



GAIL GAS LTD

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

CNG AND CITY GAS DISTRIBUTION PROJECT

BID DOCUMENT FOR GAS GENERATOR SET VOLUME – II OF II (TECHNICAL)

(BID DOCUMENT NO: 110290/WGI/GAIL GAS/22-R0)

LIMITED DOMESTIC COMPETATIVE BIDDING



DELIVERS. EVOLVES.

WHOLE LIFE SOLUTIONS FOR PIPELINE AND SUBSEA SYSTEMS

ISSUED BY



**GAIL GAS LIMITED
CITY GAS DISTRIBUTION PROJECT**



**MATERIAL REQUISITION FOR
30/50/100 KVA GAS GENERATOR SET**

**CLIENT
JOB NO.**

-

**TOTAL
SHEETS**

15

DOCUMENT NO

11

0290

02

10

06

001

Blank area for drawing or content.

REV	DATE	DESCRIPTION	PREP	CHK	APPR
1	23/10/10	ISSUED FOR BID	GK	SB	HM
0	16/08/10	ISSUED FOR BID	GK	SB	HM
A	10/08/10	ISSUED FOR I.D.C.	GK	SB	HM

TABLE OF CONTENTS

1.0	LIST OF ATTACHMENTS	3
2.0	SCOPE OF SUPPLY	4
3.0	GENERAL NOTES	4
4.0	REMARKS	5
5.0	SPECIAL INSTRUCTION TO BIDDER	5
6.0	INFORMATION/ DOCUMENTS / DRAWINGS.....	6
	TO BE SUBMITTED BY SUCCESSFUL BIDDER	
7.0	CHECK LIST.....	7
8.0	COMPLIANCE STATEMENT.....	8
9.0	FORM-A	9
10.0	FORM-B	10
11.0	FORM-C	11
12.0	VENDOR DRAWING DOCUMENT SUBMISSION SCHEDULE.....	12
13.0	LIST OF VENDORS	13



**MATERIAL REQUISITION
FOR GAS GENERATOR SET**

Document No.

Rev

11- 0290- 02-10- 06- 001

1

SHEET 2 of 15

1.0 LIST OF ATTACHMENTS

S. NO.	DOCUMENT TITLE	DOCUMENT NUMBER	No. of Sheets
1.0	Material Requisition	11-0230-01-10-06-001	16
2.0	Technical Specification of 100/50/30 KVA Gas Generator Set	11-0230-01-10-02-007	10
3.0	Bid Evaluation Criteria	-	01
4.0	SOR	-	06

2.0 SCOPE OF SUPPLY

2.1 General

This Specification covers supply of Gas Generator to be used in City Gas Distribution for Dewas, Meerut, Sonipat and Kota.

The scope of supply covers design, engineering, packaging, inspection, testing, supply, truck loading & unloading, shipment, transit insurances` and documentation requirements of these items in accordance with the requirements of this requisition.

Item	Description	Total Qty (Nos.)	Delivery Location				
			CGS Rai	Meerut	Kota	Sonipat	Dewas
1	100 KVA Gas Generator Set (Specification as per attached document no.: 11-0290-02-10-02-007)	01	01	-	-	-	-
2	50 KVA Gas Generator Set (Specification as per attached document no.: 11-0290-02-10-02-007)	01	-	01	-	-	-
3	30 KVA Gas Generator Set (Specification as per attached document no.: 11-0290-02-10-02-007)	07	-	02	02	02	01

3.0 GENERAL NOTES

- 3.1 Gas Generator shall be as per technical specification.
- 3.2 Bidder shall quote separately for spares for two years normal operation of Gas Generator Set as per price schedule. List of spares quoted shall be furnished as per Form-C.
- 3.3 Bidder to include the start up and commissioning spares for Gas Generator Set in the quoted price. However, list of spares (start up and commissioning) shall be made available without cost as per Form-B.
- 3.4 Bidder must submit duly filled up and signed data sheets, compliance statement, Check List and forms (Form-A, Form-B, & Form-C,) along with his offer.

In the absence of this information, Company reserves the right to reject bidder's offer without any reference to Bidder in this regard.



**MATERIAL REQUISITION
FOR GAS GENERATOR SET**

Document No.

11- 0290- 02-10- 06- 001

Rev

1

SHEET 4 of 15

4.0 REMARKS

4.1 Supplier's Compliance

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

4.2 Compliance with Specification

The supplier shall be completely responsible for the design, manufacture, inspection, testing, supply & supervision of installation, testing and commissioning, transportation & storage of above material at various locations in accordance with the MR and all attachments thereto.

4.3 Supplier's Scope

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

4.4 Inspection

Supplier shall submit with his bid a list of 3 well known international Third Party inspection Agencies as per enclosed inspection agency list(Annexure-I), which he intends to use for inspection. This agency will issue all relevant certificates as per specification, codes & approved QAP.

Inspection shall also be performed by a designated Third Party Inspection agency and/or purchaser as set out & specified in the codes & particular documents forming this MR & QAP.

5.0 SPECIAL INSTRUCTIONS TO BIDDERS

5.1 Bidder to note that no correspondence shall be entered into or entertained after the bid submission.

5.2 Bidder shall furnish quotation only in case he can supply material strictly as per this Material Requisition and specification/data sheet forming part of Material Requisition.

5.3 If the offer contains any technical deviations or clarifications or stipulates any technical specifications (even if in line with MR requirements) and does not include complete scope & technical / performance data required to be submitted with the offer, the offer shall be liable for rejection.

5.4 Bidder must submit all documents as listed in checklist with his offer.

5.5 Supplier must note that stage wise inspection for complete fabrication, testing including the raw material inspected to be carried out.

