



Bhagyanagar Gas Ltd.

# **BHAGYANAGAR GAS LIMITED**

(A JOINT VENTURE OF HPCL & GAIL)

## **BID DOCUMENT FOR**

**Tender for Procurement of Stationary CNG  
Storage Cascades for CNG DBS & Online  
Stations in Hyderabad, Vijayawada & Kakinada**

## **UNDER LIMITED DOMESTIC COMPETITIVE BIDDING**

**Bid Document No.: BGL/335/2016-17**

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Bhagyanagar Gas Ltd.  
BHAGYANAGAR  
GAS LIMITED

**Tender for Procurement of Stationary CNG Storage  
Cascades for CNG DBS & Online Stations in  
Hyderabad, Vijayawada & Kakinada**

VOLUME  
II OF II

**Bid Document No. BGL/335/2016-17**

**SECTION – 7  
TECHNICAL SPECIFICATION**

## **1.0 INTRODUCTION**

Bhagyanagar Gas Limited (BGL), a joint venture of Hindustan Petroleum Corporation Limited (HPCL) and GAIL (India) Limited, is executing Projects for CNG and City Gas Distribution in different cities of Andhra Pradesh and Telangana.

Bhagyanagar Gas Limited (BGL) (hereinafter referred as Owner), is supplying Piped Natural Gas (PNG) to Domestic, Commercial and Industrial consumers and Compressed Natural Gas (CNG) to automobiles in Hyderabad city in Telangana and Vijayawada, Kakinada cities of Andhra Pradesh through CGD and CNG Networks. BGL intends to extend its CGD and CNG network in Vijayawada to supply Natural Gas to Domestic, Commercial consumers through MDPE network and to existing/new CNG stations through Steel pipeline network by setting up new facilities.

Bhagyanagar Gas Limited is now inviting tenders on Two bid system basis for procurement of CNG Cylinder Cascades.

The present document covers the technical specifications for the enquiry.

**MATERIAL REQUISITION**

**A. DESCRIPTION OF GOODS AND/OR SERVICES**

Item	Quantity Unit	Description	Identification Number
<b>HYDERABAD,VIJAYAWADA &amp; KAKINADA</b>			
1	8Nos.	<p>Design, Engineering, Manufacturing, Assembly, Supply, Inspection and Testing at works and at site if required, loading, unloading at site of CNG Stationary Storage Cascade of minimum 3000 liters water capacity at filling temperature of 15 °C, for filling and storing of CNG at 250 bar g and suitable for 10 to 55 °C with 3 bank as specified in Technical Specification inclusive of services as stipulated in the tender document.</p> <p>Supply of required nos. of 20 dia. J type foundation bolts with nuts, 200 mm long with threaded length 50mm &amp; Supply of required nos. of 20 dia. Anchor bolts with nuts, 100 mm long with threaded length 50 mm as applicable will be in the scope of vendor for suitable fixing of stationery storage cascades.</p>	
<b>Mandatory Spares for each cascades (Stationary): Total 8 Sets</b>			
(a)	1 No per each cascade	Pressure Gauge Range (0-400 kg/cm <sup>2</sup> )	
(b)	1 No per each cascade	Cylinder Valve with end tube fitting.	
(c)	2 Nos. per each cascade	Isolation Valve	
(d)	1 No per each cascade	Check Valve	
(e)	1 No per each cascade	Tube Pig Tail	
(f)	1 No per each cascade	Burst Disc with washer	
(g)	2 Nos. per each cascade	Seal Kit, spindle & handles for isolation valves	
(h)	1 No per each cascade	Safety Relief device	
(i)	3 Nos. per each cascade	1/4" NPT (M) x 3/4" OD - male connector	
(j)	3 Nos. per each cascade	Bull Nose Connector - 1/4" NPT (M) X 3/4" OD	

**Note: Delivery of Stationary cascades shall be intimated during dispatch. Delivery locations may be Hyderabad, Vijayawada and Kakinada:**

All the mandatory spare parts shall be wrapped and packaged for prolonged so that they will be preserved in original as new condition:

- The spare parts shall be properly tagged and coded so as to facilitate easy identification.
- Spares shall be packaged separately and clearly marked spares and shipped at same time as the main equipment.
- The above cascades shall be suitable for both, stationary as well as mobile (to be mounted on Light Commercial Vehicle) purposes.

**B. REMARKS / COMMENTS**

**1. GENERAL NOTES**

**VENDOR's Compliance**

Vendor shall submit his bid in full compliance with the requirements of this MR and attachments.

Vendor must include the following statement in his bid:

*We certify that our bid is fully complying with your enquiry dated ----- and referenced -----*

Compliance with this material requisition in any instance shall not relieve the Vendor of his responsibility to meet the specified performance.

**2. COMPLIANCE WITH SPECIFICATION**

The vendor shall be completely responsible for the design, materials, fabrication, testing, inspection, preparation for shipment and transport of above equipment strictly in accordance with the Material Requisition and all attachments thereto.

All items shall be provided with En 10204 -3.2 certifications.

**3. VENDOR'S SCOPE**

Vendor scope of work includes the equipment with all internals and accessories shown on the data sheets, specifications and all unmentioned parts necessary for a satisfactory operation and testing except those which are indicated to be out of the Vendor's supply.

**4. INSPECTION**

Vendor shall appoint anyone of the following TPIA for inspection purpose after approval by consultant / purchaser:

- a) Lloyd Register of Industrial Services
- b) Technische Ueberwachungs Verein (TUV) SUD South Asia
- c) International Certification Service Pvt. Ltd
- d) TQ Services
- e) Moody International (India) Pvt. Ltd
- f) Bureau Veritas(India) Pvt. Ltd
- g) SGS
- h) Quality Services and Solutions Pvt. Ltd.
- i) Velosi Certification Services
- j) Certification Engineers International Ltd

Apart from inspection by TPIA, inspection shall also be performed by BGL delegate, as set out and specified in the codes and particular documents forming this MR.

**5. APPLICABLE DOCUMENTS**

General prescriptions, requirements and information are listed in Annexure of this Material Requisition.

**6. VENDOR'S DOCUMENTS**

Vendor shall supply the documentation as listed under point D of this Material Requisition.

All documents shall be supplied in English language.



**C. LIST OF ATTACHMENTS**

The table here below lists the documents which are integral part of this Material Requisition. The applicable revision index of each document is mentioned in the column below the current Material Requisition Revision index.

When the Material Requisition revision index is "A" or "1", all listed documents are attached. For other Material Requisition revision index, only modified or new documents are attached.

Documents	Material Requisition Revision						
	0	1	2	3			
Particular Technical Specification - CNG Storage Cascade	0	1	2	3			
Data Sheet - Cascades	0	1	2				
Data Sheet - Pressure Gauge	0						
Data Sheet - Temperature Gauge	0						
Data Sheet - Pressure Safety Valve				0			
QAP - High Pressure Gas Cylinder, Cascade Frame & Fittings	0	1	2				
Drawing of stationary Cascade				0			

**D. LIST OF ATTACHMENTS**

The table hereunder specifies the quantities and the nature of the documents to be submitted by the CONTRACTOR to the ENGINEER.

The documents required at the inquiry stage and to be included in the bid are listed under column A. The documents required after award of the AGREEMENT and subject to the written approval of the ENGINEER are listed under column B.

The final and certified documents are listed under column C are to be produced along with the dispatched of the main consignment.

Any document, even when preliminary, shall be binding and therefore duly identified and signed by the CONTRACTOR. It shall bear the ENGINEER's Project reference, the Material Requisition number and the identification number.

THE DOCUMENTS ARE FULLY PART OF THE SUPPLY WHICH SHALL BE COMPLETE ONLY IF AND WHEN THE DOCUMENTS COMPLYING FULLY WITH THE MATERIAL REQUISITION REQUIREMENTS ARE RECEIVED BY THE ENGINEER.

Documents and Data	Doc. Index No.	A		B		C	
		Number of copies	Number of copies	Required date	Number of Copies	Required date	
Technical specification for CNG Storage CASCADE and Accessories giving details of various components.	TSC	3	3	2 weeks	3	With Final Tech File	
Process and instrument diagram	PID	3	3	2 weeks	3	With Final Tech File	
Installation requirements for all equipment included in the supply.	INS	-	3	2 weeks	3	With Final Tech File	
Typical cross sectional drawing and literature to fully describe the details of all major components such as Cylinders, valve, gauges piping etc. Data sheet indicating material of tube, tube size etc., piping and instrument diagram.	PPG	3	3	2 weeks	3	With Final Tech File	
Leaflets, catalogues for all major items.	CT	3	3	2 weeks	3	With Final Tech File	
Factory acceptance test procedure.	FAT	3	3	2 weeks	3	With Final Tech File	
Engineering manuals including O&M manual.	OMM	-	3	2 weeks	3	With Final Tech File	

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Documents and Data	Doc. Index No.	A	B		C	
		Number of copies	Number of copies	Required date	Number of Copies	Required date
Maintenance schedule of the storage system along with list of Spares for O&M during warranty period.	MS	3	3	2 weeks	3	With Final Tech File
A complete zonal drawings of the Storage Cascade (complete package), all certification for all components used within the hazardous areas should be provided.	ZDWG	3	3	2 weeks	3	With Final Tech File
Quality Assurance Plan (QAP) of Cascade Frame and Cylinders along with GAD, dimensional drawings, load data.	QAP,GA D,DMD, LDS	3	3	2 weeks	-	-
Copies of Chief Controller of Explosives approval.	CCOE	3	3	2 weeks	3	With Final Tech File
Cascade Data Sheet, GA drawings.	CDS	3	3	2 weeks	3	With Final Tech File
Schematic of cascade piping.	PPG	3	3	2 weeks	3	With Final Tech File
Drawing of cascade frame along with 4G static calculations for one complete assemble cascade with all the cylinders mounted & filled.	DWF	3	3	2 weeks	3	With Final Tech File
Drawing of cylinder of specified parameters proposed to be used in offered cascade approved from Chief Controller of explosives, Government of India.	DWC	3	3	2 weeks	3	With Final Tech File
Make of bought out items	BGT	3	3	2 weeks	3	With Final Tech File

Documents and Data	Doc. Index No.	A	B		C	
		Number of copies	Number of copies	Required date	Number of Copies	Required date
Bill of quantities with weight of each component.	BOM	3	3	2 weeks	3	With Final Tech File
Detailed time schedule for supply indicating time periods required for cylinder manufacturing, cascade frame fabrication, shop testing, dispatch of material from works and delivery at site.	SCH	3	3	2 weeks	3	With Final Tech File
Test Certificates	TCS	-	-	-	3	With Final Tech File

**NOTES**

- 1) Documents listed in column A is required to be submitted during bid time (1 original+3copies).  
Durations in column B (Required date) two weeks after FOI date or as indicated in Table.  
Durations in column C (Required date) are after document approval during final dispatch of consignment.  
Due date of each document may be proposed.
- 2) Final technical file shall be supplied in hard copy as indicated, and in electronic format (PDF Acrobat files) on Six (6) CD-ROMs.

