TERMS OF REFERENCE (TOR)

1. **SCOPE OF SUPPLY:**

   1.1. Supply, installation, testing & commissioning of **02 No. of Generators (one diesel and one gas engine.)** set of **450 KVA** at 50 °C for continuous operation at maximum site ambient conditions along with switch gear, control panel (load breaker, switch, MCCB/ACB) Bus bars, power cables and all connection accessories etc. etc.

   1.2. All power and control cables having tentative length of 50 meters from new Generator set to Generator Remote Control Panel.

   1.3. All installation material for completion of job like cable glands, lugs etc.

   1.4. One set of spare parts (each for every Genset) to cover pre-commissioning, commissioning and performance testing. (The spare parts list should be fully detailed with item wise price & quantity).

   1.5. Two years recommended spare parts (01 Set Each for every Genset) with list (The spare parts list should be fully detailed with item wise price & quantity).

   1.6. Foreign & Local supply component should be clearly mentioned in the bid.

   1.7. The required generator sets shall be utilized to deliver the power to ESP (Electrical Submersible Pumps). The load of ESP is main Inductive type.

2. **CODES AND STANDARDS:**

   - API
   - Relevant British standard specifications & code of practices
   - ISO
   - IEEE
   - ANSI
   - ASME

3. **SITE CONDITIONS:**

   a. Design Ambient temperature = 50 ºC (Although temp. may go upto 53 °C for few hours during Summer)
   b. Design Minimum Ambient temperature = - 4 ºC
   c. Altitude (above mean sea level) = 222.5 feet
   d. Average barometric pressure= 14.38 Psi
   e. Non Hazardous area (Gensets will be installed in well ventilated covered area / open shed)
   f. Fuel gas pressure (available) = 100 Psi Max-80 Psi Min

4. **FUEL GAS COMPOSITION:**

Methane =88.186 (Mole %)
Ethane = 5.517
Propane = 0.406
Iso Butane =0.017
N-butane = 0.017
Iso Pentane = 0.007
N-pentane = 0.01
O- Hexane plus = 0.265
Nitrogen = 2.912
CO2 = 2.663,
Calorific value Dry= 1017.08 btu/ft^3
Calorific Value Saturated: 999.38 btu/ft^3
Gross ideal Heat value: 1013.91 btu/ft^3
Specific Gravity: 0.6302

5. **NEQS LIMITS FOR ENGINE EXHAUST (As Per SEQS 2016):**

Sr. No	Parameter	Unit	NEQS Value
1	CO	Mg/Nm^3	800
2	SO_2	Mg/Nm^3	1700
3	No_x	Mg/Nm^3	400
4	H_2S	Mg/Nm^3	10
5	PM	Mg/Nm^3	300

Note: Incase above mentioned values differs then NEQS limits of the present prevailing standards of Pakistan shall be considered for Engine Exhaust (Both for Gas and Diesel).

6. **ENGINE:**

6.1. The engine should be capable of developing sufficient horse power to drive the alternator on full load at maximum site ambient conditions in continuous operation.
6.2. The engine should be turbocharged.
6.3. The engine should be designed for most suitable number and layout of cylinders.
6.4. The engine should be equipped with each cylinder temperature display meter at engine skid.
6.5. The engine should be minimum equipped with following systems:
   i. Cooling system (including radiator system / Heat Exchanger / Cooling tower) water cooled, with level switches, thermostats for pre-alarm & trip, expansion tank, pressure gauges etc.

ii. Lubricating system with lube oil filtration, pressure & temperature gauges, coolers, level switch.
iii. Fuel gas system (filter & pressure regulator to regulate the available 80-100 psi fuel gas pressure, Expansion tank, Manual & Automatic S.D valves, piping & pressure & temperature gauges etc)
iv. Genset shall be enclosed in noise level below 85dBA at 1meter.The canopy shall be sized to have adequate free space for maintenance.
v. Batteries for engine cranking/starting system,
vi. Air inlet system with air filtration and pre-filter for dusty environment conditions & indicators.
vii. Control system should be Controller based / PLC based.

6.6. The Generator control panel will be installed at about distance of 50 meters in the separate control room. The generator sets should be provided with an engine instrument panel, a remote Generator control panel and synchronization panel (for synchronising both diesel and Gas Gen ets of 450 KVA). The engine control panel should be skid mounted on anti vibration mountings. All necessary equipments including but not limited to alarm/shut down, start push button, stop push button, alarm acknowledge, hours run meter, Engine mounted generator circuit breaker 'open' & 'close' indicators, Local/remote selection switch, generator CB open/close, frequency meter, P.F, KW, KVAR & WH meters.etc.

