

ANNEXURE- 3

TECHNICAL SPECIFICATION FOR 2 X 125 MT WORKOVER RIGS

Single drum servicing and work over rig mounted on a self-propelled back in type carrier, fitted with diesel engine, transmissions, draw-works, telescopic mast. The Rig shall also have sub-structure, drilling / handling equipment, hydraulic, pneumatic, lighting systems etc., along-with necessary catalogues.

Rig and its equipments shall be suitable for Ambient Temp. 2 degree to 44 degree centigrade, relative humidity 95% maximum & altitude of 100 meter minimum. Rig engine should be above carrier deck and layout of all rig equipment should be such that there is ease of maintenance.

Technical details of various equipment of 125 MT workover rig is as follows:

A. MAST AND SUBSTRUCTURE**1. Telescopic Mast in accordance with API 4F (PSL – 2) with API monogram**

1. Lightweight open faced four legged, two-section Telescoping Mast of efficient design having manufactured & monogrammed as per API Spec 4F, latest edition (PSL 2), with hydraulic mast tilting & extending systems, self-actuating stabilizers and automatic locking device to lock the mast into its fully extended operating position; with safety chokes to assure a safe descent rate to protect the mast in the event of failure of the hydraulic system / abrupt loss of hydraulic pressure; an unobstructed line of vision to the crown block.

2. Mast rest pad complete with supporting frames should be suitably positioned on the carrier for resting the collapsed mast during transportation. The frame should not obstruct the driver's view in any case.

3. API rated hook load capacity of minimum 125 MT (136 ton, 275577.8 lb) with 8 line strung and with required wind guy lines and cross guys to racking board, design & construction in accordance with API 4F, latest edition (PSL – 2) and API monogrammed. (Guy lines should be complete with heavy duty turn buckles & guy posts). The Minimum Wind Load Capacity of the Mast with full set back should be 80 miles/hr (128 Km/hr) with guy lines. The guy line anchors should be designed to be placed at a radial distance of minimum 65ft and maximum 85ft distance from the well centre.

4. Clear working height (ground to underside of crown frame) – 102 feet to 118 feet

5. Hydraulic mast tilting & extending systems and automatic locking device to lock the mast into its fully extended operating position as per Rig design and should come with Audio alarm when the upper mast is fully raised and locked on the lower mast. The system shall include manually operated bleed valve for removal of entrapped air.

6. A built in orifice system / check-choke system shall be provided to assure a safe descent rate to protect the mast in the event of failure of the hydraulic system / abrupt loss of hydraulic pressure.

7. The Rigs should be equipped with Suitable capacity heavy-duty adjustable jackscrews with lock nuts for centering / aligning of mast.

8. Automatic locking system shall be provided with additional safety manual lock. This is required after telescoping of mast to full height. This added safety feature is to prevent accidental unlocking of automatic locking system.

9. Automatic erecting type racking board designed to eliminate possible interference with wellhead equipments during raising & lowering of mast. Racking board to be of all welded construction be provided with height adjustment having 3 different positions at approx. 16Metres, 17.5Metres & 19Metres from top of sub structure to enable stacking of range - 2 tubing in doubles at sub-structure floor with capacity to

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rack minimum 16000 feet of 2-7/8" tubing in doubles. Additional pipe raft to be provided if required to stack the required length of pipes. Racking board shall also be suitable for racking of 2-7/8" and 3-1/2" tubing & drill pipes. Racking board shall be provided with folding railing & safety belt.

10. Racking board shall automatically lower into working position as mast is telescoped up & is raised into folded position as mast is telescoped down. Adjustable fingers are to be arranged for end racking only.

11. The railing of monkey board should get folded in the monkey board itself when the mast is lowered and should get unfolded when mast is raised.

12. Single standpipe of 3" size complete with upper tube turn, hammer union on upper end & steel elbow & hammer union at lower end shall be clamped to mast and opposite to operator's side. Working pressure shall be 5000 PSI.

13. Mast climbing ladder along with suitable fall prevention device for person climbing the ladder, starting not more than 2ft height from the derrick floor up to crown block shall be provided.

14. Crown block platform (crown nest of minimum 0.6M width) shall be provided with handrails and entrance from ladder & floor of expanded metal.

15. Two Hydraulic cat-works shall be fitted to the mast / floor.

16. Mast shall have an integral 'travelling block cradle' for use to secure travelling block while travelling.

17. The mast shall be designed to withstand wind speed of minimum 80 miles/hr (69 Knots) with full pipe / setback with all guy ropes properly placed as per standard API pattern.

18. External Mast guying shall be provided as per API 4F, latest edition standard for specified wind velocity and full pipe / setback. One set of crown & racking board wind guide line complete with wire lines along with thimbles clips, come longs & boomers shall be provided. Also, to include internal load lines from crown to carrier.

19. Mast shall be painted as per the painting schedule indicated.

20. Raising, lowering, locking & telescoping controls at operators position near base section of mast with clear view during operation.

21. Escape device: DGMS approved Topman Emergency Escape device & Escape line is to be provided as per OMR 2017. The Topman Emergency Escape device & Escape line shall conform to OMR-2017 and subsequent guidelines/notifications issued by DGMS. This device is used to allow a worker to easily get to a safe distance on ground away from the work platform (monkey board) on the rig in emergency needing evacuation. It shall include wire line, mast anchor & ground anchor. There should be safe & sufficient clear passage at Monkey board for Top Man to the escape device.

22. The mast should be designed to ensure lowering and raising of mast with substructure in work-over position at its full design height. During this process the substructure shall not obstruct the mast. Substructure shall also not interfere during removing of carrier from site with mast lowered onto it, in travel position.

23. The mast shall be provided with a nameplate having full information as required to be provided as per API 4F, latest edition (PSL - 2) in English.

24. Mast accessories: cable racks for guy lines storage on mast side.

25. Spinning line roller guides located in mast for hydraulic catwork system.

26. One set of two counter weights for use with manual tongs installed on lower mast section must include weight buckets, guides, sheaves & wire line from buckets.

27. One additional sheave to be provided for rigging up Power tong.

28. Diving board to be provided with foldable extension & handrail & toe board.

29. Hydraulic Cat works -

Hydraulic make up (spinning) cylinder with stroke multiplier, giving minimum 4 ft stroke providing minimum 10000 lbs (4444kg) line pull. Hydraulic break out cylinder to develop a minimum line pull of 20000 lbs with 4 ft stroke. Hydraulic Cat works is to be complete with all fittings, hydraulic controls, turn-back sheaves, wire-

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lines, hoses, rollers, piping to rig hydraulic system & installed on mast. Control for makeup & breakout to be located at Drillers console.

2) Crown block integral with the mast, monogrammed to API 4F, (PSL – 2):

- (i) Static load capacity - minimum 125 MT (136 ton)
- (ii) Five (05) sheaves with crown block & two (02) cat line sheaves as per API 8C.
- (iii) Integral design shall have 8 numbers of lines to block strung up.
- (iv) Wire line size 1.1/8"-500M long 6x19 construction, RH, regular, IWRC as per API 9A
- (v) The sheave bearings shall have provision of lubrication from grease jerks provided at a convenient point.

3) Sub structure API 4F, Latest Edition (PSL – 2) with API monogram:

1. Sub structure shall be collapsible, pin type, telescoping / parallelogram / swing type. Bracings on sub structure shall not obstruct handling, placement & removal of 7 1/16"- 3 stacks BOP of Hydril / Cameron / Shaffer / WOM make.
2. Sub structure should provide working floor area (approximately 16'x16') with detachable railings on all sides and with provision to accommodate 17-1/2" rotary table. Rotary table should be flushed with the working floor.
3. The side railings shall have the toe boards welded (plate of 0.15 meter height all around, at the bottom)
4. Collapsible substructure shall have minimum clear working height of 14 ft below rotary beam in work-over mode, (However, height should be sufficient enough to accommodate the BOP stack along with riser nipple, considering 2 ft well head height) and the overall height of maximum 9 ft in collapsed condition for transportation.
5. Substructure shall be rated for minimum 185 MT (203.9 ton) rotary load, minimum 90 MT (99.2 ton) set back load & minimum 275 MT (303.1 ton) simultaneous load.
6. Structure floor and folding wings shall be plated with chequered floor plate. Set back area shall be covered with 3" thick wood or any other material to withstand the weight.
7. Base area of substructure shall be plated with 10mm steel plate for improved floatation.
8. Suitable hydraulically operated mechanized system for easy and safe installation of Hydril / Shaffer / Cameron / WOM BOP of 7-1/16". The system should be easy to maintain and it should be so designed that it can be transported separately as well as can be retracted within the substructure and doesn't interfere in day to day rig operations. There should be safe provision of horizontal and vertical movements of the BOP during mounting and dismounting without much labour.
9. The substructure to be so designed that while placing against the well head no beam / member to foul with the standard well head. The base of the substructure should have minimum clear area of 2.85 M (length, along the outfit centre line) X 2.25 M (Wide; perpendicular to the outfit centre line).
10. Substructure shall be provided with nameplate containing all information required as per API 4F, latest edition (PSL – 2) in English.
11. One ladder from sub structure floor to ground off driller's side & one ladder from substructure floor to carrier floor to be provided.
12. Every open-sided floor or platform 1.8 meters or more above adjacent floor or ground level where any person is allowed to work or pass be guarded by a standard railing.
13. On every derrick or portable mast, where a person has to work, a platform at least 0.60 meters wide shall be provided on at least one side of the crown block. The

platform shall be equipped on its outer edges with a two-rail railing at least one meter high and toe board of 0.15 meter high.

14. Pins / locks required for fitting / removing during unfolding / folding of sub structure should be at safe working height level and easily accessible

4. V-door pipe slide:

V-door pipe slide of steel frame, metal plated with minimum 10mm thickness. Pipeguide from catwalk level to substructure floor level should be provided. Slide unpins for transport. The pipe slide including a set of stair with railings from sub structure floor level to ground level and its slope should be such that pipes during lowering of singles, latching of the elevator can be handled easily. To achieve this it is suggested that the distance between centre of Rotary Table to V - Door should be around 3.25 meters, but safety of operating personnel is also to be ensured. Provision to be kept for placement of V-door pipe slide both along the outfit (parallel to outfit) and also to be placed perpendicular to the outfit on off-driller side. The placement will be decided during the use of outfit depending on the availability and orientation of the well site plinth area.

5) Catwalk/pipe racks:

One 3'6" – 4' wide x 3' 6" high x 37' - 40' long, **in two pieces**, catwalk plated with minimum 10mm thickness steel plates along-with hinged pipe racks on each side. One sloping ramp at far end of cat walk with stairs to ground should also be provided. Pipe racks are to be placed parallel to the outfit. This will be required to reduce the overall plinth area requirement for the outfit placement.

Vendor scope: Vendor shall provide all the part drawings of above-mentioned items (Mast, Sub structure, Crown block, V-door pipe slide, catwalk/pipe racks) including part drawings and material specification of international standard. BHEL will manufacture the same at BHEL Hyderabad works. Vendor may refer to Technical/special conditions for the same. The price of set of drawings will be considered for **bid evaluation**.

B. RIG CARRIER

1. Carrier ramps:

Carrier / Rig Ramp as per design – in two pieces, with tyre guides, load beams, jack supports, turnbuckles, mud boat decking of chequered plate, tie up arrangement with sub structure.

2) Carrier:

DIMENSIONS:

Overall Width: Maximum 2.9 meters with walkway (folded) including cathead of Drawworks.

Overall Height: Maximum 4.5 meters from ground.

Length - Carrier (without mast) : Maximum 18 meters.

Length – Overall (with mast) : Maximum 20 meters.

Rear Overhang: preferably not to exceed 30% of wheelbase.

Ground Clearance: Not less than 25 cm.

1. The carrier shall be robustly built to take the full load with the mast under difficult travelling condition through hilly terrain, cross country, slushy and loose earth roads

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in the fields. Carrier shall be self-propelled, right hand drive (Steering wheel shall be on the right hand side of the carrier when viewed from the rear).

2. Total weight of the carrier with the mast (Laden Weight) shall not exceed 60 MT as our roads and bridges are rated for 60 MT only.

3. Carrier shall be equipped with individual control levers installed in the hydraulic valve bank.

4. Casing spool space for cut and slip provision to be provided between hydraulic tank and driver cabin. However, manufacturer may locate it in any other convenient location looking into availability of space. Sufficient space should be allowed for maintenance of equipment.

5. Dead line anchor suitably mounted on the Carrier Frame for designed line size with API 8C (PSL-2) monogram as applicable. The dead line anchor to be of suitable construction and ensure positive reliable transmission of the deadline load signal to the sensor.