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### 1.0 SCOPE

This document covers minimum requirement for design, engineering, procurement, fabrication / manufacture, assembly, inspection at works and supply at site / BGL's stores CNG storage cascades.

### 2.0 SITE ENVIRONMENT

The climate conditions to be considered for selection, design and derating of equipment shall be as indicated below:

- Maximum Wind Velocity : 160 Km/hr.
- Maximum Ambient Temperature : 47.5 °C
- Minimum Ambient Temperature : 1.7 °C
- Design wet bulb Temperature : 27 °C
- Relative Humidity : 90%
- Altitude, M above MSL : 560 meters

The equipment offered shall be suitable for smooth, efficient and trouble free service in the tropical climate prevailing at the site as indicated above.

The equipment shall be designed to give efficient and reliable performance under outdoor industrial conditions and shall be rendered proof against rats, lizards and other vermin.

### 3.0 INSTRUCTIONS TO VENDORS

This specification describes the technical specification of the equipment to be supplied to be used as Stationary cascade to be installed for CNG stations of BGL in City of Vijayawada/Hyderabad/Kakinada.

Various parts of the specification shall be read in conjunction with each other. In case where requirements given in different parts differ, the most stringent shall govern.

The specification indicates the scope and requirements completely and clearly as possible. Any additional work/equipment or technical requirement not mentioned in the specification but required to make the offered system complete in accordance with the specification or specification or required for safe operation shall be deemed to be included in the offer.

The Vendors are advised to visit the sites before submission of their offers, to ascertain for themselves type, nature and extent of work involved and actual site conditions. Failure to do so shall not absolve the Vendor of their responsibilities regarding supply, installation, testing, commissioning etc. under their scope of work. Furthermore, no plea of the Vendor based on un-favorable site conditions and/or non-availability/lack of information shall be considered.

It will be responsibility of the Vendor to comply fully with relevant National/International standards, Indian Explosives Act, Regulations of Insurance association of India and Factories Act, while supplying materials and/or carrying out work as per this specification.

Vendor's responsibility shall also include preparing and submitting all necessary drawings, calculations, test certificates etc. as required by concerned inspector.

The Vendor, free of cost and without affecting agreed milestones, shall carry out modifications suggested by the statutory bodies.

The Vendor shall be deemed to have inspected the site area and access and ascertained all conditions affecting the contract. The Vendor shall be deemed to be fully conversant with the complete requirements of the work.

Civil engineering work i.e., foundations, trenches etc. shall be arranged by Owner. The vendor shall submit foundation and other drawings indicating requirement of work to be carried out by Owner within two weeks of placement of order. In case the requisite information regarding requirement regarding requirement of slots, pipe and other fixing inserts etc. as required for proper installation of equipment is not indicated by the Vendor within two weeks from placement of order, such facilities shall have to be arranged/provided by the Vendor at their own cost.

All work shall be carried out to the satisfaction of the Owner. Any work found to be carried out without the approval of Owner or work which is considered to be unsatisfactory and of poor quality of workmanship shall be rectified by the Vendor without any additional cost.

The Vendor shall complete and fulfill all formalities with the statutory authorities in India having jurisdiction in the area. Vendor shall also arrange for inspection and approval of installation by Indian Statutory authorities, if required.

The Vendor shall correct all project original drawings with "As Built" information and shall on completion of erection of the equipment submit originals of all finalized drawings of the Owner.

#### **4.0 DESIGN BASIS & PHILOSOPHY**

##### **4.1 Design Basis**

The Supplier should prepare the design basis required to meet the requirement with respect to technical specification and liaise with PMC/Client to obtain necessary confirmation and approval.

##### **4.2 Design Philosophy**

Storage fulfills three functions.

1. It allows more vehicles to fill than the compressor could fill directly one after the other during peak times.
2. It allows the vehicle to fill at a faster rate than if directly from the compressor.
3. It prevents the compressor from stopping and starting too often.

It is anticipated that the natural gas feed composition, flow rate and pressure will be fluctuating. Hence, Supplier should design the CNG storage facilities with optimum

degree of flexibility, reliability, operability to accommodate the varying composition of feed, other unexpected contaminants, flow rate and pressure.

The CNG storage facilities should consist of standardize modules, which are assembled into a complete system. Each system should be designed in standardized modular frames. The modular approach allows the CNG Stationary storage and mobile storage facilities to be easily installed there by reducing installation time.

The design life of the CNG storage facilities should be 20 years.

## 5.0 GAS COMPOSITION

Component	Range mole %	Design case mole %
Methane	84.50-98.77	89
Ethane	0.69-9.00	5
Propane	0.3-4.00	1.5
Butane	0.00-2.00	0.5
Pentane	0.00-0.35	0.35
Hexane	0.00-0.15	0.15
Heptane	0	0
Carbon Dioxide	0.00-4.50	3
Nitrogen	0.05-1.25	0.5
<b>SUM</b>	<b>100</b>	<b>100</b>

- O<sub>2</sub> not more than 0.5% mole.
- CO<sub>2</sub> less than 4%.
- Total S including H<sub>2</sub>S Not more than 17 PPM by weight
- H<sub>2</sub>S not more than 23mg/m<sup>3</sup> by volume.
- Specific gravity to be calculated by Bidder.
- Calorific value Net Kcal/SCM to be circulated by Bidder.
- Temp of gas shall be 20 to 40° C.

## 6.0 CODES AND STANDARDS

The design, construction, manufacture, supply, testing and other general requirements of the Storage Cascades should be strictly in accordance with the Applicable Standards and Codes and should comply fully with relevant Indian / International standards, Gas Cylinder Rule 1981, Indian Explosives Act 1984, Stationary and Mobile Pressure Vessels (Unfired) Rules 9SMPV) 1981, CNG Cylinder.

Design Code, IS: 7285-1988, CNG Cylinder Valves, IS:3224-1979 (Amendments 1983, 84, 85, 86, 89, 92, 98), Hydrostatic Stretch Test, IS:5844-1970, Safety Devices



of Gas Cylinders, IS: 5903-1970, regulations of Insurance Association of India & Factories Act while carrying out work as per this specification.

The bidder without any additional cost and delivery implications should carry out any modification suggested by the statutory bodies either during drawing approval or during inspection, if any.

#### CODES AND STANDARDS TO BE FOLLOWED

IS 7285: 2004	Specification for seamless steel cylinders for permanent and high pressure liquefiable gases.
IS 3224: 2002	Valve fittings for compressed gas cylinders excluding liquefied petroleum gas (LPG) cylinders.
Is 5844-1970	Hydrostatic Stretch Test.
IS 5903-1970	Safety Devices of Gas Cylinders.
OISD – 179	Safety requirements on compressors, storages, handling and refueling of natural gas for use in automotive sector.

GAS CYLINDER RULES – 2004

INDIAN EXPLOSIVES ACT – 1884

STATIONARY AND MOBILE PRESSURE VESSELS (UNFIRED) RULES

(SMPV) 1981 ASNI, ASTM, NEC, NEMA, ASNZ, NFPA

NFTA 52 Standards for CNG vehicular fuel systems.

SAFETY DEVICES OF GAS CYLINDERS- IS: 5903-1970, regulations of Insurance Association.

All the applicable statutory codes, natural laws and local regulations for safety and Environment protection shall be followed by the vendor for design, engineering, Fabrication etc. The vendor shall obtain from concerned authorities all necessary approvals.

## 7.0 EXTENT OF SUPPLY AND SERVICES

### 7.1 Supply

Supply of CNG storage cascades of capacity 3000 water liter (- 0%, + 5%) at 15°C with following minimum details:

#### Cylinders& Others

- All cylinders should be designed, constructed and tested in accordance with the Indian Standard 2825, as amended from time to time, IS: 7285-2004 Part II or similar such other standard code approved by the Chief Controller of Explosives.

- Robust painted Iron cascade frame. The iron surface shall be properly cleaned, primer and paint selected and applied to have a service life of at least five years. The exterior of the equipment is required to be corrosion free for at least five years and to have a fade free life without oxidation of paint surface for at least five years in an environment of bright sunlight with an intense UV content. The bidder to specify the grade of paint intended to be used.
- Material of Flange, Header Pipe, Female Nipple for vent manifold should be Carob Steel (CS).
- Interconnecting tubing/piping, fitting, valves.
- Non return valves (NRV's) as required for three-bank operation.
- Pressure on each bank (Low, Medium & High Bank).
- Temperature gauge on high Bank.  
All other items required for use of cascade as mobile for transportation of gas shall be properly fitted and the drawing of cascade shall be approved by BGL/TEPL prior to supply.

## 7.2 Services

The services to be rendered by vendor shall include but not limited to the following.

- Preparation and submission of documents/drawings as per schedule under point "D" of MR and Gas flow calculations, 4-G static test Calculation of one complete assembled cascade with all the cylinders mounted & filled and sequencing calculations for cascade for maximizing the recovery from the cascade storage for residual cylinder pressure of incoming vehicle for refill pressure 35 bar g.
- Procurement of raw materials, bought out components, fabrication, shop assembly.
- Pipe work should be designed, tested and installed to ensure its safe operation at the worst conceivable conditions of flow, pressure and temperature.
- Shop inspection and testing including third party inspection (TPIA) or inspections by BGL's delegate and statutory approvals.
- Testing at site, if required.
- Packaging, crating, dispatch of cascades.
- Painting as per the present document.

- Preparation and submission of documents / drawings as per schedule.
- Bidder to submit foundation and other drawings indicating requirement of work to be carried out by Owner within one month of placement of order.
- Supervision during trial run, if required.

## 8.0 TECHNICAL SPECIFICATIONS

The following specifications are to give the vendor the technical and operating conditions the cascades must fulfill. Features other than those indicated herein but which call for a better design, increase in efficiency, enhance reliability, optimization may be accepted subjected to BGL's approval. The Vendor may submit their bid for any alternative design as optional item which may be indicated separately describing all advantages. The cascade shall be shipped in completely assembled condition. Gas supply line and delivery connection shall be made at site.

The vendor shall bid in their main offer, items according to the technical specifications outlined below.

### 8.1 Cascade

- Cascade shall be a group of identical cylinders of capacity required to meet the specified total water capacity, dimensional and weight limitations. The cascades shall also be provided with structural frame having facility of lifting and placement.
- Cascade Storage Capacity.

The water storage capacity of static cascade shall be 3000 (-0%, +5%) water litres at 15 degree C (Cylinders conforming to IS: 7285-2004).

- Cascade Storage Dimension

For ready access and to ensure that all cylinder fittings are easily accessible, multiple cylinder units, which comprise a CNG storage facility and are stored in a vertical position should be limited to a width of 1.2m, a length of 5.5m and a height of 1.6m above floor level. (L x W x H – 5500mm x 1200mm x 1600mm).