6.7. Metering system shall include but not limited to; Ammeters, Voltmeters, Watt meters, Frequency meters, P.F indicator, Watt hr meter, Temperature indicator, frequency voltage and active power recorder, Temperature indicator, winding temperature meter, bearing temperature meter etc.

6.8. All Engine requirement, Characteristics, stator, rotor, excitations, terminal boxes, battery charging, voltage regulation system, Governor, Generator Control panel, Control system, protections, manuals, tools & software, instrumentation should be as per detail in Annexure-A, B & C. However, this is minimum requirement & bidder / Manufacturer must provide latest additional control / protection / securities for smooth operation & control.

7. ALTERNATOR:

7.1. The generator shall be designed for 415 VAC, 50 HZ, 3-phase, 4-wire, P.F =0.8 rated at **450 KVA** at 50 ^{o}C continuous operation at specified site conditions.

7.2. Generator temperature rise should be within NEMA for continuous duty over an ambient temperature of 50 ºC. Coupling to engine flywheel shall be through a flexible coupling for a positive alignment.

7.3. The electrical power generator should be rated on a continuous running duty basis.

7.4. Insulation class of alternator = H.

7.5. The alternator shall have steel fabricated construction, self cooled type. All material used in the construction shall be designed for use in dusty environment.
7.6. The generator should be synchronous type with brush less excitation system and ventilation system.
7.7. Possibility of automatic and manual operation shall be provided.
7.8. The power and control cables between generator, control panel etc should be provided by supplier.
7.9. The power cable should be compatible with gen set power rating both for Gas & Diese.
7.10. All types of power/instrument cables required for both generator sets and synchronization panel from gen sets to Control room (50 M away) shall be sole responsibility of supplier.
7.11. Terminal box should be able to permit suitable entrance of several lengths.
7.12. All necessary CT's for the voltage regulator for measuring and protection shall be provided in terminal box.
7.13. The output signal shall be practically sinusoidal.
7.14. The winding shall carry embedded thermal sensors to protect it against overheating.
7.15. The alternator shall be able to withstand an over speed of 20% above rated speed for some time.
7.16. Space heater shall be provided.
7.17. The exciter should be shaft mounted, brush-less revolving armature type,
7.18. The excitation current should be controlled by closed loop electronic circuit.
7.19. Circuit Breaker should be installed on each Genset skid for the protection of Generator and isolation of power cables.

8. **SYNCHRONIZATION PANEL:**

Bidder to provide the synchronization panel for synchronization of the both Gen Sets cap: 450 KVA (Gas and Diesel as per SOR Line item # 01 and 02). All the specifications must be prepared according to the technical specification of both gen sets for panel. Bidder shall provide all the drawings and technical specification in his technical bid for technical evaluation. The panel must be according to the prevailing international codes and Standards.

9. **BIDDER QUALIFICATION CRITERIA:**

The bidder who intends to participate in this supply, installation & commissioning of the generators set bid, must fulfill the following requirement / parameters for qualification. Bidder should provide documentary proof otherwise bid will be considered as technically non-responsive and will be rejected. The bidder to provide the following mandatory data for evaluation/qualification:

8.1. Bidder must submit the Authorization Letter from the Packager in favor of bidder to bid for Subjected Case.

8.2. The Bidder offered Manufacturer/OEM shall have at least Twenty (20) years of experience of Manufacturing & supply of generators.
8.3. The offered brand must have well reputation in oil & gas plants, refineries & Petrochemical sector in Pakistan, bidder to provide verifiable proof.
8.4. At least 08 Gensets (min. 450 KVa capacity) of the offered OEM/Brand should be in use in oil & gas sector, refineries & Petrochemical sector with in Pakistan during last 15 years or more (Less than 15 years not acceptable). Verifiable proof should be provided. Supply of Gas Gensets outside Pakistan will not be considered.
8.5. Bidder offered Manufacturer/OEM should have established dedicated workshop facilities since last 10 years for both (parts & services) within Pakistan for after sales service & warranty/guarantee of the generator set.
8.6. Spares and service facilities of (Top End, Major Overhauling and site services etc.) of OEM or Authorized Partner / Distributor / Dealer must be available in Pakistan since last consecutive 10 years. Provide OEM Authorization letter showing confirmation and verifiable contact details of existing after sales services facilities in Pakistan.
8.7. The workshops of the Manufacturer/OEM should have sufficient qualified manpower, all tools, equipment, testing facility, overhead cranes, cleaning facility etc. for maintenance, top end & major overhauling of the gas engines & generators. OGDCL reserved the right to visit the workshop facility to verify the submitted detail. OEM Confirmation letter for availability of such facilities in Pakistan shall be provided with technical bid regarding overhauling services to be provided.
8.8. The bidder should submit the satisfactory performance certificates from the clients for the after sale services through the workshop facility within Pakistan. In case bidder is not the authorized Dealer of OEM, then Authorization letter from OEM will be required, showing the availability of After Sales services in Pakistan.
8.9. List of all the offices and service agencies across Pakistan.