3) Drive and Axle:

1. Drive to be as per design, However, there shall be minimum of 3 (three) numbers Drive Axle at rear.

2. The carrier shall be provided with adequate numbers of Front and Rear axles to take the full load of the unit during stationary and travelling conditions. Individual Load on each axle (all front and rear) shall be within Maximum Permissible Gross Vehicle Weight (i.e. Total Axle Capacity) of the unit.

3. Adequate numbers of heavy duty drive axles and multi-speed transmission to move the unit in difficult road condition. Axle loading shall be as per Indian Motor Vehicle Acts and Rules framed there under. However, there shall be a minimum 3 (three) numbers Drive Axle at rear. All drive axles shall have Inter Axle Lock and Differential Lock facilities. Axles shall be any of Rockwell, Fabco, Dana, Clarke, Meritor, Sisu, Axle tech makes or equivalent reputed make. Complete details, along with technical leaflet, of the axles offered should be provided along with the bid. All steering front axles.

4) Suspension:

1. Heavy duty suspension system both in the front and rear. Preferably Rocker Beam (Walking Beam) type suspension with auxiliary leaf spring support at rear axles and suitable Leaf Spring suspension at front axles with heavy duty double acting shock absorbers. Air Spring type suspension (both at front & rear) is not acceptable. Suspension shall be any of Hendrickson, Neway or equivalent reputed make. The technical details of the suspension offered must be provided along with the technical bid.

5) Load Distribution:

Proper positioning of all components / equipments on the platform for equal / even distribution of load on the all axles. Load distribution details on all axles shall be provided by the bidder along with the supply.

6) Steering and Turning radius:

1. Right Hand drive (Steering wheel shall be on the right hand side of the carrier when viewed from the rear), Hydraulically Power Assisted Steering system - power assistance on the all front wheels. "Minimum Turning Circle" (MTC) Radius shall not be more than 20 meters for the carrier fitted with mast. It shall be bidder's endeavour to supply the steering box of make Spicer, ZF, Sheppard, Rane, TRW; steering pump of VICKERS, PARKER or REXROTH makes. Details of Make, Model, Capacity of all major components viz. steering pump, steering box, power cylinders (if any) etc. of

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the steering mechanism shall be provided in the technical bid. The technical leaflets of the components offered (steering pumps, steering box etc.) should be provided in the technical bid. Layout diagram of steering system should also be provided in the technical bid.

7) Transmission:

1. The transmission (main transmission as well as transfer case) shall be suitable for both rig operation and road drive of the complete unit even through slushy oil field road, soft ground etc. and match with the engine output. The road drive gear shifter-preferably of pneumatic type for the main transmission shall be fitted inside the driver's cabin. Transmission shifter with locking arrangement for travelling / operations mode to be provided at convenient operating positions. This is to prevent accidental engagement of travelling transmission in Work-over mode.

8) Wheels, Rims and Tyres:

1. Suitable wheels with tube tyres available in India of adequate ply rating should be provided. It is preferred to have the same tyre size both in the front and rear axles. If it is not possible due to design constraint, two numbers front wheels and two numbers rear wheels shall be provided with each carrier as spare wheels (rims with tyres & tubes). The details of tyres / wheels (size, load bearing capacity, make etc.) should be provided in the technical bid. **Super Giant wheels will not be accepted.**

9) Brake System:

1. Service Brake: Multiple Circuit Pneumatic / Hydraulic Foot-operated Power Brake acting on all wheels.
2. Emergency / Parking Brakes: Automatically engaged Emergency Brake acting on all rear wheels in the event of low air pressure.
3. All Emergency / Parking Brake Servos shall have manual release mechanism (Screw Type) to release the brake manually in case of low / no air pressure for maintenance and towing the unit whenever necessary.
4. Manual Hand Operated Parking Brake acting on all wheels. All brake valves shall be of Bendix or Wabco or Rexroth make.
5. All wheel brake drums shall have dust cover.
6. Brake actuator shall be of S - cam type with slack adjustor.
7. Brake shall have anti-lock braking system (ABS).

10) Performance:

Speed limit in Highway: Approx. 40 Km/hr.

Gradeability: 30%.

11) Electrical System:

1. Light & reflectors viz. Headlights, Parking lights, Brake lights, Side marker lights, Indicator lights, Hazard warning lights, rear and side reflectors, cabin lights, etc. as per standard and suitable Reversing Audio Alarm with Blinker at rear of the unit.
2. In addition, 2(Two) powerful searchlights with protective guard at suitable locations at rear of driver's cabin for illuminating the entire platform area.
3. While all lights shall be covered to the extent possible with suitable guard to prevent damage all electrical fittings / components / connections shall be suitable to operate in hazardous oilfield area preferably with two wire system.

12) Pneumatic System:

1. Pneumatic system with suitable air Dryer and suitable System Protection Valve(s) to keep rest of the circuit active in the event of failure / leakage of air in a particular circuit(s). All valves / components, piping / tubing, etc. underneath the carrier at

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easy access locations-preferably mounted on inner walls of the chassis. All air tanks shall have Drain Plugs. Suitable tyre inflation valve with air pressure gauge shall be provided in the pneumatic system. High-pressure air hose of adequate length with nipple (for the said purpose) shall also be supplied along with the unit.

13) Exhaust Position:

Exhaust with spark arrestor cum silencer as mentioned in Section: Carrier Engine.

14) Drivers Cabin:

1. Robust built comfortable full-width driver's cabin of pressed steel construction, suitably upholstered, rubber mattress covered floor, all controls at easy access positions, full view Windshield of non-splinter glass, adjustable type comfortable driver's seat with shock absorber and complete with all fittings / accessories viz. Windshield Wipers, Electric Fan(s), Roof Lamps, Sun visors, twin Rear View Mirror, Air & Electric Horns, Fire Extinguisher, First Aid Box, Handgrips / Handles, Footsteps, Lockable Door(s) with moving window glass, etc.

2. For maximum visibility on all sides for the driver, adequate number of windows with sliding lockable toughen / non-splinter glass at both sides and rear of the cabin as well as there shall not be any object behind and sides of the cabin obstructing view. The rear windows shall be provided with protective wire net cover from behind. Two (02) seat for Co-passenger (to assist driver in traffic) at left and right sides of the unit near driver seat. Carrier controls for selection of transmission speed, brake and on road application shall be provided inside the carrier cabin.

15) Gauges, Meters etc. in Driver's Cabin:

All standard gauges & meters like Speedometer with Odometer (KM calibration), Engine Oil Pressure Meter with low pressure warning buzzer, Engine Temperature Meter with high temperature warning buzzer, Engine Hour Meter, Engine Tachometer, Air pressure Meter with low pressure warning buzzer, Ampere Meter, Transmission Oil Pressure Meter with low pressure warning buzzer, Transmission Oil Temperature Meter with high temperature warning buzzer, etc. and Engine Power Switchover Switch with identification plate in driver's cabin. Calibration in all meters shall be in Metric System.

16) Towing Hooks:

Heavy-duty clevis pin type Towing Hooks both at front and rear capable of pulling / towing the unit from bogged down situation in slushy areas in oilfields from front as well as rear. (Pin size minimum 25 cm in length and 5.0 cm in diameter).

17) Fuel Tank:

Two Numbers diesel tank, of adequate capacity made of stainless with filling cap, lock & key, drain plug, vent line etc. Digital / Analogue fuel tank level indicator to be provided on the instrument panel as well as with guard mounted at the top of the tank.

18) Walkways and Stairs:

Folding walk ways alongside of the unit on & off operator's side extending from rear of unit to engine area including stairway with hand rails from walk way to ground on both sides with checker plate decking throughout. Suitable locking arrangement shall be provided for the walkways and railings to keep in folded positions to prevent accident during travelling. Detachable Stairs shall be provided on both sides of the engine for quick access.

19) Spare Parts (For Carrier):

All spares in specified quantity as indicated in the Spare parts List for Carrier (**ANNEXURE-IV**) shall be supplied along with the unit. Specific description, Part

number, Make etc. shall be clearly indicated in the technical bid. Bidder to separately quote for the spares, **the cost of which will be considered for bid evaluation purpose.**

20) Tool Kit:

(i) Complete Tool Kit for general maintenance of the carrier i.e. Wheel wrench / wrenches, Tyre inflating hose of minimum 20 meters long with nipple, Pressure Gauge, Heavy duty Grease gun, 50MT capacity Hydraulic Jacks with handles, 2 (Two) numbers Stopper Block for rear wheels with suitable storage arrangement at easy access location(s) - to prevent accidental movement of unit while in stationary position in addition to other necessary tools for general maintenance of the carrier components, to be supplied along with each carrier.2.

List of tools that shall be supplied under the Tool Kit to be submitted along with the technical bid. Two standard toolboxes shall be provided on carrier.

21) Painting:

DA Grey or any other suitable shade painting after applying primer. Under Coating with Anti Corrosive Treatment for cement & rust and polyurethane paint.

22) Manual and Catalogues:

Supply of 02 (two) sets of Spare Parts Catalogue and Workshop & Service Manual in printed form in addition to supply of the same in compact disc (CD) format for all major components / systems like steering, axles, front & rear suspension, pneumatic & electrical systems, brake system, etc. complete with all schematics along with the unit.

All above manuals, catalogues & CD shall contain only those components /systems that have been used in the unit i.e. the same must be CUSTOM ILLUSTRATED MANUALS/CATALOGUES ONLY – not the generalized ones.

23) Documentation and Bid Submission: Bidder's response should clearly be defined - specific details / specification are to be provided in the bid. Response like - 'As per NIT Specifications / Technical Leaflet', 'Noted', 'Accepted' or in any similar fashion is not encouraged.

(i) The following documents shall be submitted along with the technical bid for bid evaluation. Technical leaflets with detailed diagram and specifications, Make & Model of chassis, axles, suspension, steering, wheel & rim, brake, pneumatic and electrical systems, etc.

b. Detailed dimensional drawing of Driver's cabin with construction and material description.

c. Layout drawing of all components on the carrier with details of load distribution.

d. List of tools that shall be supplied under Tool Kit.

e. Specific description, Part Nos., Make & Model, etc. as detailed in the Spare Parts List for Carrier provided in the Tender.

f. List of additional spares, if any, for 2(two) years maintenance as felt necessary but not covered in the Spare Parts List for Carrier provided in the Tender with Description, Part

Nos., Make, etc. Procurement of the same spares however shall be as per BHEL discretion. The cost of additional spares, not covered in the Spare Parts List for Carrier provided in the Tender with Description, will not be considered for bid evaluation purpose.

g. A Checklist as per enclosed format (CHECKLIST FOR CARRIER) shall be furnished along with the technical bid.

(ii) The following documents are to be submitted along with the supply of the unit. Bidder to categorically confirm compliance of the same in the technical bid:

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a. Sale Letter, Pollution & Roadworthy Certificate (in similar format of Form 21, 22 & 22A of Indian Motor Vehicle Act - sample copies enclosed), Engine Emission Norms Certificate, etc. as required under Indian Motor Vehicle Act for registration of the unit in the name of end customer. Additionally, Type Approval Certificate from chassis manufacturer duly certified by inspecting authority of the country of origin and Body

Fabrication Approval certificate from body builder to be provided. In this regard, the bidder is requested to note the conditions given in Chapter-87 of ITC (HS), 2012, Schedule-1- Import Policy, Section: XVII of INDIA.

b. Final Chassis Built Up / Vehicle Content Record documents.

c. Notwithstanding any clause mentioned elsewhere in the Tender, the invoice for CARRIER WITH ENGINE & TRANSMISSION shall be submitted separately, i.e. the same (invoice) shall include the cost of the chassis frame and all assemblies / components that are required for road movement of the unit only and the driver's cabin.

24) Guarantee/Warranty:

(i) As mentioned elsewhere in the Tender, the unit shall be under guarantee / warranty by the supplier (i.e. the bidder) for minimum period of 01 (one) year from the date of successful commissioning of the complete unit at site.

(ii) BHEL reserved the right to inspect, test and if necessary reject any part / parts after delivery at site in case of any fault on the part of the supplier. It shall in no way be waived by the reason that the unit / item was previously inspected and passed by BHEL as per Inspection Clause detailed elsewhere in the Tender.

(iii) To keep the unit fully operational, in case of failure of any item during the warranty period, it is the supplier's responsibility to arrange replacement / repairing at site at their own cost including custom duty, freight, etc. within a period of maximum 3 (three) weeks from the date of notification of such failure. The warranty for the repaired item shall be correspondently extended by a period equal to that from the date of failure to the date of re-commissioning. In case of replacements, the warranty shall be for (one) year from the date of commissioning of the replaced item.

