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| **طرح نگهداشت و افزایش تولید 27 مخزن** |
| **TBE FOR EMERGENCY DIESEL GENERATOR – BK12****نگهداشت و افزایش تولید میدان نفتی بینک** |
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| D00 | Jul. 2023 | IFI | H.Shakiba | M.Fakharian | A.M.Mohseni |  |
| **Rev.** | **Date** | **Purpose of Issue/Status** | **Prepared by:** | **Checked by:** | **Approved by:** | **Client Approval** |
| **Class: 3** | **Client Doc. Number:** **F0Z-708322** |
| **Status:** | **IDC: Inter-Discipline Check****IFC: Issued For Comment** **IFA: Issued For Approval****AFD: Approved For Design** **AFC: Approved For Construction** **AFP: Approved For Purchase****AFQ: Approved For Quotation** **IFI: Issued For Information****AB-R: As-Built for Client Review** **AB-A: As-Built –Approved** |

**REVISION RECORD SHEET**

|  |  |  |  |  |  |  |  |  |  |  |  |  |
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| **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |  | **PAGE** | **D00** | **D01** | **D02** | **D03** | **D04** |
| **1** | X |  |  |  |  | **51** |  |  |  |  |  |
| **2** | X |  |  |  |  | **52** |  |  |  |  |  |
| **3** | X |  |  |  |  | **53** |  |  |  |  |  |
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| **TBE for Diesel Generator of BK-12** |
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| **Rev** | **Item** | **Description** | **Project Requirement** | **Bidder** |
| **MAHNIROO** | **SAZAND** | **MABNA** |
| 1. **Scope of Supply & Services**
 |
| D00 |  | Standard | IEC 60034ISO 3046 | Yes | Yes | Yes |
| D00 |  | Reference Document | BK-GNRAL-PEDCO-000-EL-SP-0009BK-SSGRL-PEDCO-110-EL-CN-0008BK-SSGRL-PEDCO-110-EL-DT-0004BK-SSGRL-PEDCO-110-EL-SL-0002 | Yes | Yes | Yes |
| D00 |  | Scope of Supply & Services | Based on MR & TCL | Yes | Yes | Yes |
| D00 |  | Spare Part for Commissioning & Start up | Required | Yes | Yes | Yes |
| D00 |  | Spare part for 2 Years Operation | Required | Yes | Yes | Yes |
| D00 |  | Special Tools for Erection & Maintenance | Required | Yes | Yes | Yes |
| D00 |  | Guarantee Period | Based on MR & TCL | Yes | Yes | Yes |
| D00 |  | Delivery Time | By Vendor |  |  |  |
| D00 |  | Delivery Place | By Vendor |  |  |  |
| D00 |  | Operators Training | Required | Yes | Yes | Yes |
| D00 |  | Installation, Commissioning & Test | As per Spec by Vendor | Yes | Yes | Yes |
| D00 |  | Engineering | By Vendor | Yes | Yes | Yes |
| D00 |  | Supervision on Installation | By Vendor |  |  |  |
| D00 |  | Documentation | According to VPIS | Yes | Yes | Yes |
| 1. **Environmental Conditions**
 |
| D00 |  | Installation | Outdoor/Under Shelter | Yes | Yes | Yes |
| D00 |  | Humidity | 100 % | Yes | Yes | Yes |
| D00 |  | Altitude | 50 m | Yes | Yes | Yes |
| D00 |  | Design Temperature  | Max: 52 °CMin: -05 °C | Yes | Yes | Yes |
| 1. **Engine Specification**
 |
| D00 |  | Engine Manufacture | By Vendor |  |  |  |
| D00 |  | Engine Model | By Vendor |  |  |  |
| D00 |  | Maximum Output Rating at Site | By Vendor |  |  |  |
| D00 |  | Operation Duty | Continuous |  |  |  |
| D00 |  | Engine Speed (rpm) | 1500 rpm | Yes | Yes | Yes |
| D00 |  | Fuel Type | Gasoline |  |  |  |
| D00 |  | Arrangement | By Vendor |  |  |  |
| D00 |  | Delay for Availability of Diesel | By Vendor |  |  |  |
