineer-in-charge.				
a	PCC 1:4:8 [1 Cement : 4 coarse sand : 8 stone aggregate 40 mm nominal size]	M3	0.15		
	[1. Rate to include cost of all labour, tools, tackles, equipment, hire charges, supply of all materials such as minimum 43 grade cement, coarse sand and coarse aggregates, other minor construction materials, shuttering, staging, shoring/strutting, finishing, etc. with all bye works and sundry works. 2.This is for rate contract purpose and is to be executed based on site requirement.]				



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S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
3	Demolition Works				
a	Demolition and of RCC/PCC(taking all necessary Precautions) for all depths below and height including supply of all tools and tackles, labour, cutters, necessary scaffolding, propping etc., including disposal of unservicable material to any lead, stacking of steel and other servicable materials as per direction of Engineer-in-charge.(Note: This is for rate contract purpose and is to be executed based on site requirement)	M3	1		
b	Demolition and of Paver blocks/WBM(taking all necessary Precautions) for all depths below and height including supply of all tools and tackles, labour, cutters, necessary scaffolding, propping etc., including disposal of unservicable material to any lead and other servicable materials as per direction of Engineer-in-charge.(Note: This is for rate contract purpose and is to be executed based on site requirement)	M2	5		
4	Restoration works				
	Restoration of demolished Paver blocks/WBM and restoring it to normal original condition including supply of all tools and tackles, labour, necessary scaffolding, propping etc., and as per direction of Engineer-in-Charge(Note: This is for rate contract purpose and is to be executed based on site requirement)	M2	5		
A	MS Structural Works				
1	Supplying ,fabricating, providing of structural steel work with TATA/SAIL/VSP make members/plates including cost of bolts, nuts, welding etc. Job includes handling, transporting erecting, straightening, cutting, drilling holes, bolting, welding, all fabrication jobs wherever necessary, fixing in position with required alignment at all heights and applying two coats of black colour enamel paint asian make over a coat of red oxide primer. Rate to include zebra painting of yellow	MT	0.2		

S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
	colour of 100mm to the columns up to 1500mm from Base plate.				
i	For Storage Cascade SS tubing support Stand & Misc Jobs				
2	Providing and fixing chequered plate covers				
	Providing and fixing chequered plate in approved panel, SS tube trench or over steel structure including cutting, welding, hoisting, fixing in position, and applying two or more coats of approved quality synthetic enamel over a priming coat of approved steel primer etc complete as per scope detailed drawings , technical specifications and directions of the Engineer-In-Charge.	MT	0.1		
	[Rate to include cost of all labour, nut, bolts, tools, tackles, hire charges royalties, levies, transportation, scrap value, gas cutting, welding, other consumables, paints, compressed air, water, electric power etc. all complete.]				
B	CNG Electrical Works				
1	Supply , laying , testing and termination of 1100V grade, steel wire armoured ,copper conductor cable of following sizes & type in surface trench./on wall/structural surface/VDRCC/PCC/paver block/in G.I. Pipes/conduit as specified with all necessary consumables job includes cable terminations etc. Cables shall conform to IS 1558 Part II. This includes dismantling of VDRCC/RCC/PCC including restoration if any along the cable route: removing & relaying of pauer blocks if any along the cable route: Supplying, fittings, fixing and jointing B-class GI pipes of ISI make like Zenith or equivalent make of the required sizes including all fittings conforming to IS 1239 as required and as directed by EIC and also this includes providing and laying PVC pipes including all fittings of required sizes as required and as directed by EIC.				
i)	4 x 25 mm ² Armoured -copper(EBXL or XLPE insulation)	RM	60		