5.6 Vendors for bought out items to be restricted to the approved vendor list attached with bid document. Approval of additional vendor if required, for all critical bought out items shall be obtained by the supplier from the purchaser before placement of order. Credentials/PTR of the additional vendor proposed to be submitted by supplier for review and approval of Purchaser/ Purchaser's representative.


	MATERIAL REQUISITION FOR GAS GENERATOR SET	Document No.	Rev
		11- 0290- 02-10- 06- 001	1
		SHEET 5 of 15	

6. INFORMATION/ DOCUMENTS / DRAWINGS TO BE SUBMITTED BY SUCCESSFUL BIDDER

Successful Bidder shall submit four copies unless noted otherwise, each of the following:

- 6.1 Inspection & test reports for all mandatory tests as per the applicable code as well as test reports for any supplementary tests, in nicely bound volumes.
- 6.2 Filled in Quality Assurance Plan (QAP) for Purchaser's/ Consultant's approval. These QAPs shall be submitted in two copies with in 15 days from LOI/ FOI.
- 6.3 Detailed completion schedule activity wise (Bar Chart), within one week of placement of order.

Note: All drawings, instructions, catalogues, etc., shall be in English language and all dimensions shall be metric units.

	MATERIAL REQUISITION FOR GAS GENERATOR SET	Document No.	Rev
		11- 0290- 02-10- 06- 001	1
		SHEET 6 of 15	

CHECKLIST – TECHNICAL

Bidder confirms following, as a minimum, has been enclosed in the offer.

S.NO.	Requirements	Compiled by Bidder
1	Reference List of previous supply of Gas Generator Set	Yes/No
2	Filled – up Data Sheets, duly signed and stamped by bidder enclosed.	Yes/No
3	List of recommended commissioning spares and accessories for Gas Generator Set enclosed.	Yes/No
4	List of recommended spares and accessories for two year normal operation for Gas Generator Set.	Yes/No
5	Compliance statement duly filled and stamped enclosed.	Yes/No
6	GA & assembly drawings, cross section drawings including part list & material list enclosed.	Yes/No
7	Other technical details & vendor's product catalogues enclosed.	Yes/No



**MATERIAL REQUISITION
FOR GAS GENERATOR SET**

Document No.

Rev

11- 0290- 02-10- 06- 001


1

SHEET 7 of 15

COMPLIANCE STATEMENT

S.No.	Requirement	Bidder's Confirmation
1	Bidder confirms that all materials proposed by the bidder are same/ superior to those specified in specification/ data sheets enclosed.	
2	Bidder confirms that the offer is in total compliance with the Technical requirements of the Material Requisition. Bidder confirms that deviation expressed or implied any where else in the offer shall not be considered valid.	
3	Bidder confirms that all spares and accessories required for two years of normal operation have been quoted separately as per price Performa enclosed with Bid Document.	
4	Bidder confirms that prices for start-up/commissioning spares and accessories have been included in the quoted items	
5	Bidder confirms that in the event of securing order for the requisitioned item(s), good for manufacturing drawings of ordered item(s) shall have complete details with dimensions, part list and material list including back-up calculations in the first submission, failing which the vendor shall be solely responsible for any likely delay in delivery of item(s).	

Bidder's Signature with Stamp

	<p align="center">MATERIAL REQUISITION FOR GAS GENERATOR SET</p>	<p align="center">Document No.</p>	<p align="center">Rev</p>
		<p align="center">11- 0290- 02-10- 06- 001</p>	<p align="center">1</p>
		<p align="center">SHEET 8 of 15</p>	

FORM – A

REFERENCE LIST OF SUPPLY OF GAS GENERATOR SET FOR THE FIVE YEARS

S.No.	Project	Client(Name & Address)	Type	Size	Rating	Service	Year of Supply

To be filled, signed and stamped by Bidder.

Bidder's Seal

Signature of Bidder



MATERIAL REQUISITION
FOR GAS GENERATOR SET

Document No.

Rev

11- 0290- 02-10- 06- 001

1

SHEET 9 of 15

FORM – B

LIST OF SPARES & ACCESSORIES FOR START UP & COMMISSIONING FOR EACH GAS GENERATOR SET

S.No.	Part No.	Description	Quantity
1.		Engine Oil	Minimum 15 ltr.
2.		Lube Oil Filter	Minimum 01 no.

Note: Any other item/spares required may also be included in the list. Bidder to include the start up and commissioning spares for GAS GENERATOR SET in the quoted price.

To be filled, signed and stamped by Bidder.

Bidder's Seal

Signature of Bidder



**MATERIAL REQUISITION
FOR GAS GENERATOR SET**

Document No.

Rev

11- 0290- 02-10- 06- 001

1

SHEET 10 of 15

FORM - C

LIST OF SPARES AND ACCESSORIES FOR TWO YEARS OF NORMAL OPERATION FOR EACH GAS GENERATOR SET

S.No.	Part No.	Description	Quantity(Minimum)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
11.			
12.			
13.			
14.			
15.			
16.			
17.			
18.			
19.			
20.			
21.			
22.			
23.			
24.			
25.			
26.			
27.			
28.			

To be filled, signed and stamped by Bidder.

Bidder's Seal

Signature of Bidder



MATERIAL REQUISITION
FOR GAS GENERATOR SET

Document No.

