

**OIL INDIA LIMITED**  
(A Govt. of India Enterprise)  
P.O. Duliajan-786602, Assam  
**E-mail:material@oilindia.in, Fax No.91-374-2800533**

**ANNEXURE-I**

**Tender No. : DID3563P07/GC**  
**Tender Date : 25.11.2006**

Item No./ Mat. Code	Material Description	Quantity	UOM
<b>10</b> 0C000457	<p>RECIPROCATING PISTON PUMPS FOR BOWSER LOADING DUTIES</p> <p><b>A. PUMP</b></p> <p>1. <b>Type</b> : Horizontal, triplex single acting / duplex double acting reciprocating piston pumps as per hydraulic institute standard.</p> <p>2. <b>Capacity and Discharge</b> : The piston size selected should be adequate to meet the pressure and volume requirements of 25 kg/cm<sup>2</sup> and 20 m<sup>3</sup> /hr respectively.</p> <p>3. <b>Fluid end Features</b> :</p> <p>(i) Forged carbon steel / pressure tested casting, one piece fluid end with bolted valve covers.</p> <p>(ii) Replaceable, high carbon steel, case hardened and honed, fluid cylinder liners</p> <p>(iii) Hardened steel fluid valves with rubber / polyurethane inserts.</p> <p>(iv) Replaceable, hardened valve seats</p> <p>(v) Replaceable fluid pistons, single acting / double acting type, taper fitted to piston rods.</p> <p>(vi) Alloy steel, case hardened and polished, piston rods</p> <p>(vii) Self lubricating glands with piston rod packing</p> <p>4. <b>Power end Features</b> : Either <b>Category A</b> or <b>Category B</b></p> <p><b>Category A</b> (For triplex single acting piston pumps)</p> <p>i. One piece cast iron frame integrating main bearing housing and crosshead guides ensuring perfect alignment and rigidity.</p> <p>ii. Alloy / carbon steel crankshaft</p> <p>iii. Heavy duty taper roller crankshaft bearing</p> <p>iv. Two piece, steel backed, precision type, aluminum alloy/ babbitt line crank pin bearings.</p> <p>v. Nodular / S.G. iron or heat treated alloy steel connecting rods</p> <p>vi. Nodular /S.G. / Alloy iron cross heads, heavily reinforced around piston rods and cross head pin bosses.</p> <p>vii. Bronze / gunmetal crosshead pin bushings</p> <p>viii. Alloy steel crosshead pins</p> <p>ix. Flooded sump splash lubrication for power end</p> <p>x. Sight glass gauge or oil level dipstick</p> <p><b>Category B</b> (For duplex double acting piston pumps)</p> <p>i. One piece cast iron frame integrating main bearing and jackshaft bearing housings and crosshead guides ensuring perfect alignment and rigidity.</p> <p>ii. Main gear eccentric having one piece casting herringbone gear integral with eccentric designed to withstand heavy load and ensure perfect alignment.</p> <p>iii. Alloy /carbon steel shaft for main gear eccentric</p> <p>iv. Adjustable, taper roller, main bearings</p> <p>v. Taper roller bearing /roller bearing supported jackshaft extended on both sides to accept a variety of drive arrangements.</p> <p>vi. Replacement, single piece, high lead bronze eccentric bushings</p> <p>vii. Nodular /S.G. iron or heat treated alloy steel connecting rods.</p> <p>viii. Solid type, nodular / S.G. / Alloy iron cross heads, heavily reinforced around piston rods and cross head pin bosses</p> <p>ix. Bronze / Gunmetal crosshead pin bushings</p>	3	NO

