



OIL & GAS DEVELOPMENT COMPANY LIMITED
PROCUREMENT DEPARTMENT (LOCAL), ISLAMABAD
SCHEDULE OF REQUIREMENT

Material : **30 KVA DIESEL GENERATORS FOR SOGHARI-3 & JAND-1**

- **Due Date:**

Tender Enquiry No: **PROC-LE/17620**

Bid Bond Value : RS. 100,000/-

EVALUATION WILL BE CARRIED OUT ON FULL

Attachment(if any) : YES

Sr No	Description	Quantity	Make/Brand offered	Unit	Unit Price (PKR) Inclusive Of All Taxes Except GST	Unit Price (PKR) Inclusive of GST	Total Price (PKR) Inclusive of GST	Delivery Period Offered	deviation from Tender Spec. If Any
1	30 KVA DIESEL GENERATOR, AS PER ATTACHED DATA SHEET AT ANNEXURE 'A' & SPECIFICATIONS AT ANNEXURE 'B'	2		Number					

Special Note: The prospective bidders also download the master set of Tender Document

- The prospective bidders may keep in touch with OGDCL web site for downloading the clarifications/amendments (if any) issued by OGDCL.
- I. MATERIAL TO BE DELIVERED AT KHADEJI WITHIN 120 DAYS AFTER ISSUANCE OF LPO. II. PAYMENT TERM IS PAYMENT AFTER DELIVERY/INSTALLATION/COMMISSIONING

Discount (if any) shall only be entertained on Schedule of Requirement of Bidding Document (Financial Proposal). If the discount is mentioned elsewhere in the bid, the same shall not be entertained.



OIL & GAS DEVELOPMENT COMPANY LIMITED
PROCUREMENT DEPARTMENT (LOCAL), ISLAMABAD
SCHEDULE OF REQUIREMENT

Mandatory Checklist

Please confirm the compliance of the following mandatory information along with the bid(s) (failing which bids(s) will not be accepted)

Documents	To be Attached with the Technical/Financial Bids	Compliance	
		Yes <input type="checkbox"/>	No <input type="checkbox"/>
Original Bid Bond	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Copy of NTN Certificate	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Copy of GST Certificate	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Confirmation that the Firm is appearing on FBR's Active Taxpayer List	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly signed and stamped Annexure-A (Un-priced)	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly filled, signed and stamped Annexure-B	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly filled, signed and stamped Annexure-D	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly filled, signed and stamped Annexure-L on Company's Letterhead	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly signed and stamped Annexure-M on Company's Letterhead	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly signed and stamped Annexure-N on Non-Judicial Stamp Paper duly attested by Notary Public	Technical Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly filled, signed and stamped Annexure-A (Priced)	Financial Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly filled, signed and stamped Annexure-C	Financial Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>
Duly filled, signed and stamped Annexure-E	Financial Bid	Yes <input type="checkbox"/>	No <input type="checkbox"/>



OIL & GAS DEVELOPMENT COMPANY LIMITED
PROCUREMENT DEPARTMENT (LOCAL), ISLAMABAD
SCHEDULE OF REQUIREMENT

For the Vendors/Contractors who opt to submit Bank Draft/Call Deposit/Pay order against Bid Bond/Performance Bond, our Accounts Department has finalized an arrangement for online payment to such Vendors/Contractors, which will be processed through (IBFT & LFT) for which following information is required:

i.	IBAN No. (International Bank Account Number 24 Digits)	
ii.	Vendor Name as per Title of their Bank Account	
iii.	Contact No.of Company's CEO/ Owner (Mobile & Landline)	
iv.	Bank Name.	
v.	Bank Branch Name and Code	

Name, Sign and Stamp of the authorized official of the Bidder(s) _____



DAKHNI PRODUCTION FACILITIES



DOCUMENT TITLE	DATASHEET FOR 30 KVA DIESEL GENERATOR	
DOCUMENT NO.	XXXX-EDS-004	REV-1

GENERAL

Equipment Name	Disel Generator	Location	Outside
Tag Number	G-001	Manufacturer	-
Number Required	1	Model No.	As per Vendor
Fuel	<input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gas <input type="checkbox"/> LPG <input type="checkbox"/> Bio-Gas	Operation Mode(s)	<input type="checkbox"/> Island <input type="checkbox"/> Parallel with Generator <input type="checkbox"/> Parallel with Utility
Major Dimensions (L X W X H) mm	<input type="checkbox"/> VTS <input type="checkbox"/>	Weight (Kg)	<input checked="" type="checkbox"/> VTS <input type="checkbox"/>
Performance Standard	As per Specifications		

YEAR OF MANUFACTURING: 2019 OR LATEST

ENVIRONMENTAL DATA

Maximum Temperature	50 °C	Area Classification	Hazardous	Non-Hazardous
Minimum Temperature	0 °C	Zone	0	1
Ambient Temperature	35 °C	Group	None	<input checked="" type="checkbox"/> IIA <input type="checkbox"/> IIB <input type="checkbox"/> IIC
Maximum Humidity	10 - 40%	Location	<input type="checkbox"/> Indoor <input type="checkbox"/> Outdoor	<input type="checkbox"/> High
Altitude Above Sea Level	550 m (Note-1)	Temperature Class	<input checked="" type="checkbox"/>	<input type="checkbox"/>

GENERATOR CHARACTERISTICS

Output Power (Continuous)	30 kva	Zero Sequence Impedance:	VTS	$pu x_0$
Output Voltage	415 +/-5% V	Negative Sequence Impedance:	VTS	$pu x_2$
No. of Phases	3	Direct Axis Subtransient Reactance:	VTS	$pu x''_d$
Frequency	50 +/-2% Hz	Direct Axis Transient Reactance:	VTS	$pu x'_d$
Rated Speed	VTS rpm	Direct Axis Synchronous Reactance:	VTS	$pu x_s$
Duty Cycle	<input type="checkbox"/> Stand-by <input type="checkbox"/> Prime <input type="checkbox"/> Continuous	Quadrature Axis Subtransient Reactance:	VTS	$pu x''_q$
Rated BIL	VTS KV	Quadrature Axis Synchronous Reactance:	VTS	$pu x_q$
System Fault Level	<input type="checkbox"/> VTS KA (Symm) for 1/2 Sec (Note)	Efficiency		Power Factor
Req. Symm reactance (Xd')	VTS pu	No Load	VTS	
Req. Asymm reactance (Xd'')	VTS pu	1/2 Load	VTS	0.8
Insulation Class	A E B F H	3/4 Load	VTS	0.8
Rotar Temp. Rise	A E B F H	Full Load	VTS	0.8
Stator Temp. Rise	A E B F H	Overload	110% for 1 Hr in every 12 hrs	
Connection	<input type="checkbox"/> Star <input type="checkbox"/> Delta <input type="checkbox"/> Star	Max Overspeed	125% for 2 mins	Winding Pitch VTS
Neutral Earthing	<input type="checkbox"/> Directly Earthed <input type="checkbox"/>	Max THD	4%	Waveform
Frame Earthing	<input type="checkbox"/> By Manufacturer <input type="checkbox"/>	Harmonic Content		
Motor Starting Capability	<input checked="" type="checkbox"/>	1st	VTS	9th VTS
	Exciter	3rd	VTS	11th VTS
Construction	<input type="checkbox"/> Brushless <input type="checkbox"/> Static <input type="checkbox"/> PMG <input type="checkbox"/> Other	5th	VTS	13th VTS
No Load Voltage (VTS) V	Rated Current (VTS) A	7th	VTS	15th VTS
Rated Volts	VDC	Cooling		
	Space Heaters	Construction	Fan Cooled	Air-to-Air Heat Exchanger
Required	<input type="checkbox"/> No <input type="checkbox"/> Required	Power	(VTS) KW	Voltage (VTS) V
Voltage	Power (VTS) kW	Phase	3	Frequency (VTS) Hz
Phase	Quantity VTS	Flow	(VTS) m³/s	Pressure (VTS) kPa
	Voltage Regulation	Alternator Manufacturer	<input checked="" type="checkbox"/> Stamford/Siemens/CAT or Equivalent	Voltage Source
Rated Output Voltage	415 V	Phase	3	<input type="checkbox"/> External <input type="checkbox"/> Generator <input type="checkbox"/> TX
Regular Drift	less than 5 % per 20 °C	Inlet Temp.	(VTS) °C	Outlet Temp. (VTS) °C
	Terminal Box	Pump Detail	Make VTS	Model VTS
Placement	Top Bottom Left Right	Motor/Pump		Rated Output (VTS) KW
Arrangement	Cable Busbar	Enclosure		
Cable Type	CU/XLPE/SWA/PVC	Alternator Enclosure Protection	<input type="checkbox"/>	IP 23 (Min)