Rev

11- 0290- 02-10- 06- 001

1

SHEET 11 of 15

LIST OF VENDORS

Gas Engine	:-	Cummins / Kirloskar / Kohler/ Caterpillar/ Doosan / Lamda / General Motors
Alternator	:-	Cummins / Kirloskar / Crompton Greaves Ltd./Kohler/Siemens/General Motors
Cables-LT-Power-PVC(FRLS)	:-	Associated Flexibles & Wires (P) Ltd./ CCI/ Finolex Cables Ltd./ Gemscab Ind. Ltd./ RPG Cables Ltd. / KEI Ind. Ltd./Nicco Corp. Ltd./ Polycab Wires Pvt. Ltd./ Radiant Cables Pvt. Ltd./ Ravin Cables Ltd./ Torrent Cables Ltd./ Universal Cables Ltd. / Incab / Havell's India Pvt. Ltd. / Cords Cable Ind.Ltd.
Batteries	:-	Exide / Amco/ Amara Raja/ HBL NIFE
Cable glands for Hazardous area FLP Junction Box	:-	Comet Industries / Baliga / Comet Brass Products/ Flexpro/ Flameproof Equipment / FCG Power/ FCG Flameproof Control Gears pvt Ltd./ Prompt Engg. Works/ Sudhir Swgrs. Pvt. Ltd
Protection relays (Electromechanical type)	:-	ABB (Baroda) /Easun Reyrolle / Areva T&D India Ltd.
Auxiliary Relays	;-	ABB (Bangalore) / Areva T&D India Ltd.
Control switches/Selector Switches	:-	L&T/ Siemens/ Havell's India/ Switron Devices/ Hot Line Swgrs.& Controls / Kaycee/ ArevaT& D India Ltd.
MCBs	:-	Datar Switchgear /Havells India / Indo Asian fuse Gear / Indiana Current Control/Standard Electricals/ Schneider Electricals India Pvt.


		Ltd./Legrand India Pvt. Ltd. /MDS
MCCBs	:-	GE / L&T/ Siemens / Schneider Electric
Fuses	:-	L&T / Siemens/ GE India Industrial Ltd./ Indo Asian fuse gear
Timers	:-	Bhartia Ind./ L&T/ Siemens/ Electronic Automation
Meters	:-	Automatic Electric/ Meco Instruments/ Rishab Instruments/ Nippen Electricals Instruments Co. / Areva T& D India Ltd.
Push Buttons/Indicating lamps	:-	L&T/ Siemens/ Tecknic Controls/ Bhartia Ind. /Schneider Electric/ Shri Tulsi Switchgears/ Controls & Switchgears & Contactors Ltd./ Hot Line Switchgears & controls./ Precifine Product Pvt. Ltd. (For LED type Indicating lamp only)
Contactors	:-	L&T / Siemens/ GE India Industrial Pvt Ltd./ Schneider Electric/ Bhartia Ind./ Controls & Switchgears & Contactors Ltd./ABB (Bangalore)
Bimetal Relays	:-	L&T / Siemens/ Bhartia Ind./ Controls & Switchgears / Contactors Ltd./ABB (Bangalore) & Schneider Electric.
CT/PT	:-	Indocoil / GM / AE Kappa Electricals/ L& T / Pragati Electricals/ Precise Electricals/ Silkaans Electricals/ Narayan Power Tech. Pvt Ltd.
Selectro Switch	:-	Kaycee
Fuse switch combination	:-	ABB (Bangalore)/ Control & Switchgear/ Indo Asian Fuse Gear/ L&T / Siemens/ Schneider Electric/ Havells India Pvt. Ltd /Standard Electricals Ltd.
Heavy duty switches	:-	L&T / Siemens/ Schneider Electric/

Control & Switchgear/ Indo Asian Fuse Gear

Notes:-

- 1.0 Make of other equipment/components not mentioned above shall be subject to prior approval of WGI / Owner.
- 2.0 In case of non-availability of equipment/material from above vendors, alternate makes, if required may be supplied after WGI/Owner approval.

-----X-----X-----

	MATERIAL REQUISITION FOR GAS GENERATOR SET	Document No.	Rev
		11- 0290- 02-10- 06- 001	1
		SHEET 15 of 15	



**GAIL GAS LIMITED
CITY GAS DISTRIBUTION PROJECT**



TECHNICAL SPECIFICATION FOR 100/50/30 KVA GAS GENERATOR SET				CLIENT JOB NO		0290
				TOTAL SHEETS		15
DOCUMENT NO	11	0290	02	10	02	007

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

2	31/01/11	RE-ISSUED FOR BID	GK	SB	HM
1	12/11/10	RE-ISSUED FOR BID	GK	SB	HM
0	12/08/10	ISSUED FOR BID	GK	SB	HM
B	10/06/10	ISSUED FOR CLIENT APPROVAL	GK	SB	HM
A	07/06/10	ISSUED FOR I.D.C.	GK	SB	HM
REV	DATE	DESCRIPTION	PREP	CHK	APPR

TABLE OF CONTENTS

SR. NO.	DESCRIPTION	PAGE NO.
1.0	Scope	3
2.0	Codes & Standards	3
3.0	General	3
4.0	Gas Engine	4
5.0	Lube Oil System	5
6.0	Engine Starting System	6
7.0	Air Intake And Exhaust System	6
8.0	Governing System	6
9.0	Digital Controller	6
10.0	ALTERNATOR (Power Output @ 0.8 Power Factor)	7
11.0	Performance Requirements	7
12.0	Wiring	8
13.0	Control System	8
14.0	Base Frame	8
15.0	AVM Pads	8
16.0	Accoustic Enclosure	8
17.0	Packing and Despatch	9
18.0	Tool Kit	10
19.0	Tests & Inspection	10
20.0	Drawings	10
21.0	Deviations	11
22.0	Loading & Compensation Criteria	11
23.0	Performance Testing at Site	13
24.0	Warranty / Guarantee	13
25.0	Certification	13
26.0	Third Party Inspection Report	14
	Annexure-II List of Third Party Inspection Agency	15

1.0 SCOPE

This specification covers the design, engineering, packaging, shop testing, supply, erection, testing and commissioning of 415V, 3 phase & N, 1 no. 100KVA, 1 no. 50 KVA, 7 nos. 30 KVA Gas Generator Set for CNG Station at along with all required accessories including integral AVM pads and weather and Sound proof acoustic enclosure.