| D00 |  | Engine Cooling System | Required | Yes | Yes | Yes |
| D00 |  | Cooling Fan Power Requirement (kW) | 10 (Assumption) |  |  |  |
| D00 |  | Aspiration (Type) | Turbo Charged, Intercooler |  |  |  |
| D00 |  | Cylinder Configuration | By Vendor |  |  |  |
| D00 |  | Number of Cylinders | By Vendor |  |  |  |
| D00 |  | Number of Consecutive Starts | 6 |  |  |  |
| D00 |  | Bore/Stroke (mm) | By Vendor |  |  |  |
| D00 |  | Compression Ratio | By Vendor |  |  |  |
| D00 |  | Governor Type | Electronic | Yes | Yes | Yes |
| D00 |  | Air Cleaner Type | Heavy Duty |  |  |  |
| D00 |  | Piston Speed | By Vendor |  |  |  |
| D00 |  | Engine Starting System | Electrical | Yes | Yes | Yes |
| D00 |  | Type of Batteries | Nickel Cadmium (Type H, Vented) | Yes | Yes | Yes |
| D00 |  | Quantity of Batteries | 20 | Yes | Yes | Yes |
| D00 |  | Size of Batteries | By Vendor |  |  |  |
| 1. **Generator Specification**
 |
| D00 |  | DG Identification No | DG-12 | Yes | Yes | Yes |
| D00 |  | Generator Manufacture | By Vendor |  |  |  |
| D00 |  | Rated Power (at Generator Terminal) | 198.5 KVA (at Site Condition) |  |  |  |
| D00 |  | Duty Type | Continuous | Yes | Yes | Yes |
| D00 |  | Rated Terminal Voltage at Full Load | 400 V ± 5% | Yes | Yes | Yes |
| D00 |  | Frequency | 50 Hz ± 2% | Yes | Yes | Yes |
| D00 |  | Rated Power Factor | 0.8 |  |  |  |
| D00 |  | Number of Poles | 3 Ph+ N | Yes | Yes | Yes |
| D00 |  | Synchronous Speed | 1500 rpm | Yes | Yes | Yes |
| D00 |  | Neutral System | TNS | Yes | Yes | Yes |
| D00 |  | Adjustable Output Power | 90% - 110% |  |  |  |
| D00 |  | Adjustable Output Speed | 95% - 105% |  |  |  |
| D00 |  | Degree of Protection (IP) | IP 23 for GeneratorIP 54 for Panel | Yes | Yes | Yes |
| D00 |  | Stator Winding Connection | Star | Yes | Yes | Yes |
| D00 |  | Neutral Point | Brought Out | Yes | Yes | Yes |
| D00 |  | Insulation Class | F | Yes | Yes | Yes |
| D00 |  | Temp. Rise for Continuous Duty | B | Yes | Yes | Yes |
| D00 |  | Winding | Copper | Yes | Yes | Yes |
| D00 |  | Short Circuit at Rated Voltage & Current | By Vendor |  |  |  |
| D00 |  | Synchronous Reactance Xd(base 600kVA, 400V, Saturated) (p.u.) | By Vendor |  |  |  |
| D00 |  | Direct Axis Transient Reactance X’d1 (p.u.) | By Vendor |  |  |  |
| D00 |  | Direct Axis sub-trans. Reactance X”d (p.u.) | By Vendor |  |  |  |
| D00 |  | Quadrature Axis Reactance Xq (p.u.) | By Vendor |  |  |  |
| D00 |  | Quadrature Axis sub-trans. Reactance X”q(p.u.) | By Vendor |  |  |  |
| D00 |  | Zero Sequence Reactance X0 (p.u.) | By Vendor |  |  |  |
| D00 |  | Negative Sequence Reactance X2 (p.u.) | By Vendor |  |  |  |
| D00 |  | Leakage Reactance XL (p.u.) | By Vendor |  |  |  |
| D00 |  | Time Constants (sec):Td’Td”Ta | By Vendor |  |  |  |
| D00 |  | Generator Efficiency at (%):1/2 Full Load3/4 Full Load4/4 Full Load | By Vendor |  |  |  |
| D00 |  | Number of Bearings | 1 (2 is Preferred) |  |  |  |
| D00 |  | Type of Bearings / Lubrication | Anti Friction / Grease |  |  |  |
| D00 |  | Generator Space HeaterVoltage (V)Power (W) | Required230 VBy vendor |  |  |  |
| 1. **Exciter**
 |
| D00 |  | Exciter Type | Self-Excited (PMG is preferred)Brushless, 3 Phase Sensing |  |  |  |
| D00 |  | Exciter Manufacturer | By Vendor |  |  |  |
| D00 |  | Exciter Voltage | By Vendor |  |  |  |
| D00 |  | Exciter Power | By Vendor |  |  |  |