PHYSICAL ARRANGEMENT OF ALTERNATOR

Mechanical Data	Weight Kg	Accessories	Quantity	Range	Make & Model
Height x Width x Depth mm x mm x mm (VTS)	VTS	Winding Temp. Sensor	2 Nos. Per Phase (NOTE 8)	VTS	VTS
Rotor	VTS	Bearing Temp. Sensor	1 Nos. Required (NOTE 8)	-	-
Stator	VTS	Cooling Air Temp. Sensor	N/R	-	-
Accessories	VTS	Vibration Sensor	N/R	-	-
Total (Overall)	VTS	Lightning Arrester	N/R	-	-
Audible Sound Level (Overall)	85 [dBA] @ 1m	Surge Capacitor	N/R	-	-
Bearing Type	Ball Roller Combination (1 ball, 1 roller)	Voltage Regulator CT's	Required (VTS)	VTS	VTS
Bearing Lubrication	Oil Grease Bearing	Differential CT's	VTS	VTS	VTS
Protective Coating	Standard Other	Cross Current Compensation CT	N/R	-	-
Tropicalisation	Required Not-Required	Overcurrent Protection	Required (VTS)	VTS	VTS

Requirement for PARALLEL operation with another set:

Not Required

ENGINE CHARACTERISTICS

Output Power (Engine Output)	<input checked="" type="checkbox"/> 30 KW	Manufacturer	CAT/PERKINS/MAN/Deutz	Model	As per Vendor
Speed	VTS rpm	Cylinder Arrangement	(VTS)	No. of Cylinders	VTS
Starting Torque	<input checked="" type="checkbox"/> Kgm	Type of combustion chamber			
Rotaton (Viewed from Coupling End)	<input type="checkbox"/> CW <input type="checkbox"/> CCW	Bore	(VTS) mm	Stroke	(VTS) mm
Recommended Rated Power of Engine at Site	(VTS) KW	Comp ratio	VTS	Displacement	(VTS) L
Charging	<input type="checkbox"/> Naturally Aspired <input type="checkbox"/> Turbocharged <input type="checkbox"/> Supercharged	BMEP at Rated Load	(VTS) MPa		
Piston Speed	(VTS) m/sec	Regenerative Absorbption	(VTS) KW		
Coolant Capacity w/o Radiator	(VTS) L	Combustion air inlet flow rate	(VTS) m³/min		
Coolant Pump External Resistance	(VTS) m water	Exhaust gas flow rate	(VTS) m³/min		
Coolant pump flow rate	(VTS) L/min	Exhaust gas temperature	(VTS) m³/min		
Coolant fan air flow rate	(VTS) m³/min	Heat Rejection to coolant	(VTS) KW		
Allowable exhaust back pressure	(VTS) Kpa	Heat Rejection to exhaust	(VTS) KW		
Exhaust Flange Size	<input type="checkbox"/> <input checked="" type="checkbox"/> (VTS) mm	Heat Rejection to atmosphere from engine	(VTS) KW		
Engine Cooling	<input type="checkbox"/> Water Cooled <input checked="" type="checkbox"/> Air Cooled <input type="checkbox"/> Supercharged	Heat Rejection to atmosphere from generator	(VTS) KW		
Governor Type	<input type="checkbox"/> Hydraulic <input checked="" type="checkbox"/> Electronic	Power Required for Radiator Fan	(VTS) KW		
Governing Class	G2 (NOTE 11)				



DAKHNI PRODUCTION FACILITIES



DOCUMENT TITLE	DATASHEET FOR 30 KVA DIESEL GENERATOR	
DOCUMENT NO.	XXXX-EDS-004	REV-1

Mechanical Efficiency	(VTS)	%
Jacket Water Heater	Required <input type="checkbox"/> Not-Required <input checked="" type="checkbox"/>	Power <input type="checkbox"/> KW
Air Shutoff Valve	Required <input type="checkbox"/> Not-Required <input checked="" type="checkbox"/>	

STARTING SYSTEM

DC Motor Start and Batteries	DC Motor	Required <input type="checkbox"/> Not-Required <input type="checkbox"/>	24 VDC
	Battery Type	<input checked="" type="checkbox"/> Lead-Acid <input type="checkbox"/> Ni-Cad	
	Nominal Cell Volts	<input checked="" type="checkbox"/> N/R <input type="checkbox"/> V	Volts per Cell
	End Cell Voltage	<input type="checkbox"/> 24 <input type="checkbox"/> V	VDC
	Internal Battery Resistance (VTS)	<input type="checkbox"/> $\mu\Omega$ @ 25°C	
	No. of Cells	N/R	
	No. Of Batteries	(NOTE-3)	
	Battery Short Circuit Current	(VTS) kA	
	Battery Location	Enclosed <input type="checkbox"/> Separate on support racks <input type="checkbox"/> Along with Genset	

Battery Charger (NOTE-4)

Battery Charger type	<input type="checkbox"/> Constant Voltage, Current Limiting <input type="checkbox"/> Constant Current, Voltage Limiting	Single <input type="checkbox"/> Dual <input checked="" type="checkbox"/>
Battery Temperature Compensation	<input type="checkbox"/> Required <input checked="" type="checkbox"/> Not-Required	Number of Multiple Parallel Units (if applic)
Offline Charging (Dual Systems)	<input type="checkbox"/> Required <input checked="" type="checkbox"/> Not-Required	Input Voltage 230 VAC \pm 10%
Anticondensation Heater	<input type="checkbox"/> Required <input checked="" type="checkbox"/> Not-Required	Input Frequency 50 Hz
Float Charge Voltage	(VTS) VDC	No. of Phases 1
Boost Charge Voltage	(VTS) VDC	S/C Capacity (VTS) kA for 1 sec
Equalization Charge Voltage	(VTS) VDC	Protection <input checked="" type="checkbox"/> MCCB <input type="checkbox"/> HRC Fuses
Max Ripple Voltage (w/o battery)	(VTS) mV or %	Charger efficiency at 100% load: (VTS) %
Max Recharge Time	hrs to 95% Capacity	Charger max heat output: (VTS) (KW)

GENERATOR CONTROL PANEL

General (NOTE 13)		Controls & Monitoring	
Type	Electronic Microprocessor Based	Mode Selection	Required <input checked="" type="checkbox"/> Not-Required <input type="checkbox"/>
Make	VTS	Model	VTS
Mounting	Within GCP Cubicle	Location	LT Room
Safety Shutdown Indication			
Indicators	LED/LCD	Alaram	Required
Visual Indication	<input checked="" type="checkbox"/> High Engine Temp.	<input type="checkbox"/> Low oil Temp.	LCD Display
	<input checked="" type="checkbox"/> Fail to Start	<input type="checkbox"/> Generator Over Speed/Frequency	
	<input checked="" type="checkbox"/> E/R stop	<input checked="" type="checkbox"/> Generator Under Speed/Frequency	
	<input checked="" type="checkbox"/> Generator High Voltage	<input type="checkbox"/> Generator Low Voltage	
	<input checked="" type="checkbox"/> Oil pressure sender ckt	<input type="checkbox"/> Loss of speed signal	
	<input type="checkbox"/>	<input type="checkbox"/>	
Operating Characteristics			
Operating Voltage	230 VAC	Frequency	50 Hz
Communication Interface	RS232 <input checked="" type="checkbox"/> RS485 <input type="checkbox"/> USB <input type="checkbox"/> Ethernet <input type="checkbox"/>	Emergency Stop Push Button	Required <input type="checkbox"/> Not-Required <input checked="" type="checkbox"/>
		Connectivity with SCADA/DCS	Required <input type="checkbox"/> Not-Required <input type="checkbox"/>

Notes

- Contractor shall give actual derating curves of rating above rated mean sea level. The required shall be after temperature and Above means sea level compensation.
- Alternator terminal box shall be suitable for withstanding the specified system fault level.
- Contractor to ensure required no. of batteries for rated genset for at least six starts.
- Dual redundant Battery charger to be placed inside generator Control Panel.
- One extra dry battery set with two times fill of sealed battery water to be provided.
- The design temperature for Alternator package shall be the maximum ambient temperature. The battery ampere-hour capacity shall be based on minimum ambient temperature.
Vendor to provide one trolley (6 shelf with 40 sq foot of storage) of tools for maintenance of 1000 pcs with minimum weight of 150 kgs tools only.
- VTS = Vendor to Specify
- TBD=To Be Decided
- RTD Sensor output shall be terminated at Generator Control Panel. RTD can be 3 wire or 4 wire. Manufacturer/Vendor shall take account of all requirements in this regard including Transmitters for 4-20 mA output to Generator Control Panel or RTD inputs directly in Generator Control Module.
- All Control Cables including speed, voltage, temperature, engine control etc. shall be provided by Vendor. Distance from generator to Genset Control Panel will be approximately 30 Meters. 75 meters cables from unit to control panel to be provided with extra switches. Power Cables shall be provided by others.
- Control Cables shall be of spec: CU/XLPE/PVC/SWA/PVC. Any other cable specs shall be first approved by Client prior to purchase.
- Battery Cables and Battery Charging cable shall be provided by vendor. All cables shall be approved before client prior to purchase.
- Performance Standard of Engine shall be as per ISO8528
- Generator Control Panel shall be in cubicle form, metal enclosed, with 14 SWG sheet (min), hinged type, display of Control Module LCD on panel front etc.
- Bidder to sign & stamp Data Sheet & Specifications (All Pages).