2.0 CODES AND STANDARDS

The Gas Generator set with all its components shall comply with the latest applicable standards, regulations and safety codes in the locality where the equipment shall be-installed. The equipment shall comply with following British Standards, Indian Standards or equivalent British or International Standards with latest revisions.

3.0 GENERAL

- 3.1 The Gas Generator Set shall be outdoor type complete with suitable acoustic enclosure, to limit noise level to 75 db. The set shall consist of Gas Engine coupled to suitable alternator having self, brushless / static excitation system and include all necessary accessories and control panel as specified and as required.
- 3.2 The engine and generator shall be mounted on an integral robust fabricated steel frame with anti vibration mountings pads. No separate foundation will be provided. Required set of foundation bolts, nuts and washer etc. and set of spanner and tools shall be supplied by the bidder.
- 3.3 The generator set shall be factory built and production tested.
- 3.4 The generator set shall be capable of taking the block loading in single step.
- 3.5 The generator shall have Integral vibration isolation.
- 3.6 The generator shall have advanced Digital Controller for the engine and alternator combine with LED display unit for display of system parameters and fault indication of both the engine / alternator .
- 3.7 The generator set shall have cooling system rated for 50⁰ C ambient temperature.
- 3.8 The generator shall have a test certificate confirming the generator load parameters.
- 3.9 The generator shall have auto start feature with programmed cranking cycles.
- 3.10 The generator shall have package mounted Line Circuit breaker for protection.
- 3.11 The generator package shall have a gas detection alarm sensor fitted in flame proof box with controller and alarm mounted in separate compartment in the acoustic enclosure as per guidelines of the statutory agency.

- 3.12 All the electrical/instrumentation fittings/equipment, Junction box shall be flame proof and shall bear valid certification.
- 3.13 The generator set shall have a spark arrester fitted on it and a catalytic converter fitted on it.
- 3.14 Lifting lugs must be provided for safe handling and the gas generator shall be mounted on the iron base frame which shall be grouted on the concrete foundation.
- 3.15 All internal piping and piping required for the connection of Gas Generator inlet, auxillaries, meter etc. with the clients tap-off provided at a distance as per SOR up-to the foundation shall be to the Bidder scope.
- 3.16 The material used for station piping shall be Carbon Steel for connection between GAIL GAS's tap-off point and Gas Genset inlet / metering device.
- 3.17 The laying of GI earthing strip of 50x6mm from equipment (at two distinct point) to the earthing pit (provided by owner) shall be to the bidder's scope.
- 3.18 Supply, installation, testing and commissioning of gas genset electric panel including supply of all power / control cables and proper fixing of panel on wall. If it is required to change the location of existing panel of electric panels of electric room, to fix the genset is in the scope of supplier.
- 3.19 Supply, installation, testing and commissioning of 415V, 50Hz, 4 pole, 100A change over switch for 7 nos. 30 KVA Gas Generator and 1 no. 50 KVA Gas Generator and 415V, 50Hz, 4 pole, 200A change over switch for 1 no. 100 KVA Gas Generator set in the scope of supplier.
- 3.20 Supply, laying, testing & termination of PVC insulated PVC sheathed, armoured, FRLS outer sheath, stranded Copper / Al conductor cables in surface trench/ on wall/ structural surface/ in GI pipes/ conduits as per site requirements as follows :
 3.5Cx50 Sq.mm Al cable for 7 nos 30 KVA Gas Gen Set Min. 50 mtr. of each set
 3.5Cx70 Sq.mm Al cable for 1 no 50 KVA Gas Gen Set Min. 50 mtr. of each set
 2x3.5Cx95 Sq.mm Al cable for 1 no 100 KVA Gas Gen Set Min. 2x50 mtr. of each set

4.0 GAS ENGINE

- 4.1.1 The generator set shall be powered by proven field tested 4 stroke, min. 4 cylinder, water cooled Gas Engine suitable for operating on CNG with a power output of at least 5 % more than the maximum power required by the alternator along with all standard engine components along with all standard engine components and shall have following features:
 - a. Internal Exhaust System with approved Spark Arrestor and catalytic converter.
 - b. The Gas Engine shall be suitable for block loading in one step and supplied with Electronic Isochronous Governor for optimum fuel, spark performance and frequency regulation of ± 1 %.
 - c. Residential grade silencer.
 - d. 70A / 12V Battery Charging Alternator.
 - e. 12 V starter motor.
 - f. High engine temperature safety & shutdown.
 - g. Low Lube Oil Pressure safety & shutdown.
 - h. Dry type air filter.
 - i. Cartridge type lubrication oil filter



**TECHNICAL SPECIFICATION
FOR
GAS GENERATOR SET**

Document No.