****Vendor scope: Vendor shall quote for supply of all the above equipment of Rig carrier including spare parts which will be considered for bid evaluation.**

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A) CHECKLIST FOR RIG CARRIER (TECHNICAL):

Srl. No.	Parameters/Requirements	Bidder's offer (to give details or yes/no, as applicable)	Remarks, if any.			
1.	Overall Dimensions	a	Overall Width			
			i	Carrier		
	ii	Carrier with walkways (folded) including cathead of draw works etc.				
	b	Overall Height	i	With mast		
			ii	Without mast		
	c	Overall Length	i	Carrier with mast		
			ii	Carrier without mast		
d	Front Overhang					
e	Rear Overhang					
f	Ground Clearance					
2.	Make & Model of Chassis (if any)					
3.	Make & Model of Transmission & Gear Shifter					
4.	Type of steering system (Hydraulically assisted or Mechanical)					
5.	Right Hand Drive Steering or Left Hand Drive Steering (When viewed from rear)					
6.	Make, Model of Steering Box.					
7.	Make, Model of Steering Pump.					
8.	Make, Model of Steering power cylinder (if any)					
9.	Transmission shifter with locking arrangement (Provided-Yes/No)					
10.	Drive					
11.	No. of Axles	a	Front			
		b	Rear			
12.	Positions of Drive Axles	a	Front			
		b	Rear			
13.	Make & Model of Axles	a	Front			
		b	Rear			
14.	Maximum Permissible GVW of the carrier					
15.	Total Weight (Laden Weight) of the unit					
16.	Axle capacity (per axle)	a	Front			
		b	Rear			
17.	Axle Loading (per axle)	a	Front			
		b	Rear			
18.	Nos. of Drive Axle at rear.					
19.	Inter Axle Lock					
20.	Differential Lock (in all drive axles)					
21.	Make, Model & type of Suspension	a	Front			
		b	Rear			

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22.	Load distribution details (provided Yes/No)					
23.	Make, Type, Size of Wheels & Tyres		a	Front		
			b	Rear		
24.	No. of spare wheels (rims with tyres & tubes).		a	Front		
			b	Rear		
25.	Brake System	a	Type of Service Brake	a	Front	
			b	Rear		
		b	Type of Emergency/Parking Brake			
		c	Make of Manual Hand Operated Parking Brake			
26.	Brake actuator whether S-cam or not.					
27.	Minimum Turning Circle Radius.					
28.	Reversing Alarm with Blinker Lights.					
29.	2(Two) powerful searchlights with protective guard at suitable locations at rear of driver's cabin					
30.	Auto Electrical fittings/equipment suitable for hazardous oilfield area provided or not.					
31.	Calibration of all standard gauges & meters like Speedometer / Odometer, Engine Oil pressure Meter etc. in Metric (KM) calibration.					
32.	Provision of Air Dryer in truck's pneumatic system with suitable system Protection Valve(s).					
33.	Heavy duty clevis pin type Towing Hooks at front & Rear of the carrier.					
34.	Folding walking and stairs as per Tender specification.					
35.	Spare parts for carrier as per enclosed list.					
36.	List of tools under Tool Kit.					
37.	Painting of Carrier					
38.	Manual & Catalogue as per Tender.					

B) CHECKLIST FOR RIG CARRIER (DOCUMENTATIONS):

The following documents shall be submitted along with the technical bid for bid evaluation-

Sr. No.	Descriptions	Document enclosed (Yes or No)	Remarks, if any
1.	Technical leaflets with detailed diagram and specifications, Make & Model of chassis, axles, suspension, steering, wheel & rim, brake, pneumatic and electrical systems, etc.	YES/NO	
2.	Detailed dimensional drawing of Driver's cabin with construction and material description.	YES/NO	
3.	Layout drawing of all components on the carrier with details of load distribution.	YES/NO	
4.	List of tools that shall be supplied under Tool Kit.	YES/NO	
5.	Specific description, Part Nos., Make & Model, etc. as detailed in the Spare Parts List for Carrier provided in the Tender.	YES/NO	

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6.	List of additional spares, if any, for 2(two) year maintenance as felt necessary but not covered in the Spare Parts List for Carrier provided in the Tender with Description, Part Nos., Make, etc. Procurement of the same spares however shall be as per end user discretion.	YES/NO	
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C) CHECKLIST FOR RIG CARRIER (DOCUMENTATIONS):

The following documents shall be submitted along with the technical bid for bid evaluation-

Srl. No.	Descriptions	Document enclosed (Yes or No)	Remarks, if any
1.	Sale Letter, Pollution & Roadworthy Certificate (in similar format of Form 21 & 22 of Indian Motor Vehicle Act - sample copies enclosed), Engine Emission Norms Certificate, etc.	YES/NO	
2.	Final Chassis Built Up/Vehicle Content Record documents.	YES/NO	
3.	Notwithstanding any clause mentioned elsewhere in the Tender, the invoice for <i>CARRIER WITH ENGINE & TRANSMISSION</i> shall be submitted separately, i.e. the same (invoice) shall include the cost of the chassis frame and all assemblies/components that are required for road movement of the unit only and the driver's cabin.	YES/NO	

****ALL THE ABOVE CHECKLISTS A,B,C SHALL BE SUBMITTED ALONG WITH TECHNICAL BID**

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Attachment-I

SAMPLE COPY OF FORM 21, 22 & 22(A)

SAMPLE COPY OF FORM 21

Following is a sample copy of FORM 21 of Indian Motor Vehicle Act only. The certificate to be issued by supplier in their letter head, shall contain following minimum information -

FORM 21

[See Rules 47 (a) and (d)]

SALE CERTIFICATE

(To be issued by manufacturer/ dealer or officer of Defence Department (in case of military auctioned vehicles) for presentation along with the application for registration of a motor vehicle).

Certified that

.....
(Brand name of the vehicle)
Has been delivered by us toon.....(date).....
Name of the buyer.....
Son /wife / daughter
Address (Permanent)
(Temporary)
The vehicle is held under agreement of hire-purchase/lease/hypothecation with
.....

The details of the vehicle are given below:

1. Class of Vehicle
2. Maker's name
3. Chassis No.
4. (Engine No. Or motor number in the case of Battery Operated Vehicles)
5. Horse power or cubic capacity
6. Fuel used
7. Number of cylinders
.....
8. Month and year of manufacture
9. Seating capacity (including driver)
10. Unladen Weight
11. Maximum axle weight & number description of tyres (in case of transport vehicle)
 - (a) Front axle
 - (b) Rear axle
 - (c) Any other axle
 - (d) Tandem axle
12. Colour or colours of the body
13. Gross vehicle weight
14. Type of body

Signature of the Manufacturer /Dealer or Officer of defense Department

SAMPLE COPY OF FORM 22

Following is a sample copy of Indian Motor Vehicle Act only. The certificate to be issued by supplier shall contain the following minimum information. –

FORM 22

[See Rules 47 (g), 115, 124(2), 126-A and 127(1), 127(2)]

INITIAL CERTIFICATE OF COMPLIANCE WITH POLLUTION
STANDARDS, SAFETY STANDARDS OF COMPONENTS AND ROAD-WORTHINESS
(TO BE ISSUED BY THE MANUFACTURER)

Certified that the following vehicle complies with the provisions of the Motor Vehicles Act, 1988 and the rules made thereunder, including the following mass emission norms:

Brand name of the vehicle:

Chassis number:

Engine number/Motor number:

(In case of battery operated vehicles)

Sub-rule No.....of rule 115:

Emission norms:

[(Bharat Stage-IV Bharat (Trem) Stage-IV etc.)

Signature of Manufacturer

[Form 22, shall be issued with the signature of the manufacturer duly printed in the Form itself by affixing facsimile signature in ink under the hand and seal of the manufacturer.]

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SAMPLE COPY OF FORM 22 (A)

Following is a sample copy similar to FORM 22(A) of Indian Motor Vehicle Act only. The certificate to be issued by supplier shall contain following minimum information.-

PART – II

(TO BE ISSUED BY THE BODY BUILDER)

Certified that.....(brand name of the vehicle) bearing Chassis number and Engine numbercomplies with the Safety & Road Worthiness Standards as per provisions of the..... (Name of Motor Vehicles Act of country of origin).

It is also certified that body of the above vehicle has been fabricated by us and the same complies with the provisions of the (name of Motor Vehicles Act of country of origin).

Signature of body builder

C. CARRIER ENGINE

(i) Two (02) numbers Caterpillar C11 ACERT fuel efficient electronic diesel engine (**For each 125 MT work-over Rig**), turbocharged, after cooled, Inline 6(Six) cylinder, capable of developing minimum 300 HP (net) @ 2100 RPM at flywheel end [operating speed range 1800-2200 RPM] under standard atmospheric temperature of 2°C-50°C, altitude not exceeding 150 Meters above mean sea level, relative humidity 95% at 35° C.

(ii) The engine should be suitable for continuous duty & capable of developing 10% in excess of its rated output at its rated speed for a period of 1hr in any period of 12 hrs continuous running without undue heating or any other mechanical trouble.

(iii) Engine shall conform to minimum EURO-IV / BHARAT STAGE-IV / EPA TIER-IV or equivalent emission norms.

(iv) Engine Fault Diagnostic Tools [both licensed software as well as hardware-CAT ET & Laptop] with accessories & also display on the engine panel shall be supplied along with each unit. Bidder shall categorically confirm in the bid that the offered software & hardware is for the particular engine of the truck.

(v) All the accessories & fittings of engine viz. Radiator, Coolers, Silencer cum Spark Arrestor, Air Compressor, Engine Harness Wirings & accessories etc., must be of OEM [Caterpillar] supplied with proof of documents. Bidder must confirm in their offer to provide documentary evidence from OEM [Caterpillar] regarding supply of the above mentioned items at the time of inspection.

(vi) Accessories of the Engine:

a) Heavy duty Air Cleaner with pre-cleaner & Vacuum Indicator.

b) Spark Arrestor cum Silencer covered with heat resistant material & capable of max exhaust back pressure: 75mm Hg exhaust is diverted to off-operator side with 85dB muffler and spark arrestors.

c) Heavy duty Radiator for Industrial use with Fan, Fan arrangement & low water level indication with alarm. The radiator must be having capacity of at least 20% in excess of total heat rejection of the engine.

d) Pneumatically operated Inlet Air shut off device & Fuel shut off device should be provided with the engine for emergency shut off & designed in such a way that it can be operated from engine as well as Driller's console. Proper interconnection drawing between the Driller's console & the Air-shut off device must be provided along with the offer.

e) Instrument Panel should have Oil & Fuel pressure gauge, Oil, Water & Exhaust temperature gauge, Electronic Tachometer with R/Hours meter, Emergency air shut-off switch etc. There should be sufficient space for maintenance and repair of the Instrument Panel.

f) Suitable Safety Shut Off system with Alarm for Low lube oil pressure, High water temperature, Engine over speed etc. Bidder must mention the Safety Shut Off system offered for the engine & provide detail information with literature.

g) Air compressor with minimum capacity of 30 CFM (850LPM), @2100 rpm @ 120psi or as per design for meeting complete air requirement of the rig package as per rig design with air tank of suitable capacity. It should be suitable for all air control valves, clutches of rig system, rotary slips etc. **Air dryer** without heating system, mounted before the air receiver with pipe connection, filter-regulator lubricator & gauges is to be provided.

Suitable capacity air receiver/s mounted on the carrier, size & capacity should be mentioned along with the offer. Air receiver/s and all Hard Pipe lines (Compressor to tank and tank to supply end) shall be tested as per relevant API standard for any leakage. Test certificate to be provided along with the supply.

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h) The critical wiring should be in separate rodent proof conduit with proper marking from other wiring for following:-

- 1) Engine shutdown signals.
- 2) Engine Throttle signal from derrick & Cabin.
- 3) Wiring which activates the special modes of engine like PTO enable, engine de-rate, idle RPM mode etc.
- 4) Interfacing wiring between engine, transmission and safety system.

