OIL INDIA LIMITED
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ANNEXURE – I
TENDER NO.KID4916P08/08
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COMPLETE FIRE FIGHTING SYSTEM FOR BHOGPARA OCS COMPRISING OF :

(I) ENGINE DRIVEN DRENCHING PUMP – 2 UNITS
(II) MOTOR DRIVEN JOCKEY PUMP – 2 UNITS
(III) AUTOMATION SYSTEM FOR ABOVE

DETAILED SPECIFICATIONS ARE AS UNDER :

A) DIESEL ENGINE DRIVEN FIRE PUMP :

I) Pump Specifications :

Type: Horizontal Split Casing
Stage: Single Stage
Capacity : 410 kls / hr.
Head : 100 m of liquid column
Liquid : Water of Specific Gravity 1.0
Duty : Continuous
Application : Fire Fighting / drenching
Negative Suction Head : 4 m
Efficiency : 70% (minimum)
Brake Horse Power}
Suction Size } to be indicated by the bidder
Delivery Size }
Shaft Seal : By gland packing

Impeller design should be such that delivery pressure of 10 kg / sq. cm. is obtained even with 4 m negative suction.

Selected pump should be as per UL 448 duty condition.

1) Pump should run for rated duty condition.
2) Pump should be capable of deliver 150% of rated flow with minimum of 65% of rated head.
3) Pump should be suitable for speed mentioned.
4) Rated head below 40 psi is not allowed.
5) Shut-off head should not be more than 140% of rated head and have raising nature.

Bidder should give the following information regarding Performance at

(a) Duty point and
(b) 1.5 times discharge :
Total Head #
Discharge

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Efficiency -
Pump Speed -
BKW / BHP -
NPSHR -

II) CONSTRUCTIONAL FEATURES :

i) The material of construction of the Pump body, Suction, Delivery and intermediate parts should be Close Grained Cast Iron.

ii) The material of construction of the impeller should be Stainless Steel or, Bronze. The impeller should be fully shrouded and dynamically balanced for smooth running.

iii) The material of construction of the shaft should be Stainless Steel.

iv) The material of construction of the shaft sleeve should be Stainless Steel.

v) The material of construction of the casing Ring should be Bronze or, Cast steel.

vi) The material of construction of the Gland & Gland nuts should be Cast Iron.

vii) The pump must be supported by Heavy Duty Bearings and Grease Cups should be provided for lubrication.

DIESEL ENGINE :

The engine should be a four stroke, in-line Six cylinder, naturally aspirated / turbocharged, Radiator cooled Diesel engine, rated for continuous power, capable of developing 10% more power than the net minimum BHP requirement of pump input at the duty condition specified above and at site condition given below :

Maximum Temperature : 40 deg C
Minimum Temperature: 5 deg C
Maximum Relative Humidity at 35 deg C : 95 %
Maximum Altitude above mean sea level : 150 M

HSD conforming to IS: 1593 : 1982 and having following specifications :
Cetane Number : 42.5

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Gross Calorific Value : 19480 BTU / CFT

1.0 Engine should comprise of the following system :

I) COOLING SYSTEM Comprising of :

i) Engine driven fresh water pump - Engine mounted
ii) Heavy duty radiator (having capacity at least 20% in excess of total heat rejection of the engine) with Blower fan.
iii) Thermostat installed in Engine coolant outlet.
iv) Corrosion inhibitor.
v) Spin-on filter for coolant.

II) AIR INTAKE SYSTEM comprising of :

i) Air intake manifold # Engine mounted.
ii) Dry type Intake Air filter- Engine mounted
iii) Vacuum Indicator # Mounted on Intake Piping.

III) EXHAUST SYSTEM comprising of :

i) Turbocharger- Engine mounted if engine is turbocharged.
ii) Water cooled exhaust manifold.
iii) Exhaust Silencer- Residential type with Spark arrester.
iv) Flexible connection and related piping.

IV) FUEL SYSTEM comprising of :

i) PT fuel pump
ii) Fuel Filter # Simplex type, paper element- Engine mounted.
iii) Mechanical Governor.
iv) Fuel Injectors.
v) Wire braided hoses between filter and fuel pump.
vi) Wire braided flexible hoses for fuel supply and return to Diesel Tank.
vii) Check (non-return) valves in Fuel supply and Drain lines.
viii) Fuel tank built within the oil field skid (base frame) complete with drain valve, air vent, inlet and outlet connection. The fuel tank should be large enough to hold enough fuel for at least 8 hours continuous operation of the engine on fuel load.