11-0290-02-10-02-007

Page 4 of 15

Rev

2

- j. The generator set engine should be fitted with 3-way catalytic converter capable of reducing NOx, CO and HC by over 70%.
- k. The catalyst supplier should have its product validated by ARAI
- l. Catalytic converter approved makes: a) Johnson Matthey Brand, b) Airshield Brand
- m. The generator set shall have a gas train to operate at a gas pressure of 14 - 19 Kg /cm². Any facility required for reduction or increase in the pressure from the average pressure range for the operation of Gas Generator shall be to the Bidder scope.
- n. The Bidder shall provide a metering device at the inlet of Gas Genset for metering the gas used for operation. The Gas Flow meter should be suitable to handle natural gas. The Gas Flow meter should be diaphragm type. The metrology should be in accordance with EN1359 & MID. Maximum permissible errors should be $\pm 3\%$ from Q_{min} to 0.1 Q_{max} and $\pm 1.5\%$ from 0.1 Q_{max} to Q_{max}. It should be capable to handle maximum flow rate of 16 m³/Hr for 30 KVA , 25 m³/Hr for 50KVA, 40 m³/Hr for 100 KVA and minimum flow rate of 0.1 m³/hr. The Gas Flow Meter should be able to operate in Ambient temperature ranges of (-)25°C to (+) 55°C and Gas Temperatures of (-)25°C to (+) 55°C. It should operate at pressure up to 0.5 Bar. The Gas Flow Meter should have a Totaliser with 8 digit index and IP54 protection. The Totaliser should have a UV Resistant cover and Fitted with a reflecting disc on the first drum to facilitate periodical checks. It should also be Prepared with a magnet in the first drum (0.1m³/pulse) or second drum (1m³/pulse) for retrofitting an external Low frequency transmitter. The Gas Flow Meter should be equipped with magnetic coupling. The Gas Flow Meter should be equipped with a Back Run Stop to prevent the meter from running backwards in case of tampering. The Casing of the Gas Flow Meter should be made from Aluminium coated sheet steel. The material of the measuring body of the Gas Flow Meter should be Polyacetal(POM). The material of the Diaphragm of the Gas Flow Meter should be Polyester fabric coated with NBR-ECO. The Distribution valves and grid of the Gas Flow Meter should be made of phenol resin.
- o. The generator set shall be able to operate on the following gas configuration:

Sr. No.	Component	Composition (%)
1	Methane	89.44
2	Ethane	4.58
3	Propane	0.83
4	i-Butane	0.07
5	n-Butane	0.06
6	i-Pentane	0.09
7	n-Pentane	0.28
8	Hexane	0.17
9	Carbon Dioxide	4.38
10	Nitrogen	0.10
	Total	100.00

5.0 LUBE OIL SYSTEM

Automatic pressure lubrication system shall be provided.
Bidder shall also indicate the specific lube oil consumption and capacity of the lube oil tank.

6.0 ENGINE STARTING SYSTEM

Starting of gas engine shall be by electrical starting system.

Electrical Starting System shall comprise of a starter motor, batteries, battery charger and all the necessary instruments and accessories. Batteries and battery charger shall be supplied by the bidder.

7.0 AIR INTAKE AND EXHAUST SYSTEM

Air intake filter and silencer shall be provided.

The exhaust system shall consist of an exhaust gas driven turbocharger, exhaust gas silencer, necessary piping, adapters, accessories etc.

8.0 GOVERNING SYSTEM

The Gas engine should have Electronic Isochronous governing .

Governor shall be provided for keeping constant speed within permissible limits with variable load. The governor shall be Electronic type. It shall be capable of operating on isochronous mode i.e. the speed of the engine (frequency of the generator set) shall remain constant irrespective of the load on the Gas Generator set upto 100% capacity. RPM indicator and tachometer to trip the Gas Generator set during over speed shall also be provided.

9.0 DIGITAL CONTROLLER

The Digital Controller shall be integrally mounted on generator set and shall have automatic start function with provision for manual Start / Stop / Reset and Auto options as per technical specs / features listed below:

- a. The Digital Controller shall have self diagnostics and test function.
- b. Digital Controller shall have LED to display Engine Parameters like Running Hours, Crank Cycle status, Diagnostics.
- c. LED shall also display communication faults like
 - i. High Engine Temperature,
 - ii. Low Oil Pressure
 - iii. Fail to start (Over Crank Safety)
 - iv. Over Speed
 - v. Over Frequency
 - vi. Over Voltage
 - vii. Under Frequency
 - viii. Under Voltage
 - ix. High Battery Voltage
 - x. Low Battery Voltage
 - xi. Auxiliary Fault.
- d. Digital Controller shall preferably have a MMI membrane keypad for configuration and adjustment of features like
 - i. Password protection for Menu access
 - ii. System configurations like System Voltage, Phase and
 - iii. Frequency settings etc.

	TECHNICAL SPECIFICATION FOR GAS GENERATOR SET	Document No.	Rev
		11-0290-02-10-02-007	2
		Page 6 of 15	

10.0 ALTERNATOR (Power output @ 0.8 Power Factor)

The alternator shall be designed for the specified rating voltage etc. and shall be Single bearing with class 'H' insulation with 13 deg. temp. rise as per NEMA MG1-1.66, IEEE & ANSI standards.

The alternator shall be suitable for continuous operation at 415V, 3 phase, 4 wire system, 50 Hz, 0.8 pf (lag).

The Alternator should be able to take the 100 % load in single step

The alternator shall have following features:

- Brush type, screen protected, revolving field, self excited, self regulated through an AVR /AVR.
- It should have PMG(Permanent Magnet) excitation incorporated for block & motor loads.
- Sustained short circuit current of upto 150% of the rated current upto 5 seconds.
- It should have vacuum impregnated windings with fungus resistant varnish for use in humid areas.
- It should have self ventilated and drip proof construction.
- It should have Superior voltage wave form from a two-thirds pitch stator & skewed rotor.
- +/- 1 % voltage regulation (max.)
- IP:23 enclosure
- Two nos. body earthing terminals which shall be separate from the neutral terminal.
- Permissible overload 10% for one hour in 12 hours of duration.

11.0 PERFORMANCE REQUIREMENTS

The unit shall be capable of starting from cold condition.