Note: Engine Harness wirings must be of OEM [Caterpillar] supplied.

i) Engine starting system should have independent pneumatic & electric starter with interlock for use of one starter at a time. 2 (two) numbers maintenance free Heavy duty battery suitable for hazardous area (Please refer extract of hazardous area and relevant regulations enclosed at Attachment-II), complete with cable & connection to be provided in a steel box with wooden panel inside the box. Each engine should have 24-volt battery charging flame proof alternator.

j) General:

- 1) Vibration Dampener and guard.
- 2) Lifting eyes.
- 3) Fumes disposal.
- 4) Crankcase breather.
- 5) Heavy duty servicing hour meter.
- 6) Maintenance tools.
- 7) Standard painting of the engine.
- 8) Engine crank case design should be of Shallow Pan type.

k) Sound Barriers:

The bidder should provide proper & suitable Sound Barrier (acoustic enclosure) to reduce the noise of the engine. The Sound Barrier should be sliding / easy removable type for ease of engine maintenance. Details about the Sound Barrier (acoustic enclosure) with drawing, dimension, material, reduction of engine noise outside the sound barrier etc must be provided along with the offer.

l) Operating Site Condition: The engine should be suitable for operation at the following site condition:

- 1) Engine site temperature - 50°C (Max)
- 2) Engine site temperature - 2°C (Min)
- 3) Maximum relative humidity at 21°C - 100%
- 4) Maximum relative humidity at 35°C - 95%
- 5) Maximum relative humidity at 45°C - 70%
- 6) Altitude above sea level - 150 m.
- 7) Average annual rainfall - 343 cms.

m) Tool Kit for Engine & Transmission:

01 (one) set of Standard Tools for each Work-over outfit of Snap-on / Stanley make in heavy duty 3/5 tray metal box with handles & locking arrangement for carrying out normal maintenance of engine as per Annexure -II (Item No. 1 to 33) to be supplied. Special tools should be supplied along with the consignment for carrying out engine major overhauling jobs as per enclosed Annexure-II (Item No. 34 to 39). These tools must be supplied in proper tool box. Specific description, part nos., make, etc. and unit price of each item shall clearly be indicated in the bid. Cost of the above tools as per **Annexure -II shall be considered for evaluation purpose.**

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(vii) Spare Parts for Engine:

Bidder should quote unit price for following spare parts for each engine. Item wise price of each spare part with part number should also be provided. Bidder must mention in their offer the total quantity of each of the following spare part required for running of each engine for 2000hrs.

- 1a) Primary Fuel Filter.
- 1b) Secondary Fuel Filter.
- 2) Lube Oil Filter.
- 3) Air Filter.
- 4) Electric Starter.
- 5) Pneumatic Starter.
- 6) Charging Alternator.
- 7) Fuel Injector.
- 8) Radiator & Alternator Power Transmission Belt Set.
- 9) Lube Oil (ltr.).
- 10) Coolant (ltr.).
- 11) Air Compressor Repair Kit.
- 12) Turbocharger Repair Kit.
- 13) Water-Oil Separator.

The unit cost of above spare parts will be considered for bid evaluation. However, end customer reserves the right to decide the item & quantity of spare parts for procurement along with the main equipment.

(viii) Documentation & Bid Submission:

Bidder's response should clearly be defined. Bidder shall furnish specific details / specifications of all major components, system with make & model etc wherever applicable. Generalized response like- 'As per Tender Specifications / Technical Leaflet', 'Noted', 'Accepted' or in any similar fashion is not encouraged.

It shall be bidder's endeavour to offer the following items as per make & models indicated against each item. However other suitable makes & models are acceptable in case of operational and or design requirements supplemented with proper justification.

- 1) Steering Pump: Victor, Parker, Rexroth
- 2) Hydraulic Pump: Parker
- 3) Air Starter: IR
- 4) Air Dryer: Wabco Single Chamber Air dryer, without heater.

(ix) Special Notes:

1) The Engine with Transmission must be mounted on a single rugged skid & should be anchored firmly with the main chassis of the Workover Outfit. Alternately Engine and Transmission may be chassis mounted; as per Bidder's design. However the Bidder must confirm in their offer that the foundation bolts of the Engine & Transmission will be fastened in such a way that these can be removed easily from the Engine-Transmission platform without going under the Carrier.

2) **Annexure-I:** Technical Check List is attached with the Tender. Bidders must fill up the same & return with offer for Technical Scrutiny.

3) **Annexure-II:** Details of Maintenance Tools with quantity is attached with the Tender as per clause no. 1(vi) (m) above. Bidders must include the same in their scope of supply & offer.

4) Parts List, O&M Manual & Service Manual:

Bidder shall provide detailed dimensional drawing of all major parts and GA drawing along with the offer. Detail technical datasheet; catalogue etc must be provided along with the offer for technical scrutiny.

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01(one) set of Parts List, O&M manual & Service manual [in English only] for each Rig Package in soft as well as hard copy for Engine and Allison Transmission must be provided along with the supply. Bidder must confirm the same in the offer.

(x) Test Certificate:

Each Engine must be load tested at manufacturer's work & test certificate have to be provided along with the delivery of material.

The nature of after sales services, which the successful bidder will provide during initial commissioning and also in subsequent operation, should be clearly indicated. Supplier must categorically confirm regarding compliance with the inspection / test procedure and other terms & conditions detailed above are very essential. Offers will be liable for rejection in the absence of such confirmation.

(xi) Deviation: Deviation in respect of any specification as detailed above should be highlighted with technical calculation / catalogue / literature etc.

(xii) Guarantee / Warranty:

The complete package / unit shall be under guarantee / warranty by the supplier for a minimum period of 01 (one) year from the date of successful Commissioning of the complete unit at site. BHEL reserves the right to inspect, test & if necessary reject any part / parts after delivery at site in case of any fault on the part of the supplier. It shall in no way be waived by the reason that the unit / item was previously inspected & passed by BHEL as per Inspection Clause detailed elsewhere in the tender. To keep the unit fully operational, in case of failure of any item during the warranty period, it is the supplier's responsibility to arrange replacement / repairing at site at their own cost including custom duty, freight, etc. within a period of maximum 3 (three) weeks from the date of notification of such failure.

2) Transmission with integral torque convertor with each Carrier Engine.

(i) Suitable capacity **Allison transmission** [Electronic – 4700 OFS Series or Above] to cater maximum output torque of the engine with retarder brake, lock up clutch and drop box for transmitting power for rig operation and carrier drive, having minimum five forward & one reverse speeds, with dual controls i.e. from driver's cabin and driller console along with indicator and with safety interlock facility. Model of Allison transmission must be mentioned in the offer with technical brochure for technical scrutiny.

Bidder must confirm in their bid to provide O&M manual & parts book [Soft & hard copy in English language] along with the supply of Allison Transmission.

(ii) Rig manufacturer should ensure proper matching between Carrier Engine & Transmission to meet adequate power requirement for operating the rig / carrier. Programmed self-diagnostic kit (both licensed software as well as hardware-Laptop) shall be supplied along with the unit. If additional software is required to maintain the electronics transmission system, same should be supplied with license. Bidder shall categorically confirm in the bid that the offered software is for the particular transmission of the rig. Moreover, suitable weather protection for electronic system is to be provided.

(iii) Power take off (PTO) from transmission system with pneumatic clutch and controls for hydraulic pump. Make and model should be indicated by the bidder in their techno-commercial bid.

(iv) Transmission wiring should be in separate rodent proof conduit with proper marking from other wiring & numbered for easy identification. All cables must be terminated properly. If any cable is not used in the harness it should be removed from the harness. Suitable connectors with sufficient cable length are to be provided

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where flexibility is required as per instrument manufacturer design, so that the cables are not in stress.

(v) All the accessories, fittings / connections & harness wiring of Allison Transmission must be of OEM supplied with proof of documents. Bidder must confirm in their offer to provide documentary evidence from OEM regarding supply of the above mentioned items at the time of inspection.

(vi) Driller's console gear selector should have removable connector at both ends.

(vii) All the electrical / electronic circuit diagrams for operation of the Transmissions must be furnished along with the offer for scrutiny.

(viii) Spare Parts for Allison Transmission:

Bidder should quote unit price for following spare parts for each transmission. Item wise price of each spare part with part number should also be provided. Bidder must mention in their offer the total quantity of each of the following spare part required for running of each transmission for 2000hrs.

a) Filter, Transmission Oil.

b) Suction & Delivery Hose.

c) Complete PTO.

d) Transmission Oil (litres)

The unit cost of above spare parts will be considered for bid evaluation. However, BHEL reserves the right to decide the item & quantity of spare parts for procurement along with the main equipment.

3) Power Transmission to Draw-works & Carrier:

Suitable power transmission system, as per rig design shall be provided for transmitting power to draw-works and rotary table in work-over mode and to carrier in road-mode with dual control from cabin and driller's console along with safety interlocks and indicators.

4) Hydraulic system:

(i) Complete with Hydraulic Pump [Make: Parker], hydraulic oil reservoir, suitable hydraulic lines, filters, hoses, pressure gauges, connections and valves, regulator etc. for the operations of / like mast raising / lowering, extending, levelling jacks, hydraulic cat works, hydraulic winches, hydraulic power tong drive, etc.

(ii) Capacity of the pump as per rig design, minimum 2500 PSI nominal working pressure. It shall be bidder's endeavour to supply the Hydraulic distributor, valve manifold, Hydraulic valves of VICKERS, COMMERCIAL HYDRAULICS, BENDIX, EATON, PARKER or REXROTH make only.

(iii) Hydraulic pump shall be driven from PTO of the Allison Transmission with pneumatic clutch and controls. Total Interface drawing of Engine, Transmission & Hydraulic pump shall be supplied along with the supply and accordingly in the technical bid.

(iv) Protection for hydraulic pipe with guide pipes & support at intermittent locations to avoid damages to the hydraulic pipe.

(v) Tank, reservoir capacity as per design with filler cap, breather, oil level gauge filter, safety by-pass relief valve to prevent accidentally exceeding max rated working pressure, pressure & temperature gauges.

(vi) Hydraulic Test Certificates from reputed Certifying agencies to be made available for all hoses installed as per applicable SAE / DIN standards.

(vii) Bidder should quote unit price for following spare parts. Item wise price of each spare part with part number should also be provided.

a. Hydraulic pump [with make & model], complete

b. Hose, suction complete, Hydraulic pump

c. Hose, delivery complete, Hydraulic pump

The unit cost of above spare parts will be considered for bid evaluation. However, BHEL reserves the right to decide the item & quantity of spare parts for procurement along with the main equipment.

5. Auxiliary Air Compressor:

i) 01 (one) complete set of skid mounted Electric Motor Driven Auxiliary Rotary Screw Air Compressor package must be supplied along with each of the Work-over Rig Package. The detail technical description of Air Compressor is as follows:

a) Capacity: Min 50 CFM

b) Pressure rating: Min 150 PSI

c) Compressor Power rating: Min 11.0KW

d) Sound Level: 65-69 dB(A) measured at a distance of 1mtr.

e) Air dryer: Non heater type

f) Make: IR / SULLAIR

g) Standard scope of supply:

- Screw Air Compressor with Lubrication system
- Cold Box / Hot Box design - electronic system for increased life of the components.
- Controls & Instrumentation- auto start/stop, blow down & load/unload solenoid, air pressure gauge, total hr counter, fault warning etc.

h) The package shall include air receiver of 1000 Litres capacity each with necessary pipe connections & isolation valves. Connection should be made between the air tanks of air compressor & carrier. Compressor with motor must be mounted in a separate acoustic enclosure with proper ventilation. The complete Air Compressor package [1no compressor with air vessel] must be mounted on a rugged oil field type rugged skidded hut for easy & secured transportation. Bidder must provide necessary drawing of skid and the schematic view of package along with the offer for technical scrutiny.

i) Motor must be flame proof and explosion proof. The bidder along with the offer must provide brochure & literature of offered air compressor for technical scrutiny. The bidder along with the offer must provide brochure of offered air compressor.

j) Air receiver and lines shall be tested as per relevant API standard for any leakage. Test certificate to be provided along with the supply.

ii) System for filling air in outfit carrier tyres in case of emergency with required hose and adapters shall be provided. The system shall be hooked with air system with one extra out let tapping with valve.

iii) Spare Parts for Air Compressor:

Bidder should quote unit price for following spare parts for each compressor. Item wise price of each spare part with part number should also be provided. Bidder must mention in their offer the total quantity of each of the following spare part require for running of each compressor for 2000hrs.

a) Air Filter Element.

b) Lube Oil Filter Element.

c) Separator Element.

d) 'V' Belt.

e) Coolant

f) Hose Hydraulic.

g) Tubing.

h) Orifice

i) Filter Pad

The unit cost of above spare parts will be considered for bid evaluation. However, BHEL reserves the right to decide the item & quantity of spare parts for procurement along with the main equipment.