Packager of GenSet

8.10. The bidder offered Packager shall have at least Ten (10) Years packaging experience of Renowned Manufacturer/OEM.
8.11. At least 05 Gensets (min. 450 KVa capacity) of the Renowned OEM/Brand packaged by the same packager should be in use in oil & gas sector, refineries & Petrochemical sector with in Pakistan during last 10 Years. Verifiable proof should be provided. Atleast 03 gensets must be in operation for last 03 years. Supply of Gensets outside Pakistan will not be considered.
8.12. In case of bid submitted by any Joint venture companies, the experience of one COMPANY will govern e.g Thirteen years' experience of one COMPANY & Seven years of the other COMPANY will not be considered as twenty years.
8.13. COMPANY shall provide certified copy of valid NTN/GST certificates (In case of local bidders).
8.14. Listed status of the COMPANY / other COMPANY profile.

8.15. Bidder shall submit the HSEQ policy of the Packager.
8.16. Bidder declared as black listed at PPRA website will not be entertained.
8.17. Bidder shall have strong financial strength to meet the execution of Contract & later on maintenance services, evidence should be provided.

10. **OTHER TERMS AND CONDITIONS:**

9.1. The cost of 02 years spare parts with list should also be provided (This cost will not be considered in evaluation) the spare parts list should be fully detailed with item wise price & quantity.
9.2. De-rating chart should be provided along with technical bid.
9.3. The manufacturer should guarantee the equipment against all defects of material or malfunction and against faulty construction for 01 year operation or 18 months after shipment (Whichever is earlier). During guarantee period, the remedy to these faults should be responsibility of supplier including replacement of faulty parts/transportation.
9.4. The OEM/supplier should provide 02 sets of operation and maintenance/instruction manuals (Hard copy and soft copy) with all P&ID's, all mechanical/instrument/ electrical drawings, Quality plan, list of recommended lubricants/chemical, installation drawings & PLC / Controller software etc.
9.5. The first fill of oil & radiator coolant should be responsibility of supplier/seller.
9.6. Any type of civil work involved will be performed by OGDCL. Bidder to provide foundation drawings soon after placement of purchase order.
9.7. Installation, leveling, alignment, grouting, terminations, tie-in, startup/commissioning on Full Load / Off Load will be supplier responsibility, along with all associated material.
9.8. Spplier should arrange load bank at OGDCL site for full load testing of the Genset till successful commissioning of both Gen sets.
9.9. OGDCL will provide Unloading, Water, fuel, electricity for commissioning & installation activities at site only.
9.10. Food & accommodation for the installation & commissioning team will also be provided by OGDCL at site.
9.11. Earthing will be OGDCL responsibility.
9.12. All the necessary special and ordinary tools during startup activities will be supplier responsibility.
9.13. Third party inspection will be carried out at manufacturer works by any third party inspector deputed by OGDCL. Supplier should make arrangements & provide access to carry out TPI.
9.14. Bidder should arrange factory acceptance test at manufacturer/packager's works. The factory acceptance test shall be witnessed by Two OGDCL engineers. All cost including air tickets, boarding, lodging at destination will be in OGDCL's scope. All

other arrangements, pick & drop from Airport to site and back, local transportation, test equipment, documentation for FAT will also be in bidder scope.

9.15. Delivery period for Material: 240 days after establishment of L/C. Commissioning & Startup of the offered Gensets must be completed within 03 months after receiving of material at site. Bid validity should be 180 days from Bid opening date.