The unit shall be capable of a peak output of 10% in excess of the rated output for a period of one hour out of a total 12 consecutive hours of operation, without exceeding permissible temperature limits and with a fairly clear visible exhaust.

The unit shall operate up to 110% of the rated speed over the entire range of output without undue vibration and noise.

Slam shut off valve or an alternate arrangement should be provided to shut off the supply of gas in case gas pressure exceeds the specified limits.

The bidder shall provide gas meter of reputed make to monitor the gas consumption in SCM/kg.

Proper filter shall be provided before gas metering unit to ensure protection against any foreign material.

1 no. ball valve shall be provided for isolating the gas supply from gas genset as and when required.

Any item not mentioned and required for proper functioning of the gas genset / gas train shall be provided free of cost by bidder.

The bidder would be required to submit test certificate of all the equipments in Gas Gensets / Gas train.

The filter should be hydro tested up-to 1.5 times of the line pressure at its installation point.

The bidder would be required to submit calibration certificates of gas meter and pressure gauges and other installed instruments as applicable and submit the detailed P&ID & GAD.

Bidders shall submit the TPI report for inspection of all items of Gas Gensets and the Gas Genset as a whole equipment under operating conditions.

12.0 WIRING

All control wiring inside the controller shall be carried out with 2.5 sq.mm 1100/650 V grade PVC insulated copper wires.

13.0 CONTROL SYSTEM

The Gas Generator set will be normally at rest when the station A.C. supply is available from normal power source. In case of main AC power supply failure, the Gas Generator shall be started as follows.

On failure of normal station A.C. power supply, Gas Generator set shall start manually.

When Gas Generator set is running & grid power restores, the load shall be transferred to grid manually and the Gas Generator set will stop after a preset time.

Three attempt starting facility shall be provided for the Gas Generator set. In case, the gas engine fails to start and reach rated speed within 30 seconds, it shall be disconnected and locked out automatically.

14.0 BASE FRAME

Skid mounting type base frame, fabricated from suitable size MS channel, of heavy side members and cross members, providing common bed for engine and alternator, directly coupled together. The base frame shall have provision for grouting the set on grouting bolts as well as fixing on the Anti-Vibration Mounts. Provision shall also be made in the base frame for lifting the Set.

15.0 AVM PADS

Vibration Mounting Pads, as recommended by the set manufacturer shall be supplied with the GG set.

16.0 ACOUSTIC ENCLOSURE

The acoustic enclosure shall be made of 2 mm (Min) CRCA sheet. The salient feature of the acoustic enclosure is:

- i. The enclosure shall be of modular construction with provision to assemble and dismantle easily at site.


- ii. The sheet metal components shall be hot dip seven tank pretreated before powder coating.
- iii. The enclosure shall be powder coated (inside as well outside) with a special pure polyester based powder. All nut & bolts / external hardware shall be made from stainless steel.
- iv. There shall be provision for filling fuel from outside the enclosure with locking arrangement.
- v. External drain plugs shall be provided for draining lube oil and diesel.
- vi. The door shall be gasketed with high quality EDPN gaskets to prevent leakage of sound.
- vii. The door handles shall be lockable type.
- viii. Sound proofing of the enclosure shall be done with high quality Fibre glass frock wool/ mineral wool conforming to IS : 8183 . The insulating material for sound proofing shall be further covered with fibre glass tissue and perforated sheet.
- ix. Acoustic hoods with noise splitters, if required , shall be used to block and reduce the sound leakage.
- x. A high efficiency residential silencer along with associated piping and flexible bellow shall be provided in the enclosure to reduce exhaust noise.
- xi. Specially designed attenuators shall be provided to control sound at air entry and exit points.
- xii. Adequate ventilation shall be provided to meet total air requirement. If required, a blower shall be provided to meet total air requirement.
- xiii. Temperature of enclosure should not exceed beyond 5°C of ambient temperature
- xiv. The enclosure shall be provided with high enclosure temperature safety trip.
- xv. There shall be provision of emergency shut down from outside the enclosure.
- xvi. There shall be arrangement for illuminating the enclosure from inside.
- xvii. Noise level shall be 75 dB (A) at 1 m distance from enclosure.
- xviii. Earthing points on the body of the enclosure shall be isolated through DMC insulator mounted on the enclosure.

17.0 PACKING AND DESPATCH

The unit shall be packed suitably to facilitate installation and transportation. During transport, care shall be taken to avoid damage to paint or accessories of the equipment if any damage is caused during transport, the vendor shall repair the same, free of cost.

18.0 TOOL KIT

Special tool kit, if any, for the Gas Generator Set shall be supplied.

	TECHNICAL SPECIFICATION FOR GAS GENERATOR SET	Document No.	Rev
		11-0290-02-10-02-007	2
		Page 9 of 15	

19.0 TESTS & INSPECTIONS

Following tests shall be carried out in Gas Generator:

Routine tests for engine like fuel consumption test at 100% & 50% load for 12 hrs each, 24 hours running test at 75% load, etc. as per relevant Indian / International Standards/ Manufacturer Standards.

Routine tests for alternator, as per latest IS-4722 or other applicable Indian Standards, like Insulation Resistance and High Voltage Test etc.

8 hour run test with the set completely assembled at works / site with full load and 10% overload. All parameters will be recorded in presence of the customer's representative.

Bidder shall submit copies of routine and type test certificates for approval in required sets before despatch.

