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Annex-A Technical Specifications & Terms of References (ToRs)

RFQ/HCR/SYR/24/38

Supply, Delivery, Installation and Startup of an 80 KVA Immobile Soundproof Generator with Accessories

General description:

1. Supply, Delivery, Installation and Startup of an 80 KVA prime power rated, immobile, soundproof power generator set (genset) along with its accessories.
2. Supply an operation, control, and automatic start-up panel.
3. Supply a mains grid/genset power source switch panel.
4. Supply 6 oil filters, 6 diesel filters, and 2 air filters. (Should be provided with the Gen-Set)
5. Supply one fuel tank with a min. capacity of 2000L.

General Terms of References (ToRs):

1. All parts of the genset must be brand new, not refurbished or previously used, heavy-duty, and designed for nonstop operation around the clock.
2. The year of manufacture is 2020, at least.
3. The engine and the alternator are manufactured by a reputable international manufacturer with ISO certification specializing in this domain, which will be considered upon technical evaluation.
4. The genset is immobile.
5. The genset is equipped with recently manufactured genset batteries 100A minimum.
6. The engine and alternator are fixed on a metal base and coupled with a durable, flexible coupling to ensure that the axles of the rotating parts are straight. The static and dynamic balances are duly performed by the manufacturer or the assembly processor, who will provide certification.
7. The genset is equipped with high-quality vibration dampers that correspond to its size.
8. The Genset is compatible with the diesel available in Syria.
9. Voltage: three-phase 380V with a neutral pole; Frequency: 50Hz; Power Factor: 0.8; Rotational speed: 1500 rpm.
10. The preferable delivery lead time is sixty (60) days, starting from the day following the commencement order date.
11. Place of delivery: Arida Border Crossing/Tartous.
12. The bidder shall be well-experienced in this domain, and specialists will carry out the implementation.



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13. The bidder shall provide a one-year warranty for the genset.

Technical Specifications of the 80 KVA Generator with Accessories:

A. Diesel engine:

1. The engine's prime power is 80 kVA, and the standby power 100 kVA. The vendor must provide tables of power calculation under operation location conditions.
2. Continuous-operation, four-stroke, diesel engine with a mechanical injection system (a metal placard must be fixed on the engine indicating the country of manufacture and a plate with the full rated specifications).
3. The engine must endure a 10% overload above the rated power for one hour per 12 hours. The vendor must provide a table of load tests.
4. Modern automatic mechanical speed regulator. The tolerated load/no-load frequency shift must not exceed $\pm 2\%$. The engine should not be allowed to run at a speed that does not appear in the manufacturer's speed graph.
5. The engine is equipped with a dry oil tank, full-flow filter with a replaceable filter element, oil level gauge, Oil with a 15W-40 viscosity, and a manual oil pump.
6. The engine cooling system is water-based (closed system) and uses an equatorial radiator filled with coolant, protected by a metal grille, equipped with a fan and a water pump on the engine driven by belts.
7. The engine is equipped with a dedicated system for the exhaust gas along with its accessories.
8. The starter must operate on 12V DC power.
9. 12V battery charger (dynamo).
10. The engine is equipped with a stopping solenoid.
11. The engine is equipped with a 220V electric heater for the coolant (water heater jacket).
12. The engine is equipped with a voltmeter to measure the battery voltage.
13. The engine is equipped with a water trap to remove the water from the diesel supplied to the genset.
14. The engine/genset is equipped with a switch to disconnect the battery during maintenance.

B. Alternator

1. 80 kVA three-phase brushless alternator with a visible neutral pole.
2. Voltage: 220/380V; Frequency: 50Hz; Rotational speed: 1500 rpm.
3. Power factor: 0.8 lagging.
4. Self-excited, auto-regulated, and auto-ventilated.
5. Class H insulation.