9.16. The following tests and checks shall be performed at Manufacturers works as a minimum:

i. Insulation resistance.
ii. Measurement of winding resistance
iii. Determination of short circuit characteristics
iv. Fuel system test
v. Measurement of nominal no-load speed.
vi. Oil flow, temperature and pressure measurements.
vii. Testing of all control and protective devices.
viii. Testing of control and logic circuits.
ix. Operation of the completed generator package at ¼ load for 30 minutes, ½ and ¾ load for 1 hour, full load for 4 hours and 110% overload test for one hour.
x. Voltage and frequency measurements.
xi. Temperature rise at rated load and frequency.
xii. Measurement of fuel consumption.
xiii. Measurement of exhaust gas temperature.
xiv. Phase sequence.
xv. Determination of efficiency and power factor at 100%, 75% and 50% of full load.
xvi. Parallel operation and load sharing.
xvii. Measurement of vibration. Measurement of noise

11. **FINANCIAL BID FORMAT:**

Sr. #	Scope	Unit Price	Total Amount
1*	02 No. of Generators (One diesel engine driven and one gas engine driven) sets with Power and control cables, panels, Fuel gas regulation & filter system (complete package) having capacity 450 KVA @ 50 °C (each) along with One set of spare parts (for each set) to cover pre-commissioning, commissioning and performance testing.		
2	Installation, leveling, alignment, grouting, terminations, tie-in, startup/commissioning, testing. Lump sum		

3	Special and preventive maintenance tools (01 set).		
4	02 year spare parts (with list and unit cost) 02 sets		

Note: For item No. 01, bidder to provide breakup cost of each item

Required Quantity of the generators is 02 no's (One diesel engine driven and one gas engine driven.) However, OGDCL reserves the right to increase or decrease the quantity based on the requirement at later stage. In such case, unit rates quoted for sr. 1~2 shall prevail.

Financial Evaluation will be based on Sr. # 1-2 only, selection of 02 Year Spare parts, Special Tools and TPI will be on OGDCL choice.

Annexure-A

Sr. No.	**Engine Requirements**		
A	**General**		**Acceptance / Deviation if any**
1	Type	Genset	
2	Services	Base Load Power Generation	
3	Power (BHP) Normal	To drive the genset of 450 KVa	
4	Power (BHP) rated	To drive the genset of 450 KVa @ Site Conditions	
5	RPM	1500	
6	Drive	Direct	
7	Synchronization requirement	Parallel	
B	**Engine**		
1	Turbocharged	Required	
2	After cooler	Required	
3	Exhaust manifold	Water cooled	
4	Rated speed Max	1500 RPM	
C	**Site Location**		
1	Installation	Land Based ,Inside open shed	
2	Elevation	222.5 ft	
3	Ambient Temp:	(46°C to 53°C) max, (for Design 50 °C) 35°C normal (-4°Cmin)	
4	Barometric Pressure	14.21 Min, 14.55 Max PSIA	
5	Atmosphere	Non.Corr:	

6	Coating	stand: Manf:	
7	Noise Specs	API 615	
8	Cop: Alloy	Allowed	
9	Elect: Area	Non-Class f	
10	Emission Control	Required as per Environmental Standards	
D	**Fuel Gas System**		
1	Filter	Required	
2	Pressure Regulator Valve	Required	
3	Manual S.D.Valve	Required	
4	Automatic S.D.Valve	Required	
5	Piping & Gauge	Required	
E	**Air Inlet Filter**		
1	Mounting	Skid	
2	Type	Dry	
3	Stages	Two (Cyclone + Element)	
F	**Spark Arresting Exhaust Silencer**		
1	Mounting	Skid	
2	Piping	To be supplied by vendor	
3	Insulation	Required	
4	Type	Commercial	
G	**Oil**		
1	Type	Dual with transfer valve	
2	Differential pressure indicator	Required with taps & gauges.	
H	**Fuel Gas**		
1	Fuel Pressure (PSIG)	190-150 PSIG	
2	Fuel Temp©	46 Max , 5 Min	
3	CV (BTU/SCF) Average	883.31	
I	**Starting System**		
1	Mounting	Skid	
2	Method	Battery	
3	Startor	02 Nos, Electric Type/ Qty can be accepted to Vendor Standard	
4	No of 15 sec starts	6	