In the case of storage facilities in which cylinders are in a horizontal position, each storage unit should be limited to a height of 1.6m, a length of 5.5m and a width equal to the length of one cylinder up to 2m. To ensure ready access all cylinder fittings should be arranged to face one direction in each unit. Each such storage unit should be separated from other unit by a distance of not less than 2m. Where horizontal units are placed parallel to each other, cylinder fittings should be arranged so that they do not face cylinder fittings of other units. L x W x H – 550mm x 2000mm x 1600mm).

- The water liter capacity of any individual cylinder in-group of cylinders forming cascades shall not exceed 500 liters at 15° C for 3000 water liter capacity cascades.
- The design, construction & testing of cylinder shall be as per IS 7285-2004 and approved by (PESO).
- Storage cylinder manufactured older than 2011 shall not be accepted.
- Working Pressure of cascade cylinder shall be minimum 250 bar g at 15° C.
- Cylinder material shall be seamless allow steel (Cr-Mo) as per design / drawings approved by PESO.
- Cylinder neck threading shall be as per IS 3224-2002 or as per design approved by PESO.
- Offered Cascades shall be of 75 liters Water Capacity cylinders and vendor shall observe minimum neck threads size of dia 25.4 mm standard. Type 4 threads with a taper of 1 in 8 on diameter confirming to IS-3224: 2002 or equivalent.
- The cylinder shut-off valve shall be with combination Fusible Bursting Disc conforming to requirements of IS 3224: 2002 or as per design approved by PESO.
- The burst disc shall rupture on excess pressure as well as excess temperature either individually or combined. The burst disc discharge shall be common header for safe venting. Vendor shall indicate burst pressure and temperature.
- The cylinder shut-off valve orifice shall be designed for high flow to permit the combined flow of 100 kg/min from each bank at pressure of 250 bar g. Vendor to furnish necessary calculations indicating overall pressure drop for each bank, Coefficient of flow (Cv) valves, valve orifice size etc.
- Number of cylinders in the cascade shall be divided into three independent banks of low, medium and high pressure of different storage pressures. Vendor shall optimize the number of cylinders in each bank for maximizing the recovery from the cascade storage and submit the calculations along with the bid. Vendor may assume the residual cylinder pressure of the vehicle coming for refill at 35 bar g.
- The interconnecting tube work of cylinders manifold in configuration suitable for priority filing and sequential dispensing system by the electronic CNG dispensers at the Retail Outlets.

- Full bore ball valves for isolation shall be provided at inlet of each fill line and at each bank outlet line. The final end connection at battery limit shall be 3/4" OD tube.
- Ball valve must be of good quality and be appropriately selected frequency of use.
- Ball valve sets 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.
- The interconnecting tube work shall be minimum of 3/4" OD tubing. The sizing of connecting tubing between each outlet and its associated cylinders shall be such that where they join the total incoming flow areas shall not be less than outgoing area. The loops in tube work shall be provided for absorbing concentration, expansion and vibration piping/tubing shall be suitably clamped to the frame structure.
- Pipe work should be designed, tested and installed to ensure its safe operation at the worst conceivable conditions of flow, pressure and temperature.
- The system should be "go-on-g" gauge to demonstrate that fittings are properly tightened. Wherever possible valves and control devices should incorporate the same end connector system. The number of fittings used should be minimized.
- A Test and Inspection Certificate issued by manufacturer of the cylinder duly countersigned by an Inspector that the Cylinder meets the requirements of the standard or code referred above submitted to PESO shall be provided.
- All cylinders should be new and unused. Re-certified cylinders are not acceptable. Before using the Cylinder or before refilling the cylinder, which has to be made gas free, air contained therein shall be purged by an inert gas or by the CNG gas. Cylinders of 75 lit water capacities at 15° C are only envisaged. All cylinders in a cascade shall be of same capacity.
- The supplier should ensure that Personnel assembling the piping work should be competent in the system employed.
- The preferred valve types for isolation are 1/4" turn ball valves. Such valves have similar material to the attached tube / fittings.

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- Cylinders in the cascade may be vertically or horizontally placed. In case of horizontal configuration, minimum 30mm cylinder to cylinder gap shall be provided (conforming to requirements of OISD—179). The material used to separate the cylinders should be sufficiently strong enough and should not absorb moisture. Special precautions should be taken to avoid corrosion at the point of contact.
- All cylinder valves and fittings must be rated for the full range of temperature and pressures and the manufacturer should stamp or otherwise permanently mark the valve body to indicate the services rating.
- Double compression ferrule fittings shall be used to tube connection tubes.
- All cylinders to be hydrostatically tested and approved by third party certification body. Test certificates shall be duly endorsed by approval body and issued before delivery.
- The location of inlet/outlet tube and pressure gauges shall be as per approved drawing.
- Cascade to be purged with N<sub>2</sub> after testing and shipped with a positive pressure of N<sub>2</sub> at 1 barg in the cascade before dispatch.
- Suitable vent as attached in the drawing to be provided for stationery cascade. The height of the vent should be 3m from the base of the cascade.

**8.2 Marking of cylinders**

- a) Every Gas cylinder shall be clearly and permanently marked in accordance with the following conditions by stamping, engraving or similar process;
  - a.1 on the shoulder of the cylinder which shall be enforced by forging or other means, or
  - a.2 on such a part which is inseparably bound with the cylinder and which is not or only negligibly effected by the stresses due to the gas pressure within it.
- b) The name place shall not be affixed to the cylinder by soldering, if there is risk of corrosion or embrittlement.
- c) In conjunction with the original marking, space shall be provided for stamping the test date obtained at the periodic inspection.
- d) Markings shall be as carried out and the letters and numerals used shall be such shape and size that the markings is clear and easily readable and does not give place for misreading.

- e) All cylinders must be permanently stamped with the word CNG together with the following information:
- e.1 Manufacturer's, owner's and inspector's marking and rotation number; (These markings shall be registered with the PESO);
  - e.2 Specifying that the cylinder has been manufactured for "CNG only".
  - e.3 A symbol to indicate the nature of heat treatment (such as normalizing, or tempering) given to the cylinder during manufacture.
  - e.4 The date of the last hydrostatic or hydrostatic stretch test, as the case may be, with the code mark of recognized testing station where the test was carried out. The code mark shall be registered with the PESO.
  - e.5 Working pressure and test pressure;
  - e.6 Tare weight
  - e.7 Water capacity.
  - f.7 All the markings, except the manufacturer's marking, which may be on the base, shall be stamped on the neck end of the cylinder.

### **8.3 Marking on valves**

Valves fitted to the cylinder shall be clearly and durably marked in accordance with the following provisions by stamping, engraving or similar process:

- i) Specification of the valves.
- ii) Year and quarter of manufacture.
- iii) Manufacturer's symbol.
- iv) Working pressure.
- v) The name of chemical symbol of the gas for which valve is to be used.
- vi) The type of screw threads on the outlet namely left handed (L.H) or right handed (R.H);
- vii) Inspector's stamp.

### **8.4 Labelling of cylinders**

- Every cylinder shall be labeled with the name "CNG ONLY" with letter of at least 25mm high in contrasting color and the name and address of the Purchaser by whom the cylinder was filled with gas.
- A warning in the following terms shall be attached to every cylinder containing Compressed Natural Gas namely:
  - i) Do not change the color of the cylinder.
  - ii) This cylinder should not be filled with any gas other than CNG.
  - iii) No flammable material should be stored in the immediate vicinity of this cylinder or in the same place in which it is kept.
  - iv) No oil or similar lubricant should be used on the valves or other fittings of this cylinder.

- v) Please look for the next date of test, which is marked on a metal ring inserted between the valve and the neck of the cylinder, and if this date is over, do not accept the cylinder.
- All storage system should be supplied in a three bank arrangement. Low bank 50%, Medium bank 30% and High bank 20% of the total storage system.
  - Supply of required nos. of 20 dia. J type foundation bolts with nuts, 200 mm long with thread length 50mm & Supply of required nos. of 20 dia. Anchor bolts with nuts, 100 mm long with thread length 50mm as applicable will be in the scope of vendor for suitable fixing of stationery and mobile storage cascades at site.

### **8.5 Pipe Work, Valves and Fittings**

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

All pipe work should be ASTM A 316 stainless steel tube. Double compression ferrule fittings shall be used in tube connection tubes. And makes of these fittings shall be of SS 316 of Swagelok, Parker only. The system should be “go-on-go” gaugable to demonstrate that fittings are properly tightened. Whatever possible valves and control devices should incorporate the same end connector system. The number of fittings used should be minimized. The supplier should ensure that personnel assembling the pipework should be competent in the system employed. The preferred valve types for isolation are ¼” 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 frequently of use. Ball seats must be suitable for natural gas operation of 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.

The gas inlet connection of each bank shall be terminated with ¾” union after the isolation valve.

Supply of required nos. of 20 dia. J type foundation bolts with nuts, 200 mm long with thread length 50mm & supply required nos. of 20 dia. Anchor bolts with nuts, 100 mm long with thread length 50mm as applicable will be in the scope of vendor for suitable fixing of stationery & mobile storage cascades.

### **8.6 Pressure Relief Devices**

- Each cylinder used for the storage of CNG should be equipped with suitable pressure relieving device and a suitable isolating valve which should be readily accessible when installed in the storage bank. The isolating valve should not be capable of closing off the pressure relieving device, or should be locked in the open position.



- Relief devices should be positioned in such a way as to avoid charges of high pressure gas to the operator or persons in close vicinity.

#### **8.7 Safety Relief Devices for cylinder storage**

- Cylinders manufactured in India, if fitted with relief devices in their bodies, shall have such safety devices manufactured and maintained in accordance with IS: 5903.
- Piping and gas storage systems should be protected against over pressure by safety relief devices. Relief devices installed to protect the storage systems should have sufficient capacity to vent the maximum flow produced by the compressor and should be set to open at a pressure not exceeding 20% above the maximum allowable work pressure of the system or the pressure which produces a hoop stress of 75% of the specified minimum yield strength, whichever is lower.
- A combination burst disc/fusible allow assembly should be incorporated in the cylinder valve. Burst disc should yield at a pressure not less than 1.5 times manufacturer's recommended operating pressure of the cylinder, and not more than test pressure. The disc should relieve pressures in excess of 30 Mpa.
- In addition to above a mechanical pressure relief valve which opens at the predetermined pressure should be used. This should not be part of the cylinder valve.
- Safety relief valves should be provided with means to seal to prevent tampering by authorized persons.
- Minimum required rate of discharge from the safety valve should be at least equal to any input from the system whether stored or being compressed.
- Each safety relief valve should be clearly marked by the manufacturer.
- The maximum pressure in the storage system should not exceed 255 bar (g).
- The cascade cylinders should be supplied with impact test certification.
- The mobile storage capacity should be 3000WL and the dimensions should not exceed L x W x H (according to the vehicle used) fixing of SS Tubes & Components will be finalized during detail engineering.