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	<p>x. Alloy steel crosshead pins  xi. Flooded sump splash lubrication for power end  xii. Sight glass gauge or oil level dipstick  5. <b>Accessories:</b></p> <p>i. Suitably sized and rated safety relief valve mounted on the discharge piping  ii. Discharge pressure gauge having a range of 0-50 kg/cm<sup>2</sup>  iii. Suitably designed suction stabilizer and discharge pulsation damper, mounted and installed in line with the suction and discharge piping  iv. Properly raised main line and bleed line gate valves.  v. Complete set of fitting, interconnection pipings and companion flanges with appropriate bolting, gaskets dampener brackets, etc.</p> <p>6. <b>Duty / Services :</b>  The pump should be designed for intermittent duty/service. It shall be deployed to load crude oil onto bowsers at well head setups, from crude oil storage tanks.</p> <p>7. <b>Liquid to be handled :</b>  The pumping unit should be suitable for pumping crude oil, the characteristics of which are given below #</p> <p># API Gravity : 15° - 30°  # Pour point : 3 - 39° c  # Salinity : Up to 5000 ppm  # Temperature : 50° c (maximum)</p> <p>8. <b>Suction condition :</b> Negative head of 3 meters  9. <b>Name Plate and Rotation Arrows :</b> A nameplate shall be securely attached at a readily visible location wherein the manufactures name, machine serial number, maximum and minimum design limits and rating data, maximum allowable working pressure and temperatures, hydrostatic test pressure etc. should be clearly indicated.  Rotation arrows indicating direction of rotation of major items should be cast in or attached.</p> <p>10. <b>Certificate and documents to be forwarded :</b>  The following documents should be forwarded along with the quotations:</p> <p>i. Product line catalogue, specifying materials of construction and constructional features of the pump and technical literatures of all ancillary equipment.  ii. Performance chart of the reciprocating piston pump including all technical calculations such as hydraulic horse power requirement, volumetric efficiency, mechanical efficiency, RPM, maximum piston rod load, NPSH requirement etc.</p> <p>The following documents should be forwarded within a month of issue of LOI or placement of firm order:</p> <p>i. A foundation diagram for the complete pump set indicating the static and dynamic loads of the package.  ii. A layout drawing for the complete pump set indicating the orientation of all components to be assembled on the master skid.</p> <p>The following documents must be forwarded along with the supply of equipment.</p>		

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	<p>i. Certified test results  ii. Certificate of hydrostatic testing  iii. Manufacturers certificate of authenticity  iv. Certificate of test / conformance of pump  v. Operation and maintenance manuals, parts lists of pump, gear box and all other accessory equipment.</p> <p><b>B. SPEED REDUCTION:</b>  The reduction of speed from the prime mover rated at 1500 RPM to the desired speed of the reciprocating pump shall be effected either by means of #</p> <p>? A suitably selected and designed external foot mounted gear box. or  ? A belt and pulley system</p> <p><b>N.B.</b> Guards should be provided over couplings / pulleys &amp; belts used as part of the transmission train. Provision of guards over belt drives and couplings has become mandatory as per recommendations of OISD &amp; DGMs bodies.</p> <p><b>C. PRIME MOVER (DIESEL ENGINE) :</b>  The prime mover should be a four stroke, naturally aspirated, vertical in-line, air cooled, diesel engine, rated for continuous power and capable of developing a net minimum HP of 25 HP at 1500 rpm at the site conditions given below #  Maximum temperature : 40°C  Minimum temperature : 5°C  Maximum relative humidity at 35°C : 95°C  Maximum altitude above mean sea level: 150 M  With HSD conforming to IS: 1593:1982 and having the following specifications:  Cetane number : 42.5  Gross calorific : 19480 BTU /CFT (10000 cal /gm)  The engine shall conform to ISO:3046/BS5514/IS 10000 specifications and shall be rated for continuous, power with an overload power rating of 110% of the continuous power corresponding to engine application, for a period of 1hr. within a period of 12 hrs. of operation.  The engine governing should be in accordance with Class A-2 governing specified in BS: 5514/IS 10,000.  The engine should comprise of the following sub systems:</p> <p>1. <b>Cooling System</b>  The cooling system of the air-cooled engine should comprise of a belt and pulley driven blower fan assembly.</p> <p>2. <b>Air Intake System</b>  The air intake system of the engine should comprise a heavy duty oil bath type air cleaner and an air intake manifold.</p> <p>3. <b>Starting System</b>  The starting system of the engine should be a 12 volt electric starting system comprising of a battery of reputed make, battery leads, engine mounted battery charging alternator (Make : LUCAS TVS), 12 volt starter (Make : LUCAS TVS/ DELCO REMY) and a starting ring fitted to the engine flywheel .</p> <p>4. <b>Exhaust System</b>  The exhaust system should comprise of an air cooled exhaust manifold,</p>		