5	Batteries	To be supplied by vendor , Lead acid type	
6	High tension leads/plugs	Unshielded	
7	Trickle charger	To be supplied by vendor ,	
8	Trickle charger amps @	240 V-1 Phase -50 Hz- 30 A/ Vendor Standard to meet the requirement	
J	**Cooling System**		
1	Jacket water heaters	02 Nos, ResistiveType, 25 amps @ 240-1-50 Vendor Standard to meet the requirement	
2	Water cooler		
2.1	Mounting	Skid/ Separately Installed/ Remote	
2.2	Supplier	To be supplied by vendor ,	
2.3	Sizing	vendor 's standard	
2.4	Type	Horizontal type, Air Cooled	
2.5	After Cooler	Integral with J/W cooler/ Vendor Standard	
2.6	Piping	To be supplied by vendor	
K	**Manual / Tools**		
1	Operation / maintenance procedures manuals for engine, Alternators & all accessories.	02 Hard Copies & 02 CDs	
2	Spares Parts manuals for engine, Alternators & all accessories.	02 Hard Copies & 02 CDs	
3	Manufacturer data Records (MDR)	To be provided.	
4	Preventive/ Schedule Maintenance Plan	To be provided.	

Annexure-B

Instrumentation

Sr. No.	Description	Control Panel Mounted indicator	Engine Mounted Indicator	Alarm	Shutdown	Acceptance / Deviation if any
1	Fuel Gas inlet Pressure 80-100 Psi	√	√	√	√	
2	Intake Filter ΔP	√		√		
3	Lube oil pressure	√	√	√	√	
4	Lube oil filter ΔP		√			
5	Intake Manifold pressure		√			
6	Jacket Water Temperature	√	√	√	√	

7	Cylinder Temperatures		√	√		
8	T.charger Exh.Gas outlet Temp.	√	√	√	√	
9	Intake manifold Temp.		√			
10	Exh. Manifold Temp.		√			
11	High Engine Oil Temperature		√	√	√	
12	Low lube oil level	√		√	√	
13	Low coolant level	√		√	√	
14	Engine Vibration Switch	√	√	√	√	
15	Engine service Hours		√			
16	Engine Speed		√			
17	Engine over Speed	√		√	√	
18	Fuel Shutdown valve	√		√	√	
19	Barring device out	√				
20	Panel Power	√				
21	Battery charger Power	√		√		
22	Battery Amps	√				
23	Over Crank	√		√	√	
24	Alternator Reverse Power	√		√	√	
25	Alternator Earth Fault	√		√	√	
26	Over / Under Voltage	√		√	√	
27	Over / Under Frequency	√		√	√	
28	Alternator Differential	√		√	√	
29	Over current	√		√	√	
30	Loss of Field excitation	√		√	√	
31	Winding Temperature	√		√	√	
32	Generator Bearing Temperature	√		√	√	
33	Emergency Stop	√	√	√	√	
34	Fire detectors	√		√	√	
35	Cooler / radiator fan Vibration		√	√	√	
36	Short circuit	√		√	√	

Annexure-C

Synchronous Alternator

Sr. No.	Characteristics		Acceptance/ Deviation if any
1	Power	450 kVA	
2	Power factor	0.8	
3	Voltage	400 ± 5%	
4	Number of Phase	3	

5	Synchronous Speed (rpm)	1500	
6	Frequency (Hz)	50 ± 1%	
7	Service	Continuous	
8	Neutral Grounding	Low Resistance/ Solidly Grounding	
9	Parallel operation	Yes	
10	Cooling method	Air cool	
11	Automatic Voltage Regulation	Yes	
12	Ambient	50 c°	
13	Protection	IP 55	
Stator			
14	Casing Orientation	Horizontal/ Vendor Standard	
15	Bearing Type	Ball / Roller/ Vendor Standard	
16	Insulation Class	H	
17	Winding Temperature Sensor	Yes	
18	Bearing Temperature Sensor	Yes	
19	Winding Connection	4 wire, wye-connected	
20	Anti-Condensation Heater	Yes, 220 Vac	
Rotor			
21	Winding Material	Copper	
22	Insulation Class	F	
Excitation			
23	Excitation	Self excitation / PMG Base	
24	Exciter	Brushless Type	
25	Exciter Insulation Class	F	
Terminal Boxes			
26	Protection Type	IP 55	
27	Cable Gland	Brass	
Battery Charging			
28	Rectifier	Yes	
29	Input	220/400 Vac ± 10 %, 50 Hz ± 2 Hz	
30	Output	24 Vdc ± 1%	
31	Batteries	Ni-Cd, Lead Acid	
32	Battery Box	Yes	
33	Voltmeter (Both Input and output)	Yes	
34	Ammeter (Both Input and output)	Yes	
35	Rectifier ON/OFF switch	Yes	
36	Suitable for outdoor location	Yes	