23/1/2019	1	RE-ISSUED FOR REVIEW	JAK	SAG	AJ	AJ
22/1/2019	0	ISSUED FOR REVIEW	JAK	SAG	AJ	AJ
DATE	REV	DESCRIPTION	PREP.	CHKD.	APPR.	PM



Oil & Gas Development Company

DAKHNI PRODUCTION FACILITIES

SPECIFICATION FOR DIESEL GENERATOR

CONSULTANT:

Jan, 2018



PETROCHEMICAL ENGINEERING CONSULTANTS

C-2, Block No. 17, Gulshan-e-Iqbal, Near National Stadium, Karachi-75300, Pakistan.
Telephones.: +92 (21) 34827780, 34961088, Fax: +92 (21) 34961089,

E-Mail: shoaib@pcec.com.pk web: www.pcec.com.pk





 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

TABLE OF CONTENT

1.0	INTRODUCTION	3
2.0	SCOPE	3
3.0	GENERAL	5
4.0	CODES AND STANDARDS	6
5.0	DESIGN AND CONSTRUCTION REQUIREMENTS OF DIESEL ENGINE	7
6.0	DESIGN AND CONSTRUCTION REQUIREMENTS OF ALTERNATOR.....	14
7.0	DIESEL GENERATOR CONTROLS	19
8.0	OPERATION MODES	23
9.0	SKID HOOK-UP FACILITIES	24
10.0	MARKING AND FINISH	28
11.0	INSPECTION AND TESTING.....	30
12.0	VENDOR DATA/DRAWING REQUIREMENTS	35

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

1.0 INTRODUCTION

1.1. This specification covers the general requirement for Diesel Generator for Dakhni Gas Field of Oil and Gas Development Company Ltd

2.0 SCOPE

2.1. The Generator shall be provided with all accessories including the starting system and Generator Control.

2.2. The Vendor shall factory design, fabricate, assembly, test at works, package and prepare for shipment the Diesel Generator package consisting of but not necessarily limited to the following:

2.2.1. Diesel engine/generator set

2.2.2. Complete cooling system (Water Cooling)



2.2.3. Electrical start-up system complete with the dual redundant battery and dual redundant battery charger.

2.2.4. Complete lube oil system and lube oil make-up system



2.2.5. Complete fuel system

2.2.6. Local Control Panel for Diesel Generator Control and Monitoring System with AVR, governor, generator and generator protections

2.2.7. Local instrument panel

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

- 2.2.8. Remote Control Panel housing remote voltage and frequency control equipment, metering, potentiometers and load sharing system.
- 2.2.9. Drawings, maintenance manuals, Inspection and testing including certified test reports
- 2.2.10. Inspect installation; approve installation, test and commission
- 2.2.11. Vibration isolating mounts
- 2.2.12. Interconnecting piping, tubing for auxiliary systems
- 2.2.13. Air intake system
- 2.2.14. Grating Required.
- 2.2.15. Exhaust system with muffler, stainless steel expansion joint and connecting exhaust section
- 2.2.16. Torsional and lateral analysis of complete machinery train (Vendor standard acceptable)
- 2.2.17. An auto trip device independent of speed governor to safely shut down on over speed of engine
- 2.2.18. All electrical and instrumental cabling and accessories for skid mounted equipment and terminations for Employer/Owner's Engineers connections.
- 2.2.19. Interconnecting electrical/instrumental cabling (wiring within the skid)

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

2.2.20. Insulation within the package where necessary for safety purposes

2.2.21. All necessary junction boxes

2.2.22. Grounding of electrical equipment within skid and provision of two grounding lugs on skid.

2.2.23. Painting as per Vendors standard

2.2.24. Export crating with long term preservation for up to 12 months

2.2.25. Testing and inspection at Vendors works including certified test reports



2.2.26. Vendor to make sure that proposed genset is able to cater the load of UPS and all motors and should not trip on either condition.

3.0 GENERAL

3.1. Work covered by this contract shall include design, manufacture, supply, transportation, delivery, installation, testing and commissioning of Diesel Generator Sets and auxiliaries required for Stand-by Duty power generation.

3.2. The generator set shall consist of a diesel engine directly coupled to an electric generator, together with the necessary control panel, battery, diesel tank etc and accessories to provide continuous duty supply to facility.

3.3. In the event of a conflict between this specification and any other documentation, the Employer/Owner's Engineer shall be made aware for clarification before commencement of design or fabrication.



 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

- 3.4. Deviations to the requirements of this Specification and the referenced standards and documents to which the equipment shall be manufactured and tested must be stated by Vendor in writing at the bid stage.
- 3.5. In the absence of such a statement, it is considered that the requirements of the specification are met without exception.
- 3.6. Any shortcomings that are identified during or on the completion of fabrication shall be corrected by the Vendor at the Vendor's expense.

4.0 CODES AND STANDARDS

- 4.1. The equipment offered shall conform to the latest revision of relevant Standards as mentioned in 2332-EE-401 as well as following standards.



ISO 8528	Reciprocating Internal Combustion Engine Driven Alternating Current Generating Sets
ISO 15550	Internal Combustion Engines – Determination and Method for the Measurement of Engine Power – General Requirements
ISO 3046/1	Reciprocating internal combustion engines -- Performance -- Part 1: Declarations of power, fuel and lubricating oil consumptions, and test methods -- Additional requirements for engines for general use
BS 5514	Reciprocating internal combustion engines. Performance. Standard reference conditions, declarations of power, fuel and lubricating oil consumptions and test methods
IEC-34(Part-1).	Rotating Electrical Machines - Part-1 Rating and Performance

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

5.0 DESIGN AND CONSTRUCTION REQUIREMENTS OF DIESEL ENGINE

5.1. General

- 5.1.1. Compression ignition diesel engine shall be supplied to drive the generator, in accordance with ISO 3046 Parts 1 to 6.
- 5.1.2. Diesel generator shall be turbocharged; four stroke type unless otherwise specified in datasheet.
- 5.1.3. The Vendor shall advise rated power at standard SAE conditions and de-rated power for site conditions. The engine shall also be de-rated for air intake and exhaust losses.
- 5.1.4. The stand-by rating shall be in accordance with ISO 8528.
- 5.1.5. The engine speed shall be decided by the Vendor based on achieving the best possible efficiency and operating reliability to produce the specified kW electrical output at 50Hz.
- 5.1.6. The diesel generator will provide power to Emergency Loads Only in case of failure of Main Backup Genset or when terminal is operated on low load.
- 5.1.7. The system shall consist of a Diesel Generator skid, Local Control Panel (LCP) and a Remote Control Panel (RCP). The Remote Control Panel will be mounted away from the Diesel Generator and located in the LV switchgear/MCC room unless otherwise specified in Detailed Layout.
- 5.1.8. The Diesel Generator Set shall be designed to include the following facilities:



 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

- a. It shall be suitable for automatic/manual start and be capable of carrying full load within 15 seconds.
- b. Automatic disconnection from the main bus and engine shutdown on the occurrence of a set malfunction.
- c. Automatic engine cranking facility. Six unsuccessful engine cranks in succession shall result in "Fail to Start Alarm".
- d. Start and stop emergency generator from Local Control Panel, Remote Control Panel and interfaces with switchgear/MCC.
- e. The engine/generator shall be for Hot stand-by operation in accordance with ISO 8528)
- f. All equipment shall be designed for safe operation, which shall include safety guards for exposed rotating parts and 'fail safe' controls.
- g. Any part of the equipment supplied by the Vendor weighing in excess of 25 kg shall be supplied with individual eyebolts, lifting lugs, holes in frames or similar devices to enable the part to be hoisted by lifting slings, bars, etc., with minimal risk of accident or damage.

5.2. Driver Requirements

- 5.2.1. The prime-mover shall be a diesel engine. Driver shall be of standard proven design, construction and materials. Engine over speed shutdown system shall be provided as part of Engine Management System.