| D00 |  | Exciter Current:Continuous OperationShort Time Overload | By Vendor |  |  |  |
| D00 |  | AVR:TypeModelRated Voltage | ElectronicBy VendorBy Vendor |  |  |  |
| 1. **Control Panel**
 |
| D00 |  | Manufacturer | By Vendor |  |  |  |
| D00 |  | Standard | IEC, IPS-M-EL-143(3) |  |  |  |
| D00 |  | Type  | Fixed | Yes | Yes | Yes |
| D00 |  | Construction | Free Self-Standing | Yes | Yes | Yes |
| D00 |  | Sheet Steel Thickness  | 2mm Wall / 2.5 mm Frame | Yes | Yes | Yes |
| D00 |  | Access  | Front Via Hinged Door | Yes | Yes | Yes |
| D00 |  | Location | Outdoor (Under Shelter) | Yes | Yes | Yes |
| D00 |  | Ingress Protection | IP54 | Yes | Yes | Yes |
| D00 |  | Busbar System | 3Ph+N+PE | Yes | Yes | Yes |
| D00 |  | Rated Busbar Current (A) | 630 | Yes | Yes | Yes |
| D00 |  | Busbar Material | Copper (Insulated With Heat Shrink) | Yes | Yes | Yes |
| D00 |  | Finish Color | RAL 7032 | Yes | Yes | Yes |
| D00 |  | Cable Entry | Bottom via Cable Gland | Yes | Yes | Yes |
| D00 |  | Panel Accessories | Anti Condensation HeaterPanel LightingRemovable Gland Plate | Yes | Yes | Yes |
| D00 |  | Power & Control Cables between Diesel & Control Panel | By Vendor | Yes | Yes | Yes |
| D00 |  | Incoming Cable Size | 11x(1x185) (9Ph+2Neutral) | Yes | Yes | Yes |
| D00 |  | Cable Box & Relevant Cable Glands | By Vendor |  |  |  |
| D00 |  | Transducers (4~20mA output) | Generator VoltageFrequency |  |  |  |
| 1. **Switch Device**
 |
| D00 |  | Type of Switching Device | ACB | Yes | Yes | Yes |
| D00 |  | Manufacturer | By Vendor |  |  |  |
| D00 |  | Type Designation | By Vendor |  |  |  |
| D00 |  | Operating Mechanism | Motor Operated, Spring Charged,Stored Energy, Trip Free Mechanism | Yes | Yes | Yes |
| D00 |  | Number of Poles | 4 | Yes | Yes | Yes |
| D00 |  | Rated Current | 630 | Yes | Yes | Yes |
| D00 |  | Rated Voltage | 690 | Yes | Yes | Yes |
| D00 |  | Standard | IEC |  |  |  |
| D00 |  | Rated Breaking Current | Not Less Than 35kA | Yes | Yes | Yes |
| D00 |  | Charging Motor Operating Voltage | 24 (Fed From Diesel Batteries) | Yes | Yes | Yes |
| D00 |  | Trip Unit | Electronic type | Yes | Yes | Yes |
| D00 |  | Trip Unit Model | By Vendor |  |  |  |
| D00 |  | Indicators on Panel | Yes | Yes | Yes | Yes |
| 1. **Protection**
 |
| D00 |  | Stator 3 Phase Overcurrent Protection (50/51) | Yes | Yes | Yes | Yes |
| D00 |  | Thermal Overload Relay (49RMS) | Yes | Yes | Yes | Yes |
| D00 |  | Stator Over/Under Voltage & Frequency (27/59) & (81H/81L) | Yes | Yes | Yes | Yes |
| D00 |  | Generator Neutral CT | Yes | Yes | Yes | Yes |
| D00 |  | Ground Fault Protection (50G, 51G) | Yes | Yes | Yes | Yes |
| D00 |  | Voltage/Current Test Terminal Boxes | Yes | Yes | Yes | Yes |
| 1. **Engine Auxiliaries**
 |
| D00 |  | Starter Manufacturer | By Vendor |  |  |  |
| D00 |  | Starter Motor Voltage (V) | By Vendor |  |  |  |
| D00 |  | Starter Motor Power (kW) | By Vendor |  |  |  |
| 1. **Generator Accessories**
 |
| D00 |  | RTD (PT100) | Yes (9 RTD’s for S > 500kVA) |  |  |  |
| D00 |  | Lifting Bolts | Yes | Yes | Yes | Yes |
| D00 |  | Earthing Bolt  | Yes | Yes | Yes | Yes |
| D00 |  | Drain Plug  | Yes | Yes | Yes | Yes |
| 1. **Storage Fuel Tank**
 |
| D00 |  | Tank | Yes | Yes | Yes | Yes |
| D00 |  | Daily Tank Capacity | For 8 Hours Operation | Yes | Yes | Yes |