37	Overload protection	Yes	
38	Automatic Boost charging and float charging	Yes	
Note: Charging of control panel in control room must be activated by utilising power of gen set or else (if required). All the required power cables shall be suppliers responsibility.No power source other than these gen sets is available at site.			
Voltage Regulation System			
39	AVR /DVR	Yes	
40	No-load voltage adjustment	±10 % of rated voltage	
41	0-100 % rated load	±5 % of nominal voltage	
42	Steady state regulation for constant load	2 % of nominal voltage	
43	Transient variation on the sudden application or removal of rated load	10 % of nominal generator voltage	
44	Transient voltage recovery sec.	±5 % nominal voltage within 1 Sec	
45	Over Excitation protection	Yes	
46	Over Voltage protection	Yes	
47	Over temperature protection	Yes	Also AVR is acceptable without over temperature protection.
48	Loss of sensing protection	Yes	
49	Under frequency protection	Yes	
50	Excitation field ampere limit protection	Yes	
Governor			
51	Electronic Type	Yes	
52	Steady load condition	± 0.25% of 50Hz	
53	Rated speed	Yes	
54	Idle Speed	Yes	
55	Acceleration ramp time	Yes	
56	Deceleration ramp time	Yes	
57	Start fuel limit	Yes	
58	Gain and reset	Yes	
59	Actuator compensation	Yes	
60	Load gain	Yes	
61	Droop	Yes	
Generator Control Panel			
62	Remote Control Panel	Yes	
63	Distance between Generator and control panel	50 m	
64	Floor Mounting	Yes	
65	Ready wire type	Yes	

66	Air Circuit Breaker (ACB)	YES	
67	Protection type	IP42	
68	Cable entry	Bottom	
69	Front access door	Yes	
70	Control cables / other accessories	Yes	
	Control system		
71	Controller based / PLC based Control system	Yes	
72	Manual / Auto start/stop sequence control	Yes	
73	Load / unload ramping control	Yes	
74	Alarm and trip indication	Yes	
75	Load Sharing and speed control	Yes	
76	Excitation Control	Yes	
77	Manual / Automatic synchronization	Yes	
78	Monitoring equipments and emergency stop push-button	Yes	
79	Automatic cycle crank control	Up to 3 crank	
80	Automatic standby mode	Yes	
81	Temperature monitoring	Yes	
82	Metering system	Yes	
	Protection		
83	Alternator Reverse Power	Alarm / Shutdown	
84	Over / Under Voltage	Alarm / Shutdown	
85	Over / Under Frequency	Alarm / Shutdown	
86	Differential Current	Alarm / Shutdown	
87	Over current	Alarm / Shutdown	
88	Loss of Field excitation	Alarm / Shutdown	
89	Winding Temperature	Alarm / Shutdown	
90	Generator Bearing Temperature	Alarm / Shutdown	
91	Winding Temperature	Alarm / Shutdown	
92	Stator Earth Fault	Alarm / Shutdown	
93	Rotor Earth Fault	Alarm / Shutdown	
94	Low Oil Pressure	Alarm / Shutdown	
95	High Engine Oil Temperature	Alarm / Shutdown	
96	High Jacket Water Temperature	Alarm / Shutdown	
97	Engine Over speed	Alarm / Shutdown	
98	Low Jacket Water Level	Alarm / Shutdown	
99	Low level of lubrication oil	Alarm / Shutdown	
100	Over Cranking (Start failure)	Alarm / Shutdown	
101	Emergency Stop	Alarm / Shutdown	

102	Fuel Gas Pressure	Alarm / Shutdown	
103	Fire detectors	Alarm / Shutdown	
104	Engine Vibration	Alarm / Shutdown	
105	Cooler / radiator fan Vibration	Alarm / Shutdown	
106	Engine exhaust temperature	Alarm / Shutdown	
107	Short circuit	Alarm / Shutdown	
Manual / Tools /Software			
106	Controller /PLC Software CD/DVD	Yes	
107	Interface Cable	Yes	
108	Laptop	Yes	
109	Operation Service / maintenance procedures Manual	Yes	
110	Spare parts Manual	Yes	
111	Complete circuit & logic diagrams	Yes	
112	Manufacturer Data Records (MDR)	Yes	
Canopy (Genset shall be enclosed in Canopy)			
1	noise level	below 85dBA at 1meter.	
2	Adequate Space for Maintenance	Yes	

NOTE: Bidder should clearly mention & provide technical detail of deviation if any, so that the same can be Technically Evaluated/ Compared to accept or reject. Reference of any other code or vendor standard should be clearly defined i.e what is vendor standard or referred code differ with the requirement.