#### **8.8 Corrosion Protection**

- Pressure vessels which are made of materials that are subject to corrosion by atmospheric conditions should be protected by painting or other equivalent means necessary to prevent corrosion.

- Importance should be drawn to avoiding corrosion which can limit the working life of a cylinder and affect the fatigue characteristics in serious cases. The implementation of good periodic maintenance anti-corrosion procedures is strongly recommended.

### **8.9 Valves**

- All valves fitted to gas cylinders shall comply in all respects with the following specifications namely:
  - a. In respect of Industrial Gas Cylinder, IS: 3224.
  - b. Valves for cylinders shall have outlets provided with left hand screw threads for the pipes or connections.
  - c. The valves shall be attached to the cylinder neck by screwing and not by making any permanent attachment or inserting adapter in between.
  - d. The design of spindle operated valves shall be such that when fitted to the cylinders it shall not be possible to withdraw the spindle under normal operating conditions.
- Each gas storage unit should have a quick action gas storage isolation valve installed in the steel supply pipe immediately adjacent to its gas storage unit to enable individual shut off and isolation of each unit. These valves will be within fence enclosure.
- Separate common valve system to be supplied for each storage bank complete with non-return valve.

### **8.10 Cascade Frame**

- The frame shall not allow lateral and rotational movement of cylinders during regular road transport under any circumstances. Vendors shall take into account the rough patches / bumps on roads.
- Frame shall be free standing and have facilities for lifting by crane and forklift the complete assembled cascade. Bottom and top of frame shall be reinforced to prevent any twisting or strain to interconnections among cascade cylinders during lifting by crane, forklift and during the transport.
- Frame structure of each cascade shall be capable of withstanding 4G impact (four times gravity) from any direction without any distortion. Vendor to submit 4-G static test Calculation of one complete assembled cascade with all the cylinders mounted & fitted Vendor to test one frame for satisfactory performance, strength and stability. Test results and report shall be submitted to BGL.

- Each storage system should be supplied with suitable lifting lugs. Bottom and top of frame shall be reinforced to prevent any twisting or strain to inter connections among cascade cylinders during lifting by crane, forklift and during transport.
- Cascade storage system to be skid mounted and complete with removable metal frames and non-metal/non-sparking spacer material.
- Cascade and spacer frame to be painted with anti-rust and etching primer under coat. Importance should be drawn to avoiding corrosion which can limit the working life of a cylinder and affect the fatigue characteristics in serious cases. The implementation of good periodic maintenance anti-corrosion procedures is strongly recommended.
- All cylinder tubing, manual isolation valves and pressure relief valves should be protected from knocking by any moving object and should not protrude outside the metal frame or brackets.
- Frame shall be suitably covered with canopy from top to avoid the ingress of rain water.
- All items used in the frame shall be waterproof.
- Supplier shall submit structural drawing of the frame giving details of the steel, welding procedure, corrosion protection for approval of Owner/Owner's representative before commencing fabrication work.
- Frame shall support the cylinder adequately and allow the cleaning of cylinder.

#### **8.11 Draining arrangement**

- Draining arrangement for each cylinder shall be provided.
- Materials used for Draining piping shall be stainless steel 316.
- The tubing material shall be of Sandvik make.
- All SS Tube fittings shall be of Swagelok/Parker make.

#### **8.12 Piping / Tubing / Fitting / Pressure gauges / Temperature gauges**

- All rigid piping, tubing and other components on the storage system be designed for the full range of pressures, temperatures and loadings to which they may be subjected with the factor of safety of at least 4 based on the

tensile strength at 20° C. Any materials used including gasket and packing should be compatible with natural gas and its service conditions.

- All piping should be designed in accordance with engineering calculations based on the requirements of ASME B31.3 in conjunction with EEMUA supplement to ASME B31.3 or equivalent design standards. Standards used should be used in total.
- All welding piping should be fabricated and tested in accordance with ANSI/ASME B31.3, API 1104 or equivalent standard. Whichever standard is chosen for use, it should be used in total.
- All piping to be tested after assembly to pressure equal to that of the pressure relief device setting and proved leak free.
- Materials used for the piping shall be stainless steel 316 fully annealed seamless confirming to ASTM A269 with maximum hardness of Rb80 or less and suitable for bending and flaring. OD tolerance shall not exceed +0.005%. The piping/tubing material shall be of Swagelok/Parker make.
- Double compression ferrule Fittings shall be used in tube connection tubes.
- All fittings including valves shall be of Swagelok, Parker make only.
- Material shall be SS 316 conforming to ASTM A269. Open ends on fittings and vents shall be provided with caps.
- Liquid filled Pressure gauge of diameter 4", (0-004kg/cm<sup>2</sup>) with a 2-way valve on each bank shall be used. Thus each cascade shall have three pressure gauges. Pressure gauges shall be securely mounted.
- Every CNG storage unit including each manifold group or bulk storage tank should be provided with a suitable pressure gauge for each bank. The pressure gauge should be directly connected to the tank or storage system. The gauge should be dial graduated to read approximately double the operating pressure.
- A good quality industrial pressure gauge should be used with a dial face of at least 63 mm or larger. Gauges should be built to requirements of BS 1780 or ANSI/ASME B40.1 or OISD-179 equivalent.
- Temperature gauge of diameter 4" with necessary arrangement on high bank only shall be used. Thus each cascade shall have only one Temperature gauge on high bank.
- All end connections, pressure & temperature gauges, valves and fittings of cascade shall be within tamper proof, wire cage enclosure. These shall be on one side of cascade for ease of operations.

- Vendor shall provide a suitable draining arrangement duly certified/approved by PESO for the purpose of removing moisture and other contaminants that may accumulate within the Piping / Tubing.
- Material of vent tubing shall be SS 316 and make shall be of Swagelok/parker make.

### **8.13 Painting**

Every cylinder is painted with the appropriate identification colors specified in IS:4397 for Industrial cylinders.

- White color on cylinder body.
- Red IS 537 on cylinder neck portion.
- Yellow color on frame.
- The paint shall be chosen, primed and applied as to have a service life of five (5) years. The exterior surface is required to be corrosion free for five (5) years and to have faded free life without oxidation of paint surface for five years in an environment of bright sun light with an intensive UV content.
- Surface preparation by Short Blasting as per grade SA 2 ½, Swedish Standard SIS055 909. Three coats of paint shall be applied with minimum thickness of 300 micron. (Permissible thickness in each coat shall be within 80 to 120 micron).

### **9.0 PROTECTION OF VALVES & ACCESSORIES**

- All valves and accessories shall be safeguarded against accidental damage of interference.
- Valves and accessories shall be mounted and protected in such a way that risk of accidental rupture of the branch to which the valve or accessory is connected is minimized.
- Valves and accessories situated at the rare of a vehicle shall be protected by the rare cross member of the frame of the vehicle against damage.

### **10.0 EQUIPMENT**

- Piping, Fitting and Meters:
  - a. All piping, fittings and meters mounted on the cascade shall be designed to with stand the most severe combined stresses imposed by the following, namely.
    - a.1 The maximum designated pressure of the vessel.
    - b.2 The super imposed pumping pressure of the shock loading.

- b. The materials used for vessel equipment shall be sufficient ductile to withstand rough usage and accidental damage. Brittle materials such as cast iron shall not be used.
- Protection of piping and equipment:
  - a. All piping and equipment shall be adequately protected to minimize accidental damage which may be caused by rough usage, collision or overturning.
  - b. Any equipment or section of piping in which liquid may be tapped shall be protected against excessive pressure caused by thermal expansion of the contents.
- Marking of connections:

All connections on the vehicle which require manipulation by the operator of the vehicle should be clearly marked to prevent incorrect operation. The form of this marking should correspond with the operating procedure laid down for the vehicle.

#### **11.0 INSPECTION AND TESTING**

- Before bringing any items of equipment to site, factory testing should be carried out to demonstrate the function of all equipment within the system if so desired.
- Vender shall be given 2 weeks' notice of the date and location of the tests so that the equipment may be witnessed if desired.
- Upon delivery to the site, all the equipment should be assembled in a complete system. Thereafter, final site acceptance test would be carried out. Such tests should be witnessed and signed off by the company representative. The supplier should rectify and replace all defects, faults, failures, etc. and all costs should be borne by Supplier. The costs should include accommodation, travelling, expenses, etc.
- Venders shall carryout 4G static calculation of one complete assembled cascade with all the cylinders mounted and filled and submit the same for owner review.
- Vender shall carryout cylinder bursting test of one cylinder from the entire batch produced for supply to BGL in case offered cylinders are of new design (conforming to the requirement of IS 7285:2004). Vendor shall inform the schedule of the testing well in advance to enable owner or their authorized representative to depute technical personnel for witnessing the test.

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- Vendor shall carry out all standards shop test/QA/QC as per recommendation of manufacturer/Chief Controller of Explosives. Copies of the testing/inspection carried shall be furnished to BGL.
- Vendor shall furnish record of storage capacity check of each cylinder in a cascade and the same need to be demonstrated to owner or their authorized representative.
- Each assembled storage cascade with all tubing, valves shall be pressures tested to ensure existence of no leakage prior to dispatch.
- Manifold of the cascade shall be tested to 250-bar g. The manifold shall be checked for sequencing.
- There shall be no any back flow between any two banks with all valves open for three bank of cascades.
- Dispatch clearance to be given by BGL after final inspection to be witnessed by BGL/Third Party Inspection agency appointed by BGL.

**12.0 CALIBRATIONS, TEST CERTIFICATES AND THIRD PARTY CERTIFICATION**

- Every cylinder should be carried with Hydrostatic or Hydrostatic stretch test and a certificate should be provided.
- Leak test should be carried for each cylinders or cascades with all tubing's, valves and a certificates should be furnished to the owner.
- All instruments gauges, valves, pressure gauges, safety relief devices, shut off valves tubing's and piping etc should be pressure tested, calibrated and such test calibration certificates, should be presented upon delivery to site. If any of the test certificates is not in order, the supplier's should replace the affected equipment with valid certificate at supplier cost.
- Calculation shall be carried for 4G stationary of one complete cascade with all cylinders mounted and filled and the same should be submitted for review of the owner.
- Burst test of one cylinder from the entire supplies shall be produced and incase offered once are new design the schedule for the test should be informed prior to enable the owner or their authorized representative to depute their personnel for witnessing the test.

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- All standards shop sites/QA/QC as per the recommendation of the manufacturer/Chief Controller of Explosives to be carried out and a copy of such certificates shall be furnished to the owner.
- Record of storage capacity check of each cylinder in a cascade shall be furnished and same shall be demonstrated to the owner/its representative.

