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1. Scope:-

- ⇒ It is the intent of these specifications whether or not specifically mentioned herein, to describe a diesel engine, Four – wheel, hydraulically operated, articulated, front end scoop Wheel Loader equipped with **3m³** for multipurpose Rock bucket.
- ⇒ Bucket capacity shall be not less than **3m³** Rock, when handling an average material density of **1800 kg/m³**.
- ⇒ All items to be fully assembled with the entire necessary fittings and attachments & tested ready for immediate use.

2. Engine

2.1 General:-

- The diesel engine shall perform smoothly and efficiently under all operating conditions & shall develop the rated horse-power when operating on commercial diesel fuel with sulfur content of **1%**.

2.2 Type:-

- The engine shall be four stroke, water-cooled, direct injection, diesel, turbo charged, preferably after cooled, with not less than **6** cylinders & shall be equipped with replaceable wet type cylinder sleeves/liners.

2.3 Horsepower

- The engine shall deliver minimum **220 HP**, net at fly wheel rated RPM, equipped with fuel pump, water pump, cooling fan, heavy duty radiator, lubricating oil pump, air cleaner, alternator, hydraulic pump & any required engine accessories.

2.4 Required Engine Data

- The supplier shall submit manufacturer certified engine data according to **SAE** standard net power, torque and specific fuel consumption curves, at governed **RPM**, at sea level and **2500m** elevations.
- Specify certified average fuel consumption per hour when the loader is working Heavy workload conditions Lit/hr.

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2.5 Lubrication System

- Engine lubrication system shall be of the full force-feed type, by a gear, rotor or equivalent type oil pump.
- Pump shall be strainer protected.
- Oil clarification shall preferably be with replaceable cartridge filters (filters through full flow & by – pass cartridge filters or filters of better filtration system).
- The engine oil filler cap shall preferably permanently be attached to filler neck (oil filler cap secured by chain or other mechanism)
- Oil cooler shall be incorporated in the lubrication system.

2.6 Starting system

- The engine shall be equipped with heavy-duty 24V direct electric starting system.
- An electric motor shall start the engine satisfactorily at temperatures as low as 0⁰C without recourse to any auxiliary heating or starting device.

2.7 FUEL SYSTEM

2.7.1 Fuel Tank

- The fuel tank or tanks shall be properly ventilated, protected both internally and externally from corrosion and must incorporate a baffled sump to collect water formed by condensation properly supported with an under – side sheet metal for protection.
- Fuel tank cap shall be self –closing type permanently fixed on the filler neck (fuel tank cap with chain is required).
- Fuel tank (s) made from plastic will not be accepted.
- Fuel tank capacity not less than 290L

2.7.2. Injection pump

- The injection pump shall preferably be mechanically driven with all necessary regulatory & controlling attachments.

2.7.3 Injectors

- Injectors shall be accessible, interchangeable, and readily removable.

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2.7.4 Fuel Filters

- The fuel filters shall be dual with water & sediment trap and shall be accessible, replaceable and readily removable for quick maintenance.

2.7.5 Water Separator

- A water separator shall be installed in the diesel supply system to prevent water from going into the fuel system. It shall also retain rust, metal chips & dirt particles.

3. COOLING SYSTEM

- The cooling system shall be of tropicalized, closed pressurized, pump forced type, water medium with ample capacity to permit continuous full load operation of the engine, without boiling of the coolant under high load operating conditions.
- The cooling system shall incorporate efficient tropicalized thermostat.
- Cooling system should include corrosion resistor element replaceable type.

3.1 Radiator

- The radiator shall be tropicalized, of the heavy – duty construction, properly mounted to withstand shock and strains, likely to be encountered in operation.
- Upper & lower channels/tanks, as well as core shall be made from brass and / or copper of repairable type.
- The radiator shall have adequate capacity & flow area.
- The radiator shall be easily removable & accessible for maintenance.
- A device for preventing collection of rust & dust, which gives unfavorable effect on cooling system, shall be provided in the system.
- Plastics will not be acceptable in manufacture of any part of the radiator.
- It is required to install water filter with in the cooling system for trapping foreign materials.

3.2. Cooling Fan

- The cooling system shall be fitted with an adequate size direct drive, cooling fan blowing away from the engine in forward direction to the radiator.
- The fan shall be made from steel (metal) & driven by belt.



4. ELECTRICAL SYSTEM

The electric system shall be composed of complete **24V** electric starting, charging & lighting systems.

- The system shall be protected with fuses from damage caused from over loads & shorts.
- All wiring shall be enclosed in non-metallic loom.

4.1. Alternator

- The alternator shall be heavy – duty fan ventilated.
- An electronic voltage regulator shall be provided with in the system.
- It shall be of adequate capacity to provide service under normal operating conditions.

4.2 Batteries

- The batteries shall be heavy duty, of ample power to start the engine when cold at sufficient speed down to ambient temperature of **0°C**.
- Batteries shall be **2x12V** in series system, each **120 AH** (minimum) at **24** hours rating.

5. AIR CLEANER

- Shall be of heavy duty of a dry-type.
- Shall be fitted with pre-cleaner preferably cyclone type.
- Shall be fitted with automatic dust evacuator
- Dust indicator with restriction gauge/indicator of ample capacity, shall be furnished.
- The restriction gauge/indicator shall be well protected from external damage & strong enough to withstand shocks & impacts.

6. LIGHTING SYSTEM

- ✓ Lighting system shall comply with vehicular traffic regulation.
- ✓ The lighting system shall consist of but not limited to:-
 - Back up light
 - Turn signal with emergency 4-way flashers
 - Work light (front & rear)
 - Two lights with stop and tail lights
 - Panel lights
 - Cab interior light
 - etc

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7. TRANSMISSION

- The transmission shall be a hydrostatic type of the full power shift, with torque converter, preferably with planetary gearing system, at least four speeds forward and reverse preferably with selector for four-wheel drive.