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6. IP23 ingress protection rating, or higher.
7. Protection against radio, television, or telephone interference [EMI] in accordance with the international norms.
8. Highly productive.
9. Modern automatic voltage regulator (AVR) performing the required regulation where the tolerated load/no-load voltage shift must not reach beyond $\pm 2\%$, or better. The voltage must be manually adjustable via a variable resistor.
10. Equipped with overheating protection, and the vendor must indicate its tolerance of the increase in the rotational speed.

C. Operation, control, and automatic start-up panel (Control Panel):

1. A metal panel of iron sheets is sufficiently sized to accommodate its components and ensure easy maintenance. Its door must be tightly shut and equipped with an injected rubber gasket. It is highly impermeable and sprayed with thermal coating for weather protection (heat and humidity). It is mounted on the gen-set's base, vibration-proof, and equipped with internal LED lighting with a special ON/OFF switch powered by the battery.
2. The assembly processor supplies the genset's operation/control panel.
3. It must be a modern model equipped with a microprocessor programmed with all operation, monitoring, and protection commands and a backlit LCD screen for easy reading in dim light.
4. Easy to use and upgradable, with adjustable settings, and displays multiple fault alerts simultaneously.
5. IP65 ingress protection rating.
6. On automatic start-up mode, the genset starts up with the load on as fast as possible.
7. The genset operates during:
 - Voltage failure on one of the main power phases.
 - Undervoltage on one of the main power phases below 80% of the rated voltage (adjustable).
 - Alternating mains power phases.
8. The start-up settings include three start-up attempts at adjustable intervals.
9. It has a standard MCCB thermal-magnetic circuit breaker (supplied with the genset).
10. The panel displays the following readings:
 - Voltage and frequency on each phase.
 - The current on each phase.
 - Rated power (kVA) and actual power (kW).
 - Power factor.
 - Coolant's temperature.



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- Oil pressure.
 - Operation hours.
 - Engine temperature.
11. The panel must contain the following protection systems:
- Low oil pressure (alert and turn off).
 - Low fuel level.
 - Low coolant level.
 - Coolant overheating (alert and turn off).
 - Overvoltage/undervoltage (alert and turn off).
 - Over-frequency/under-frequency (alert and turn off).
 - Overload (alert and turn off).
 - Start-up failure (alert and turn off).
 - Battery charge failure (alert only).
 - Battery voltage alternation (alert only).
 - All protection systems must run on any operation mode.
12. The panel must contain pilot lights or display messages for the following:
- Operation mode: Automatic, Manual, or OFF (pilot light or message).
 - Load (pilot light or message).
 - Battery charging (pilot light or message).
 - Faults: start-up failure, low oil pressure, engine overheating, overload, overvoltage, undervoltage, over-frequency, and under-frequency (pilot light or message).
13. There is a mode selection switch (OFF, Manual, Automatic) and an emergency press button to turn the genset off for troubleshooting.
14. Troubleshooting press button.
15. To operate properly, the panel must be equipped with all the protection systems and proper circuit breakers.
16. The vendor must indicate whether the genset records a fault log showing the fault's type, date, and time.

D. Sound attenuated enclosure:

1. The enclosure is preferred to be manufactured/supplied by the assembly processor and meet international standards.
2. Sound attenuation must be around 75 dB from seven meters or better.
3. IP44 ingress protection rating at least.



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4. The enclosure's soundproofing material must be thick enough, and preferably, it should be as thick as possible.
5. The enclosure and its components must be rustproof, coated with thermal spray, and preferably electrostatic coating.
6. It must have doors on both sides and a glass window revealing the control panel.
7. It must be equipped with an outer press button for emergency turn off, and a see-through door revealing the control panel.
8. It must be equipped with one-pin and three-pin electric outlets.
9. Both the enclosure and the panel must be lighted.
10. It must be equipped with a 1 kg fire extinguisher.

