

PURCHASE SPECIFICATIONS
FOR
200 KVA DG SET
FOR
WORKOVER RIG APPLICATION



SPECIFICATION NO. : OR 12695
REVISION NO. : Rev 03
DATE : 16.9.2020

DISTRIBUTION : PI - 4 copies
O/C - 1 copy

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PART - I

GENERAL TERMS AND CONDITIONS

Part I covers the commercial and other various terms and conditions applicable for design, manufacture, testing, supply, installation and commissioning of DG Set and associated equipment as detailed below:

1.0 INTRODUCTION:

- 1.1 The DG set envisaged in this specification is for DULIAJAN, ASSAM and rating of equipment for particular rig is 200 KVA. DG set shall be tested at BHEL Hyderabad prior to final commissioning at Rig site of M/s OIL Duliajan. Location of Rig site mentioned here is tentative. There is possibility of Rig shifted to other location (within Assam) at the time of final commissioning. No price variation is applicable on account of this. Supplier to take up commissioning activity at BHEL Hyderabad and OIL Duliajan site on call. Ultimate customer for items required against this specification is M/s OIL Duliajan (Assam), and therefore referred in to this specification wherever necessary.
- 1.2 DG Set shall majorly consist Diesel Engine, Alternator, DG Control Panel, Battery & Battery Charger, Diesel Tank assembled on heavy duty Oil field skid and acoustic enclosure with suitable coupling and anti-vibration mounting, lube oil, coolant, complete in all respect and in ready to use condition, Providing Training to M/s OIL engineers on DG set by OEM during Installation & commissioning at Rig-site is also included in scope of supplier. Refer Part II of this specification for more details.
- 1.3 The equipment should confirm to this BHEL specification No. OR12695
- 1.4 Any other hardware or item not detailed in this specification but necessary for proper functioning of DG Set at Oil Rig site should be in the supplier's scope.
- 1.5 Notwithstanding anything mentioned either in this specification or any future drawing approval or approval or MOM or inspection or correspondence by BHEL, ensuring safety, ergonomics, adequate safe working space for maintenance and operation, aesthetics and use of sound engineering practice, compliance with CPCB and other applicable norms, providing adequate clearances for components and assemblies and proper integration of various assemblies irrespective of whether the same is explicitly mentioned in specification or not shall be solely responsibility of supplier, and shall be taken care by supplier only, during all stages including design, drawing submission, manufacturing, Installation and commissioning. BHEL cannot be hold responsible if these aspects violated by virtue of any approval, MOM, correspondence or inspection by BHEL.

The technical details and specifications covered in "PART – II TECHNICAL DETAILS & SPECIFICATION OF THE EQUIPMENT"

Note : BHEL Tender General terms and Conditions BP200102 shall be applicable for this tender, however wherever any specific condition is mentioned in this document i.e. OR12695, same shall override the same/similar condition of BP200102.

2.0 DELIVERY SCHEDULE AND COMPLETION :

- 2.1 Delivery period for material shall be within 10 weeks (F.O.R destination) from the date of approval of drawings / documents by BHEL after placement of Purchase Order. Delivery of consignment to be done on F.O.R destination basis at BHEL Hyderabad. Freight and transit Insurance shall be in scope of supplier upto BHEL Hyderabad.
- 2.2 Commissioning at BHEL Hyderabad : Supplier to depute their team for commissioning within 10 days from date of intimation by BHEL Bhopal. Commissioning of DG set at BHEL Hyderabad to be completed in 7 days time.
- 2.3 Commissioning at OIL Duliajan site : Supplier to depute their team for commissioning within 10 days from date of intimation by BHEL Bhopal. Commissioning of DG set at OIL Duliajan site to be completed in 7 days time.
- 2.4 Training for OIL staff at OIL Duliajan site to be provided during Installation and Commissioning at OIL Duliajan site for 4 engineers/technicians for 5 working days.

3.0 OFFER SUBMISSION :

Offer to be submitted in Two bid system as per BHEL General Terms and Conditions of tender BP200102. PQR related documents to be submitted with Part-1 (Technical & unpriced commercial bid)

The bids shall be evaluated based upon "Total Cost to BHEL" for complete package (all items of tender) which will include taxes, duties, freight, insurance, loadings due to noncompliance of BHEL commercial terms etc., as applicable as per standard procedure of BHEL.

4.0 PAYMENT TERMS :

BHEL standard conditions for payment terms & payment schedule as per BP200102 shall be applicable. However following special conditions shall be applicable for release of payment in addition to mentioned in BP200102 :

4.1 Material payment :

80% of the material portion including taxes, duties, freight & insurance charges on receipt and acceptance of material at BHEL works. Payment shall be released only after submission of Performance Bank Guarantee (PBG) by supplier.