8. STEERING

- Fully hydraulic power articulated steering with power amplification and meets SAE and ISO standards

9 BRAKES

- Foot operated hydraulic power actuated service brake on all wheels, with separate brake circuits for front and rear axles. The brake system should meet the requirements according to ISO **3450:2011** standards.
- The parking brake shall be of hand operated mechanical type and automatically applied when brake pressure fails during operation.
- Service brake and parking brakes shall be with built-in safety features for emergency.

10. WHEELS & TIRES

10.1 Wheels.

The wheels shall be of heavy-duty type of all metal construction with tire & rim assembly interchangeable with all wheels. A spare wheel should also be included.

10.2 Tires.

- The tire should have adequate size, heavy – duty traction type, suitable for loader operation under Uneven, bumpy and loose gravel.
- The tires should be radial and suitable for use under the most severe conditions.

11. FRAMES.

- The frames shall be extra heavy duty, highly resistant to both vertical & horizontal distortion, and suitable for use under the most severe conditions.

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12. AXLES.

- Heavy duty, fully floating, removable, is preferred.

13. OPERATOR'S CONSOLE

13.1 Controls

- All operating control shall be easily accessible to a normal sized operator and shall not require exorbitant amount of effort for activities.

13.2 Operator's Seat

- Adjustable, suspension seat with arm rests, placed for good visibility of the operator and for efficient operation of the loader is required.

13.3 Cab

- A cab shall be shock & sound proof fully enclosed steel cabin with safety glasses, windows lockable service doors & necessary mirrors.
- The windshield glasses shall be equipped with wipers
- The cab location shall offer maximum all around visibility & safe operation of the machine.
- Should be air conditioned with a standard.
- Should be equipped with FM/AM radio modulator including USB.

14. INSTRUMENTATION

The instrument panel shall include but not limited to:-

➤ **Gauges:-**

- Water temperature.
- Engine oil pressure.
- Fuel level.
- Torque converter temperature, (if applicable).
- Hydraulic Oil temperature in transmission.
- Brake pressure.
- Hour meter.
- Voltmeter or Ammeter.
- Speedometer.
- Etc.

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➤ **Indicator / warning lights:-**

- Engine coolant over heat & level.
- Engine oil low pressure.
- Transmission & hydraulic filter service indicators.
- Parking brake.
- Emergency steering system.
- Air cleaner service indicator.
- Parking brake (buzzer)
- Shut down to idle as standard
- Etc.

15. HYDRAULIC SYSTEM

- The hydraulic system shall be equipped with adequate capacity of tanks, line fitters, strainers and relief valves.
- Hydraulic oil cooler shall be incorporated in the system.

15.1 Hydraulic Pump

- The pump shall be gear or vane type pump, or equivalent, mechanically driven by the engine.

15.2 Boom Cylinders

- The double acting boom lift hydraulic cylinders of adequate size, suitably fastened to twin bucket lifting arms are required.

15.3 Hydraulic Pressure Hose

- The hose shall consist of a seamless oil resistant synthetic rubber tube, brand of high tensile steel wire, weather & oil resistant rubber cover with hydraulic hose fittings at either end. Fittings shall be threaded to standard pipe threads & equipped with swivel fittings at one hose end.

16. Bucket

- The bucket shall be rock. type of high quality alloy steel (high grade steels designed to handle hard & abrasive materials at sever conditions) electric arc welded at all seams and equipped with pin-on, or bolt-on teeth & reversible type segments & corner guards. In order to reduce bucket maintenance costs & prolong service life of the bucket, the bucket shall be fitted with bolt on reversible & inter combinable segments in combination of teeth.

16.1 Capacity

The bucket capacity for average material density of 1800 kg/m³ shall be minimum **3 m³** rock cubic meter heaped.

17. Operating Specifications

- Dumping clearance at full lift: min. **2.97** meter
- Dumping reach at full lift & **45⁰** discharge angle: min. **1.2** meter
- Maximum overall length should be not less than **1200** mm
- Operating weight min. **16,500** kg.
- Minimum ground clearance **485** mm

18. ADDITIONAL ESSENTIAL ACCESSORIES REQUIRED

- Front and rear hook
- Cap locks for fuel and hydraulic tanks.
- Pre - cleaner
- Back – up Alarm
- Transmission guard & power train guard.
- Two sets of all keys.
- Lockable door type engine hood side cover
- Horns
- Etc

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19. Life expectancy of major components

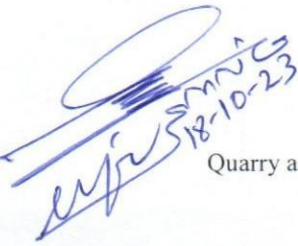
- Suppliers are required to indicate average life expectancy separately for the major assemblies, namely engine, transmission, hydraulic pumps, steering pumps, torque converter, etc and their warranty period should be mentioned.

20- Field kits


- ✓ The supplier shall submit the list of field kits of spare parts and quantity per line item required minimum for Three years.

21- TOOLS and Manual

- ✓ Set of ordinary & special tools with lubrication gun, hydraulic jack 25tons, filter wrenches, as required for maintenance & repair with lockable toolbox.
- ✓ Tools to be supplied shall be listed.
- ✓ At least two sets of English version manuals and technical literatures of the units shall be included
 - The sets of manuals shall consists but not limited to: -
 - Operators instruction and maintenance manual
 - Diagnostics & workshop repair manual
 - Spare parts catalogue


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