Following inspections shall be carried out in Gas Generator:

Bidder shall arrange for below mentioned inspection at site on owner request

- a) Visual
- b) Dimensional
- c) Fitment & alignment
- d) Guarantee parameter

Bidder shall submit the following documents before dispatch:

- a) Calibration certificate of all instruments
- b) Un-priced PO copies of all bought-out items
- c) Test certificates of all bought out items
- d) Internal test certificates for all the tests carried out in the bidders / manufacturer works
- e) Type test certificates of the equipment
- f) TPI inspection reports & certificates

20.0 DRAWINGS

Bidder shall submit prints of following drawings in required sets:

- a. Outline dimensional drawings with general arrangement.
- b. Piping flow sheets and piping layout.
- c. Electrical wiring and schematic diagram along with cable schedule and general arrangement drawing for control panel.
- d. Foundation drawings.
- e. Fuel oil system with instrumentation and control with write-up.
- f. Lube oil system with instrumentation and control with write-up.
- g. Governor system and voltage regulator write-up.
- h. G.G. set instrumentation and control system with write-up.

One print of each of above drawing will be returned to bidder after making all necessary corrections/ comments. Bidder shall incorporate these and send within fifteen (15) days, 5 prints of each drawing for final checking/ approval.

The bidder shall also provide 7 sets of installation, operation, maintenance and major overhauling instruction manuals before inspection.

21.0 DEVIATIONS

- 21.1 Deviations, if any from this standard (clause wise), shall be clearly indicated in the offer with reasons thereof. In the absence of any such activities, the compliance to the clauses shall be deemed automatically.
- 21.2 The bidder shall submit the duly signed & stamped copies of all NIT documents as a token of compliance to NIT.

22.0 LOADING & COMPENSATION CRITERIA

- 22.1 The total guaranteed fuel consumption for 30 KVA, 50 KVA, 100 KVA generator capacity shall not increase 10.5 SCMH, 11.5 SCMH, 28.5 SCMH at 100 % Load for the given composition of natural gas.

22.2 PRICE LOADING FOR FUEL CONSUMPTION OF GAS GENERATOR SET

Bidder shall indicate the specific fuel consumption in SCMH and the total fuel consumption (for 30/50/100 KVA generator capacity) in SCMH for the given composition natural gas as guaranteed value in the offer. Fuel consumption of all the techno-commercially qualified Bidders shall be compared with respect to the lowest SCMH quoted by any Bidder. All other bidders shall be loaded as per differential cost evaluated as per following formula. Total cost of the package for evaluation purpose (A+B+C+D)i.e. cost as per SOR and addition of Differential operating cost as defined hereunder.

Where

A = Capital cost of each package including cost of erection, commissioning, and special tools and commissioning spares

B = Cost of Recommended spares: Nil

C = Differential operating cost as defined hereunder

D = Cost of Annual Maintenance during Guarantee / Warrantee period and subsequent 2 years.

Differential operating cost C (in Rs) = $Nop \times (Fe - Fr) \times Cf \times Df$

Where:


Nop = 1080Hrs.

Fe = Guaranteed fuel consumption in SCMH for bidder under evaluation

Fr = Lowest Guaranteed fuel consumption SCMH (amongst technically accepted bidder)

Cf =Cost of fuel as Rs 29/-per SCM

Df =discounting factor to arrive at Net Present Value (NPV) based on 5 years i.e.3.274

	TECHNICAL SPECIFICATION FOR GAS GENERATOR SET	Document No.	Rev
		11-0290-02-10-02-007	2
		Page 11 of 15	

The financial loading on account of fuel consumption shall not exceed 10% of basic Gas Genset supply cost on FOT basis.

For loading calculations purpose fuel consumption as indicated in the original bid shall be taken. If any bidder fails to indicate the fuel consumption, highest fuel consumption figure from the techno-commercially accepted bidders shall be considered for evaluation purpose and the same shall be considered for demonstration by the supplier at site, if found L -1..

22.3 Penalty for not meeting the parameters during the Performance Test (PT).

- a) This section describes the guaranteed parameter, which the Gas Generator set (Genset) package must fulfill, the penalty for shortfall in guaranteed parameters and rejection of Gas Generator set package by the Purchaser.
- b) The guaranteed parameter shall be adjusted to account for variation in gas composition and prevailing ambient condition during testing.
- c) Necessary calculations and correction curves shall have to be furnished by Bidder along with bid, which shall be final & no deviation shall be permitted afterwards.
- d) In case of any inconsistency in manufacture and/or operation of supplied Gas Genset, Bidder shall at his own risk and cost, eliminate the defects to the satisfaction of Owner.
- e) Bidder shall furnish guaranteed values in the data sheet attached with this specification.

22.4 Gas Generator Set Capacity


Bidder shall guarantee maximum i.e. 100% power output of 30/50/100 KVA with given gas composition, and inlet pr. and Gas Temperature as per SOR with no negative tolerance for errors in instruments and measurements. Since the Gas pr. at GAIL GAS's provided tap-off point varies between the range as listed in MR & SOR the Gas Genset shall be suitable to operate at min to max pressure range.

If the Gas Genset Capacity is found lower than the required capacity the Gas Genset shall be rejected and the bidder shall be responsible for providing the correct capacity Generator immediately i.e. maximum within the 1 month duration or else the contract shall be rejected and BG shall be forfeited.

Bidder to note that the inlet pressure and temperature as listed in SOR shall be provided at GAIL GAS's Tap-off point, all necessary modifications required for pr. reduction / increase shall be bidder's responsibility and all instruments / equipments required for the modification shall be provided by the bidder, including station piping from the tap-off point to Gas Genset inlet.