5.3. Diesel Engine



 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

5.3.1. Diesel Engine of required bhp, stationary type, four stroke with V cylinder arrangement shall be complete with integral air intake through suitable air filters and exhaust system, speed regulation system, fuel injection system, lube oil system, cooling water system, silencers, self contained piping, instruments, mounted on anti vibration mounts

5.3.2. The engine shall have the following characteristics but not limited to following:

- Electronic Governor
- Light duty Air Cleaner charge Airlines guard
- Radiator Designed for operation upto 50°C
- Caterpillar corrosion Protecting Coolant Conditioner
- Muffler-Industrial
- Stainless steel exhaust felx & ANSI weld flange
- Turbo outlet elbow
- VR6 Voltage Regulator with Load Adjustment Module.
- Primary & Secondary Fuel Filters
- Fuel Pressure Gauge
- Flexible Fuel Lines
- Generator Self Excited
- Oil Drain Line with valve (Piped to edge of base frame)
- Fumes Disposal
- Base Fuel Tank (Sufficientfor8HoursCapacity)
- Charging Alternator
- Circuit Breaker
- 24V–BatterySet
- Tool Kit (Locally)

5.3.3. Engine rating shall be stated by vendor in accordance with the standards above. The engine should comply with CPCB emission guidelines and should be of emission

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

optimized type. The engine shall be installed in Generator Room Area where it will be operated as Stand-by Duty. Vendor need to declare the max load factor for Stand-by Duty application.

5.4. Fuel System and Equipment

5.4.1. A diesel fuel system shall be furnished for the engine. Diesel fuel will be provided in accordance with AS 3570.

5.4.2. Diesel shall be provided from Diesel Storage Tank. Capacity of storage tank shall be enough for 5 days operation at nominal load.



5.4.3. The fuel system shall comprise the fuel injectors, injecting lines, injection pump and metering unit, fuel filter and all other components to make an operable fuel system. Coalescing water separator in the fuel system shall also be provided and shall be located on skid.

5.4.4. Fuel filters shall be single, full flow, edge-type with sludge sump. Element shall be the replaceable type, easily accessible and removable without breaking any fuel line connections.

5.5. Exhaust Systems

5.5.1. The Vendor shall provide an exhaust system for engine including horizontally mounted silencer, expansion joint and exhaust section from engine to silencer. The Vendor shall supply and fit a tail pipe of matching diameter.

5.5.2. Flexible exhaust joints shall be corrugated stainless steel type SS 316. Interlocking element style shall not be used.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

5.5.3. Joints between expansion joint, silencer and ducting should be flanged with a bolt pattern preferably matching ANSI dimensions.

5.5.4. The silencer shall be provided with a mating flange to suit site welding to pipe with an outside diameter in accordance with ANSI B36.10.

5.5.5. The Vendor shall ensure that engines are designed to achieve rated power with the backpressure due to the proposed exhaust layout. This should allow for the most adverse effect of wind direction at maximum mean hourly speed. Additionally the Supplier shall make due allowance for any recirculation of exhaust gas into the air inlet stream under the most adverse wind condition.

5.5.6. The exhaust manifold and turbocharger shall be insulated for personnel protection, where appropriate.

5.5.7. The maximum gaseous emissions from the diesel engine shall not exceed the levels specified in the project.



5.6. Cooling System

5.6.1. Engine cooling shall be provided by means of a closed circuit jacket coolant system.

5.6.2. Engine jacket coolant shall be fresh water conditioned with suitable inhibitors to prevent corrosion and fouling of the coolant system. In any case, the coolant shall comply with the recommendation of the engine manufacturer.

5.6.3. The coolant system shall be equipped with engine driven coolant pump, coolant reservoir and coolant air/water exchanger and incorporate the following features.

- a. Automatic control of engine inlet water temperature.
- b. Water temperature gauge to indicate engine water jacket temperature.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

c. Cooling water high temperature alarm in the power cylinder outlet manifold.

5.6.4. Piping design shall meet the requirements of Piping Design and Materials specification.

5.7. Lube Oil System

5.7.1. The engine lubrication shall be a pressure system.

5.7.2. Lubrication systems shall consist of an oil pump with a suction strainer, suction and return system, an oil cooler, a full flow filter and other necessary instruments.



5.7.3. The lube oil filter shall be of the replaceable paper type complete with pressure gauge and bypass/relief valve and so located and connected that lubricating oil is continuously filtered and cleaned.

5.7.4. The main oil pump shall be driven from the crankshaft, either directly or through gears and shall be accessible for maintenance without draining the oil from the crankcase.

5.7.5. The lube oil shall be water cooled, the cooling water being from the engine jacket water-cooling system.

5.7.6. The engine lubrication system shall be provided with an automatic oil make-up system and oil level regulator complete with tank.

5.7.7. Piping design shall meet the requirements of Piping Design and Materials specification.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

5.8. Air Intake System

5.8.1. Engine-mounted dry replaceable paper element type air intake filters suitable for marine service shall be furnished.

5.8.2. A stainless steel bird screen shall be furnished at each air intake.

5.9. Vibration

5.9.1. The generator/engine skids will be mounted on a structural steel surface and they shall be designed to minimise vibration transmission to the structure as far as possible without the need for excessive stiffening of the structure.



5.9.2. Balance quality of the equipment shall not exceed the criteria given in BS 5265 and vibration isolators shall be provided in accordance with ISO 2017.

5.9.3. The Supplier shall provide all information necessary for Employer/Owner's Engineer assessment of potential vibration. This shall include:

- a. Mass and centre of gravity of equipment
- b. Magnitude, location and frequency of internal forces and couples, torque reactions and out of balance forces
- c. Vibration Isolators stiffness
- d. Details of any transient forces arising from the generator or engine during start-up, load change or shutdown

5.10. Governor

5.10.1. Governor shall be Electronic, isochronous and base load mode of operation.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

5.10.2. The engine shall be supplied with an electronic load-sharing governor suitable for droop, isochronous or base load mode of load sharing. Generator set speed droop shall not exceed 1 percent from no load to full load. Steady state band, 25 percent to 100 percent, shall not exceed ± 0.6 Hz

5.10.3. The governor shall be equipped for speed control system on local control Panel.

5.10.4. Overspeed trip setting shall be set at 115%. Adjustable speed range shall be within 85% to 105% unless otherwise specified in datasheet.

5.11. Piping

5.11.1. The piping layout shall be designed so all valves are easily accessible in normal operations.



5.12. Engine Local Instrument Panel

5.12.1. The skid shall be equipped with a Local Instrument Panel. The panel shall be skid mounted on vibration isolators and located such that the panel is accessible and instruments visible from the outside of the machine enclosure without having to open access plates or covers. The panel shall house interconnecting facilities for all sensors and gauges.

6.0 DESIGN AND CONSTRUCTION REQUIREMENTS OF ALTERNATOR

6.1. Starting System

6.1.1. The Diesel Generators Set shall be supplied with DC Battery starting system. The starting system shall be electric type and shall consist of 24V batteries with sufficient capacity to attempt six (6) starts of 15 seconds each, in succession with 5 second

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

intervals. The batteries shall be sealed lead acid type and shall be installed on the diesel generator skid. The batteries shall be equipped with isolator switch.

6.1.2. The Vendor shall provide battery-charging facility. The battery chargers shall be an integral part of the controller. The dual battery charger shall be adequately sized for charging of the connected batteries and shall include the following



- a. One set of NO/NC contacts wired to the terminals for general alarm
- b. Battery charger ON indicator
- c. AC power failure alarm
- d. DC voltmeter
- e. DC ammeter
- f. Low battery voltage alarm
- g. High battery voltage alarm
- h. DC Breaker
- i. Separate "Float" and "High Rate" charging adjustments accurately set to match the battery characteristics
- j. Battery charger fail indication and alarm

6.1.3. Batteries will be charged over a 10 hour period from fully discharged state to a fully charged state.

6.1.4. In general the charger shall be parallel redundant type as per clauses mentioned above unless otherwise stated in datasheet.

6.2. Generator

6.2.1. The exciter shall be shunt type unit designed to provide an adequate range of excitation to allow the generator to operate with a satisfactory margin of stability under both steady and transient load conditions.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

6.2.2. Insulation system for generator and exciter shall be class H with temperature rise limited to Class B.

6.2.3. The generator shall be designed for solidly earthed neutral operation. The neutral terminal shall be brought to the terminal box, which houses the phase terminals. The generator shall be capable of withstanding a maximum bolted single line-to-earth fault at its terminals for 10 seconds without damage, while operating with fixed full load excitation. In addition, the generator and excitation system shall be capable of withstanding for 10 seconds without damage an excitation level in the field winding corresponding to a fault current of 300 percent of full load current, along with the associated short circuit heating and forces in the armature windings.