V) LUBRICATING SYSTEM comprising of :

i) Lubricating Oil Sump.

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ii) Engine Mounted Lube Oil Pump- Gear Driven.
iii) Engine Mounted Lubricating Oil Cooler # Water Cooled- integral with Engine Coolant circuit.
iv) Lubricating Oil filter- Simplex Type Paper Element # Engine Mounted.
v) Oil Filter Tube with Cap and Lube Oil Dipstick Oil Level Check- Engine Mounted.

VI) ENGINE STARTING SYSTEM comprising of :

i) Non-shielded type 24 V DC starter, Make : LUCAS-TVS / Delco Remy.
ii) Alternator for battery charging, Make : LUCAS-TVS / Delco Remy.

VII) ENGINE INSTRUMENT PANEL comprising of :

i) Lub Oil pressure indicator
ii) Water Temperature indicator.
iii) Lub Oil temperature indicator.
iv) Tachometer and Hour Meter.
v) Starting Switch with key.
vi) Push button switch.
vii) Ammeter.

VIII) SAFETY CONTROLS :

Safety control devices to protect the engine against the following occurrences should be provided.

i) Low Lub oil pressure.
ii) High water temperature.
iii) Over speed.

IX) OTHER FEATURES :

i) Vibration damper
ii) Flywheel suitable for the selected Clutch
iii) Flywheel Housing
iv) Front and rear engine support
v) Lifting eyes
vi) Crank Case Breather
vii) SAE standard rotation
viii) Suitable Hand Throttle Control
ix) Non sparking guards over blower fan belt drive and water pump belt drive.
x) Non-return valve in each drenching pump delivery line (total 2 nos. NRV)

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GENERAL NOTES :

i) The engine should conform to ISO 3046/BS5514/IS 10000 specifications and should be rated for continuous power with an overload 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.
ii) Power calculation should be made based on 150% of rated capacity.
iii) The bidder should submit the following information along with relevant performance rating curves and engine product catalogue :

Gross HP developed at rated RPM.
Deduction for blower fan and other ancillary equipment.
Net HP developed at rated RPM.
Specific fuel consumption at rated power as well as 110%, 75% and 50% of rated load.

iv) The engine shall be tested at manufacturer's works and relevant test certificate in this regard shall be submitted to OIL. OIL may if felt necessary, depute representative to oversee the testing of the engine at manufacturer's works.
v) Performance chart of the centrifugal pump indicating capacity, head, efficiency, size of impeller etc. as well as all technical calculations for BHP, NPSH requirement etc. should be forwarded along with the offer
vi) A suitably selected and rated Clutch Power Take-Off point unit (Make Ghatge Patil) and coupling should be incorporated in the transmission system to couple the Diesel Engine with the centrifugal pump for transfer of power.
vii) The pump set is to be supplied with all components and accessories fitted and mounted on a robust fabricated MS skid. 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 size of the skid should be adequate enough to provide for sufficient working space in and around the pump set.
viii) A Non-Sparking type Coupling Guard fabricated from Aluminum sheet should be placed over the Coupling and the Coupling Guard should be suitably anchored to the oil field skid.
ix) The diesel Engine and Centrifugal pump should be painted with Fire Red paint.
x) Bidders must fill up the DATA SHEET for the engine, pump and ancillaries.

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B. DETAILS OF JOCKEY PUMP MOTOR AND STARTER CONTROL PANEL FOR BHOGPARA OCS.

Motor:

The motor shall have the following specifications.

Type : The motor shall be 3 phase, squirrel cage, AC Induction motor conforming to BIS 325