22.5 COMPENSATION FOR FUEL CONSUMPTION OF GAS ENGINE IN EXCESS OF GUARANTEED VALUE, FOUND DURING PT:

During the performance test, in case the generator set fails to meet the guaranteed values as listed in data Sheet, the compensation (calculated as per formula given under here) shall be claimable by the owner and the same shall be recovered by the owner from any payment due

	TECHNICAL SPECIFICATION FOR GAS GENERATOR SET	Document No.	Rev
		11-0290-02-10-02-007	2
		Page 12 of 15	

to the supplier. In case such claims are not fully recovered than supplier will pay the balance amount to the owner. During performance test of the Gas Generator set, in case the fuel consumed by generator in terms of SCM_H, at defined load, is found more than as specified by bidder, the generator set shall be rejected & immediate replacement shall be made by bidder. However, for every extra SCM_H consumed, during the operation till PT over and above the guaranteed value up-to a maximum of upper limit the Bidder shall compensate the owner for extra fuel consumption and until the gas genset is replaced with correct one.

The compensation per generator set shall be the differential cost calculated as follows:

$$PY \text{ (in Rs)} = 2 \times (FT-FG) \times CF \times Noap \times DF$$

Where,

PY = Differential Cost

FT = Fuel consumption as obtained from field test in terms of SCM_H

FG = Guaranteed fuel consumption in SCM_H

CF = Rs. 29/-per SCM

DF = 3.274 (Discounting factor based on 5 years of operating years)

Noap = No. of actual operations at site in Hrs.

The total penalty to be charged for non-conformance of guaranteed parameter on account of fuel consumption shall not exceed 10 % of basic gas genset supply cost on FOT basis. Bidder has to replace the generator before this amount is exhausted or within 2 months whichever is earlier, if not then the genset shall be put out of use and contract shall be terminated and substitute arrangement shall be made by the owner on its own.

No advantage shall be given for better performance than the guaranteed.

Fuel consumption shall be adjusted for actual gas at site for density and C.V. Calculation shall be provided by the bidder along with the bid document.

23.0 PERFORMANCE TEST AT SITE

Performance testing shall be carried out at site after 1 week of installation & Commissioning at site or as and when scheduled by EIC.


All the guaranteed and other parameters as per the technical specification & data sheet shall be checked during the PT at site by client.

24.0 WARRANTY/GUARANTEE

Warranty/ Guarantee shall be one year from successful installation & commissioning of Gas engine set.

25. CERTIFICATION:


- a) The bidder shall be responsible for obtaining all statutory approvals, as applicable for all electrical, instruments and control systems.
- b) In general, the following verification shall be provided by the bidder.

	TECHNICAL SPECIFICATION FOR GAS GENERATOR SET	Document No.	Rev
		11-0290-02-10-02-007	2
		Page 13 of 15	

- For all flame proof equipment manufactured within India, the testing shall be carried out by any of the approved testing houses- Central Mining Research Institute (CMRI)/ERTL etc.
- For all intrinsically safe equipment manufactured within India the testing shall be carried out by any of the approved testing houses – Central Mining Research Institute (CMRI)/ERTL etc.

26.0 THIRD PARTY INSPECTION REPORT:

Third party Inspection of material at manufacturer's works has to be arranged by the Bidder for the supplied material. Bidder shall submit the copy of TPI report for the inspection of all items of the Gas Genset and the equipment as hole at the time of delivery of material at site, and also enclose the Original copy with the Set of final documents. The TPI appointed should be a accredited Inspection / testing agency as per Annexure-II

	TECHNICAL SPECIFICATION FOR GAS GENERATOR SET	Document No.	Rev
		11-0290-02-10-02-007	2
		Page 14 of 15	

ANNEXURE –II

LSIT OF THIRD PARTY INSPECTION AGENCIES

S.NO	ITEM	NAME OF VENDOR	ADDRESS	PHONE NO	FAX NO
	Third Party Inspection Agency	Tata Projects Ltd	22,Sarvodaya Society, Nizampura,Baroda-390002	0265-2392863	0265-2785952
		Indian Register of Shipping	52 AAdi Shankaracharya Marg Opp. Powai Lake, Powai,MUMBAI,400 072	91-22-30519400	91-22-2570361 1
		Bax counsel Insepection Bureau Pvt. Ltd.	303, Madhava,Bandra Kurla Complex Bandra(E)-400051	022-26591526,022-26590236	022-2659152 6
		Bureau VeritasQI	The Leela Galleria, 5th floor, Andheri-Kurla Road,Andheri(E), Mumbai-400059	022-26956300	022-2695630 9
		Germanischer Lloyd	304-305, Anna Salai,Teyanampet,Chennai-600018	044-24320335	044-2432818 6
		Velosi Certification Services,Mumbai	Velosi Certification Services(I)Pvt.Ltd.,212,Shivkrupa Complex Centre,Off Ghokhale Road,Navpada Thane(W)400602	022-25376770	022-2542677 7
		ABS Industrial Verification Ltd., Mumbai	404,Mayuresh Chambers,Sector-11,CBD Belapur(E),Navi Mumbai-400614	022-27578780 /1 /2	022-2757878 4 / 5
		Certification Engineers International Ltd.	EIL Bhavan, 5th floor,1 Bhikaji Camma Place,New Delhi-110066	011-26167539,26102121	011-2610141 9
		Dalal Mott MacDonald	501, Sakar -II, Ellisbridge, Ahmedabad-380006	079-26575550	079-6575558
		International Certification Systems	E-7,Chand Society, Juhu Road, Juhu, Mumbai-4000049	022-26245747	022-2262481 67
		SGS	SGS India Pvt. Ltd, SGS House,4B,A.S.Marg,Vikhroli(W),Mumbai-400083	022-25798421 to 28	022-2579843 1 to 33

Note: The details of Vendors indicated in this list are based on the information available with WGEIL. Contractor shall verify the capabilities of each vendor for producing the quantity with proper quality. Purchaser or purchaser representative does not take any responsibility on the performance of the vendor.