6.2.4. Connection between generator and switchgear/MCC shall be via cables. The Vendor shall ensure that the cable-terminating box at alternator is suitable for termination of these cables.

6.2.5. The generator and AVR shall incorporate integral overload protection.



6.2.6. The voltage regulator, governor and other equipment shall be provided with radio interference suppression.

6.2.7. Vendor shall install space heaters in the generator to prevent condensation of moisture, when not in service. The rated voltage shall be 240V AC single phase unless otherwise stated in datasheet.

6.2.8. The generator shall match overspeed capabilities of the engine.

6.2.9. The generator bearings shall have an L10 life of 30,000 hours at 38°C.

6.3. Automatic Voltage Regulator (AVR) System

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

6.3.1. The automatic voltage regulator system shall consist of a solid-state regulator, ancillary winding exciter, an under frequency module, together with manual voltage adjustment.

6.3.2. The voltage regulator shall provide automatic voltage build-up, ½ percent voltage regulation and ±10 percent range of voltage adjustment.

6.3.3. The ancillary winding exciter shall support all three phase, phase-to-phase, and phase-to-earth faults for at least the time necessary for protection system to operate and shut down the generator set.



6.3.4. The generator AVR shall be capable of sustaining 300% of generator full load current for 10 seconds during short circuit.

6.4. Motor Starting Capability

6.4.1. The Main stand-by generator shall be capable of starting the motor size identified on the generator data sheet. Generally the electric motor shall have a starting current of 6 times its rated full load current and a starting power factor of 0.4 while feeding a base load (to be provided by the Employer/Owner's Engineer) with the maximum voltage drop at the generator terminals being limited to 15%.

6.5. Generator Requirements

6.5.1. The synchronous generator shall be suitable for stand-by operation, with the neutral solidly grounded, at the rated kW output, voltage, and frequency as specified in the generator data sheets.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

6.5.2. Site rating of the generator shall take into account the ambient temperature, the air-cooling of the generator, the system power factor and the winding insulation temperature limitation.

6.6. Skid

6.6.1. The skid shall be equipped with lifting pad eyes at each corner. These pad eyes shall be designed to carry at least twice the shipping weight of the package.

6.7. Generator

6.7.1. The exciter shall be designed to provide an adequate range of excitation to allow the generator to operate with a satisfactory margin of stability under steady state and transient conditions.



6.7.2. The generator shall be capable of withstanding the fault level defined on the drawings while operating at full load excitation.

6.7.3. The generator shall be capable of withstanding an excitation level in the field winding corresponding to a fault current of 300% of full load current.

6.8. Safety

6.8.1. All rotating parts shall be equipped with safety guards.

6.8.2. The manifold and hot parts of the exhaust system shall be equipped either with protective shields or insulating blankets.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

7.0 DIESEL GENERATOR CONTROLS

7.1. The control of the Diesel Generator shall be from the Local Control Panel and Remote Control Panel.

7.2. Diesel Generator Remote Control Panel (RCP) (If Required)

7.2.1. The control system of the diesel generator shall include a RCP.

7.2.2. The RCP will be installed in the LV switchgear/MCC room and shall have degree of ingress protection IP41. The colour of finish coat shall be light grey as per RAL-7032. The enclosure shall have bottom entry for cables.



7.2.3. The RCP shall be provided with the following:

- a. Normal start and stop pushbuttons
- b. Emergency stop pushbutton (Red with mushroom head)
- c. Emergency generator circuit breaker close and open pushbuttons
- d. Emergency switchboard mains supply circuit breaker close and open pushbuttons
- e. Lamp test pushbutton
- f. Reset pushbutton
- g. Auto/Off/Manual/Test selector switch (with lockable manual position)

7.2.4. The remote control panel shall also incorporate requirements listed within the body of this specification, referenced drawings and data sheets. Vendor shall provide all features necessary for safe and reliable operation of the emergency diesel generator.

7.2.5. RCP shall be PLC based control system.

7.3. Diesel Generator Local Control Panel (LCP)

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

7.3.1. Diesel Generator set shall be equipped with a LCP. The LCP shall house all controls including AVR and governor. The LCP shall be PLC based control system housed in padlock able IP65 metal enclosure and shall be equipped with front end control panel equipped with visual alarms and manual controls. The colour of finish coat shall be light grey as per RAL 7032.

7.3.2. The LCP shall be freestanding electrical cubicle (IP65) and shall house Automatic Voltage Regulator (AVR), electronic governor controller and facilities for manual and automatic start, control and monitoring of the diesel generator unit. Both, governor controller and AVR shall be equipped with facilities for manual setting of RPM and voltage. Adequate hook-up facilities shall also be provided.

7.3.3. The preferred voltage sensing system shall be redundant and self-testing. The failure of the voltage sensing system shall result in an alarm.



7.3.4. A remote common alarm shall be provided (volt free contact NO/NC contact). The remote alarm shall be activated by the alarms from the skid mounted diesel generator following Local Control Panel.

7.3.5. In addition to the other requirements, the Vendor shall provide a start, stop, emergency stop pushbuttons (red with mushroom head), alarm reset push buttons, lamp test pushbuttons and lockable selector switch on the LCP. The selector switch shall allow for the modes of operations mentioned in Single Line Drawings.

7.4. Local Control Panel – Alarms, Indication & Controls

7.4.1. The LCP shall be equipped with local start/stop; emergency stop and start disable facilities. The following alarms shall be indicated in the LCP:

- a. High cooling water temperature

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

- b. Low lube oil pressure
- c. High lube oil temperature
- d. Low starting battery voltage
- e. Low fuel pressure
- f. Low fuel level
- g. High generator winding temperature
- h. Low voltage
- i. Low frequency
- j. High voltage
- k. High frequency
- l. Generator overload

7.4.2. In addition, the following faults shall be equipped with local and remote alarms (Volt free contacts wired to the terminals):



- a. Fail to start
- b. Over speed shutdown
- c. Low lube oil pressure
- d. High cooling water temperature
- e. General alarm
- f. Low fuel level alarm

7.4.3. The threshold settings of the alarms to be specified by the Vendor in the tender package.

7.5. Control Power Supply

7.5.1. The Vendor shall note that the power supply to the controls of the Diesel Generator shall not be fed from the starting batteries. Vendor shall provide 24VDC power system for controls of the diesel generator package.

7.5.2. The DC power supply system for controls supplied by Vendor shall consist of:

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

- a. One Battery charger
- b. One Battery bank
- c. One (1) DC distribution board

7.5.3. Automatically regulated output voltage of the battery charger shall be maintained within plus or minus 1% for load changes from zero to full load with line voltage variations of plus or minus 10% and frequency variations of plus or minus 5%. Automatic over-current limit shall be adjustable and preset at 105% of rated output to prevent overloading of the charger during the starting of the engine.

7.5.4. Each battery charger shall be capable of supplying the maximum load that can occur on the DC system and additional 20% spare capacity in addition to both the boost (equalizing) and floating charge to the battery bank.



7.5.5. Contactor shall inform the time required for charging the batteries from fully discharged to fully charged state.

7.5.6. Each battery charger shall be equipped with set of contacts for remote alarm "Charger Failure".

7.5.7. Each recharged battery shall maintain the system during mains power supply failure for a minimum duration of 2 hours at maximum loading of controls and indications.

7.5.8. Each battery shall be sized to adequately satisfy control requirements with 20% spare capacity.

7.5.9. The module-isolating switch of each battery and battery charger shall be a miniature

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

circuit breaker. The front panel of each battery charger shall be fitted with two indicator lamps and an analogue meter scaled to read DC output Volts. One lamp shall indicate primary circuit healthy. Second lamp shall indicate battery charger failure.

7.5.10. Industrial standard testing required for the batteries and chargers shall be carried out by the Vendor.

8.0 OPERATION MODES



8.1. Interfacing of Incomers of Switchgear/MCC and Diesel Generator and sequence of operation

8.1.1. The following details provide a general guideline regarding the requirements. Vendor shall develop them into fully functional schematics and modify to make them functional, safe and reliable. The division of scope of work between Switchgear and Diesel Generator Vendor is generally as shown on the Single Line Diagram. The Switchgear and Diesel Generator Vendors shall co-ordinate the interface between themselves to provide a safe and operable system.