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iv) Electrical Scope of supply for above mentioned Screw Compressor includes the following:

(a) The suitable size of Cable used for connecting the motor from Power Distribution Panel shall be EPR (Ethylene Propylene Rubber) insulated, and HOFR (Heat Resistant, Oil Resistant and Fire Retardant), CSP (Chloro Sulphonated Polyethylene) sheathed screened 4 Core Copper conductor Cables suitable for Oil Mines. All electrical cables shall conform to the provisions stipulated in line with IS-9968 read with the latest BHEL specifications (OR12003, OR12002 & OR12005) as the case may be. Motor must be flame proof and explosion proof.

(b) Electrical Scope of supply includes the following: Control panel to start / stop and protect the motor and compressor, with the following minimum facilities:

I. One adequately sized manually operated three-phase isolation switch to switch on/off all incoming power to the panel. Incoming power to the panel / motor will be connected to this switch.

II. Auto Start / Stop – Motor start / stop are to be controlled by the microprocessor – This is the default motor control scheme, MCCB and contactor based, with start/stop command from the Microprocessor controller.

III. Indication lamps: Input power available / Motor Running / Motor Stop / Motor Tripped

IV. Emergency Stop Switch – A push button to instantly stop the motor. This should be “push to operate - turn to reset” type mushroom headed button.

V. Protection – Motor should be protected against the following:

a. Reverse rotation. Normal rotation as per the compressor direction of rotation

b. Overload

c. Single Phasing

d. Earth Leakage

(c) Microprocessor based controller (This shall be ambient cooled and should not require any special means of cooling).

(d) Temperature sensors input.

(e) Solenoid valves control (Blow down SV, Load/Unload SV).

(f) Pressure Transducer sensor input.

(g) Package Air Pressure gauge.

(h) Total running hours counter.

(i) High discharge Air temperature indication lamp.

(j) Fluid Filter change indication lamp.

(k) Air / Fluid separator Element change indication lamp

(l) Air intake filter change indication lamp.

(m) Display of all important parameters via indication lamps / on a screen

(n) The control panel to be easily accessible, and IP 23 rated. All cables / sensor wire to be of bottom entry. All indication lights, meters and displays shall be located on the front.

The control cable connections in the panel should be done with copper conductors only. For all other matters not specified above, the panel design and manufacture should be as per IS 8623.

(o) Special Notes (Electrical):

a) Earthing studs – All electrical current carrying / consuming equipment or item should be provided with a minimum of two earthing studs.

b) Bidder should supply the electrical schematic drawing, clearly marking the motor starting system, the protection system, and the indications / safety devices employed.

c) All electrical schematics / wiring diagrams shall be approved by BHEL before manufacture.

d) Power connections to the compressor from the external power source will be terminated on the isolator / MCCB of the control panel.

e) Only 01 (one) spare motor having specification, make & model exactly same with the above offered Screw Air Compressor must be supplied along with the Work-over Rig package. The bidder should confirm the same in their offer.

****Vendor scope: Vendor shall quote for supply of all the above equipment of Rig carrier ENGINE, Allison Transmission, Auxiliary Air compressor etc., including spare parts which will be considered for bid evaluation.**

D. RIG EQUIPMENT

1) Draw-works (Main winch) on the Carrier:

- (i) Main drum suitable for hook load capacity of minimum 125 MT (136 ton) in accordance with API 7K as applicable.
- (ii) Single drum dynamically balanced draw works should have Axially mounted, water cooled with Disc Brake as auxiliary brake, suitable for minimum 125 MT (136 ton), on the Brake Drum / shaft to carryout Retarding as well as Braking, also having provision of parking. The Band Type Brakes should also be provided as main Brakes. The Disc Brake and Band Brake should be complete with adjustment system & cooling system for working in 55 degree Celsius ambient temperature and at continuous full load. The electrical motor operated cooling system should either be mounted on the carrier or provided as a separate portable unit connected with the suitable hoses etc. The equipments should be mounted in such a way that safety during operation is ensured and there should be enough space for maintenance of the equipment. The Disc Brake is to be of National or Eaton Make. The control of the Disc Brake shall be provided at a convenient place in the hands of the Rig Operator, through a pneumatic Valve and the movement of Valve lever shall determine the braking Torque applied. Complete Rig operation should be possible independently with the help of Band Brakes as well as with the combination of Disc Brakes & Assist Brake.
- (iii) Rated input horsepower suitable for rated hook load capacity, designed to provide empty block speed of 6.5 to 7 feet/sec & block speed at 125 MT hook load, 1st gear operation is 0.45 feet/sec to 0.9 feet/sec, 8 lines strung up.
- (iv) Main drum dimensions as per design with Lebus grooving for wire rope as per design to be provided for proper wire line spooling. However, the casing line size should be 1 1/8" (1.125 inch).
- (v) The Draw works and its brakes shall have suitable water cooling system. Manifold, valves, reservoir, pump, exchanger should be included as per design.
- (vi) Disc Brake to be axially mounted on the draw works drum assembly. The pump for cooling system of the disc brake should be driven as per manufacturer's design. The same cooling system should also cater for the cooling of brake band assembly of the draw-works. The coolant tank and the heat exchanger of the cooling system will be as per bidder's design, and is preferably to be mounted on the carrier.
- (vii) Draw-works should have sufficient range of forward speeds and one reverse speed.
- (viii) Main drum driven by high capacity air balloon type air flex or equivalent make, pneumatically operated clutches mounted outboard for easy accessibility & maintenance.
- (ix) All roller chains of cotter pin / riveted type, with API 7F, latest edition monogramming.
- (x) Wire rope with API 9A, latest edition, monogrammed.
- (xi) Draw-works to have centralized greasing system.
- (xii) Chain drive shall be fully enclosed oil bath type, having lubrication as per design. Chain guards shall be designed to have inspection windows to carry out repair and replacement of chains easily.

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(xiii) Automatic crown block saver safety shut off device to limit block travel, installed on Draw-works, automatically disengages clutch & sets main drum brake when block comes too close to crown block. (or required travel is reached).

(xiv) Automatic floor saver safety shutoff device to limit block travel, installed on drawworks, automatically disengages clutch & sets main drum brake when block comes too close to rotary table. (or required travel is reached).

(xv)(a) Automatic Hook load limiting device: Automatic Hook load limiting device installed to prevent overloading of mast, linked up to weight indicator. Limiting device receives signal from weight indicator and applies brake & disengages draw works clutch simultaneously when the set hook load is reached.

(b) Suitable Casing Rope travel guide should be provided to prevent overlapping of the Rope on the Draw Works Drum.

(xvi) Driller's console / Control panel (Suitable for Hazardous area classified as per Attachment -II):

Driller console to be located at rear of carrier with provision for elevating it to the base of the mast for use with substructure at derrick floor level. Mechanical controls located adjacent to Driller console for draw works brakes, include a chain tie down for the handle. Suitable arrangement to be provided to protect from ingress of rain water.

a) CONTROLS: Driller console should have Air control for main drum clutch, assist brake, engine throttle, engine shutdown and emergency shutdown, Hydraulic winch & Catwork control, Transmission shifter, Rotary drive clutch, Hydraulic pump, Pneumatic slip, provision for Mud pump controls, cooling water and assist brake water controls.

(b) Driller console should have following GAUGES / INDICATORS - Air, hydraulic, Stand Pipe pressure gauges, Hook load, Tong torque, Transmission shifter indicators and provisions for installing Mud Pump pressure gauges & SPM Meter for mud pump.

2) Rotary drive system on Carrier:

(i) Rotary drive system as per rig design from transmission to Rotary table with air balloon type clutch. Clutch control and engine throttle shall be at driller's console.

(ii) Elevated drive to rotary table with suitable protective guards.

(iii) Lubrication / grease header to be provided.

(iv) Lubrication system to be provided as per rig design.

3) Hydraulic Power tong circuit:

(i) Hydraulic power tong circuit with pressure and return line pressure gauge, adjustable relief valve with hydraulic outlet up to rear bumper shall be provided.

(ii) Tong hydraulic circuit shall be integral with rig hydraulic circuit.

(iii) Hydraulic pressure gauge and remote pressure control of tong circuit shall be located at the driller's console.

4) Hydraulic winch on Carrier - 02 Numbers

(i) One to be mounted at suitable position on derrick floor and other on the carrier at a suitable position between draw-works and engine.

(ii) Hydraulic winch, suitably mounted with grooved sheaves, under crown, and cable, having minimum capacity of 10,000 lbs at 2,000 PSI oil pressure, with fail safe brake. It should include remote air control valve in control box & piping from & to valves, filters, safety controls, pressure gauges & all necessary fittings.

It shall be bidder's endeavor to provide Pull Master / Braden makes only.

(iii) Additional control on sub structure towards pipe rack side shall be provided for the hydraulic winch mounted on the derrick floor.

(iv) Safety guards shall be installed on both the winches.

5) Stand Pipe Manifold:

- (i) Stand pipe 3" x 5000 PSI working pressure including gooseneck and hammer union mounted on mast (male and female portion of hammer unions are to be suitably provided, wherever it is specified along with pipe / goose neck / reducer etc so as to complete the stand pipe for connection with mud pump discharge on one side and swivel on the other side). Stand pipe and manifold shall consist of-
 - (ii) Two (2) 2-1/16" 10,000 psi working pressure gate valves API 6A (PSL - 3) monogrammed.
 - (iii) Two (2) 2-1/16" 5,000 psi working pressure gate valves along with companion blind flange, API 6A (PSL - 3) monogrammed - to be supplied loose.
 - (iv) Three (3) 2" hammer unions, Fig 602.
 - (v) One (1) 2" Line pipe threaded box connection for pressure gauge.
 - (vi) One (1) 2" Line pipe threaded box connection for pressure transducers.
 - (vii) One 3" fig 602 x 2" fig 602 hammer union changeover.
 - (viii) API monogrammed 3" X 5000 PSI high pressure hammer union Fig 602, two (2) numbers to be supplied loose.
 - (ix) API monogrammed 2" X 10000 PSI high-pressure hammer union Fig 602, two (2) numbers to be supplied loose.
 - (x) API 6A, (PSL - 3) monogrammed 2 1/16" X 10,000 PSI working pressure gate valve two (2) numbers to be supplied loose.
 - (xi) Two (2) 2" x 12' long, 5000 PSI working pressure vibrator hose at pump discharge for connecting to high pressure line with 2" hammer union Fig 602 end connection at both ends.
 - (xii) One (1), 2" x 12' long x 5000 PSI working pressure vibrator hose for connecting to standpipe manifold.
- Kill line kit for field installation consisting of:
- (xiii) 2" NB, 5000 Psi WP Pipe with hammer unions Fig 602 on both ends, 10 ft long (unfolded) - 8 numbers; 6 ft long (unfolded)- 4 numbers and 4 ft long (unfolded) - 4 numbers.
 - (xiv) Four (4), 2" 5000 psi WP, corner pipe 90 degree swivel joints and with hammer unions Fig 602.
 - (xv) (a) 3", 5000 Psi WP Pipe with hammer unions Fig 602, 10ft long (unfolded) -10 Numbers (With hammer unions), (b) Equivalent Swivel style 10 - 10 Numbers, (c) Equivalent Swivel style 50 - 10 Numbers.
 - (xvi) 2 1/16", 5000 psi WP, Plug valve, female threaded ends - 04 Numbers , Check valve (screwed type) - 04 Numbers
 - (xvii) 3", 5000 Psi WP , Plug valve, female threaded ends - 04 Numbers, Check valve (screwed type) - 04 Numbers

6) Hydraulic tubing tong:

- (i) One set of Light weight hydraulic tubing tong of minimum torque rating 8000 ft lbs, as per API 7K & Monogrammed, replaceable jaws type for 2.3/8", 2.7/8", 3 1/2" tubing, complete with accessories like torque gauge assembly rating 8000 Ft. lbs., spring hanger assembly, Hydraulic Hoses with Quick couplings, Hydraulic Lift Cylinder Assembly for tong height adjustment and all other necessary items for its installation and operation.
- (ii) The tubing tong is to be supplied with jaws for 2-7/8" tubing and jaw sets for 2.3/8" & 3 1/2" tubing to be supplied loose. Hydraulic tongs to be run from rig hydraulic system only. 10 sets of spare inserts for 2-7/8" tubing, 06 sets of spare inserts for 2-3/8" tubing & 4 sets for 3-1/2" tubing to be provided loose.

7) WORKING TOOLS LIST PER RIG:

Minimum listed below and additional specific tools example for wheel repairs / replacement, air filling, carbon shaft / cross repair, chain replacement, bearing replacement pullers, torque wrench, compensator charging tool kit etc. as per rig requirement, Heavy-duty Grease gun – 2 (two) numbers and 50MT capacity Hydraulic Jacks with handles are to be supplied. Bidder to specify in the technical bid.