| D00 |  | Tank Material | Steel, 2.5mm thickness | Yes | Yes | Yes |
| D00 |  | Fuel Filter Type | By Vendor |  |  |  |
| D00 |  | Permissible Suction Head | By Vendor |  |  |  |
| D00 |  | Permissible Return Head | By Vendor |  |  |  |
| D00 |  | Interconnecting Pipes & Valves | Yes | Yes | Yes | Yes |
| 1. **Skid/Enclosures**
 |
| D00 |  | Mounting Pads | Yes | Yes | Yes | Yes |
| D00 |  | Complete Package on Skid | Yes | Yes | Yes | Yes |
| D00 |  | Bolt, Nut & washers | Yes | Yes | Yes | Yes |
| 1. **Exhaust System**
 |
| D00 |  | Max. Allowable Back Pressurefor Exhaust Line (Pa) | By Vendor |  |  |  |
| D00 |  | Exhaust Flow (at Standby Power) (m3/h) | By Vendor |  |  |  |
| D00 |  | Exhaust Gas Temp After Turbine(at Standby Power) (ºC) | By Vendor |  |  |  |
| D00 |  | Exhaust Pipe | Yes | Yes | Yes | Yes |
| D00 |  | Silencer Type | Residential |  |  |  |
| D00 |  | Spark Arrester | Required |  |  |  |
| 1. **Air Intake**
 |
| D00 |  | Air Filter Type | Required/ By Vendor |  |  |  |
| D00 |  | Combustion Air Flow (m3/h) at:Standby PowerPrime PowerContinuous Power | -By VendorBy VendorBy Vendor |  |  |  |
| D00 |  | Max. Air Intake Restriction of Engine (hPa)With New FilterWith Used Filter | -By VendorBy Vendor |  |  |  |
| D00 |  | Alternator Cooling Air (m3/h) | Required/ By Vendor |  |  |  |
| 1. **Lubricating System**
 |
| D00 |  | Type | Forced Feed by Gear Oil Pump |  |  |  |
| D00 |  | Total oil Capacity min. / max. (Liter)  | By Vendor |  |  |  |
| D00 |  | Oil Filter | By Vendor |  |  |  |
| D00 |  | Oil Cooler | Water Cooled |  |  |  |
| D00 |  | Oil Type Required | By Vendor |  |  |  |
| D00 |  | Lube oil Consumption (gr/h) at:Continuous PowerPrime PowerStandby Power | -By VendorBy VendorBy Vendor |  |  |  |
| 1. **Cooling System**
 |
| D00 |  | Total Coolant Capacity (Lt) | By Vendor |  |  |  |
| D00 |  | Water Pump Type | Centrifugal |  |  |  |
| D00 |  | Temp. Rise Across Engine (ºC) | By Vendor |  |  |  |
| D00 |  | Heat Rejection to Exhaust (kW) | By Vendor |  |  |  |
| D00 |  | Heat Rejection to Coolant (kW)  | By Vendor |  |  |  |
| D00 |  | Heat Rejection to Intercooler (kW)  | By Vendor |  |  |  |
| D00 |  | Heat Rejection by Radiation From Engine Surface (kW)  | By Vendor |  |  |  |
| D00 |  | Cooling Air Required for Radiator (m3/h) | By Vendor |  |  |  |
| 1. **General**
 |
| D00 |  | Noise Level  | Not Exceed 81 dB (A) in No Load Running  |  |  |  |
| D00 |  | Weight of Diesel Engine Without Oil & Water (kg) | By Vendor |  |  |  |
| D00 |  | Weight of Generator (kg) | By Vendor |  |  |  |
| D00 |  | Weight of Diesel Generator Skid (kg) | By Vendor |  |  |  |
| D00 |  | Overall Dimension of Diesel Generator Skid (W x D x H) (mm) | By Vendor |  |  |  |
| D00 |  | Dimension of Control Panel(W x D x H) (mm) | By Vendor |  |  |  |
| D00 |  | Deviation from Project Document | By Vendor |  |  |  |
| D00 |  | Catalogues | By Vendor |  |  |  |
| D00 |  | Vendor’s Engineering team ability & experience in IRAN | By Vendor |  |  |  |
| D00 |  | Vendor’s after sale service in IRAN | By Vendor |  |  |  |
| D00 |  | Vendor’s ability for commissioning & start up for Diesel Generator inside of IRAN | By Vendor |  |  |  |
| D00 |  | Reference list in IRAN | By Vendor |  |  |  |
| **Overall Conclusion** | **Acceptable** | **Acceptable** | **Acceptable** |