8.1.2. Vendor shall provide a selector switch for the incomers, which allows selection of between both Gensets.

8.2. Emergency Stop of Diesel Generator

8.2.1. In the event of an emergency stop, i.e. when the emergency stop push button is activated, the emergency MCCB is opened and the engine comes to a stop without going through a cool down cycle.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

9.0 SKID HOOK-UP FACILITIES

9.1. The Vendor shall provide terminals for all incoming and outgoing cabling. The power cables shall be terminated directly to the generator terminal box and cables for anti-condensation heater will be terminated directly onto the heater. The anti-condensation heater shall be equipped with IP65 isolator switch. All control cables shall be wired to skid mounted IP65 marshalling box. The Vendor shall provide 20% spare capacity in all hook-up facilities. The Vendor shall complete all internal wiring with all outgoing/incoming wiring wired to the hook-up facility (i.e. terminal strip).

9.2. Generator Set Enclosure (If Genset is not installed in Generator Room)



9.2.1. The generator set, including all associated equipment mounted on the skid base. Vendor shall provide a weather protective enclosure for the Emergency Diesel Generator. The enclosure shall also meet the requirements of Mechanical Packaged Equipment specification.

9.2.2. Vendor to furnish noise level one meter from the skid.

9.2.3. The enclosure shall be fitted with doors or removable panels to provide access to all equipment for inspection and maintenance. Hinges for doors shall be heavy-duty type and be complete with neoprene weatherproof seals and hold open devices. The door base where water may accumulate shall be provided with suitable drainage holes.

9.2.4. Lifting lugs are required on the enclosure to facilitate its removal during major engine/generator work.

9.2.5. The genset canopy will come complete with ventilation fan.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

9.2.6. The enclosure shall be designed to operate with all access facilities closed and have ventilation of sufficient volume such that internal air temperature does not exceed 60°C.

9.3. Earthing

9.3.1. The generator, engine, enclosure and enclosure doors shall be earthed to the base of the skid in addition, two earthing studs of respective size shall be provided on the opposite ends of the base skid. The studs shall be welded to the base in an easy accessible location.

9.4. Special Tools

9.4.1. Special tools and special lifting devices, special site inspection tools, shims, special fittings and markings required for alignment and correct assembly shall be supplied by the Vendor.



9.5. Control Devices, Cabling and Wiring

9.5.1. Control wiring shall be RED and BLACK for AC voltages and GREY for DC voltages with Flexible Multi-Stranded copper conductors not less than 1.5mm² and 1mm² respectively having 500 volt gradient, with 75°C maximum operating temperature heat resistant insulation.

9.5.2. Current transformer circuit wiring shall be not less than 2.5mm² stranded copper with 600 volt V75 insulation coloured BLACK.



9.5.3. Where applicable, cables and wires shall be fire retardant as per IEC332 part 3 category C.

9.5.4. All three-phase wiring shall be coloured Red, White and Blue. Neutral shall be Black

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

and earth Green/Yellow.

- 9.5.5. Control wiring shall be terminated on marked terminal blocks. (Employer/Owner's Engineer approved equivalent) 20% spare capacity shall be provided throughout.
- 9.5.6. Control wiring shall be marked to coincide with numbering shown on the approved wiring diagrams, all wires being numbered on both ends.
- 9.5.7. When control wiring is terminated using compression lugs, the locking spade type shall be used. Compression lugs shall be used at all screw type terminal blocks.
- 9.5.8. The control circuit neutral wire shall be brought to the terminal strip for Employer/Owner's Engineer's use.
- 9.5.9. Any wiring across shipping breaks shall be provided with wire markers and terminal blocks. Wires shall be disconnected and coiled in one unit for shipment.
- 9.5.10. The following controller devices and other equipment shall be provided and wired as required:
- 9.5.11. Control and interface relays shall be heavy duty industrial type rated with 5A minimum contacts.
- 9.5.12. Voltage and current transformers and their connections shall be in accordance with relevant Standards
- 9.5.13. Instrument current transformers shall be accuracy class 1.0 or better. Protective current transformers shall be accuracy class 10P or better. Short time rating shall be at least 1 sec if applied for instantaneous short-circuit protection.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

9.5.14. The secondary current rating of current transformers for instrumentation shall be 1A.
Secondary circuits of current transformers shall be earthed via links.

9.5.15. Voltage transformers where required, shall be of accuracy class 2M or better.
Secondary circuits of voltage transformers shall be earthed via links.

9.5.16. All potential metering and control supply wiring shall be fused close to the bus and be protected against the full bus fault rating.

9.5.17. The size and type of the wires to be selected shall be based upon mechanical strength, voltage levels and especially for current circuits on the prospective current levels.



9.5.18. The minimum allowable cross-sectional area of the wires shall be 1.5mm² and shall always be stranded. Ancillary bus wiring shall have a cross-sectional area not less than 2.5mm².

9.5.19. Colour coding of secondary wiring shall be in accordance with in accordance with relevant Standards

9.5.20. Wiring between two terminals shall be continuous; joints or interconnections are not allowed.

9.5.21. For all wires and conductors individual terminals shall be provided. Terminals shall be of the heavy-duty type, or Employer/Owner's Engineer approved equivalent. Partitions shall be included between terminals for different voltages.

9.5.22. Wiring ends of stranded conductors, which have to be connected into bus-type contacts of terminals, shall be provided with compression-type pre-insulated wire pins with insulation support. In general lugs, wire pins, etc., shall be of the compression type.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

9.5.23. For the termination of secondary wiring on components, compression-type pre-insulated push-on connectors with insulation support may also be used.

9.5.24. All wires shall be identified at both ends by means of ferrules of insulating material, or by plastic code markers. Marking shall be in accordance with the related Vendor drawings.

9.5.25. To accommodate and support the secondary wiring, covered plastic channel with slotted sides shall be used. Secondary wiring shall never be mounted direct to metal. The filling for channels shall not exceed 70%.



10.0 MARKING AND FINISH

10.1. Nameplates / Labels

10.1.1. Machine engraved nameplates/labels with full text shall be installed to designate the purpose of all circuits, instruments, meters, relays and fuses. Circuit identification nameplates/labels shall be labels on the back as well as on the front of each compartment. All nameplates / labels shall be adjacent to the devices and not mounted directly on the devices.

10.1.2. Nameplates/labels shall be manufactured from laminated plastic (UV stabilized), showing black lettering on a white background. The minimum height of letters shall be 5 mm. The main titles, such as circuit, cubicle, or feeder designation shall have letters 9 mm in height.

10.1.3. The equipment shall be identified with the equipment number using 30mm high symbols.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

10.1.4. Nameplates shall be securely mounted with machine screws such that they may be easily changed or replaced.

10.1.5. Labels shall be securely fixed to the equipment using not less than two fastenings bolts, nuts and washes shall be zinc or cadmium plated. Fastenings shall not loosen due to vibration.

10.1.6. Adhesive labels of identification tags shall not be used.

10.1.7. Nameplates and labels shall be fitted to non-detachable parts.

10.2. Painting and Finish

10.2.1. All metal parts shall be protected from rust and corrosion by plating or painting. Painted parts shall be to Vendor standard painting procedure.



10.2.2. The Vendors painting specifications and procedures shall be submitted for approval to the Employer/Owner's Engineer.

10.2.3. All other parts, such as handles, levers, and fasteners that are not stainless steel shall be cadmium, nickel or chrome-plated.

10.2.4. A minimum of 300 ml can of matching touch-up paint shall be furnished.

10.3. Site Storage



10.3.1. A set of recommendations, based on the project environmental conditions and detailing measures to preserve the quality/integrity of the equipment during a 12-month 'site storage in the open, shall be provided by the Vendor.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

11.0 INSPECTION AND TESTING

11.1. General

- 11.1.1. The Generator set and associated components shall be subject to rigorous QA and testing at all stages of manufacture.
- 11.1.2. The Vendor at his works shall carry out the tests in accordance with relevant Standards and the requirements of this specification, unless otherwise agreed.
- 11.1.3. All formal testing will be conducted in accordance with a written test procedure. The Contactor's test procedures shall be submitted to the Employer/Owner's Engineer prior to the factory acceptance test for approval. Each formal acceptance test must be signed by the Vendor's and the Employer/Owner's Engineer's representatives at the successful completion of the test.
- 11.1.4. The Vendor shall ensure that adequate notice (a minimum of five working days) is given in writing to the Employer/Owner's Engineer prior to the factory acceptance testing.
- 11.1.5. The Vendor shall afford full facilities to the Inspector during the course of manufacture and shall arrange access to any Sub-Vendor's works where necessary. Details of this requirement shall be resolved in pre-inspection meetings.
- 11.1.6. The acceptance of the work by the Inspector and its release for shipment shall in no way relieve the Vendor from any responsibility for carrying out all of the provisions of this specification and relevant documentation, nor does the Employer/Owner's Engineer, by such approval and release, assume any responsibility for such provisions.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

11.1.7. All test and inspection data shall be legible, including the name and signature of the Vendor and, where applicable, the Inspector.