(i) One set of ½" drive sockets set minimum 17 sockets, ratchet, hinge handle, speed handle, and 3 extensions.

(ii) Open end wrench set combination size 5/16" to 1¼".

(iii) Adjustable wrench set of 4 suitable sizes

(iv) Heavy duty pipe wrench set of 36" & 48" size.

(v) 10" pliers

(vi) Set of 2 Phillips screw driver suitable sizes

(vii) Allen wrench 7 piece set

(viii) 2 pound hammer & 5 pound hammer - 1 each

(ix) Tool box 24 x 9½ x 9½ w/tray

(x) Heavy-duty Grease gun – 02 (two) Numbers

(xi) Hydraulic Jacks 50MT capacity with handles is to be provided.

(xii) Heavy duty aluminium alloy pipe wrench of size 18" & 24" – 2 Numbers each.

(xiii) One Heavy duty Chain tong 36" to be provided.

(xiv) Slogging wrench open end as well as ring type, 2 numbers each of 36mm, 41mm, 46mm, 50mm, 55mm, 60mm & 75mm sizes to be provided.

8) Rig instrumentation MARTIN DECKER make, suitable for Hazardous area classified as per Attachment-II:

(i) Deadline weight indicator with sensor / load cell on driller console / control panel, indicating load on hook for the designed capacity of the rig.

(ii) Provision for installing Mud pump pressure indicator, complete, on drillers console / control panel (0-6000 PSI).

(iii) Pressure gauge mounted on stand pipe of 0-5000 PSI. Gauge should be in the clear view from the Driller's Console.

(iv) Suitable electronic recorder for recording hook load. The recorder display shall be mounted in weight indicator panel. The off-site printing of the recorded hook-load will be desired option. The storing space of the data in the recorder is to be sufficient to store cumulative data of a week i.e. 24 x 7 hours.

(v) Ton km indicator shall be provided near weight indicator box.

(vi) Provision for installing SPM indicator for mud pumps discharge at driller's console.

(vii) All instrumentation tubings / pipings to be of stainless steel. However, suitable hoses are to be provided where flexibility is required as per instrument manufacturer design / as per mobile rig design.

(viii) Tong torque sensing system should be installed. Torque indicator for tongs to be provided at driller's console.

(ix) In case of electronic sensor, same should be suitable for use in hazardous area of zone-I and gas group IIA & IIB in oil mine and shall conform to IS/IEC/EN: 60079-0:2011 & IS/IEC/EN: 60079-1:2007 and bidders are to categorically confirm the same while quoting. The bidders shall submit test reports conforming to the above relevant standards from an Indian Government Laboratory or NABL accredited laboratory or IECEx accredited laboratory or ATEX notified body, which is not a part of manufacturer's facility. Copies of above certificates should be enclosed with the quotation as well as with the supply of materials.

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(x) Calibration certificate for weight indicator & pressure gauge mounted on stand pipe to be provided at the time of supply.

****Vendor scope: Vendor shall quote for supply of all the above equipment of Total Rig equipment indicated above which will be considered for bid evaluation.**

E) GUARANTEE / WARRANTY:

(i) The complete package / unit shall be under guarantee / warranty by the supplier (or the successful bidder) for a minimum period of 01 (one) year from the date of successful commissioning of the complete unit at site.

(ii) BHEL reserves the right to inspect, test and if necessary reject any part / parts after delivery at site (including incomplete manuals, catalogues, etc.) in case of any fault on the part of the supplier. It shall in no way be waived by the reason that the unit / item was previously inspected and passed by end user as per Inspection Clause detailed elsewhere in the Tender.

(iii) To keep the unit fully operational, in case of failure of any item during the warranty period, it is the supplier's responsibility to arrange replacement / repairing at site at their own cost including custom duty, freight, etc. within a period of maximum 3 (three) weeks from the date of notification of such failure. The warranty for the repaired item shall be correspondently extended by a period equal to that from the date of failure to the date of re-commissioning. In case of replacements, the warranty shall be for (one) year from the date of commissioning of the replaced item.

INSPECTION / Testing of equipment at manufacturing stage:

Inspection shall be carried by any one of the end user approved third party inspection agencies viz. Lloyds / BV / DNV / RITES / IRS / Tuboscope Vetco as per requirements of various codes and standard mentioned in the supply order. All equipment of rig shall be tested as per standard test procedure of Rig manufacturer and equipment manufacturers and as per relevant API codes. Testing of mast shall be carried out as per API 4F. Testing of rig and systems should be carried out after final assembly of all rig modules, including carrier, substructure, mast, and after hooking up of the pneumatic & hydraulic lines between modules. Test certificates of equipment manufacturer for equipments & certificate of testing of rig after final assembly shall be submitted duly approved by TPI. Broad Scope of Third Party Inspection for Rig and Equipments shall be as under:-

(i) Inspection of rig (s) and equipment shall be carried out as per standard test procedures of rig / equipment manufacturing and as per relevant codes, components, as per requirement of API Q1 and relevant API Code.

(ii) Review / approval of QA plan and manufacturing program indicating various stages of inspection on receipt from manufacturer.

(iii) Upon approval of QA plan, manufacturer shall intimate readiness for inspection in stages to inspecting agency giving sufficient advance notice for deputing their inspectors.

(iv) Carry out all necessary NDT, Visual, Dimensional, Functional checks / tests as per QA approved plan including chemical and physical checks for raw material.

(v) Review / verification of material test certificate, QC documentations, material traceability records etc. by inspecting agency on receipt from manufacturer.

(vi) Visual inspection of various assemblies and sub-assemblies as per the specifications given in purchase order.

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- (vii) Inspection for proper workmanship of various welding jobs and mountings.
- (viii) Witness final testing / performance testing of equipment by inspecting agency as per approved QA plan.
- (ix) To witness load test of mast to rated hook load capacity for 125 MT for 125 MT Rig at manufacturer premises for each rig and the load test certificate at specified load are to be submitted with the rig. During the test all assemblies, sub-assemblies are to be monitored for proper functioning.
- (x) Inspection shall also be carried out for all items of each individual rig package and the inspection certificate is to be issued.
- (xi) Issue of TPI certificate.

Note: Bidder to quote third party inspection charges separately in the price bid only and the same will be considered for bid evaluation.

PRE-DESPATCH INSPECTION:

On satisfactory clearance of TPI (Third Party Inspection), pre-dispatch inspection call to be given to BHEL. Complete rig along with engine package should be offered for inspection & functional testing to BHEL by the supplier at manufacturer's premises at least 45 days prior to dispatch. The rig will be offered in fully assembled condition with all accessories fitted and ready for function testing.

A multidisciplinary team comprising of 7-8 engineers will visit to the supplier's premises / manufacturing plant for inspection of complete rig package & functional testing of equipments prior to dispatch. The To & Fro travelling expenses from Duliajan, Assam, India with boarding, lodging & food expenses of BHEL engineers will be to BHEL account.

Pre-Dispatch Inspection charges (if any) should be quoted separately which shall be considered for bid evaluation.

The Inspection cum Acceptance process would include but not limited to the following minimum steps / tasks -

- a) Physical verification / inspection of all the items / fittings / accessories including Parts Catalogue, Maintenance & Service Manuals, Schematics, all tools under complete tool kit as well as other tools, all spares as per the Spare Parts List for engine etc.
- b) Any modification requirement arising out of design aspect consideration (on the part of the supplier) shall be in the scope of the supplier at no extra cost.
- c) The minutes of inspection process would be prepared at the end of the inspection and jointly signed by both the parties.
- d) Supplier shall confirm in writing compliance of all the points raised in the minutes of inspection as well as any other subsequent additions / changes, following deliberation with the inspector after arrival at BHEL.
- e) Any other testing / joint inspection indicated elsewhere in this tender.

TRAINING:

The supplier should arrange comprehensive training programme for the multidisciplinary team of engineers and technicians from end customer immediately after the completion of installation and commissioning of the rigs at customer designated site for a period of 2 (two) weeks on Maintenance, Troubleshooting & Working Principle of equipments, systems, items etc. of the unit amongst other relevant subjects. The training on Engine, transmission and other major items is to

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be arranged by the supplier but imparted by respective OEM's. [Bidder should indicate the training module with duration in the technical bid. **Training charges should be quoted separately which shall be considered for bid evaluation**].

A broad guideline of training module for engineer / technician is as follows:

For Transport Engineer / Technician:

- I. Power assisted steering system including hydraulic pump and gearbox.
- II. Pneumatic system for brake & gear shifter (of the carrier) including different valves.
- III. Axle, brake & suspension systems.

For Equipment Maintenance Engineer / Technician:

- I. The operation, maintenance, trouble shooting & rectification related to Engine, Allison transmission, Generating Set [if any], Screw Air Compressor etc.
- II. Hydraulic system
- III. Pneumatic system
- IV. Draw-works, Rotary Swivel & other major rig equipment maintenance

For Electrical Engineer / Technician:

- I. Generating sets
- II. Power Control
- III. Power distribution

For Instrumentation Engineer / Technician:

- I. Training on instrumentation & control system of IC engines
- II. Driller's Console & Electronic sensors for monitoring drilling parameters
- III. Allison Transmission system

For Drilling Engineer / Technician

- I. Draw-works (with maintenance procedures)
- II. Hydraulic system
- III. Mast & controls
- IV. Raising & lowering of Mast, Assembling & disassembling of Mast & Substructure, Assembling & disassembling of Mast from carrier and packaging & unpackaging. of Mast & Sub-structure for transportation purpose.

MANUALS & CATALOGUES:

The successful bidder shall also provide documented training modules as well as video & CD presentation of their equipment for operation & maintenance.

Four (04) sets (hard copies) of Operation & maintenance, repair / overhaul manuals, part books, P&ID,s / Drawings of all rig equipments, sub-assemblies, components, instrumentation, hydraulic, air, electric, lighting, power flow systems, mast, substructure, rig carrier and its components like steering system with pumps, carrier transmission system with prop shafts, gear shifter valves front axles, drive axles, differentials, suspension system, brakes system with shifters, valves & diaphragms, wheel rims, tyres, wheel studs, power flow and other systems, valves, manifolds, hydraulic pumps, generator, drillers console, crown-o-matic / floor-o-matic devices, air compressors, hydraulic cutworks, BOP handling system, monkey board, hydraulic winch, pneumatic control valves, hydraulic control valves, tubing tongs, clutches, rotary drive system, PTO, pumps and motors, engines, transmissions, generators, light fittings, glands, tanks, hoses, couplings etc in English for each rig shall be supplied.

The bidder in addition to above shall also supply do's and don'ts for critical operations like carrier roading, carrier placing, mast raising & extending, engine and

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pumps startup and shut down, tripping etc along with operation procedure from starting engine upto doing various jobs as above. Besides, above sets of hard copies of all above manuals & drawings etc., the same are to be loaded on 2 sets of CD's per rig, and to be provided. Welding procedure for mast, substructure shall be provided.

Support for commissioning at end customer designated site: Bidder shall also quote for support provided by bidder at customer-designated site for installation and commissioning of the supplied equipment. **The same will be considered for bid evaluation**

6) COMMISSIONING, ON SITE PERFORMANCE DEMONSTRATION / TESTING:

Bidder shall provide supervisory support at BHEL Hyderabad for Interfacing of different rig equipment and the same supervision shall be provided by successful L1 bidder at end customer designated site. Bidder shall quote these commissioning charges in all as single line item as mentioned in price bid format.

Bidder to categorically confirm to the above and indicate the cost of commissioning in their offer, which will be considered for evaluation purpose.

PAINTING SCHEDULE: SUITABLE FOR CORROSIVE AND SALINE ENVIRONMENT:

Blast cleaning of all accessible surfaces to SA 2.5 standard. At least three (03) coats of polyurethane paint to be applied after applying primer and under carriage to be coated with Anti Corrosive Treatment for cement & rust.

The colour shade should be as under.

MAST – WHITE

Draw Works – Orange

Carrier Chassis – DA Grey or any other suitable shade painting

Substructure - Black

Brine Tanks – Grey

Bunkhouses: - White

Crown, Racking Board– Red

All working floors & walkways shall be painted with anti-skid paint suitable for corrosive coastal field atmosphere.

Approximate external transportation dimensions are 9m length, 2.5m width and 2.8m height (with skid beam).