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	<p>stainless steel exhaust flexible connection, exhaust silencer, spark arrestor and piping connections.</p> <p><b>5. Fuel System</b> The fuel system should comprise of mechanical governor, fuel injectors, fuel pump, fuel filter assembly, fuel lines and a fuel tank having storage capacity to meet the fuel requirement of 12 hours of full load operation.</p> <p><b>6. Lubricating System</b> The lubricating system should comprise of gear driven lubricating oil pump, lubricating oil filter with a replaceable filter element, lubricating oil pan, oil level dipstick and crankcase breather.</p> <p><b>7. Instrument Panel</b> The instrument panel should include the following #</p> <p>i. Lubricating oil pressure gauge ii. Starting switch iii. Ignition switch iv. Digital / mechanical tachometer v. Ammeter vi. Engine #low lube oil pressure# indication display red lamp</p> <p><b>8. Engine Safety Controls</b> Safety shut off/ trip system for tripping the engine in the event of #</p> <p>i. Low lubricating oil pressure ii. Engine over speed</p> <p><b>9. Other Features :</b></p> <p>i. Flywheel ii. Lifting eyes iii. Guards over belt drive (blower fan drive, charging alternator drive pulley). iv. Standard painting v. SAE standard rotation</p> <p><b>N.B. :</b> Provision of guards over belt drives and couplings has become mandatory as per recommendations of OISD &amp; DGMS bodies.</p> <p><b>10. General Notes:</b></p> <p><b>a.</b> The engine shall conform to ISO 3046/BS 5514/ IS 1000 specifications and shall be rated for continuous power with an over load power rating of 110% of the continuous power corresponding to engine application, for a period of 1 hr. within a period of 12 hrs. of operation.</p> <p><b>b.</b> The engine governing should be in accordance with Class A-2 governing specified in BS:5514/ IS 10000.</p> <p><b>c.</b> The bidder should submit the following information along with relevant performance rating curves and engine product catalogues.</p> <p>i. Gross HP developed at rated RPM ii. Deduction for blower fan &amp; charging alternator iii. Net HP developed at rated RPM iv. Fuel consumption at rated power as well as 110%, 75% and 50% of rated load</p> <p><b>d.</b> Each pump set should be ready for operation after carrying out initial servicing and making provisions for fuel.</p>		