Rated output : 20 HP
Enclosure : TEFC with Degree of protection = IP55
Insulation : Vacuum pressure impregnated, Class F with winding temperature rise limited to value specified for class B insulation
Ambient : Suitable for 40 degC max, 5 degC min, 150 m Alt, 95% RH
No of phases : 3
Voltage : Motor shall be suitable for 415 ± 6% volts, 3 Phase, 50 cycles, AC supply and should withstand high voltage fluctuation.
Freq. : 50 Hz ± 3%
RPM : To match driven load
Duty : Continuous (S1)
Mounting : Horizontal, foot mounted
Bearing : Ball/Roller bearing at DE & NDE
Type of Drive : Direct Coupled
Staring : Star Delta Starter.
Switching : 15 Starts /Hr.
Terminal Box : Cable termination box with brought out terminals suitable for terminating 2 nos. of PVCA copper cables of size 3 x 10 mm2 with 2 nos. cable entry holes. The brought out terminals shall be of brass and mounted on non-hygroscopic insulation (FRP or DMC) suitable for tropical climate.
Glands : 2 nos. of weatherproof, heavy duty nickel plated brass glands shall be supplied with the motor.
Earthing : Two nos. of earthing studs to be provided on both sides of the motor. Earthing system for the motor shall be as per the IS: 3043.
Lifting Eye: : One no. lifting hook shall be provided for lifting the motor.
Markings : - Name plate details with name of manufacturer, frame size, rated voltage, rated out put, current, frequency, type of duty, class of insulation, no. of phases, speed in rpm at rated out put, degree of protection, winding connections, amb temp, bearing sizes, lubricant, lubrication material and year of manufacture

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Paint : Two coats of DA grey paint
Make : Bharat Bijlee / Crompton Greaves/ KEC/ Siemens/NGEF.

General Notes on motor:
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1. Motor shall be tested as per BIS and test certificates shall be furnished with the supply.

Starter Control Panel:

The Starter Control Panel shall be suitably designed for the application and HP rating of the pump. The starter panel shall be sheet steel clad, totally enclosed, dust & vermin proof, self supporting and floor mounting, cubicle type, made of 14 SWG CRCA sheet built upon suitably sized MS angle iron/channel frame; having hinged door, ventilation louvers, pad locking arrangement, lifting hooks, bottom detachable gland plate, 2 Nos. of earthing studs on opposite sides with suitably sized zinc plated & passivated double nuts and spring washers, danger plate; and as fully described below:

The Starter Control Panel shall have:
1. 63A Switch disconnector fuse unit as incomer, with brought out terminals. Make: Siemens / GE / Havell's.
2. 03 nos. 25A (min), AC3 duty, contactor. with 4NC + 4NO auxiliary contacts. Make: Siemens / L&T / Telemechanique (Schneider).
AC3 rating of the contactors shall be 30% higher than the AC3 rating recommended in contactor selection chart of Siemens / L&T / Telemechanique (Schneider).
3. Over load relay of rating 13 # 21 A with manual and automatic reset .Make: Siemens / L&T / Telemechanique (Schneider).
4. The control panel shall include START / STOP push buttons with terminals for remote Start / Stop PB Station.
5. Protections: The motor shall have the following minimum (but not limited to) protections in the Starter panel
Short Circuit
Overload (make of OLR shall be same as that of contactor)
Phase failure (make of SPPR: Siemens / Telemechanique (Schneider)
Earth leakage protection provided with separate CBCT &

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ELR with earth leakage current adjustable sensitivity 0 - 500mA, time setting 0 # 500 ms, (make of ELR: Legrand / Merlin Gerin)

6. Metering & indication: The panel shall have meters and indication for the following information (CTs shall be used where necessary):

Voltage of all three phases
Motor Current of all three phases
Indications: LED type indicating lamps with complete fittings, with legend plate for “Phase Healthy”, “Motor Run”, “Motor Off”, “Motor Trip on Fault”.

7. Tinned copper brought out terminals shall be provided for all cable connections along with suitably sized zinc passivated mild steel nuts, bolts, flat and spring washers.

8. Suitable cable entry arrangement with detachable gland plate(s) and shall be provided with 5 Nos.(1 for Incoming cable, 2 for motor power supply and 2 for instrument panel power supply and control cable) of suitably sized single compression, heavy duty nickel plated brass glands shall be provided for terminating the incoming / outgoing cables.

9. All cable entries shall be from bottom of the panel the height of lowermost edge of the panel shall be at a min. height of 450mm from floor level.

General Notes on starter:

1. The Starter Control Panel shall be weatherproof with IP54 degree of protection.
2. The panel shall be thoroughly cleaned before applying 2 coats of rust preventing primer followed by 2 coats siemens gray paint and powder coated.
3. Bus bars of main power connection shall be suitably rated tinned copper bars duly sleeved with heat shrinkable PVC sleeves. Bus bars used for the neutral shall be of same cross section as that of phases.
4. Control wiring shall be done with single core, 2.5 mm^2, PVC insulated, stranded copper wires. The control voltage shall be 230VAC, 50 Hz.
5. All wires shall have ferrule numbers for proper identification.
6. Legend plates for the indication lamps, meters, control switches / buttons and labels for the terminals shall be provided.