Spare Parts

a) Bidder shall confirm in offer that supply of spares for the offered model is guaranteed for minimum of 10 years after supply.

b) Two years running spares (exclusive of mandatory spares as mentioned elsewhere in the tender) for various major components of the unit including the carrier to be quoted by the bidder.

c) Bidder shall also quote instrumentation

(b) &(c) above will **not** be considered for bid evaluation purpose.

Documentation:

The vendor should provide the Operation, Maintenance / repair manual illustrating /indicating all parts by exploded part / assembly view – 4 sets as per clause 12.4 of API 16 D along with performance test and material test reports with certificates etc. Wherever API 4F, 6A, 7F, 7K, 8C, 9A, 16A, etc. are mentioned, it is to be read with their corresponding API Q1 certificate and the items / equipments shall be API monogrammed.

Any item / equipment / accessory not included but necessary for efficient Control and operation of the system shall be provided and indicated by the bidder in the bid.

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The motors, starters and the cable glands should be suitable for use in hazardous areas and duly certified by CMRI and approved by DGMS for Zone I and Gas group IIA & IIB of Oil Mines. The bidder shall submit copies of CMRI certificates & DGMS approvals for all the flameproof electric motors, starters and cable glands along with the supply and categorically confirm submission of the same in technical bid.

GENERAL NOTES (In addition to notes mentioned elsewhere in this tender)

(a) The offered Mobile Rig package shall be brand new, unused, of recent manufacture, and free from any manufacturing defect. This shall be categorically stated by the bidders in their quotations.

(b) Any deviation(s) from the tender specification should be clearly highlighted specifying justification in support of deviation.

(c) Offers shall be complete in all respects and all the items / equipment as specified in the tender must be included in the package. Offers deemed to be incomplete shall be out rightly rejected. (Bidders may quote additional items / equipment or accessories not covered in this enquiry, if felt necessary for the completeness and efficient operation of the rig package).

(d) The Bidder shall categorically confirm that the compatibility of all equipment offered has been thoroughly scrutinized and verified for smooth and trouble-free operation of the entire package to avoid unwarranted hitches during commissioning support.

(e) Quotations shall be accompanied by detailed technical specifications, manufacturer's printed specification sheets, literature, drawings & catalogues as indicated.

(f) Bidders should specifically note the document submission schedule indicated elsewhere (i.e. in sections) including special documents requiring statutory clearances.

(g) All equipment to be supplied with the Rig Package shall be in full conformance to and monogrammed per the respective API Specification as mentioned in the tender viz. API Spec 4F, API Spec 5L, API Spec 6A, API Spec 7F, API Spec 7K, API Spec 8C, API Spec 9A, API RP 500 & API RP 13E, etc wherever applicable.

(h) Bidders shall confirm categorically that Installation & Commissioning of the Rig Package with all accessories would be carried out by their competent personnel at customer's designated drill site.

(i) Bidders, quoting for any bought out items should undertake and comply with Guarantee / Warranty clause indicated elsewhere in this tender.

(j) Bidder is to confirm to provide the cost of the rig package broken down to major components like Carrier, Mast, Engine, Draw-works, Transmission etc. within 30 days of placement of order. The indicative list of major items is attached as Annexure - V.

(k) Bidder should confirm in their technical bid that they would provide services on call out basis after the normal warranty & guarantee (as stated elsewhere in this tender) for a period not less than 3 years. The charges for such call out services should be indicated in the commercial bid but will not be considered in evaluation of the tenders.

Special notes: Vendor shall mandatory fill the "TECHNICAL EVALUATION MATRIX" attached separately as ANNEXURE E along with the Technical bid.

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TECHNICAL CHECK LIST FOR ENGINE			
Part I TECHNICAL		The following check list must be completed and returned with the offer. Please ensure that all these points are covered in your offer. These will ensure that your offer is properly evaluated. Please indicate details or Yes / No as applicable to the following question, in the right hand column.	
Sl. No.	PARAMETERS/REQUIREMENTS	BIDDER'S OFFER (To indicate details or yes/no, as applicable)	REMARKS, IF ANY
1.	Whether separately highlighted deviation from the technical specification?		
2.	Whether a detailed specification of Engine as per NIT specifications with manufacturer's technical literature / catalogue enclosed?		
3.	Whether the offered outfit engine is compatible to be fitted with offered Allison transmission as per NIT specifications?		
4.	Whether test certificate of the engine will be submitted?		
5.	Whether CAT diagnostic tools for both outfit as well as genset engine offered?		
6.	Whether Lube oil dispensing & evacuating pump sets offered?		
7.	Whether Sound level meter offered?		
8.	Whether spare parts for Engine, Allison Transmission, Screw Compressor offered.		
9.	Make & Model of outfit & Generating set Engine		
10.	Make & Model of Air Compressor [Primary & Auxiliary both]		
11.	Make & Model of Steering pump		
12.	Make & Model of Air Shut off Device		

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Part II DOCUMENTATIONS			
Sl. No.	DESCRIPTIONS	DOCUMENT ENCLOSED (Yes or No)	REMARKS, IF ANY
1.	Whether O&M Manual, Engine built up records, Parts list of engine & Allison Transmission in soft as well as hard copy provided?		
2.	Whether documents of Lubrication, fuel, hydraulic & electrical system of the engine provided?		
3.	Whether documents of Performance rating curves of the engine provided?		
4.	Whether documents of Specific fuel consumption of the engine provided?		
5.	Whether documents of Emission norms of the engine provided?		
6.	Whether documents of Heat load calculation of the engine provided		
7.	Whether sketch / drawing for steering pump drive provided?		
8.	Whether drawing of dimensional layout diagram with foot print of the engine offered?		

ANNEXURE- II

LIST OF TOOLS		
Sl No	Description of Item	Quantity
1.	Open Jaw Double Ended Spanner set in Metric & Inch-12P/C per each set.	01 Set
2.	Double Ended Ring Spanner [deep offset hexagon ring] set in Metric & Inch - 12 P/C per each set.	01 Set
3.	Heavy duty Double Hexagon Standard Socket compatible for ½" Sq. Drive in Metric & Inch - 8mm to 36mm [1/4" to 1 3/8"] per each set.	01 Set
4.	Reversible [quick release] Ratchet compatible for ½" Sq. Drive- overall length 250mm - 01per set.	01 Set
5.	Sliding T-Bar compatible for ½" Sq. Drive - 01per set.	01 Set
6.	Extension Bar compatible for ½" Sq. Drive- overall length 75mm - 01per set.	01 Set
7.	Extension Bar compatible for ½" Sq. Drive- overall length 125mm - 01per set.	01 Set
8.	Extension Bar compatible for ½" Sq. Drive- overall length 250mm - 01per set.	01 Set
9.	Universal Joint compatible for ½" Sq. Drive- overall length 78mm - 01per set.	01 Set
10.	L- Handle compatible for ½" Sq. Drive- overall length 250mm - 01per set.	01 Set
11.	Adapter ¾" F X ½" M; 01per set.	01 Set

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12.	Adapter ½" F X ¾" M; 01per set.	01 Set
13.	Universal Socket Wrench ½"; 01per set; [universal joint ½"].	01 Set
14.	Screw Driver Standard Blade, Cushion grip- 8mm X 250mm - 01per set.	01 Set
15.	Screw Driver 9 Tips with handle, Cushion grip - 01per set.	01 Set
16.	Adjustable Spanner- 200mm [8"] - 01per set.	01 Set
17.	Adjustable Spanner- 300mm [8"] - 01per set.	01 Set
18.	Allen Key Set-Long- Metric & Inch - 1.5mm to 12mm [12nos] & 1/16" to ½" [12nos] - 01per set.	01 Set
19.	Combination Pliers - 200mm [8"] - 01per set.	01 Set
20.	Long Nose Plier - 150mm - 01per set.	01 Set
21.	Circlip Plier-Straight Tip [internal Circlip puller]-Length 175mm [7"] - 01per set.	01 Set
22.	Circlip Plier-Bent Tip [external Circlip puller]-Length 175mm [7"] - 01per set.	01 Set
23.	Center Punch-Forged tool Steel hardened & tampered – 6mm X 100mm [1/4" X 4"] - 01 per set.	01 Set
24.	Ball Pen Hammer- Head length 355mm [14"] - 16 OZ - 01 per set.	01 Set
25.	Soft Face [Polymer] Hammer - Head Ø25mm - 01 per set.	01 Set
26.	Feeler Gauge- 25 Blades-300mm Long in Metric & Inch – 01 each per set; Make: Freeman.	01 Set
27.	Measuring Tape - 5Mtrs metallic -Auto retractable - 01 per set; Make: Freeman.	01 Set
28.	Tin snips - Drop forged carbon steel, hardened & tempered-Size 300mm [12"] – 01 each per set.	01 Set
29.	Thread Gauge - BSW, Metric, UNC, UNF - 01 each per set.	01 Set
30.	Caliper - Inside & Outside - 150mm [6"] - 01 each per set.	01 Set
31.	Screw Extractor Set - Hexagonal Head - 3mm to 18mm [1/8" to ¾"]; - 01 per set.	01 Set
32.	Spirit Level - ABS Plastic-3vials [horizontal, plumb & 45°] – 01 per set.	01 Set
33.	Cold Chisel - Forged Chrome-Vanadium steel, hardened, quenched & tempered - 12mm X 150mm & 25mm X 150mm – 01each per set.	01 Set
34.	Liner Puller	01 Set
35.	Piston Insert tool	01 Set
36.	Piston ring expander	01 Set
37.	Injector puller	01 Set
38.	Timing adjustment tool	01 Set
39.	Bearing puller for fan shaft	01 Set

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Make of major rig accessories for supply with rig package should be as per the following options. Bidder should confirm the make of these items in technical bid accordingly.

SI. No.	Equipment / Accessories	Make / Name of Vendor	API Specification
1.	Mast & Sub-Structure	Rig OEM	4F (PSL-2)
2.	Disc Brake	1. Eaton Corporation 2. National Oil well Varco	-
3.	Draw-works & Rotary Chains	1. Diamond Chain Company 2. Regina Catene Calibrates.P.A. 3. Rexnord Kette GMBH 4. Equivalent Make	7F (Continuous API certification for 05 years preceding original BCD without any break)
4.	Drilling Instruments & Gauges	1. Martin Decker 2. Can Global 3. Wagner 4. Oteco	
5.	Engine	1. Caterpillar	
6.	Carrier Axles	1. Rockwell 2. Fabco, 3. Dana, 4. Clarke, 5. Meritor, 6. Sisu 7. Axle Tech 8. Equivalent make	-
7.	Heavy duty suspension system	1. Hendrickson 2. Neway 3. Equivalent Make	
8.	Steering Box	1. Spicer 2. ZF 3. Sheppard 4. Rane 5. TRW	
9.	Steering Pump	1. VICKERS 2. PARKER 3. REXROTH	
10.	Carrier brake valves	1. Bendix 2. Wabco 3. Rexroth	
11.	Pneumatic balloon type Clutches	1. Airflex or Equivalent	
12.	TOOL KIT FOR ENGINE & TRANSMISSION	1. Snap on 2. Equivalent make	

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13.	Hydraulic distributor, valve manifold, Hydraulic valves	1. VICKERS, 2. COMMERCIAL HYDRAULICS, 3. BENDIX, 4. EATON, 5. PARKER 6. REXROTH 7. Rig OEM make	
14.	Hydraulic winch	1. Pull Master 2. Braden 3. Rig OEM make	
15.	Auxiliary Air Compressor	1. IR 2. SULLAIR	
16.	Rig Instrumentation	Martin Decker	
17.	Hydraulic Pump	1. PARKER	
<p>Note: The equipment conforming to API specifications must have the API monogram die stamped on the body</p>			

ANNEXURE - IV

SPARE PARTS LIST FOR CARRIER (FOR EACH UNIT)

A	FRONT AXLE	1. Wheel stud with nut(s) 2. Axle Stud with nut 3. Wheel hub oil seal 4. Wheel hub bearing 5. Differential oil seal (if any)	16 sets 16 sets 16 sets 16 sets 08 sets
B	REAR AXLE	1. Wheel stud with nut(s) 2. Axle Stud with nut 3. Wheel hub oil seal 4. Wheel hub bearing 5. Differential oil seal 6. Differential Filter Element (if any)	20 sets 20 sets 20 sets 20 sets 09 sets 09 sets
C	DRIVE LINE (PROPELLER SHAFT)	1. UJ Cross (Spider and Bearing) 2. UJ Cross (if any) for steering pump	04 sets 04 sets
D	STEERING	1. Steering oil filter element 2. Steering pump Repair kit 3. Steering Box repair kit 4. Steering Power cylinder Repair kit 5. Tie rod end 6. Steering pump 7. Steering power cylinder 8. Power cylinder hose 9. Steering column UJ Cross 10. Pressure relief valve 11. Directional control valve	15 sets 10 sets 10 sets 10 full sets 08 sets 04 numbers 08 numbers 06 sets 06 sets 06 sets 06 sets.