**13.0 TRAINING REQUIREMENTS**

- The supplier should develop a training proposal and prepare a schedule for the company's review, comment and approval.
- 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 storage system including all aspects of operations, including decanting CNG from mobile gas trailers, pressure control and integration of the overall system.
- 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 storage facilities.

**14.0 PROTECTION DURING SHIPPING**

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

**15.0 EXPERIENCE RECORD PROFORMA FOR CASCADE**

Vendor must fill the following format, which is essential to access the bidder's capability.

Sl. No.	Parameter	Information on offered model	Information on existing cascade (Location)		
			1	2	3
1	No. of units				
2	Service				
3	Working pressure of cascade in bar g				
4	Site min/max temp				
5	Normal flow from each bank kg/hr				
6	Cascade water capacity-liters				
7	Water capacity of single cylinder used in cascade-liter				
8	Material of cylinder				



9	Thickness of cylinder wall and disc end in mm				
10	Material of vent tubing				
11	Piping material and make				
12	Valve make				
13	Valve type and dia				
14	Nos. of banks in cascade				
15	Nos. of cylinder in low bank				
16	Nos. of cylinder in medium bank				
17	Nos. of cylinder in high bank				
18	Water capacity of cylinders in individual banks				
19	Contact person				
20	4G static calculation for one complete assembled package				
21	Cylinder bust test for one cylinder				
22	Design standard (Code) used				
23	Total weight of cascades in tones				
24	Bust pressure and temperature for bust disc in bar g and deg C				
25	Hydrostatic or Hydrostatic Stretch Test				
26	Pressure test for leakage				
27	Design case gas composition				
27	Approved Manufacturer License Certificate from PESO				
28	Dimensions of the Total package				
30	Warranty certificates				
31	Dimension of package max				
32	Calibration certificates for all instrument gauges etc. of package				
33	Test certificates of all instruments with cylinder, tubing's, fittings of total package				
34	Date of commissioning of cascade				
35	Design case gas composition				
36	Approval from PESO Nagpur				
37	Dimensions of package max				
38	Date of commissioning of cascade				
39	Where cascades are located: Area and fax/telephone number				
40	Major problems encountered, if any				

**16.0 CHECK LIST FOR SCOPE OF SUPPLY**

- Vendor shall furnish all the equipment of Storage Cascade System instruments and gauges and safety devices as per the enquiry document. Anything required over the above what is specified, for safe and satisfactory operation of the equipment package shall be included by the Vendor in his scope.
- 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 should give reason for the same:
- Vender's scope of supply shall include but not limited to be following:

Sr. No.	Description	Specified by Purchaser YES / NO	Included by Vendor YES / NO	Remarks
1.0	<b>Each storage cascade package complete with:</b>			
1.1	Specification - Indian Standard 2825, as amended time to time, IS: 7285-2004 similar such other standard code approved by PESO.	YES		
1.2	Cylinder material - Seamless allow steel (Cr-Mo) or standard code approved by the Chief Controller of Explosives.	YES		
1.3	All the fittings, Valves, Safety devices, gauges are as per IS 3224 or standard code approved by the Chief Controller of Explosives.	YES		
1.4	Tubing's are of rigid type ASTM 316 stainless steel tube.	YES		
1.5	All cylinders are Hydro static Tested	YES		
1.6	Water capacity of single cylinder used in cascade nto less than 50 Ltrs.	YES		
1.7	Nos. of banks in cascade-three bank system	YES		
1.8	One cylinder should be bust test	YES		
1.9	4G Stationary calculation for one complete assembled package is done	YES		
1.10	Working pressure of cascade min. 225 bar (g)	YES		

1.11	Pressure test for Leakage on cylinders with assembled condition	YES		
1.12	Isolation Valve complete with vending line valve and end plug installed on the inlet of the cylinder	YES		
1.13	Copy of Calibration certificates for all instrument gauges etc of Cascade package, Test certificates of all instruments with cylinder, tubing's, fittings of total package	YES		
1.14	BoQ with weight of each component	YES		
1.15	Drawing of cylinder of specified parameters and proposed to be used in offered cascades approved by CCOE	YES		
1.16	Drawing of cascade frame	YES		
1.17	Storage cascade with frame assembly is shipped in fully and assembled condition only to be mounted on anchored bolts laid at site.	YES		
1.18	GA drawing of the cascade	YES		
1.19	Warranty for a period of 12 months is provided from the date of final site acceptance of CNG facilities by the company's.	YES		
1.20	Make of bought out items	YES		
1.21	Detailed time schedule for supply indicating time periods required for cylinder manufacturing, cascade frame fabrication, shop testing, dispatch of material from works at delivery site	YES		
2.0	<b>Spares</b>			
2.1	Mandatory spares as specified in "Check List for Mandtory Spares" (Indicate separate price for each item)	YES		
3.0	<b>Inspection and Testing</b>			
3.1	As specified on the inspection and testing clauses	YES		
4.0	<b>Vendor Data and drawings</b>			

4.1	All data & drawings as required per VDR format as per Material Requisition.	YES		
5.0	<b>Supervision during the Trial Run if required at site of the CNG storage cascade system</b>			
5.1	Additional items not specified by purchaser but recommended by bidder for safe smooth and normal operation. (Bidder shall indicate separate list of such items in his proposal)	YES		
6.0	<b>Technical Parameters to be confirmed by vendor</b>			
6.1	Pressure range from 19 bar (g) -250 bar at 15° C	YES		
6.2	Fill pressure Kg/cm <sup>2</sup> g or [bar(g)] - 200	YES		
6.3	Operating Temperature range -[-55° C to 70° C]	YES		
6.4	Design code: IS 2825, IS 7285-2004, IS 3244 or as per applicable standard codes or approved by CCOE	YES		
6.5	Calibration traceability - To NIST as per ISO 5168	YES		
6.6	Enclosure weather proof to - IP65, NEMA4x	YES		
6.7	Process Temperature effect - $\pm 0.01$ % of normal flow rate/degree C on zero offset	YES		
6.8	All valves as per IS 3224 or as applicable standard code or approved by CCOE	YES		
6.9	Safety relief devices as per IS: 5903 or applicable standard code or approved by PESO	YES		

## 17. DATA SHEET

### CASCADE DATA SHEET

S.No.	Parameter	Specification	Offered
1	Type of service	CNG	
2	Capacity (in water liter)	3000 (-0%, +5%)	
3	No. of Banks	3	
4	Cascade Dimensions	OISD-179	
5	Cascade frame structure is able to withstand 4G (four time of gravity) test from any direction without any distortion	YES	
6	No. of cylinders in each bank		
a.	Low Bank	*	
b.	Medium Bank	*	
c.	High Bank	*	
7	Cylinder		
a.	Cylinder Make	*	
b.	Compliance Code	IS 7285:2004	
c.	Cylinder Size at 15 °C (in water liter)	Not exceed 500 liters	
d.	Cylinder Operating Condition	250 bar g at 15° C	
e.	Cylinder Testing parameters	As per IS: 7285 : 2004	
f.	Cylinder Material	Seamless alloy steel (Cr-Mo)	
g.	PESO approval	YES	
h.	Gas quantity stored in the cylinder at 15° C	*	
8	Cylinder Shut-off Valve		
a.	Make	Vanaz/Tekno	
b.	Compliance Code	IS 3224:2002	
9	Combination Bursting Disc and Fusible Plug		
a.	Burst Pressure (in bar g)	*	
b.	Fuse Melting Temperature (in °C)	*	
10	Interconnecting Tube size	Minimum 3/4" OD	
11	Pressure Drop for each bank		
a.	Low Bank	*	
b.	Medium Bank	*	
c.	High Bank	*	
12	Coefficient of Flow (Cv)	*	

**Note:**

1. All tubing fittings & other piping components shall conform to recommendations of ANSI B31.3 "Process piping".
2. (\*) – To be furnished by vendor.
3. Draining system of each cylinder shall be provided by supplier.

**PRESSURE GAUGE**

Units: Flow <-> Liquid - m<sup>3</sup>/hr Steam-kg/hr Pressure->kg/cm<sup>2</sup> Temperature ° C Level/Length<-> mm

1. Type:	Direct	15. Diaphragm Seal:	-
2. Mounting:	Local	Type	-
3. Dial Size:	100 mm	Wetted Parts Material	-
Color:	White with black inscription	Other Material	-
4. Case Material:	SS316	Process Connection Size & Rating	-
5. Bezel Ring:	Beyonet type SS316	Facing & Finish	-
6. Window		Capillary Material	-
Material:	Shatter proof glass	Amour - Flexible Material	-
7. Enclosure:	WP to IP 65 as per IEC 60529/IS 2147	Capillary Length	-
8. Pressure		Flushing/Filling connection with	
Element:	Bourdon	16. Over Range Protection:	13% of FSD
9. Element		17. Blow Out Protection:	Yes
Material:	SS316	18. Options	a) Snubber c) Gauge Saver
10. Socket		b) Syphon	
Material	SS316	d) Liquid Filled Casing	e) Vacuum Protection
11. Accuracy:	(+/-) 1% of FSD	f) Solid front	g) Two valve manifold
12. Zero adjustment	Micropointer	19. Make, Model & Quantity:	
13. Connection	1/2" NPT (M)		
Connection			
Location	Bottom		
14. Movement:	SS316		

Sl. No.	TAG No.	RANGE kg/cm <sup>2</sup> g	PRESSURE kg/cm <sup>2</sup> g			TEMPERATURE ° C			SERVICE	OPTIONS
			OP.	MAX.	DES	MIN.	MAX.	DES.		
	*	0-400	250	400	400				Natural Gas	d.e.f.g

Notes:

- "\*" Vemdpr to furnish
- 1 Process Data shall be as per Tender document.  
At the time of approval of DS, Supplier shall furnish DS with
  - 2 Catalogues.  
Approved Vendors: General Instruments, A.N. Instruments,
  - 3 Fiebig, Wika.