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	<p><b><u>D. DRIVE ARRANGEMENT</u></b>  The drive arrangement will involve either of the two mechanisms #  i. Flow of prime mover power through a flywheel mounted clutch PTO to the input shaft of an external foot mounted gearbox and finally to the crankshaft of the triplex pump. Suitably selected flexible disc coupling should be incorporated to transfer power from the prime mover to the triplex pump through the transmission, as illustrated in the schematic.</p> <p style="text-align: center;">OR</p> <p>ii. Flow of prime mover power through a flywheel mounted clutch PTO to the jackshaft of the piston pump through a suitably designed system of belts and pulleys and finally to the main gear eccentric of the pump.</p> <p><b><u>E. MASTER SKID :</u></b>  The pump set is to be supplied with all components and accessories fitted and mounted on an oilfield type three runner portable master skid and should be ready for operation after carrying out initial servicing and making provision fuel supply.  While unitizing the pump set, easy approach to various components for maintenance aspects should be kept in mind. The floor of the skid should be covered with anti skid steel plates. The skid should be fabricated out of properly sized beams (minimum 150 mm) to withstand loading / unloading and transfer in oil field trucks. The size should be big enough to provide for sufficient working space in and around the pump set.</p> <p><b><u>F. INSPECTION AND TESTING :</u></b>  The pump sets shall be inspected by Oil#s deputed representative at manufactures works / factory prior to dispatch, for which intimation must be sent to OIL in advance. However, such inspection will not relieve the supplier of his responsibility to ensure that the equipment supplied conforms to the correct specifications and is free from manufacturing and all other defects.  The supplier shall carry out full load performance test of the pump sets in presence of Oil#s deputed representative at parameters conforming to NIT specifications, where each of the pump sets shall be load tested for minimum period of 4 hours.</p> <p><b><u>G. WARRANTY</u></b>  The warranty period for the engine, pump set and all ancillary equipment should be a minimum of 18 months from the date of dispatch / shipment or 12 months from the date of commissioning.</p> <p><b><u>H. SPARE PARTS AND SPECIAL TOOL :</u></b>  Spares that shall be required for normal operation and maintenance of the pump set for a period of two years should be included in the scope of supply. Bidders should indicate the unit prices of the spares included, indicating the manufacturer#s part numbers for each spare offered along with their own equivalent part number if any.</p> <p>The following should be supplied as commissioning spares (one against each pump set).</p>		

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	<p># A set of each type and size of coupling / belt and pulley combination installed in the pump sets.  # A valve seat puller and special wrenches for tightening stuffing box glands, studs etc.  # A tool box containing the tools required for routine maintenance of the pump set.</p> <p><b>I. AFTER SALES SERVICE</b>  The nature of after sales service, which can be offered by the bidder during initial commissioning and also subsequently should be clearly stated. Bidders should also confirm that spares, both routine and vital spares, for engine, pump and all accessories quoted, shall be available for at least 10 years after the delivery of the material.</p> <p><b>J. BID EVALUATION CRITERIA (TECHNICAL) #</b></p> <p>i. The bidder should be an OEM or authorized dealer of OEM either for the pump or the engine.</p> <p>ii. If the bidder is an OEM of engine or an authorized dealer of engine, he must purchase the pump from the OEM of pump or their authorized dealer and vice versa. Necessary documentary evidences from OEM#s in this regard must be forwarded along with the bids failing which the offers will be rejected. Bidders other than the OEM must furnish the following undertaking from the OEM :  Date of manufacturer, make, , model, serial no. test certificate, literatures and parts book of the pump will be supplied if order is place on the bidder.</p> <p>iii. If the bidder is an assembler of pump set, he must purchase the pump and the engine from OEM or their authorized dealer. Documentary evidence in this regard must be enclosed with the offer failing which the offer will be rejected. The assembler should indicate that necessary infrastructural facilities for fabrication and load testing of the pump set are available with them. Bidders other than the OEM must furnish the following undertaking from the OEM #  #Date of manufacture, make, model, serial no. test certificate, literature and parts book of the pump will be supplied if order is placed on the bidder.#</p> <p>iv. Bidders should have the experience of completing at least one order in the last five financial years before the bid closing date of this enquiry against supply of pump sets of similar nature in PSU#s Central Govt. Undertakings, Other Public Limited Company or reputed Private Company. The name of the clients to whom the pump sets have been supplied along with necessary documentary evidences indicating their supply should be provided without which the offer will be rejected.</p> <p>v. Bidders must submit filled in data sheet and technical check list enclosed with the enquiry.</p> <p>vi. The bidder must assure that after sales service with respect to the pump set shall be provided their respective OEM#s or authorized dealers.</p> <p>vii. The bidder must undertake and confirm from OEM#s that the equipment to be supplied are not going to become obsolete for the next 10 years and provisioning of spares can be continued.</p>		