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7. Sufficient space shall be provided in the starter for cable termination, dressing and connecting cable leads to the brought out terminals.

Make of Starter Control Panel:
M/s. Assam Electricals, M/s. Venus Control & Switch Gear, M/s. L & T, M/s. Siemens, M/s. PLE Projects, M/s. Lotus Power & Control Gear.

Documents:

1. Bidder shall have to furnish every detail of the electrical items in their offer as per the above in the same order. All of the above shall form part of the contract, if awarded. Hence any deviations must be clearly mentioned which shall be scruitinized for acceptability. Specific type and make of components should be mentioned clearly. No deviation shall be allowed at the time of supply and in such case the order will be cancelled without any liability to OIL. IN CASE OF SUCH CANCELLATION OIL MAY RECOVER FROM THE BIDDER THE COST INCURRED BY OIL IN PROCESSING THE TENDER TILL THE TIME OF CANCELLATION.

2. All electrical items shall be procured from OEM or their authorized dealers only. In case of dealers copies of valid dealership certificates shall be furnished with the offer without which the offers shall be liable for rejection.

3. The following documents shall be submitted with the offer
GA and dimensional drawing of all electrical equipment.
Technical details of the Motor.
Bill of materials with technical details of various components of the Starter Control Panel

4. The successful bidder shall obtain approval for the drawings prior to manufacturing of equipment/panel
GA and dimensional drawing of all equipment
Power and control circuit diagrams with BOM
The manufacture of the unit is to be started only after written approval of the drawings by OIL.

5. Four bound sets of the following documents, shall be submitted with the supply
Approved GA and dimensional drawing of all equipment.
Approved Power and Control circuit diagrams.
Technical details of the Motor.

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Bill of materials with technical details of various components of the Starter Control Panel.

6. One laminated copy of the approved power & control circuit drawing shall be pasted inside of the front door of the Starter Control Panel.

DETAILS OF MOTOR DRIVEN JOCKEY PUMP FOR BHOGPARA OCS.

a) Pump specifications:

I. Type : Horizontal Spindle, high efficiency Volute casing with back pull out design.
II. Stage : Single.
III. Capacity : 25 cum / hr.
IV. Total Head : 70 to 90 mtrs. (7 to 9 Kg / sq. m)
V. Liquid : Water
VI. Duty : Continuous
VII. Application : To maintain 7 kg / sq.m line pressure of fire fighting lines.
VIII. Efficiency : 37% to 40%
IX. BKW } to be specified
} by
X. NPSHR} bidder
XI.Temperature : Ambient
XII.Specific Gravity : 1.0
XIII.Liquid Property : Clear
XIV.Shaft Seal : Gland Packing.

b) Performance at Duty Point & at 1.5 time discharge :(Bidder to furnish)
I. Capacity :
II. Total Head :
III.Efficiency :
IV. BKW / BHP :
V. NPSHR :
VI.Pump Speed :
VII.Shut of Head:

c) Constructional Features :

I.Casing : Cast Iron
II.Impeller : Bronze
III. Shaft : Stainless Steel SS-410
IV. Shaft Sleeve : Bronze
V. Lantern Ring : Bronze
VI. Impeller key & nut : Stainless Steel SS-410
VII. Casing Wear ring : Bronze
VIII.Rest of parts :Suitable for above material specification.

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Automation of Drenching system

1.0 Control philosophy:
A PLC (Programmable logic Controller) based control system shall automatically start/stop the Jockey Pumps and Drenching pumps by continuously monitoring the Fire water ring pressure and safety shutdown system of the pumps. The Fire water ring pressure shall be monitored by an Electronic pressure Transmitter and Pressure switches. The PLC shall be housed in a Control panel equipped with AUTO/MANUAL selection for each pump and safety shutdown indications and alarms.

2.0 Control logic:
The Fire water ring shall be pressurized at 8.4 Kg/Cm2. If there is any pressure loss in the Fire water ring, the PLC shall start/stop the Jockey Pumps and Drenching pumps as per the following sequence.