DEVIATION

NO DEVIATION

VENDOR'S SIGNATURE WITH SEAL



Bhagyanagar Gas Ltd.  
BHAGYANAGAR  
GAS LIMITED

**Tender for Procurement of Stationary CNG Storage  
Cascades for CNG DBS & Online Stations in  
Hyderabad, Vijayawada & Kakinada**

VOLUME  
II OF II

**Bid Document No. BGL/335/2016-17**

**TEMPERATURE GAUGE**

Units: Flow <-> Liquid - m<sup>3</sup>/hr Gas-Nm<sup>3</sup>/hr Pressure->kg/cm<sup>2</sup> Temperature °C Level/Length<-> mm

1. Type: Mercury Filled	17. Extension Type: Rigid To suit thermowell
2. Well: Required	18. Bulb Dia:
3. Mounting: Local	19. Cappillary Material: Armour Flexible: Armour Material:
4. Dial Size: 100mm	20. Over Range Protection:
5. Colour: White with black inscription	THERMOWELL:
6. Case Material: SS316	21. Material: SS316
7. Window Material: Shatterproof glass	22. Constr.: Drilled bar stock upto immersion length 500 mm, otherwise fabricated
8. Conn. Location: Bottom	23. Process Conn.: *
9. Accuracy: (+/-)1% of FSD	24. Gauge Conn.: 1/2" BSP (F)
10. Enclosure: WP to IP 65 as per IEC 60529/IS 13947	25. ThermowellDwg: *
11. Zero adj.	26. Over range protection: 130%
Screw: Required (BIMETAL)	27. Options: a) Liquid Filled: Yes b) _____ c) _____
12.	
Stem: Type: Material: Size:	
13. Stem Dia:	
14. Sama Class: V Composition: Case	
15. Bulb Type: Adjustable union Bulb Material: SS316	
16. Bulb Union Threaded To: 1/2" BSP (M)	

Sl. No.	TAG No.	RANGE kg/cm2g	TEMP.			WELL DIM.		FLANGE		LINE NO./VESSEL NO./PIPING CLASS	OPTIONS
			MIN	NOR	MAX	U	T	MATERIAL	RATING, FACING, FINISH		
	*	*				*	*				*

Notes:  
 "\*" Vemdpr to furnish  
 U: Immersion length  
 T: Lagging Extension  
 1. Element length shall be suitable for thermowell.  
 2. U-length shall be selected in such a way that the thermowell tip shall be preferably at the centre of pipe to sense the temperature accurately.  
 3. Process Data shall be as per tender document.  
 4. At the time of approval of DS, Supplier shall furnish DS with Catalogues.  
 5. Approval Vendors: General Instruments, A.N. Instruments, Pyroelectric Instruments.

DEVIATION \_\_\_\_\_  NO DEVIATION \_\_\_\_\_  VENDOR'S SIGNATURE WITH SEAL \_\_\_\_\_

**PSV**

UNITS: Flow<-> Liquid-m<sup>3</sup>/hr Steam-kg/hr Pressure->kg/cm<sup>2</sup>G Temperature<->°C Level/Length <-> mm

General	1	Tag No.	Quantity	*	*
	2	Line No.	Schedule	*	*
	3	Vessel No.		*	
	4	Safety / Relief		Safety relief	
Valve	5	Full Nozzle Full Lift / Mod. Nozzle		Full nozzle full lift	
	6	Bonnet type		Closed	
	7	Conv. / Bellows/Pilot Operated		*	
	8	Inlet Conn.	Size & Rating	*	
	9		Facing & Finish	*	
	10	Outlet Conn.	Size & Rating	*	
	11		Facing & Finish	*	
	12	Cap Over Adj. Bolt		Yes	
	13		Screwed/Bolted	Boiled	
	14	Lifting Gear - Type			
	15	Test Gag		Yes	
	16				
	17				
Material	18	Body and Bonnet		A351 CF8M	
	19	Nozzle and Disc		SS316	
	20	Spring		SS304	
	21	Bellows		-	
	22				
	23				
	24	Resilient Seat Seal		-	
Options	25				
	26				
Basis	27	Code		API 520	
	28				
	29				
Service conditions	30	Fluid	State	Natural Gas	Gas
	31	Corrosive Constituent			
	32	Required Flow Capacity			
	33	Moi. Wt.	S.G. at Rel. Temp		
	34	Oper. Pressure	Normal	Note 1	
	35	Oper. Temp.	Rel. Temp.	Note 1	
	36	Valve Discharges to		Atmosphere	
	37	Back Press Variable	Const. Or	Constant	
	38	Set Pressure			
	39	Cold Bend Test Pressure			
	40	% Over Pressure	% Blow Down	*	
	41	Cp/Cv	Compressibility Factor		
	42	Viscosity @ Rel. Temp. mPas(cP)			
	43	Vess. Wall Temp.	Surf. Area-m <sup>2</sup>		
	44	Max & Min Pressure		*	
Orifice	45	Calculated Area cm <sup>2</sup>		*	
	46	Sel. Area cm <sup>2</sup>	Orifice Design	*	*
	47	No. of Valves Reqd. for capacity		*	
	48	Total Area - cm <sup>2</sup>		*	





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49	Actual Flow Capacity	*	
50			
51	Model No.	*	
52	IBR Certification	No	
53			
54			

NOTES:

- "\*" Contractor to furnish
- 1 Process data shall be as per tender specification mentioned elsewhere.
  - 2 At the time of approval, vendor shall furnish sizing calculation and catalogues of PSV.
  - 3 Test GAG Required for safety valve & Pressure Safety valve shall be fire case type.

DEVIATION

NO  
DEVIATION

CONTRACTOR'S SIGNATURE WITH SEAL



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**QUALITY ASSURANCE PLAN - HIGH PRESSURE GAS CYLINDER, CASCADE FRAME & FITTINGS**

S. No.	OPERATION / PARAMETER	CHARACTERISTICS / PARAMETERS	ACCEPTANCE CRITERIA & CERTIFICATION	INSPECTION FREQUENCY	VENDOR	TPI A	C A	REMARKS
1	Raw Material	Chemical Composition	Chrome Moly Steel, Grade-DS-202/is:7285-2004 ci. 5.2 Table-1	One sample per heat No.	P	R	R	Verification of RMT Certificate Received from RM supplier.
<b>IN PROCESS</b>								
2	Raw Material Cutting (seamless Tube)	Length	As per process heat	4-5 jobs during setting approval & every two hour.	P	W/R	R	
		Thickness						
		Outside Diameter						
		Surface Flaws						
		Ultrasonic Examination						
3	Bottom Forming	Bottom Thickness	1.5 T min (where T is wall thickness)	4-5 jobs during setting approval & every four hour.	P	W/R	R	
		Centre of Bottom	IS: 7285 : 2004					

		Side of Bottom	Free from crack, excess metal, pin hole, ball formation, roller mark and other surface defects.	4-5 jobs during setting approval & every four hour.					
		Forting							
		Visual Inspection							
		Ultrasonic Examination			IS: 7285 : 2004	Each Cylinder			
4	Neck Forming	Solid Neck Length	As per Approved Drawing	4-5 jobs during setting approval & every two hour.	P	W/ R	R		
		Neck Diameter	As per Approved Drawing	4-5 jobs during setting approval & every two hour.					
		Surface finish, defects	Free from crack, excess metal, pin hole, ball formation, roller mark and other surface defects.	4-5 jobs during setting approval & every two hour.					
		Ultrasonic Examination	IS: 7285 : 2004	Each Cylinder					

5	Heat Treatment	Hardness	As per approved drawing	Every Cylidner	P	W	R	
		(As Tempered)	IS: 7285 : 2004					
		Mechanical Properties	As per IS: 7285 : 2004	One random cylinder will be selected from Heat treatment Batch conforming the mechanical properties like tensil test, impact test, bend test etc, in presence of inspecting officer.				
		Tensile Strength	IS: 7285 : 2004					
		Yield Strength						
		% Elongation						
Impact test (at-20° C)	IS: 7285 : 2004							

		Bend Test	IS: 7285 : 2004				
		Burst Test	IS: 7285 : 2004				
6	Ultrasonic testing	Crank deduction	As per IS: 7285 : 2004	Every Cylidner	P	W	R
		Wall Thickness measurement	As per approved drg. IS: 7285-2004				
7	Neck cutting & threading	Neck Length	As per approved drawing	Audit Check by Q.A staff	P	W	R
		Mechined neck step diameter	As per approved drawing	Audit Check by Q.A staff			
		Neck thread configuration	As per approved drawing	Every Cylidner			
		Visual inspection thread finish	Free from crack blow hole excess metal at inside neck, thread damage, flat threads etc.	Every Cylidner			
8	Water capacity checking & Hydrostatic Strength testing.	Measurement of water capacity. Togonal Expansion and permanent expansion at test pressure. Holding Time=30 Sec min.	Tolerance on water capacity +5 % IS-7285:2004	Every Cylidner	P	W	R
			Permanent expansion shall not exceed 10% of total expansion. IS: 7285:2004	Audit Check by Q.A staff			
9	Air Leakage Test	Access leakage from cylinder body, neck and bottom side at working pressure. Holding Time=60 Sec.	Free from Leakage.	Every Cylidner	P	W	R
			IS: 7285:2004	Audit Check by Q.A staff			

S. No.	OPERATION / PARAMETER	CHARACTERISTICS / PARAMETERS	ACCEPTANCE CRITERIA & CERTIFICATION	INSPECTION FREQUENCY	VENDOR	TPI A	C A	REMARKS
10	Bursting Test	The value of hoop stress shall be not less than 0.95 of the minimum specified tensile strength of the cylinder material	IS-7285-2004	One Cylinder of the first batch.	P	W	R	
11	Steam Cleaning & Air Drying	Examination of Oil residue, Moisture etc.	Free from Oil residue, Moisture etc when Cylinder is exposed to steam jet at steam temp. 160-180° C for period minimum 5-6 minutes.	Audit Check by Q.A staff	P	R	R	
12	Internal shot blasting	Scale free surface	Inner surface should be free from scales, metallic particles etc	Audit Check by Q.A staff	P	R	R	
13	External shot blasting	Scale free surface	Cylinder should be free from scales & other surface imprefection	Audit Check by Q.A staff	P	R	R	
14	Fixed data stamping	Stamp Data	As per IS:7285 : 2004	Audit Check by Q.A staff	P	R	R	
15	Variable Data stamping	Stamp Data	Verification of data as per Drawing & Test Result	Every cylinder check by Q.A staff	P	R	R	
16	Vaccum cleaning	Any scales, dust etc inside cylinder	Free from scales, dust etc from inside cylinder	Every cylinder check by Q.A staff	P	R	R	

17	Weighing	Tare weight/Calibration	As per approved Drawing	Every cylinder check by Q.A staff	P	W	R	
18	Painting (Primer & Finish painting)	Paint coating thickness	As per process sheet	Audit Check by Q.A staff	P	W	R	
19	Marking		IS: 7285 : 2004	Each cylinder	P	R	R	
20	Color identification		IS: 7285 : 2004	Each cylinder	P	R	R	
21	Cascade Frame Fabrication Painting Cascade Frame Complete	Visual (Welding etc) Dimensional Physical Test Chemical Test	Approved Drawing/Manufacturers Standard. Owner's Specification Approved Drawing	100%	P	R	R	
22	Polyurethane/Epoxy paint	Chemical Properties	Approved Make / Owner's Specification		P	W	R	
23	SS Tubes	Physical Test Chemical Test Visual (Welding etc) Dimensional Fitment & Alignment	Approved Drawing, Manufacture Test Certificate for bought out items.	As per tender / Owner's Instruction	P	R	R	
24	Fittings	Visual Dimensional Pressure Test Fitment &	Approved Drawing/Manufacturers Standard	As per tender/owner's instructions	P	R	P	

		Alignment						
25	Valves 2 Way	Visual Dimensional Fitment & Alignment	Approved Drawing/Manufacturer Test Certificate for bought out items.	As per tender/owner's instructions	P	R	P	
26	CNG Cascade Assembly	Visual (Welding etc) Dimensional Fitment & Alignment	Approved Drawing/Manufacturer Std.	Owner's specification/instructi on	P	W	R	
27	Cu Tubes for vending of Burst Disc separator	Visual (Welding etc) Dimensional Pressure Test Leakage Test Fitment & Alignment	Approved Drawing/Manufacturer Std.	Owner's specification/instructi on	P	W	R	
28	Cylinder Valves	Visual Dimensional Fitment & Alignment	As per approved CCOE Drawing, Bill of Material.	Owner's specification/instructi on	P	100% W	R	
29	Gauge	Visual Dimensional Fitment & Alignment	Approved Drawing. Bill of Material.	Owner's specification/instructi on	P	100% W	R	
30	<b>Final Inspection of Finished Cylinders:</b>		IS: 7285-2004	Each cylinder	P	100% W		



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Visual Inspection for Internal cleaning and painting of Cylinder and Cascade frame.