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	<p>12.0 <b><u>DATA SHEETS</u></b></p> <p>I. <b><u>ENGINE</u></b></p> <p>1. MAKE 2. MODEL 3. NUMBERS OF CYLINDERS 4. ASPIRATION 5. COMPRESSION RATIO 6. DISPLACEMENT 7. SIZE (BORE X STROKE) 8. DUTY 9. GROSS HP AT RATED RPM 10. DEDUCTION FOR FAN, ALTITUDE, TEMPERATURE 11. NET HP AVAILABLE AT RATED RPM 12. FUEL CONSUMPTION (LT/HR)AT i. 110% Load ii. 100% Load iii. 75% LOAD 13. LUBRICATING OIL CONSUMPTION (LT/HR) 14. SUMP CAPACITY 15. ACCURANCY CLASS 16. MAKE OF CLUTCH PTO 17. MODEL OF CLUTCH PTO</p> <p>II. <b><u>DATA SHEET (PUMP)</u></b></p> <p>1. MAKE 2. MODEL 3. SIZE (PISTON DIAMETER X STORKE LENGTH)</p> <p>III. <b><u>TECHNICAL CHECK LIST</u></b></p> <p>1. WHETHER QUOTED AS OEM OF ENGINE AND WHETHER DOCUMENTARY EVIDENCES SUBMITTED? YES/NO 2. WHETHER QUOTED AS OEM OF PUMP AND WHETHER DOCUMENTARY EVIDENCES SUBMITTED? YES/NO 3. WHETHER QUOTED AS AUTHORISED DEALER OF OEM (ENGINE/PUMP) AND WHETHER DOCUMENTARY EVIDENCES SUBMITTED? YES/NO 4. WHETHER QUOTED AS ASSEMBLER AND WHETHER DOCUMENTARY EVIDENCES SUBMITTED? YES/NO 5. WHETHER SEPARATELY HIGHLIGHTED DEVIATION FROM THE TECHNICAL SPECIFICATION? YES/NO 6. WHETHER SPARES FOR TWO YEARS OPERATION SPECIAL TOOLS AND COMMISSIONING SPARES INCLUDED IN THE OFFER? YES/NO 7. WHETHER SPARES SHALL BE AVAILABLE FOR 10 YEARS AFTER SUPPLY OF EQUIPMENT? YES/NO 8. WHETHER THE ENGIN IS AIR COOLED? YES/NO 9. WHETHER THE NETT HP OF THE ENGINE IS AT LEAST 25 HP? YES/NO 10. WHETHER THE OFFERED ENGINE CONFORMS TO ISO 3046/BS5514 SPECIFICATION? YES/NO</p>		

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	11. WHETHER THE OFFERED PUMP CONFORM HYDRAULIC INSTITUTE STANDARDS? YES/NO 12. WHETHER THE PUMP IS A SINGLE ACTING TRIPLEX PISTON PUMP? YES/NO 13. WHETHER THE PUMP IS A DUBLEX ACTING PISTON PUMP? YES/ NO 14. WHETHER THE PUMP IS DESIGNED FOR INTERMITTENT SERVICE DUTY? YES/NO 15. WHETHER THE SPEED REDUCTION IS EFFECTED BY AN EXTERNAL FOOTMOUNTED GEAR BOX? YES/NO 16. WHETHER THE SPEED REDUCTION IS EFFECTED BY A BELT AND PULLEY SYSTEM? YES/NO 17. WHETHER THE TESTING OF THE PUMP SETS SHALL BE CARRIED OUT AT MANUFACTURED FACILITY? YES/NO 18. WHETHER PRODUCT LINE CATALOGUE OF THE PUMP, ENGINE AND ACCESSORIES HAVE BEEN FORWARDED WITH THE OFFER? YES/ NO 19. WHETHER BELT SHALL BE PROVIDED OVER COUPLINGS AND BELT DRIVES YES/ NO.		
<b>20</b> 0C000457	Same as Item No. 10	4	NO
<b>30</b> 0C000457	Same as Item No. 10	2	NO

**Special Notes :** (1) To evaluate the inter-se ranking of the offers, Assam Entry Tax on purchase value will be loaded as per prevailing Government of Assam Guidelines as applicable on bid closing date. Bidders may check this with the appropriate authority while submitting their bids.