1. Jockey pump will start to make up any leakage/loss, if the pressure in the fire water ring drops below 4.6 Kg/cm2.
2. Drenching pump-1 will start if pressure in the fire water ring drops below 4.0 Kg/Cm2.
3. Drenching pump-2 will start if pressure in the fire water ring drops below 3.0 Kg/Cm2
4. Drenching pump-2 will stop if pressure in the fire water ring rise above 4.0 Kg/Cm2.
5. Drenching pump-1 will stop if pressure in the fire water ring rise above 5.0 Kg/Cm2.
6. Jockey pump will stop if pressure in the fire water ring rise to 8.4 Kg/Cm2.

The above sequence can be tabulated as follows:

Sl.No	Pump	Mode	Auto start pressure (Kg/Cm2)	Auto stop pressure (Kg/Cm2)
1	Jockey Pumps (2 Nos) (one running and other on standby)	Auto	4.6	8.4
2	Drenching Pump-1	Auto	4.0	5.0
3	Drenching Pump-2	Auto	3.0	4.0

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However, provision shall be kept to run all the pumps in manual mode also in case of emergency. Starting system logic for Diesel Engine driven Drenching pumps DC Motor starter which include solenoid coil and motor shall be provided on the engine for starting. When the Drenching pump is kept in AUTO mode (through AUTO / MANUAL selector switch on the Control panel), the starter motor shall receive the starting signal through a start solenoid coil from the PLC panel. The PLC shall make three attempts to start the engine by providing a pulse of 5 seconds to the starter solenoid followed by a delay of 15 seconds (the duration of the pulses shall be decided as per the recommendation of the OEM of the engine). If the engine does not start after three trials, ENGINE START FAILURE indication shall be provided on the control panel. Then PLC shall attempt to start the second Drenching pump in the sequence mentioned.

When the Drenching pump is kept in MANUAL mode (through AUTO/MANUAL selector switch on the Control panel), it can be started from the local control panel of the respective engine.

Starting system logic for Jockey pumps
The Jockey pumps when kept in AUTO mode (through AUTO/MANUAL selector switch on the Control panel), the PLC shall provide the starting signal to the starter panel through interposing relays. In MANUAL mode, the Jockey pumps can be started from local starter panel.

3.0 Major units of the Control system:
The control system shall consist of the following major units:
a. PLC (Programmable Logic Controller)
b. Battery charging unit
c. Control panel
d. Electronic pressure transmitter & Digital Indicator
e. Pressure switches

3.1 PLC (Programmable Logic Controller)
Rockwell automation make SLC 5/03 modular PLC (preferably) shall be provided for implementing the above control logic. The PLC shall operate on 24V DC. The Input/Output details of the PLC shall be as follows.

Inputs
a) Fire water ring pressure (Analog, 4-20mA)
b) Pressure switch-PS1
c) Pressure switch-PS2
d) Pressure switch-PS3

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e) Lube oil pressure of Drenching pump-1 (Digital)
f) Water temperature of Drenching pump-1 (Digital)
g) Speed of Drenching pump-1 (Digital)
h) Lube oil pressure of Drenching pump-2 (Digital)
i) Water temperature of Drenching pump-2 (Digital)
j) Speed of Drenching pump-2 (Digital)
k) Auto/Manual switch for Jockey Pump-1 (Digital)
l) Auto/Manual switch for Jockey pump-2 (Digital)
m) Auto/Manual switch for Drenching pump-1 (Digital)
n) Auto/Manual switch for Drenching pump-2 (Digital)
o) Any other input for implementing above control logic

Outputs
a) Fire water ring pressure low (Digital)
b) Jockey pump-1 running (Digital)
c) Jockey pump-2 running (Digital)
d) Drenching pump-1 running (Digital)
e) Drenching pump-2 running (Digital)
f) Start failure of Drenching pump-1 (Digital)
g) Start failure of Drenching pump-2 (Digital)
h) Low lube oil pressure of Drenching pump-1 (Digital)
i) High water temperature of Drenching pump-1 (Digital)
j) Over speed of Drenching pump-1 (Digital)
k) Low lube oil pressure of Drenching pump-2 (Digital)
l) High water temperature of Drenching pump-2 (Digital)
m) Over speed of Drenching pump-2 (Digital)
n) Hooter on (Digital)
o) Any other output for implementing above control logic

Interposing relays shall be provided for the outputs. The PLC system shall be designed to operate on 24V DC from the batteries of the engine. Provision shall be kept to provide 24V DC supply separately from the Control room of the Oil collecting station. The PLC shall be provided with memory protection battery backup.