11.1.8. All defects in materials detected during testing shall be repaired or replaced by the Vendor at no cost to the Employer. If the correction of any error or defect involves serious alterations requiring replacement of parts, the approval of the Employer/Owner's Engineer shall be obtained before proceeding. If the correction of the error requires witnessing by the Inspector, the Inspector shall sign the correction. Retesting of repaired or replaced materials is mandatory.

11.1.9. The Vendor shall supply supervision, specialist personnel and all necessary materials to support the inspection and testing.



11.1.10. Testing shall be carried out by the Vendor and will be witnessed by the Employer/Owner's Engineer or his nominated Inspector at various stages of manufacture and assembly. Locations are detailed below:

- a. Factory Acceptance Test (FAT) - Conducted at the original point of manufacture of the Emergency Generator and associated panels
- b. Site Acceptance Test (SAT) - Conducted at the job Site.

11.2. Factory Acceptance Testing

11.2.1. The Vendor at his works shall carry out the tests in accordance with relevant Standards and the requirements of this specification, unless otherwise agreed.



11.2.2. The FAT shall be conducted in accordance with the Vendor's standard QA procedures. The Vendors standard procedures shall be submitted to the Employer/Owner's Engineer at least two (2) months prior to testing for approval.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

11.2.3. The Vendor shall be responsible for generating the FAT procedures. A 100% correct performance is required.

11.2.4. The FAT shall include as a minimum the following.

- a. Visual inspection to prove conformity with the approved drawings and the order.
- b. Spot checks to verify the degree of protection; reliability of operating mechanisms, interlocks and safety features; insulation levels; creepage distances; earthing; labelling and interchange ability.
- c. Main and auxiliary cable circuits checked against approved schematic circuit diagrams.
- d. Insulation resistance tests including conductor testing of all busbar connections.
- e. Dielectric tests on all main, control and auxiliary circuits.
- f. Primary injection tests.
- g. Full functional testing of circuits for correct mechanical and electrical operation, including the operation of their control and protective devices.
- h. Operational testing of all mechanical and instrumentation systems.
- i. No load and full load testing of complete package.
- j. Heat run test on complete package.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	 <p>Petrochemical Engineering Consultants</p>
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

k. Alarms/trips – functional check

11.2.5. Following the above tests, the generator set and components shall be examined for any damage and to ensure that all parts are in satisfactory operating condition.

11.2.6. The generator set (prime mover and alternator) can be tested separately to the LCP. Full function / load tests will need to be conducted once installed. Refer SAT requirements.



11.2.7. The Vendor shall compile complete records of the above inspection and tests into one inspection document.

11.2.8. On completion of the FAT the generator set shall be reassembled (where necessary), checked and shipped to the nominated staging facility. The Vendor shall provide a separate take out price for this packing and shipping.

11.3. Site Acceptance Test (SAT)

11.3.1. Prior to commencement of the SAT, the Vendor will have performed the following activities:

- a. An audit and inspection of the equipment received.
- b. A deficiency report written and appropriate action taken to verify any problems.
- c. Complete installation of the generator set, its enclosure and all ancillary equipment.
- d. Pre-commissioning of the generator set and all ancillary equipment.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

- e. The Generator set powered up and functionally tested and load tested with the appropriate test equipment.

11.3.2. The Vendor shall make available, on day rates, the services of personnel to assist in the installation and performance of the SAT.

11.3.3. The Vendor shall supply all standard and special tools, test and calibration equipment necessary for the SAT. The Vendor shall provide an optional price for a load bank to allow full load testing on site.

11.3.4. The SAT will be performed by the Vendor. The SAT will demonstrate the functionality of all equipment, starter inputs/outputs and configuration. The SAT will be witnessed and signed off by the Vendor, the Owner's nominated Engineer at Site.



11.4. Certificates of Acceptance

11.4.1. On satisfactory completion of the FAT the staging test and the SAT, an appropriate certificate of acceptance shall be provided by the Vendor.

11.4.2. Attached to these certificates shall be all test records and other relevant documentation.

11.4.3. The Employer/Owner's Engineer will review and approve these certificates.

11.4.4. Final acceptance of the Generator shall be on satisfactory completion of the Warranty period.

 <p>Oil and Gas Development Company Limited</p>	<p>DAKHNI PRODUCTION FACILITIES</p> <p>(ELECTRICAL)</p>	
<p>Doc.No: XXXX-ESP-DG-001</p>	<p>Specification For Diesel Generator</p>	<p>Revision No. 0</p>

12.0 VENDOR DATA/DRAWING REQUIREMENTS

- 12.1. Documentation shall be provided by the Vendor in accordance with the requirements listed in the Supplier Document Requirement List (SDRL) in the Material Requisition Package but not limited to operation manual, control schematic diagram and maintenance manual.



DAKHNI PRODUCTION FACILITIES



DOCUMENT TITLE

DATASHEET FOR 30 KVA DIESEL GENERATOR

DOCUMENT NO.

XXXX-EDS-004

REV-0

GENERAL

Equipment Name	Disel Generator	Location	Outside
Tag Number	G-001	Manufacturer	-
Number Required	1	Model No.	As per Vendor
Fuel	<input checked="" type="checkbox"/> Diesel <input type="checkbox"/> Gas <input type="checkbox"/> LPG <input type="checkbox"/> Bio-Gas	Operation Mode(s)	<input checked="" type="checkbox"/> Island <input type="checkbox"/> Parallel with Generator <input type="checkbox"/> Parallel with Utility
Major Dimensions (L X W X H) mm	VTS	Weight (Kg)	VTS
Performance Standard	As per Specifications		

ENVIRONMENTAL DATA

Maximum Temperature	50 °C	Area Classification	<input type="checkbox"/> Hazardous <input checked="" type="checkbox"/> Non-Hazardous
Minimum Temperature	0 °C	Zone	<input type="checkbox"/> 0 <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> None
Ambient Temperature	35 °C	Group	<input checked="" type="checkbox"/> None <input type="checkbox"/> IIA <input type="checkbox"/> IIB <input type="checkbox"/> IIC
Maximum Humidity	10 - 40%	Location	<input type="checkbox"/> Indoor <input checked="" type="checkbox"/> Outdoor
Altitude Above Sea Level	550 m (Note-1)	Temperature Class	HIGH None

GENERATOR CHARACTERISTICS

Output Power (Continuous)	30	kva	Zero Sequence Impedance:	VTS	pu x_0
Output Voltage	415 +/-5%	V	Negative Sequence Impedance:	VTS	pu x_2
No. of Phases	3		Direct Axis Subtransient Reactance:	VTS	pu x''_d
Frequency	50 +/-2%	Hz	Direct Axis Transient Reactance:	VTS	pu x'_d
Rated Speed	VTS	rpm	Direct Axis Synchronous Reactance:	VTS	pu x_s
Duty Cycle	<input type="checkbox"/> Stand-by <input type="checkbox"/> Prime <input checked="" type="checkbox"/> Continuous		Quadrature Axis Subtransient Reactance:	VTS	pu x''_q
Rated BIL	VTS	KV	Quadrature Axis Synchronous Reactance:	VTS	pu x_g
System Fault Level	VTS KA (Symm) for 1 Sec (Note)		Effeciency		Power Factor
Req. Symm reactance (Xd)	VTS	pu	No Load	VTS	
Req. Asymm reactance (Xd'')	VTS	pu	1/2 Load	VTS	0.8
Insulation Class	<input type="checkbox"/> A <input type="checkbox"/> E <input type="checkbox"/> B <input type="checkbox"/> F <input checked="" type="checkbox"/> H		3/4 Load	VTS	0.8
Rotar Temp. Rise	<input type="checkbox"/> A <input type="checkbox"/> E <input type="checkbox"/> B <input checked="" type="checkbox"/> F <input type="checkbox"/> H		Full Load	VTS	0.8
Stator Temp. Rise	<input type="checkbox"/> A <input type="checkbox"/> E <input type="checkbox"/> B <input checked="" type="checkbox"/> F <input type="checkbox"/> H		Overload	110% for 1 Hr in every 12 hrs	
Connection	<input type="checkbox"/> Delta <input checked="" type="checkbox"/> Star		Max Overspeed	125% for 2 mins	Winding Pitch VTS
Neutral Earthing	Directly Earthed		Max THD	4%	Waveform
Frame Earthing	By Manufacturer		Harmonic Content		
Motor Starting Capability			1st	VTS	9th VTS
Exciter			3rd	VTS	11th VTS
Construction	<input checked="" type="checkbox"/> Brushless <input type="checkbox"/> Static <input type="checkbox"/> PMG <input type="checkbox"/> Other		5th	VTS	13th VTS
No Load Voltage	(VTS) V	Rated Current (VTS) A	7th	VTS	15th VTS
Rated Volts	VDC		Cooling		
<input type="checkbox"/> Required <input checked="" type="checkbox"/> Not-Required	Power (VTS) kVa		Construction	<input checked="" type="checkbox"/> Fan Cooled <input type="checkbox"/> Air-to-Air Heat Exchanger	<input type="checkbox"/> Air-to-Water Heat Exchanger
Voltage	Frequency 50 Hz	Power (VTS) KW	Phase	3	Frequency (VTS) V
Phase	Single	Quantity VTS	Flow	(VTS) m ³ /s	Pressure (VTS) kPa
Voltage Regulation			Voltage Source	<input type="checkbox"/> External <input checked="" type="checkbox"/> Generator <input type="checkbox"/> TX	
Alternator Manufacturer	Stanford/Siemens/CAT or Equivalent		<input type="checkbox"/> Auxiliary <input type="checkbox"/> None		
Rated Output Voltage	415 V	Phase 3	Inlet Temp. (VTS) °C		Outlet Temp. (VTS) °C
Regular Drift	less than 5 % per	20 °C	Pump Detail	Make VTS	Model VTS
Terminal Box			Motor/Pump	VTS	Rated Output (VTS) KW
Placement	<input type="checkbox"/> Top <input type="checkbox"/> Bottom <input type="checkbox"/> Left <input checked="" type="checkbox"/> Right		Enclosure		
Arrangement	<input checked="" type="checkbox"/> Cable <input type="checkbox"/> Busbar		Alternator Enclosure Protection IP 23 (Min)		
Cable Type	CU/XLPE/SWA/PVC				