Final dimensional checking of cylinders & cascade frame.  
Check every cylinder for neck threads & cleaning from inside/outside surface.  
Verification of stamped data like Cylinder Serial No. Tare Weight, Water Capacity etc.

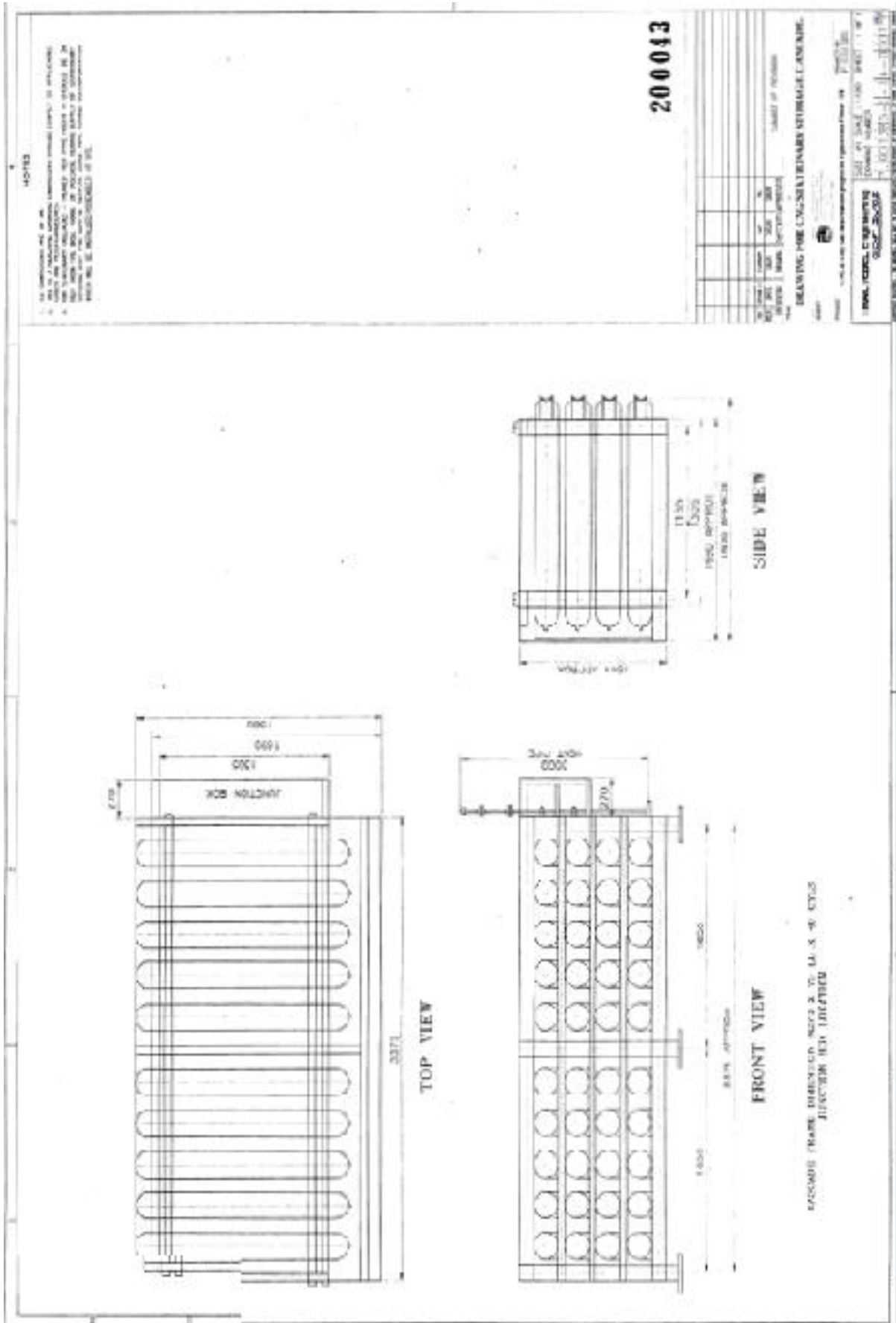
--	--	--	--	--	--	--	--

LEGEND: We witness; H=Hold; M=Monitoring; P= Perform; R=Review of documents; R/M=Random Check; A=Approved; TPIA=Third Party Inspection Agency

**Notes:**

1. The above testing and acceptance criteria are minimum requirements, however, manufacturer shall ensure that the product shall also comply to the additional requirements as per Particular Technical specification (PTS) and Data Sheet.
2. The supplier shall submit their own detailed QAP prepared on the basis of above / Technical specification for approval of Owner/Owner's representative.
3. Supplier shall submit Calibration certificates of all Instruments/Equipment to be used for Inspection and Testing to TPIA with relevant procedures and updated standards for TPIA review/Approval. All reference codes / documents shall be arranged by Vendor for reference of TPIA at the time of inspection.
4. Owner / Owner's representative include TPIA will have the right to inspect activity of manufacturing at any time.
5. TPIA along with Owner/Owner's representative shall review/approve all the documents related to QAP/Quality manuals/Drawings etc. submitted by supplier.
6. Contractor shall in coordination with Supplier/Sub vendor shall issue detailed Production and Inspection schedule indicating the dates and the location of facilities Owner/Owner's representative and TPIA to organise Inspection.
7. Special manufacturing procedures have to be specially approved or only previously approved procedures have to be used, in case of conflict between specification more stringent condition shall be applicable.
8. All reference Codes/Standards, Documents, P.O. Copies shall be arranged by vendor/supplier for reference of TPIA/BGL at the time of inspection.
9. Certification requirement shall comply with European standard EN 10204-3.2 (latest edition)







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**SECTION – 8**  
**SPECIAL CONDITIONS OF CONTRACT (SCC)**



## **SPECIAL CONDITIONS OF CONTRACT**

### **GENERAL**

The following article shall supplement the General conditions of Contract. Where any portion of the General Conditions of Contract and Instruction to Bidders is repugnant to or at variance with any provisions of the Special conditions of contract, then unless a different intention appears, the provision (s) of the Special Conditions of Contract shall be deemed to override the provision (s) of General Conditions of Contract to bidders, only to the extent that such repugnancies of variations in the Special Conditions of Contract as are not possible reconciled with the provisions of General Condition of Contract to Bidders.

In case of an irreconcilable conflict between Indian or other applicable standards, General Conditions of Contract, Special Conditions of Contract, Specification, Drawings or Schedule of Rates, the following shall prevail to the extent of such irreconcilable conflict in order of precedence:

- i. Letter of Award/ Purchase Order
- ii. Letter of Acceptance/ FOI along with Statement of Agreed Variations.
- iii. Schedule of Rates as enclosures to Letter of Award/ Purchase Order
- iv. Special Conditions of Contract
- v. Drawings
- vi. Technical/ Material Specifications
- vii. Instruction to Bidder
- viii. General Conditions of Contract (Goods) for supply part of the contract and GCC (for procurement of works) for other than supply part of the contract.
- ix. Applicable standards as specified.
- x. Applicable standards not specified.

### **1.0 DEFINITIONS AND INTERPRETATION**

In addition to meaning ascribed to certain initial capitalized terms in GCC-Goods, following initial capitalized terms shall have the meaning as ascribed to such term hereunder. In case any term defined hereunder is also defined in GCC-Goods, the meaning ascribed to such term hereunder shall prevail:

#### **1.1 Definitions:**

- 1.1.1 Bid Document shall mean documents issued to the Bidder pursuant to document listed in ITB
- 1.1.2 Effective Date shall mean the date on which seller's Obligation will commence and that will be the date of Fax of Intent (FOI)

#### **1.2 Interpretations**

- 1.2.1 Where any portion of the GCC-Goods is repugnant to more at variance with any provisions of the SCC then unless a different intention appears, the provisions of the SCC shall be deemed to govern the provisions of the GCC-Goods and SWCC provisions shall prevail to the extent of such repugnancy, variations exist.



- 1.2.2 In contract Documents unless otherwise stated specifically, the singular shall include the plural and vice versa wherever the context so requires.
- 1.2.3 Notwithstanding the sub-division of the contract Documents into separate sections and volumes, every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the agreement so far as it may be practicable to do so.
- 1.2.4 All headings, subtitles and marginal notes to the clauses of the GCC-Goods, SCC or to the Specification or to any other part of Bid Document are solely for the purpose of giving a concise indication and not a summary of the contents thereof, and they shall never be deemed to be part thereof or be used in the interpretation of construction thereof.
- 1.2.5 The terms fully capitalized and/or initial capitalized shall be interchangeable and shall have the meaning as assigned to fully capitalized term or initial capitalized term.

**2.0 SELLERS SCOPE**

- 2.1 The Scope of work includes Design, Engineering, Manufacturing, Assembly, Supply, Inspection and Testing at Works, Transportation including unloading to purchaser’s store located at Vijayawada & Hyderabad of CNG Storage CNG Cascades along with mandatory spares of 3000 liter water capacity at filling temperature of 15 degree C and storing CNG at 250 bar suitable for 10 to 55 degree C with three bank as defined in technical volume of the bid.
- 2.2 Scope also includes supply of required nos/ of 20dia J type foundation bolts with nuts, 200mm long with threaded length 50mm & supply of required nos. of 20dia. Anchor bolts with nuts, 100mm long with threaded length 50mm as applicable will be in the scope of bidder for suitable fixing of CNG Storage cascades as per bid document.
- 2.3 Brief scope of supply is as detailed below:

Item Sr.No as per SOR	Description	Quantity
1	Design, Engineering, Manufacturing, Assembly, Supply, Inspection and Testing at works and at site if required, loading, unloading to Purchaser’s store of CNG Storage Cascade along with Spares, Foundation bolts and nuts as defined above in Clause Nos 2.1 & 2.2	8 no’s

- 2.4 Bidder must quote for full quantity of the items of SOR.
- 2.5 Evaluation shall be done on least cost basis to BGL



### **3.0 DURATION OF CONTRACT:**

3.1 The duration of the contract shall be 1(One) years from the date of issuance of Fax of Intent (FOI)/Work Order (WO)

### **4.0 DELIVERY:**

The supply of CNG STORAGE CASCADES along with mandatory spares shall be completed within 8 weeks from the date of letter of intimation for supply through e-mail/letter on FOT Purchaser's Store basis. The date of receipt of cascades at Purchaser's store shall be considered as date of delivery.