For fail proof monitoring of Fire water ring pressure, an Electronic Pressure Transmitter as well as Pressure switches shall be installed on the Fire water ring. The ladder logic shall consider both the analog signal from Electronic Pressure Transmitter and Digital contact signal from the Pressure switches of the Fire Water ring, before activating any pump control.

NOTE: Ladder logic for implementing the control logic shall be developed by the supplier in consultation with OIL.

3.2 Battery charging unit:

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A suitable battery charger shall be provided to keep the batteries of the Drenching pumps in fully chargecondition all the time.
The Battery charger shall be designed to operate on 180-260V AC, 45-55HZ power supply provided by OIL.

Voltmeter and Ammeter shall be provided on the control panel to show the charging voltage and charging current.

The charger shall be cut-off from the batteries once the engine starts and the batteries are expected to be charged from the engine's alternator.

3.3 CONTROL PANEL
The Control panel shall house the PLC and Battery charging unit and equipped with AUTO/MANUAL selection for each pump and safety shutdown indications and alarms.

The Control panel shall be free standing floor, front opening type and suitable for Indoor application (IP-20 protection). Panel finish shall be FIRE RED as per IS-5.

The approximate dimensions shall be 1500mm (Height) X 585mm (Width) X 400mm (Depth) with an additional base of 150mm. The cable entry shall be bottom through a removable gland plate. The ventilation shall be through natural air.

The following indications shall be provided with clustered LED bulbs of 22.5mm diameter size on the panel.
a) AC supply ON # green
b) Fire water ring pressure low - Red
c) Jockey pump-1 running # Green
d) Jockey pump-2 running # Green
e) Drenching pump-1 running # Green
f) Drenching pump-2 running # Green
g) Start failure Drenching pump-1 # Red
h) Start failure Drenching pump-2 # Red
i) Low Lube oil Pressure Drenching pump-1 # Red
j) High Water Temperature Drenching pump-1 # Red
k) Over speed Drenching pump-1 # Red
l) Low Lube oil Pressure Drenching pump-2 # Red
m) High Water Temperature Drenching pump-2 # Red
n) Over speed Drenching pump-2 # Red
o) Any other indication required

The following selector switches shall be provided on the control panel.
a) AC supply ON/OFF
b) AUTO/MANUAL switch for Jockey pump-1

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c) AUTO/MANUAL switch for Jockey pump-2
d) AUTO/MANUAL switch for Drenching pump-1
e) AUTO/MANUAL switch for Drenching pump-2
f) Battery charger ON/OFF
g) Any other selector switches required

The following Push buttons shall be provided on the Control panel
a) Lamp Test
b) Alarm Accept
c) Alarm Reset
d) Any other Push buttons required

The following instruments shall also be provided on the Control panel
a) Loop powered LCD Digital indicator (For display of Fire water ring pressure)
b) DC Voltmeter (For display of charging current)
c) DC Ammeter (For display of charging current)
d) Electronic Hooter (For audio Alarm)

NOTE: The successful bidder shall have to provide the design of the control panel for approval before proceeding with manufacture.

3.4 Electronic Pressure Transmitter & Digital Indicator:

Electronic Pressure Transmitter
An electronic Pressure Transmitter shall be installed on the fire water ring for continuous monitoring of the Fire water pressure by the PLC. Its reading shall be available on a Loop powered Digital Indicator mounted on the Control panel.

The specifications shall be as follows:
GENERAL
Function : Transmitter
Range : 0-10 Kg/Sq.cm
Case : MFR STD
Mounting : 2 inch stand pipe
Enclosure class : Weather Proof (NEMA 4 & IP-65)
Elec. Area classification: Division1&2, Class1, Group C&D
Intrinsically safe : Yes
Lightning protection : Required
Accuracy : +/- 0.075% of span
Turndown ratio : 100:1
Response time : 250 msec or less
Process fluid : Water

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Operating Temperature : 0 to 50 Degree C
Humidity : 5 to 95% RH, Non-condensing

TRANSMITTER
Type : Micro-Processor based, SMART
Power supply : 16 to 48 VDC(24 VDC normal)
Transmitter output : 4 to 20 mA with super imposed digital signal
Accessing protocol : HART
Span & Zero adjustment : To be provided on the body
Indicator : 4½ digit LCD display with Programming facility

ELEMENT
Service : Gauge pressure
Sensing : Capacitance/ Piezoresistive or equivalent
Material: 316 SS
Over range protection to : 150% of full range
Process connection : ½ inch NPT (F)

ACCESSORIES:
Mounting bracket for 2 inch pipe - 1 No
SS Tag plate - 1 No
Flame proof double compression SS cable gland - 1 No

Preferred Vendors: EMERSON, YOKOGAWA

Loop powered Digital Indicator
A Loop powered Digital Indicator shall be provided on the control panel for continuous display of fire water ring pressure. It shall be connected in a 2-wire loop with the Electronic Pressure Transmitter and the PLC Analog input card.