PHYSICAL ARRANGEMENT OF ALTERNATOR

Mechanical Data	Height x Width x Depth mm x mm x mm (VTS)	Weight Kg	Accessories	Quantity	Range	Make & Model
Rotor	VTS	VTS	Winding Temp. Sensor	2 Nos. Per Phase (NOTE 8)	VTS	VTS
Stator	VTS	VTS	Bearing Temp. Sensor	1 Nos. Required (NOTE 8)	-	-
Accessories	VTS	VTS	Cooling Air Temp. Sensor	N/R	-	-
Total (Overall)	VTS	VTS	Vibration Sensor	N/R	-	-
Audible Sound Level (Overall)	85	[dBA] @ 1m	Lightning Arrestor	N/R	-	-
Bearing Type	<input checked="" type="checkbox"/> Ball <input type="checkbox"/> Roller <input type="checkbox"/> Combination (1 ball, 1 roller)		Surge Capacitor	N/R	-	-
Bearing Lubrication	<input checked="" type="checkbox"/> Oil <input type="checkbox"/> Grease	Bearing Single Ball	Volage Regulator CT's	Required (VTS)	VTS	VTS
Protective Coating	<input checked="" type="checkbox"/> Standard <input type="checkbox"/> Other		Differential CT's	VTS	VTS	VTS
Tropicalisation	<input type="checkbox"/> Required <input checked="" type="checkbox"/> Not-Required		Cross Current Compensation CT	N/R	-	-
Requirement for PARALLEL operation with another set:			Overcurrent Protection	Required (VTS)	VTS	VTS

ENGINE CHARACTERISTICS

Output Power (Engine Output)	30	KW	Manufacturer	CAT/PERKINS/MAN/Deutz	Model	As per Vendor
Speed	VTS rpm	Starting Torque Kgm	Cylinder Arrangement (VTS)		No. of Cylinders	VTS
Rotator (Viewed from Coupling End)	<input type="checkbox"/> CW <input type="checkbox"/> CCW		Type of combustion chamber			
Recommended Rated Power of Engine at Site	(VTS) KW		Bore (VTS) mm		Stroke (VTS) mm	
Charging	<input type="checkbox"/> Naturally Aspired <input checked="" type="checkbox"/> Turbocharged <input type="checkbox"/> Supercharged		Comp ratio	VTS	Displacement (VTS) L	
Piston Speed (VTS) m/sec	Lib. Oil Capacity (VTS) L		BMEP at Rated Load	(VTS)	MPa	
Coolant Capacity w/o Radiator (VTS) L			Regenerative Absorption	(VTS)	KW	
Coolant Pump External Resistance (VTS) m water			Combustion air inlet flow rate	(VTS)	m ³ /min	
Coolant pump flow rate (VTS) L/min			Exhaust gas flow rate	(VTS)	m ³ /min	
Coolant fan air flow rate (VTS) m ³ /min			Exhaust gas temperature	(VTS)	m ³ /min	
Allowable exhaust back pressure (VTS) Kpa			Heat Rejection to coolant	(VTS)	KW	
Exhaust Flange Size (VTS) mm			Heat Rejection to exhaust	(VTS)	KW	
Engine Cooling	<input checked="" type="checkbox"/> Water Cooled <input type="checkbox"/> Air Cooled <input type="checkbox"/> Supercharged		Heat Rejection to atmosphere from engine	(VTS)	KW	
Governor Type	<input type="checkbox"/> Hydraulic <input checked="" type="checkbox"/> Electronic		Heat Rejection to atmosphere from generator	(VTS)	KW	
Governing Class	G2 (NOTE 11)		Power Required for Radiator Fan	(VTS)	KW	



DAKHNI PRODUCTION FACILITIES



DOCUMENT TITLE

DATASHEET FOR 30 KVA DIESEL GENERATOR

DOCUMENT NO.

XXXX-EDS-004

REV-0

Table with columns for Fuel Consumption, Lube Oil Consump., Mechanical Efficiency, Jacket Water Heater, Power, and Not-Required checkboxes. Includes rows for 25%, 50%, 75%, and 100% load.

Remove this section

STARTING SYSTEM

Table for Starting System details including Hand Start, Motor Engine Driven, Diesel Engine Driven, Air/Gas Starter, Air Comp., Capacity, Pressure, Compressor Stages, and DC Motor Start and Batteries.

Remove this section

Battery Charger (NOTE-4)

Table for Battery Charger specifications including Battery Charger type, Battery Temperature Compensation, Offline Charging, Anticondensation Heater, Float Charge Voltage, Boost Charge Voltage, Equalization Charge Voltage, Max Ripple Voltage, and Max Recharge Time.

GENERATOR CONTROL PANEL

Table for Generator Control Panel details including General (NOTE 13), Controls & Monitoring, Safety Shutdown Indication, Operating Characteristics, Synchronizing/Load Sharing Panel/Remote Panel, and Intelligent Load Shedding Panel.

Remove this section

Remove this section

Notes

- 1 Contractor shall give actual derating curves of rating above rated mean sea level. The required shall be after temperature and Above means sea level compensation.
2 Alternator terminal box shall be suitable for withstanding the specified system fault level.
3 Contractor to ensure required no. of batteries for rated genset for atleast six starts. one extra dry battery set with two times fill of sealed battery water to be provided.
4 Dual redundatnt Battery cahrger to be placed inside generator Control Panel. provided.
5 The design temperature for Alternator package shall be the maximum ambient temperature. The battery ampere-hour capacity shall be based on minimum ambient temperature. Vendor to provide one trolley (6 shelf with 40 sq foot of storage) of tools for maintenance of 1000 pcs with minimum weight of 150 kgs to be specify.
6 VTS = Vendor to specify.
7 TBD=To Be Decided
8 RTD Sensor output shall be terminated at Generator Control Panel. RTD can be 3 wire or 4 wire. Manufacturer/Vendor shall take account of all requirements in this regard including Transmitters for 4-20 mA output to Generator Control Panel or RTD inputs directly in Generator Control Module.
9 All Control Cables including speed, voltage, temperature, engine control etc. shall be provided by Vendor. Distance from generator to Genset Control Panel will be approximately 30 meters. Power Cables shall be provided by others. 75 meters cables from unit to control panel to be provided with extra switches. Specs? Length?
10 Control Cables shall be of spec : CU/XLPE/PVC/SWA/PVC. Any other cable specs shall be first approved by Client prior to purchase.
11 Battery Cables and Battery Charging cable shall be provided by vendor. All cables shall be approved before client prior to purchase.
12 Performance Standard of Engine shall be as per ISO8528
13 Generator Control Panel shall be in cubicle form, metal enclosed, with 14 SWG sheet (min), hinged type, display of Control Module LCD on panel front etc.

Table with columns for DATE, REV, DESCRIPTION, JAK PREP., SAG CHKD., AJ APPR., and AJ PM.