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E	PNEUMATIC SHIFTER OF STEERING PUMP	<ol style="list-style-type: none"> 1. Shifter 2. Shifter Repair kit 3. Actuator for shifter (if any) 4. Repair kit for Actuator (if any) 5. Pneumatic Hoses for Shifter system 	04 numbers 04 sets 02 numbers 06 sets 04 complete sets
F	BRAKE & PNEUMATIC CIRCUIT	<ol style="list-style-type: none"> 1. Foot Brake Valve repair kit 2. Front wheel Servo repair kit 3. Rear Wheel Servo repair kit 4. Air Dryer Filter Element. 5. Repair Kit for all pneumatic valves 6. Maxi brake (parking brake) 	10 sets 16 sets 20 sets 15 numbers 12 sets each for each valve 06 sets 04 numbers 08 numbers 12 numbers
G	Gear Shifter (Inside the Driver's cabin)	<ol style="list-style-type: none"> 1. Gear shifter 2. Gear shifter repair kit 3. Gear shifter Hoses 	2 no 6 sets 6 sets
H	SUSPENSION	<ol style="list-style-type: none"> 1. U-BOLT. 2. Front shock absorber 3. Rear shock absorber 4. Leaf spring set (front) 5. Walking beam (rear) 	20 numbers 10 numbers 04 sets 10 numbers 10 numbers 06 sets 06 sets

ANNEXURE - V:

LIST OF MAJOR COMPONENTS OF RIG (FOR EACH UNIT)

***Price to be indicated in Price bid only. Price/rate should not be mentioned in the technical bid; else the bid shall be rejected.

	Major Components	Unit Cost
1.	Total Mast & Sub-Structure drawings, crown, v door pipe slide, etc...	
2.	Disc Brake *	
3.	Draw-works inclusive of chains	
4.	Hydraulic Winches	
5.	Rig Engine	
6.	Rig Carrier	
7.	Carrier Axles	
8.	Heavy duty suspension system	
9.	Steering Box	
10.	Steering Pump	
11.	Carrier brake valves	
12.	Pneumatic balloon type Clutches	
13.	Hydraulic distributor, valve manifold, Hydraulic valves	
14.	Auxiliary Air Compressor	
15.	Hydraulic Pump	
16.	Hydraulic Tubing Tong	

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Note: Items indicated with (*) may require certification confirming conformance to OMR- 2017 and subsequent Guidelines / notification of DGMS to be used under the notified hazardous area of the well site. Any additional item of the rig package as per the specification of the tender requiring such certification has to be mentioned under the list indicated with price break up.

COMMERCIAL CHECK LIST

THE CHECK LIST MUST BE COMPLETED AND RETURNED WITH YOUR OFFER. PLEASE ENSURE THAT ALL THESE POINTS ARE COVERED IN YOUR OFFER. THESE WILL ENSURE THAT YOUR OFFER IS PROPERLY EVALUATED. PLEASE SELECT "Yes" OR "No" TO THE FOLLOWING QUESTIONS, IN THE RIGHT HAND COLUMN.

Sl#	REQUIREMENT	COMPLIANCE
1.0	Whether bid submitted under Single Stage three Bid System?	Yes / No
2.0	Whether quoted as manufacturer?	Yes / No
3.0	Whether ORIGINAL Bid Bond (not copy of Bid Bond) as per Revised Format (Annexure VII Revised) Sent separately? If YES, provide details	Yes / No
	(a) Amount :	
	(b) Name of issuing Bank :	
	(c) Validity of Bid Bond :	
4.0	Whether offered firm prices ?	Yes / No
4.1	Whether quoted offer validity of 180 days from the bid closing date of tender?	Yes / No
4.2	Whether quoted a firm delivery period?	Yes / No
4.3	Whether agreed to the NIT Warranty clause?	Yes / No
4.4	Whether confirmed acceptance of tender Payment Terms of 80% against shipment/dispatch documents and balance 20% after successful commissioning/testing along with commissioning/testing charges?	Yes / No
5.0	Whether confirmed to submit PBG as asked for in NIT?	Yes / No
5.1	Whether agreed to submit PBG within 30 days of placement of order?	Yes / No
6.0	Whether Price submitted as per Price Schedule (refer Para 12.0 of BRC vide Annexure – II)?	Yes / No
6.1	Whether quoted as per NIT (without any deviations)?	Yes / No
7.0	Whether cost of Recommended Spares for 2 years of operations quoted?	Yes / No
7.0	Whether quoted any deviation?	Yes / No
7.1	Whether deviation separately highlighted?	Yes / No
8.0	Whether indicated the country of origin for the items quoted?	Yes / No
8.1	Whether technical literature / catalogue enclosed?	Yes / No
8.2	Whether weight & volume of items offered indicated?	Yes / No
9.0	For Foreign Bidders - Whether offered FOB / FCA port of despatch including sea / air worthy packing & forwarding?	Yes / No

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9.1	For Foreign Bidders – Whether port of shipment indicated. To specify:	Yes / No
9.2	For Foreign Bidders only - Whether indicated ocean freight up to Mumbai port (Excluding marine insurance) ?	Yes / No
9.3	Whether Indian Agent applicable ?	Yes / No
	If YES, whether following details of Indian Agent provided?	
	(a) Name & address of the agent in India – To indicate	
	(b) Amount of agency commission – To indicate	
	(c) Whether agency commission included in quoted material value?	
10.0	For Indian Bidders – Whether indicated the place from where the goods will be dispatched. To specify :	Yes / No
10.1	For Indian Bidders – Whether road transportation charges up to Hyderabad quoted?	Yes / No
10.2	For Indian Bidders only - Whether offered Ex-works price including packing/forwarding charges?	Yes / No
10.3	For Indian Bidders only - Whether indicated import content in the offer?	Yes / No
10.4	For Indian Bidders only - Whether offered Deemed Export prices?	Yes / No
10.5	For Indian Bidders only – Whether all applicable Taxes & Duties have been quoted?	Yes / No
11.0	Whether all BRC/BEC clauses accepted ?	Yes / No
12.0	Whether Integrity Pact with digital signature uploaded?	Yes / No
12.1	Whether all the clauses in the Integrity Pact have been accepted?	Yes / No
12.2	Whether all Financial documents as per BRC Financial have been uploaded?	Yes / No

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TECHNICAL SPECIFICATION

CERTIFICATE OF ANNUAL TURNOVER & NET WORTH

TO BE ISSUED BY PRACTISING CHARTERED ACCOUNTANTS' FIRM ON THEIR LETTER HEAD

TO WHOM IT MAY CONCERN

This is to certify that the following financial positions extracted from the audited financial statements of M/s.....(Name of the bidder) for the last three (3) completed accounting years upto..... (as the case may be) are correct

YEAR	TURN OVER In INR (Rs.) Crores/ US \$ Million) *	NET WORTH In INR (Rs.) Crores / US \$ Million) *

*Rate of conversion (if used any): USD 1.00 = INR

Place:

Date:

Seal

Membership No:

Registration Code:

Signature

*Applicable only for GLOBAL tenders

BID EVALUATION CRITERIA (BEC)/BID REJECTION CRITERIA (BRC)

The bids must conform to the specifications, terms and conditions given in the tender. Bids shall be rejected in case the item(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:

BID REJECTION CRITERIA (BRC)**A. TECHNICAL:**

- 1) Mobile Rig Package shall be suitable for operating in end user fields with the following environmental conditions. Bidders to categorically confirm.
 - a) Max. recorded ambient temp = 41 deg. Celsius
 - b) Min. recorded ambient temp = 5 deg. Celsius
 - c) Average annual rainfall: 250 / 300 cm
 - d) Humidity - 100% @ 21°C, 95% @ 35°C & 70% @ 41°C
- 2) The Input Horse Power Rating of the Draw-works of Mobile Rig shall not be less than 550 HP.
- 3) The Carrier shall have two (02) numbers Caterpillar, model C-11 engines capable of developing minimum 300 HP (net) @ 2100 RPM at flywheel end [operating speed range 1800-2200 RPM].
- 4) The Minimum Static Hook Load Capacity of the Mast shall be minimum 125 MT (136 tons, 275577.8 lb) with 8 lines strung for each of the offered mobile rig package.
- 5) Substructure shall be rated for minimum 185 MT (203.9 ton) rotary load, minimum 90 MT (99.2 ton) set back load & minimum 275 MT (303.1 ton) simultaneous load for each of the offered mobile rig package.

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TECHNICAL SPECIFICATION

Financial and Commercial qualifications of bidders:

***Please refer to tender document for Financial and commercial conditions

- Price bid format for foreign vendors:

- (A) Unit Cost of total package
- (B) Total material cost (unit cost X 2) (other than Sl. No. C to I below)
- (C) Cost of Spares for Carrier (refer Annexure IV)
- (D) Cost of Tools for Carrier Engine (refer Annexure II)
- (E) Cost of Spares for Carrier Engine
- (F) Cost of spares for Allison Transmission.
- (G) Cost of spares for air compressor
- (I) Cost of Commissioning spares, if any
- (J) Third party Inspection charge
- (K) Grand Total Material Cost, (B + C + D + E + F + G + I + J)
- (L) Packing & FOB Charges
- (M) Pre shipment INSPECTION CHARGES IF ANY
- (N) Total FOB port of shipment charge(K+L+M)
- (O) Ocean Freight Charges upto Mumbai, India
- (P) Banking and Insurance Charges @ 1.5% on total FOB value vide N above
- (Q) Total CIF Mumbai value, (N + O +P)
- (R) ISGT @5% on R
- (S) Compensatory cess on R if any
- (T) CIF + IGST Value (Q+R+S)
- (U) Installation & Commissioning supervision Charges:
- (V) GST & Applicable Compensatory Cess if any; on Installation & Commissioning Charges vide U above:
- (W) Training charges, if any
- (X) GST & Applicable Compensatory Cess If any; on Training charges vide W above
- (AA) Grand Total Value (T+U+V+W+X)
- (BB) grand total in WORDS
- (CC) gross WEIGHT
- (DD) Gross Volume

Price Bid Format for Indigenous Bidders for each item:

- (A) Unit Cost of Total package:
- (B) Total material cost (Unit cost X 2) (other than Sl. No. C to J below):
- (C) Cost of Spares for Carrier(refer Annexure IV):
- (D) Cost of Tools for Carrier Engine(refer Annexure II):
- (E) Cost of Spares for Carrier Engine:
- (F) Cost of Spares for Allison Transmission:
- (G) Cost of Spares for Air Compressor:
- (J) Cost of Commissioning spares, if any:
- (K) Third party Inspection charge:
- (L) Grand Total Material Cost, (B + C + D + E + F + G + J + K):
- (M) Packing and Forwarding Charges:
- (N) Pre-shipment Inspection charges, if any:
- (O) Total Ex-works value, (L + M + N) above:
- (P) GST on (O) above:

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TECHNICAL SPECIFICATION

- (Q) Compensatory Cess, If any on (P) :
- (R) Total FOR Despatching Station value (O + P +Q):
- (S) Inland Freight Charges upto BHEL Hyderabad including GST :
- (T) GST included Transit Insurance Charges @ 0.5 % of (R):
- (U) Total FOR Hyderabad value, (R + S + T) above :
- (V) Installation & Commissioning supervision charges:
- (W) GST & Applicable Compensatory Cess If any; on Installation & Commissioning Charges vide (V) above:
- (X) Training charges, if any:
- (Y) GST & Applicable Compensatory Cess If any; on Training charges vide (X) above:
- (Z) Grand Total Value (U + V + W + X + Y):
- (AA) Grand Total value in words:
- (BB) Gross Weight :
- (CC) Gross Volume :
- (DD) Import Content, if any:

Spare parts: Bidder shall confirm in technical bid that the listed spare parts are quoted in price bid. If bidder failing to quote the same, the bid will not be further evaluated.

Note : i) Please indicate HSN /SAC Code of the quoted material & services. Cost of the individual items should be shown separately and total thereto should be shown as called in the Price Bid Format (SUMMARY).

Bidder shall accept and comply with the following clauses as given in the Bid Document/ Instruction To Bidder (ITB), failing which bid shall be liable for rejection:

- i) Liquidated Damages
- ii) Warranty/Guarantee of material
- iii) Arbitration / Resolution of Dispute
- iv) Force Majeure
- v) Applicable Laws