E. Mains grid/Generator power source switch panel

The switch panel switches between three available power sources: the mains grid, another 30 kVA genset, and the genset in question; supplies the power to the load assembly junction; and has the following specifications:

1. The panel must be made of thermally sprayed iron sheets with a minimum thickness of 1 mm. It has two doors: the inner one made of iron sheets and consisting of two panels and the outer one made of glass and locked. The outer door must be sufficiently sized to accommodate all the equipment and electric fixtures.
2. IP42 ingress protection rating.
3. High quality 200 A three-pole circuit breaker from the local market, dedicated to the mains power supply, protected against under-voltage and meeting the IEC standards as an automatic circuit breaker.
4. High quality 150 A three-pole circuit breaker from the local market, dedicated to the mains power supply, protected against under-voltage and meeting the IEC standards as an automatic circuit breaker.
5. High quality 220 A three-pole contactor from the local market, dedicated to the mains power supply, protected against under-voltage, and meeting the IEC standards as an automatic circuit breaker.
6. High quality 220 A three-pole contactor from the local market, dedicated to the genset, protected against under-voltage, and meets the IEC standards as an automatic circuit breaker.
7. To protect the load, the panel must be equipped with a phase sequence relay that connects/disconnects upon mains power failure, phase failure, or phase under-voltage/over-voltage.
8. Fuses or circuit breakers to protect the control devices.



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9. Three-mode switch key: Mains, Genset, and Automatic.
10. The panel door must be secured with a lock.
11. DIN rails to mount the components.
12. Suitably sized load electric junctions on the three phases, neutral pole, and ground pole.
13. Digital meters of the current voltage and intensity on the three phases as well as the power and frequency.
14. Six pilot lights indicating the mains/genset current along with the necessary protection systems.
15. A protecting cover for the bars and contactors.
16. Time relays.

F. Supply and wire an electric power cable:

A 4x35 mm² NYY flexible or stranded cable manufactured as per the Syrian Standards for cables, equipped with the needed lugs, fasteners, etc.

G. Supply and wire electric control cables:

4x1.5 mm² control cables, manufactured as per the Syrian Standards for cables.

H. Supply and install a fuel tank along with the piping:

1. Supply and install the required fuel tank with a min. The capacity of 2000L, made of black iron sheets with a min. The thickness is 4 mm, mounted on a proper metal base with metal corners with a minimum thickness of 4mm and adequate height. The tank must be coated on both sides with two layers of red oxide primer as a base coating, plus two layers of oil-based paint. It must have a level gauge, a 2-inch upper refill inlet with a padlock, a vent, and a 1-inch bottom discharge opening.
2. A 1" feeding outlet with a ball valve (copper core) of the same size.
3. All the necessary auto-refill sensors and piping, where the tank is equipped with an outlet and a hose to fill the genset's tank.
4. Refilling is done automatically via the necessary refill sensors.

I. Testing and delivery

1. The vendor must provide an official test certificate including the genset load tests for a period of 2 hours for with the loads of: 25%, 50%, 75%, 100%, and 110% of the load and overload rated by the assembly processor.
2. Start-up, safety, and protection tests (overheating and low oil pressure) must be conducted by the vendor who will also bear the testing fuel costs (diesel).
3. The vendor is responsible for any breakdowns resulting from manufacturing defects or wiring malfunctions during the startup tests.



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Bill of Quantities (BoQs) for the Supply, Delivery, Installation and Startup of an 80 KVA Immobile Soundproof Generator with Accessories:

#	Statement	Unit	Quantity
1.	Supply and test an immobile soundproof 80 kVA power generator set with operation, control, and automatic start-up panels, automatic fuel refill, sound-attenuated enclosure, free spare parts, heater, water trap, accessories, genset start-up expenses, testing, and training as per the ToRs.	Set	1
2.	Three power source switch panel with all accessories.	Unit	1
3.	The required power cables.	Meters	35. ±20%
4.	The required electric control cables.	Meters	35. ±20%
5.	A fuel tank with a min. capacity of 2000L.	Unit	1

END OF ANNEX A