Note: Purchaser reserves the right to change the destination i.e. Purchaser's Store during execution of Contract.

### **5.0 TERMS AND MODE OF PAYMENT:**

5.1 90% (Ninety percent) payment along with taxes & duties will be paid progressively on receipt of CNG Storage Cascades and Mandatory Spares separately for each cascade at purchaser's Store and submission of Cenvatable/Vatable invoice in triplicate along with:

- a) Original LR or GR
- b) Packing List
- c) Insurance cover note covering transit insurance
- d) A certificate from manufacturer that all the items/equipment under supply including its component or raw material uses with manufacturing are new and conform to the tender requirement. In case manufacturer is not the supplier this certificate will duly be endorsed by the supplier owning over all responsibility.
- e) Performance Bank Guarantee of 10% of supplied portion value.(If already submitted, a copy of the same)
- f) Dispatch clearance issued by the purchaser
- g) Inspection release note issued by Purchaser/Purchasers appointed/approved Third Party Inspection agency
- h) Final Technical File as per bid document including all test certificates
- i) Document related to CENVAT credit to be claimed by owner, if applicable

5.2 Balance 10%(Ten Percent) payment will be released progressively after acceptance of CNG STORAGE CASCADES and Mandatory Spares by purchaser or with in 120 days from date of receipt of each cascade and Mandatory spares at site whichever is earlier

### **6.0 PACKING AND FORWARDING**

The seller, wherever applicable shall after proper painting, pack and crate all goods for sea/road/rail transportation in a manner suitable to tropical humid climatic region in accordance with the internationally accepted practices and in such a manner so as to protect it from damage and deterioration, in transit by sea or air or road or rail and during storage at the storage at the storehouse till the time of issuance to erection contractor. The seller shall be held responsible for all damages due to improper packing. The selling shall ensure sixing or packing of all consignments in such a way tht availability of carrier and /or road/rail route is properly taken into consideration.

### **7.0 DESPATCH CLEARANCE**

Seller shall obtain despatch clearance from the purchaser prior to each dispatch, which will be issued on receipt of copy of Inspection Release Note.



### **8.0 INDEPENDENT SELLER**

It is expressly understood and agreed that Seller is an Independent party and that neither the seller/its personnel are servants ,agents or employees of Purchaser nor the seller has any kind of interest in other sellers.

### **9.0 LIEN**

Seller shall ensure that the scope of Supply supplied under the Agreement shall be free from any claims of title/liens from any third party. In the event of such claims by any party, seller shall at his own cost defend, indemnify and hold harmless Purchase or its authorized representative from such disputes of title/liens, costs, consequences etc.

### **10.0 TRANSIT RISK INSURANCE**

In partial modification to GCC-Goods , All transit risk insurance from FOT dispatch point onwards to purchasers store shall be arranged and borne by supplier

### **11.0 RECOVERY OF EXCISE DUTY, SALES TAX & SERVICE TAX**

In case, the statutory variation entitles the purchaser to recover the amount (irrespective of Contractual Delivery), such amount will be recovered from any bill of the seller, immediately on enforcement of such variation, under intimation to the seller.

### **12.0 REJECTION**

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

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

### **13.0 LIMITATION OF LIABILITY**

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

### **14.0 GOVERNING LAW**

Laws of India will govern the Agreement and Hyderabad courts will have exclusive jurisdiction on all matter related to Agreement.

### **15.0 PURCHASERS RIGHTS AND AMEDIES**

Without prejudice to Purchasers right and remedies under Agreement, if SELLER fails to commence delivery as per agreed schedule and/or in reasonable opinion of the PURCHSER, SELLER is not in position to make-up delay to meet the intended purpose, the PURCHASER may terminate the AGREEMENT in full or part at SELLER's default and may get supplies from other sources at SELLER's risk and cost.



### **16.0 GUARANTEE/WARRANTY**

If any trouble or defect, originating with the design, material, workmanship or operating characteristics of any materials, arises at any time prior to expiry of twelve(12) months from the date of commissioning of the equipment or prior to expiry of twenty four (24) months from the date of last shipment (against an individual intimation), whichever is earlier, first expire, and the SELLER is notified thereof, SELLER shall, at his own expense and as promptly as possible, make such alterations, repairs and replacements as may necessary to permit the materials to function in accordance with the specifications and to fulfill the foregoing guarantees.

### **17.0 CONTRACT PERFORMANCE BANK GUARANTEE (CPBG):**

Bidder shall submit Contract Performance Guarantee as in the form of irrevocable Bank Guarantee/ Demand Draft /Banker's Cheque.

Clause nos. 12 of GCC-Goods & 24 of GCC-Works, bidder will provide Performance Guarantee of the 8% of order value including Contract value (excluding Taxes & Duties) of each letter of intimation within 30 days of receipt of corresponding letter of intimation from the Employer. This shall be in addition to retention of EMD at owner's end till completion of contract period. Performance Guarantee to be submitted shall be Exclusive of taxes & duties.

The contract performance bank guarantee shall be valid 03(three) months beyond the expiry of Warrantee/Guarantee period. The Performance Guarantee shall be in form of either Demand Draft or Banker's Cheque or irrevocable Bank Guarantee and shall be in the currency of Contract (issued by any Indian Scheduled bank or a branch of an International Bank situated in India and registered with Reserve Bank of India as Scheduled Foreign Bank).

However, in case of Bank Guarantee from banks other than the Nationalized Indian bank, the bank must be a commercial bank having net worth in excess of Rs. 100 Crores or equivalent US Dollars and **a declaration to** this effect should be made by such commercial bank either in the bank guarantee itself or separately on its letterhead. BGL shall not be liable to pay any bank charges, commission or interest on the same.

Failure of the successful bidder to comply with the requirement of this clause shall constitute a breach of contract, cause for annulment of the award, forfeiture of the bid security and any such remedy the Owner may take under the Contract pursuant to GCC-Goods.

There is no exemption to MSEs including SSI units from submission of Security Deposit/ Contract Performance Bank Guarantee (CPBG).

### **18.0 PRICE REDUCTION SCHEDULE(PRS)**

In case of delay in delivery of equipment/materials or delay in completion, unless such failure is due to Force Majeure as defined in Clause 26 of GCC; or due to EMPLOYER's defaults, Contract value shall be reduced by ½% (Half Percent) of the Un delivered portion contract price (excluding taxes, duties & freight) per complete week of delay or



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part thereof subject to a maximum of 5% (five percent) of the Undelivered portion contract price (excluding taxes, duties & freight).

The decision of the ENGINEER-IN-CHARGE in regard to applicability of Price Reduction Schedule shall be final and binding on the SELLER.

**19.0 QUALITY ASSURANCE/QUALITY CONTROL**

The seller shall prepare a detailed quality assurance plan for the execution of Contract for various facilities, which will be mutually discussed and agreed to.

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

The Purchaser, while agreeing to a quality assurance plan shall mark the stages where they would like to witness the test, review any or all stages of work at shop as deemed necessary for quality assurance.

**20.0 REPEAT ORDER**

Purchaser reserves the right within six months of order to place repeat order up to 50% of ordered quantity.





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**SECTION – 9**

**SCHEDULE OF RATES (SOR)**

Item. Sl. No.	Brief Description	Unit	Qty	Unit FOT Despatch Point price Including Packing and Forwarding Charges		Exice Duty & Ed. Cess applicable extra on <b>Col.(2)</b>		CST/LST/VAT (with concessional form) applicable extra on <b>Col. (2)+(3)</b>			Unit Freight extra upto Project site including Octol/Engry tax, transit Insurance & unloading etc.	Unit Price- Project site (all inclusive of P&F charges, applicable taxes & duties, freight etc.) <b>(2)+(3)+(4)+(5)</b>	Total Price at Project site (FOT- Site) <b>(6x1)</b>
				Amount	%	Amount	%	Amount	Amount	Amount	Amount		
				<b>(1)</b>	<b>(2)</b>	<b>(3)</b>		<b>(4)</b>			<b>(5)</b>	<b>(6)</b>	<b>(7)</b>
1.0	Design, Engineering, Manufacturing, Assembly, Supply, Inspection and Testing at works, Transportation to Project Site located at Hyderabad, Vijayawada & Kakinada. Unloading of CNG Storage Cascades (Stationery) of 3000 litre capacity at filling temperature of 15 degree C. Cascade shall be suitable for storing CNG at 250 bar g at temperature of 10 to 55 degree C with three bank as defined in the bid document along with required nos. of 20 dia. J type foundation bolts with nuts, 200 mm long with thread length 50mm & Supply of	Nos.	8										

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required nos. of 20 dia. Anchor bolts with nuts, 100 mm long with thread length 50mm as applicable suitable for fixing of storage cascades. Detailed scope of work is defined in tender document.										
Mandatory Spares for above cascades as defined in bid document	<b>Sets</b>	<b>8</b>								
<b>Total amount in Rs. Inclusive of all applicable Taxes and duties</b>										<b>..</b>

**Note:**

1	Scope of Work and other terms and conditions are strictly as per bid documents.
2	Bidder to clearly indicate 'Quoted'/Not Quoted' against each column in the price column in the un-priced Schedule of Rates and submit the same in Un-priced part of the bid. Bidder to submit Price part of above Schedule of Rules in their Priced Bid. All column of price schedule must be filled with required information as applicable.
3	Bidder must quote the price in Schedule of Rates formats only. Bid submitted with changed format/description is liable to be rejected.
4	All the Columns of quoted items in the Schedule of Rates must be filled with required information, as applicable. Bidder can indicate "0" (zero) in any column but "Included" word should not be mentioned.
5	Quoted rates are firm and fixed till complete execution of the entire order.
6	In case of discrepancy between unit price and the total price, the unit price shall prevail. If there is a discrepancy between the total amount and the sum of total price, the sum of total price shall prevail.
7	Bidders to note that full amount of Exice duty, VAT and Service Tax is a convatable amount & bidder will submit convatable invoices for availing cenvat credit by BGL.
8	Purchaser receives the rights to decrease/increase the quantity of any item(s) as per provision of Bid document before award of contract.
9	If bidder is not in position to provide cenvatable invoice for service tax on transportation, then all inclusive rate for transportation to be quoted in column 5 above.
10	Above quoted prices for supply of Cascades on FOT Site basis, shall be inclusive of all & nothing shall be paid extra by Purchaser.