S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
ii)	3 Core x 2.5 mm ² -copper (EBXL insulation)	RM	50		
iii)	3 Core x 1.5 mm ² -copper (EBXL insulation)	RM	30		
	Note: 1) length of cable is measured as single run only. 2) The contractor has to quote only the cable supply and laying rate in item				
2	Supply, erection and commissioning of sub distribution board with incomer 125 Amp, 4P MCCB and outcomer having one number 100 Amp, 4P MCCB and four numbers of 10 Amp DP MCB (Make of SWITCHGEAR should be of L&T or LEGRAND or CG), the panels must be provided with a suitable emergency shutdown button which can be fixed at outside the control room and near to the sales/dealer room, jobs must include all the accessories required for connecting the required load details given along with SOR as directed by EIC.	Set	1		
3	Supply & laying of GI Strip (for earthing) of following sizes, clamped to wall/structure including termination at the required points by welding/nut bolts including all earthing material. Bidder has to assume no. of chambers, since layout shall be given only during construction. Measurement shall be including Chamber along the direction of conduit.				
i)	40 x 5 mm	RM	35		
ii)	25 x 5 mm	RM	85		
4	Making of cable trench, of dimensions minimum 0.8Mtr (Depth) x 0.3 Mtr (Width). Underneath and above the cable sand layer of 10cms should be laid, alongside the cable, bricks must be arranged over which half circular hume pipe of 8inch dia must be covered, along the route of the cable marker should be arranged at a span of 10Mtrs. Restoration of the site to initial condition with soil. Cable should be laid as per the norms of APSEB or IE rules. Work must be done as	RM	75		



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S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
	per the attached drawing as per direction of EIC.				
5	Construction of Earthpits as per the drawing approved by EIC, using GI pipe medium (class-B) - 3M long including supply of all material required and testing of earth pits as per latest version of IS:3043 & specification. (GI pipe should be of dia 65 mm NB)	Nos.	2		
6	Construction of Instrumentation Earthpit as per the drawing approved by EIC, using GI pipe medium (class-B) - 3M long along with Copper plates etc., including supply of all material required and testing of earth pits as per latest version of IS:3043 & specification. (GI pipe should be of dia 65 mm NB)	Nos.	1		
7	Supply and fixing of suitable Shunt trip coil to the MCCB in item No.04 and weather proof emergency shutdown button in a suitable enclosure. The emergency button may be fixed at approx 20 Mtrs away from panel board as per direction of EIC.	Nos.	1		
8	Supply & fixing of 25 mm X 3 mm Copper braided flexible wire of 2.5 meter length which includes 400A crocodile clips, 95 sqmm copper lugs at both ends; job includes transportation, fixing etc. as per the directions of EIC.	RM	5		
9	Supply laying, testing of 10 sqmm. copper flexible multistrand for earthing connection wherever directed includes providing of lugs, nuts, bolts, labour charges, fixing, etc.	RM	25		
10	Supplying fittings, fixing and jointing B-class GI pipes of ISI make like Zenith or equivalent make of the following size confirming to ISI 1239. Rate shall include making chasses in the walls on concrete floors by chiselling and fixing GI pipes with clamps at every 1 mt center to center with all GI fittings like tees, bends, coupling, sockets plugs, reducers, nipples, long screws including testing pipe lines for leakage before painting and painting the pipes with hot bitumen, wrapping pipe with tension				

S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
	cloth as per specifications. In case of exposed GI pipes painting shall be done with two coats of Synthetic enamel paint and in case of underground piping painting with two coats of bitumastic painting shall be provided.				
a	1 inch dia GI Pipes	Rmt	10		
b	50mm dia GI Pipes	Rmt	10		
c	80mm dia GI pipes	Rmt	10		
11	providing and laying jointing PVC pipes of and socket type including all fittings and specials, the excavation in all types of soils except in hard strata and filling the same after laying the pipe line etc.				
a	PVC Pipes 65mm	Rmt	20		
C	CNG Mechanical Works				
1	SS TUBE LAYING & TESTING				
i	Erection, Laying, testing and commissioning of SS tubes (free issue material by the Owner) in trench & also aboveground along with SS fittings(unions/reducers/TEE/Cross/Ferrule fittings), isolation valves and Conductive Hoses providing U-clamps at regular intervals and wherever necessary, as per Technical Specification, Typical P & ID for type of CNG station and scope of work including handling, lifting, transportation from Company's stores to CNG stations & handing over of unused SS tubes & fittings to the owner store as directed. Laying, testing and commissioning of SS tubes along with fittings as per Technical Specification.				
a	1"OD X 0.120" min Wall thk. SS Tube	RM	10		
b	¾"OD X 0.095" min Wall thk. SS Tube	RM	120		
c	½"OD X 0.083" min Wall thk. SS Tube	RM	10		