The specifications shall be as follows:

Type : Programmable, Panel mounted Digital Indicator
Display : 1 inch (25mm), 3½ digit LCD
Display range : -1999 to +1999 (Programmable for any engineering units)
Input range : 4 to 20ma (at 24V DC)
Decimal point : To be selected at all positions
Accuracy : +/- 1 digit(Least significant)
Supply : Loop powered, typically less than 1.1V at all conditions
Operating mode : Linear
Zero and Span : To be adjustable any where within the range
Out of range Indication: To be provided

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Environment : Front display panel to be designed to IP65 and Instrument to Control panel seal to be designed to IP40 or better with two panel screw clamps
Mounting : Panel mounting on to DIN43700.
Operating Temperature: 0 to 50 degree C
Humidity : 5 to 95% RH, non condensing

Preferred vendor : MTL

3.5 Pressure switches:
Three Pressure switches (PS1, PS2 & PS3) shall be installed on the fire water ring for continuous monitoring of the fire water ring pressure and to control the running of pumps through PLC.

Pressure switch PS1 shall control the running of Jockey pumps. It shall be set at 4.6 Kg/Cm2 pressure and shall have a differential of 3.8 Kg/Cm2 rising. If a Pressure switch with a differential of 3.8 Kg/Cm2 is not available, TWO pressure switches may be considered.

Pressure switch PS2 shall control the running of Drenching pump-1. It shall be set at 4.0 Kg/Cm2 pressure and shall have a differential of 1.0 Kg/Cm2 rising.

Pressure switch PS3 shall control the running of Drenching pump-2. It shall be set at 3.0 Kg/Cm2 pressure and shall have a differential of 1.0 Kg/Cm2 rising.

Other specifications of the Pressure switches shall be as follows:

GENERAL
Type : Direct
Mounting : Yoke
Case Material : Cast Aluminium
Enclosure : Explosion proof
Range : 0-10 Kg/Cm2

SWITCH
Output electric contact : yes
Quantity : Two
Form : SPDT
Type : SNAP ACT MICROSWITCH
Contact plating : Gold plated
Rating : 5 A, 230V AC
Load type : Resistive

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Cable entry : ½ inch NPT(F)
Set point adjustment : Internal with indicating Scale
Differential : Adjustable

MEASUREMENT UNIT
Element type : Vendor STD.
Element material : 316 SS
Process connection : ½ inch NPT(M), Bottom
Over range protection : 30% of range

Mounting : Suitable for 2" NB pipe
Cable gland : ½" NPT
Terminal block : 2-Way type suitable for 2.5mm2 cable

ACCESSORIES
Mounting bracket for 2 inch pipe - 1 No
SS Tag plate - 1 No
Flame proof double compression SS cable gland - 1 No

Preferred Vendor: SWITZER

4.0 Documentation
THREE sets of following documentation shall be provided along with the equipment by the supplier.
a) GA drawing of the control panel
b) Wiring diagram of the control panel
c) Operation philosophy of the control panel
d) Ladder logic of the PLC (Both soft and Hard copies)
e) Hardware & software manuals of PLC
f) Operation and maintenance manuals of Pressure Transmitter, Pressure switches and Digital Indicator

C. BID EVALUATION CRITERIAL/(BEC)/BID REJECTION CRITERIAL (BRC)

I. The bids must conform to the specifications and terms and conditions given in the enquiry. Bid shall be rejected in case the terms (s) offered do not conform to the required minimum / maximum parameters stipulated in the technical specifications and to the respective international / national standards wherever stipulated. Notwithstanding the general conformity of the bids to the stipulated specifications and terms and conditions, the following requirements shall have to be particularly met by the bidders, without which the offer will be considered as non-responsive and rejected.

II. The offered model of engine dedicated for fire fighting duties by the OEM should be rated for continuous power and should be capable of developing at least 10% more power than the net minimum BHP requirement of the Pump input at duty conditions mentioned above.

III. The bidder should be an OEM or, an authorized dealer of OEM of the pump or, an OEM approved assembler of pump sets. In all cases the bidder has to purchase the engine from an OEM of engine or, their authorized dealer. Documentary evidence in this regard must be enclosed with the offer failing which the offer will be rejected.

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IV. If the bidder is an assembler of pump set, they 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 infra structural 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.#

V. Bidders should have the experience of executing at least one order in the last ten financial years before the bid closing date of this enquiry covering supply of continuous duty Centrifugal pump sets used for fire fighting in PSU#s, Central Govt. undertakings, Public Limited Companies or, Reputed Private companies in the Oil and Gas sector. Documentary evidence in this regard must be enclosed with the offer.

VI. Bidder must undertake that the equipment to be supplied are not going to be obsolete for next ten (10) years from the bid closing date and provision for supplying spares of the equipment will be continued.

D. SPECIAL NOTES:

I) DOCUMENTS:

Following documents, are required to be submitted along with the supply

List of recommended spares for two years.
All test certificates.

ii) Packing and Transportation:

During transportation, pump units and all electrical equipment are to be suitably packed to avoid transit damage or water ingress. Packing should be sufficiently robust to withstand rough handling during transit. All items should have their respective identification tag and should be suitably packed to provide ease of handling / storage and offer maximum protection during transit. Crates and boxes should have a list secured to the exterior wherein the items contained inside should be mentioned in addition to a duplicate list inside. The sling points on the crates should be properly indicated. Internal parts should be sprayed with a rust inhibitor and all openings should be covered with masking tapes to prevent ingress of water.

Manuals / packing cases containing electrical equipment should be lined with water proof material.

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iii) SPARE PARTS AND TOOLS :

List of spares in three categories should be submitted along with the offer.

a) Commissioning spares, if any.

b) Two years maintenance spares of the pump / engine.

(The prices of these spares (a & b) shall be considered during commercial evaluation of the offer).

c) Insurance items.

(Cost of these spares shall however not be considered during commercial evaluation of the offer).

iv) DRAWING AND DOCUMENTATION :

Foundation drawing for the pump sets, Jockey pump shall have to be forwarded within a month of placement of order. One set of drawings showing installation details of the pump sets, wiring diagram for the control panel should be provided against the pump sets. For design of foundation, soil bearing capacity is to be taken as 10 tons / sq. metres. Foundation bolts for grouting the pumps on foundation. Spare parts catalogue, Operation manuals both in hard copy and in digital form against the pump sets is to be provided.

v) INSPECTION AND TESTING :

The unit shall be inspected by OIL's deputed engineer at Manufacturer's works / factory prior to dispatch. However, such inspection will not relieve the supplier of their responsibility to ensure that the equipment supplied conforms to the correct specifications and is free from manufacturing and all other defects.

The inspection shall include performance / load test as well as NPSH test of the pump in unitized condition in presence of OIL's deputed representative. The pump sets shall be cleared for dispatch only after satisfactorily

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carrying out the tests specified above. Test certificates in respect of pump and Engine shall have to be forwarded along with delivery of material.
N.B. Charges for carrying out the above tests at the manufacturer's facility should be included in the purview of the offer.

vi) COMMISSIONING :

The unit shall have to be commissioned by competent personnel deputed by the supplier and to be tested at the site for operation of auto system at designated pressure i.e. the fire ring line is to be maintainted at 8.4 kg / sq.cm.. OIL shall provide necessary local transportation from its operational headquarters for the commissioning personnel to and from OIL's site near Duliajan, Assam. However, to and fro freight of Supplier's commissioning person to Duliajan, Assam and local boarding and lodging of personnel during commissioning shall be arranged and paid for by supplier. Lumpsum commissioning charges, if any, in this regard to be quoted separately by bidder.

vii) WARRANTY :

The warranty period for the engine, pump and all ancillary equipment to be provided for a period of minimum of 18 months from the date of dispatch / shipment or, 12 months from the date of commissioning, whichever is earlier.

viii) AFTER SALES SERVICE :

The supplier have to ensure for after sales service during initial commissioning and also subsequently. Bidders have also to confirm that spares for motor, air compressor & IR filter and all other accessories quoted shall be available for at least 10 years after the delivery of the material.