S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
ii	Supply, Laying, testing and commissioning of good quality of renowned make Copper tubes of 8mm OD and 0.8mm wall thickness which should withstand pressure upto 20 Kg/cm ² along with related ferrule fittings, unions, tees, elbows, cross, isolation valves, male/female connectors, reducers etc. for providing instrument air supply to dispensers from instrument air compressor(s); clamps, nut, bolts, GI wires, any fixtures etc for mounting in the tube/cable trench etc complete job and per the directions of Engineer-in-charge.				
a	8 mm OD X 0.8mm min Wall thk. Copper Tube	RM	50		
2	Handling, including lifting, transportation, loading, unloading of cascade stored at central store or store yard or other retail outlet in Hyderabad within a distance of 35 Km to retail outlet where electrical, mechanical jobs are to be carried out, to the top of the compressor canopy or the designated place along with erection. Installation of units mentioned below on the foundations. Contractor's scope shall include supply of all material and accessories including any fixtures, clamps, gasket, nut, bolts, painting etc., and their installation etc. as required:				
i	Cascade 3000 L water capacity. Erection at 5M height or designated place	Nos.	1		
2a	(Optional item for SOR No. 2) Handling, including lifting, transportation of cascade, stored/kept in that particular CNG retail outlet where electrical, mechanical jobs are to be carried out, to the top of the compressor canopy or the designated place along with erection. Installation of units mentioned below on the foundations. Contractor's scope shall include supply of all material and accessories including any fixtures, clamps, gasket, nut, bolts, painting etc., and their installation etc. as required:				
i	Cascade 3000 L water capacity. Erection at 5M height or designated place.	Nos.	1		



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S No	Description of Job	Unit	Qty	Unit Rate (Rs.)	Total Rate (Rs.)
3	Handling, including lifting, transportation, loading, unloading of dispenser stored at central store or store yard or other retail outlet in Hyderabad within a distance of 35 Km to the retail outlet, where electrical, mechanical jobs are to be carried out, on the foundations of the designated place along with erection, grouting of base plate if any. Contractor's scope shall include supply of all material and accessories including any fixtures, clamps, gasket, nut, bolts etc., and their installation etc. as required.				
1	Dispenser car	Nos.	1		
D	MISCELLANEOUS WORKS				
a	Supply, fabrication and installation of Safety sign boards made of MS sheets(3mm Thk) with required MS flats for its supports by welding/drilling, Enamel Painting of Safety Signs/Slogans/Logos i.e., "NO SMOKING, FLAMMABLE GAS, NO ENTRY, STOP VEHICLE, NO OPEN FLAME PERMITTED, BGL LOGO, OPERATION PROCEDURES OF EQUIPMENTS etc., of 2X2fts,4X4fts and required sizes, painting with approved colours as per issued drawing by BGL and installation of the same at BGL CNG station and as per directions of EIC.	Sft	90		
	Note: Contractor to include the rates of all tools, tackles, labours, charges for welding, transportation & installation at site etc., no extra payment shall be made under this item. Payments shall be made at actuals.				
b	Painting of safety slogans in English, Hindi, Telugu in letter/ character size 100 mm X 90 mm for approx. 1.5 m of length or as required sizes containing approx. 16 letters/ Characters with enamel paint. Work includes background painting with white wash with borders as directed by EIC.	Nos	10		



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<u>Not e:</u>	The quantities given above against individual items are indicative and shall not be considered to be binding. The quantities may increase or decrease at site at the time of actual execution and as per the discretion of Owner/ Engineer-in-charge. The unit rate shall be operated to work out the final payment due to Contractor.				
Total amount (a)					
Service tax @5.8% (b)					
Grand total for Structural, Electrical and Mechanical Works inclusive of all taxes and duties in Rs. (c) = (a) +(b)					