Balance 20% payment for material portion shall be released after satisfactory final commissioning of equipment at OIL Duliajan Site after issuance of "Work Completion Certificate" by OIL/BHEL.

4.2 Commissioning at BHEL Hyderabad payment :

100% for Commissioning charges at BHEL Hyderabad against "Work Completion Certificate" issued by BHEL.

4.3 Commissioning at OIL Duliajan payment :

100% for Commissioning charges at OIL Duliajan site against “Work Completion Certificate” issued by BHEL/OIL.

4.4 Training at OIL Duliajan payment :

100% for Training charges at OIL Duliajan site against “Work Completion Certificate” issued by BHEL/OIL.

5.0 SUBMISSION OF DOCUMENTS :

5.1 SUBMISSION OF DOCUMENTS ALONG WITH TECHNICAL BID (PART-1)

- i) OGA drawing of complete DG set including all major components with overall dimensions, other critical dimensions, weight, finish etc.
- ii) Electrical schematic of Control panel including incomer and neutral grounding resistor with its monitor (NGR & NGRM).
- iii) Filled up Bid Evaluation Criteria (BEC).
- iv) Type approval report for Acoustic Enclosure complying to CPCB norms & other Statutory requirements as mentioned in this document or as applicable for the rated DG set. (supplier to ensure that offered DG set meets the latest statutory norms as issued / amended time to time by MoEF / CPCB or any other agency)
- v) Standard QA Plan
- vi) Technical details of DG set and accessories as per Annexure-4

5.2 SUBMISSION OF DOCUMENTS AFTER PLACEMENT OF PO & APPROVAL

- i) Final OGA drawing of complete DG set including all major components with overall dimensions, other critical dimensions, weight, finish etc. – Within 10 days from the date of PO placement for approval by BHEL.
- ii) Final Electrical schematic of Control panel including incomer and neutral grounding resistor with its monitor (NGR & NGRM) – Within 10 days from the date of PO placement for approval by BHEL.
- iii) DG set sizing calculations - Within 10 days from the date of PO placement for approval by BHEL.
- iv) Bill of material with make of items - Within 10 days from the date of PO placement for approval by BHEL.
- v) QA plan & test procedures - Within 10 days from the date of PO placement for approval by BHEL.

- vi) P&I diagram for diesel fuel system from fuel tank to engine, water cooling system of the diesel engine, lube oil of Diesel Engine, Air intake system and exhaust air system with silencer, chimney etc. - Within 20 days from the date of PO placement for information to BHEL.

Drawings and Documents submitted by supplier for approval shall be approved within 10 days from the date of submission by BHEL. Where ever required BHEL shall obtain the approval from end user M/s OIL Duliajan and hence supplier shall also be asked to provide necessary information during approval process.

Irrespective of acceptance of OGA drawing by BHEL, integration of components/assemblies, providing required clearances and complying safety requirements and statutory norms shall be responsibility of supplier, and BHEL cannot be held responsible in any manner for above.

5.3 SUBMISSION OF DOCUMENTS ALONG WITH SUPPLY

Following documents **(7 sets in hard copy and 1 soft copy in flash drive along with each DG set)** to be submitted to BHEL Bhopal within 10 days time after dispatch of items to consignee.

- i) Operation and Maintenance manual for DG set.
- ii) Drawing manual and Bill of material (if not covered in SI No i above).
- iii) Test reports for all major components and sub-assemblies.
- iv) Test reports for final inspection carried out by TPI and any other agency.
- v) Type approval and conformity of production certificate for the DG set including all type approvals as per CPCB norms and other Statutory norms as applicable for the rated DG set.

All the drawings shall bear BHEL PO, project name customer's name equipment designation and identification numbers.

The following additional information along with relevant performance curves with conditions to be provided along with the supply :

- i) Gross Horse Power developed at rated RPM
- ii) Deduction for Altitude, Temperature etc.
- iii) Deduction for Fan and ancillary equipment
- iv) Net HP available at rated RPM & site conditions.
- v) Specific Fuel Consumption at rated speed and Power and 110%, 75%, 50% and 25% of full load.
- vi) Performance Curves of the Engines.

6.0 ADDRESS FOR SENDING FINAL DOCUMENTS AFTER DISPATCH

Technical documents & drawing, covered in Clause No. 5.3 above for BHEL shall be forwarded to following addresses:

AGM (CEE) -HOD
Block III, Western Wing
Gr. Floor
BHEL Bhopal
Piplani, Bhopal (MP)
India 462022.

7.0 CHECKLIST FOR TENDER SPECIFICATION :

Supplier shall furnish clause wise reply to Part I & Part II of this enquiry.

Bid should be complete in all aspects covering entire scope of job/supply and should conform to the technical specifications covered in our specification, duly supported with technical catalogues / literatures. Incomplete and non-conforming bids may be rejected.

Bidder shall submit completely filled up checklist provided as per Annexure-7, for evaluation of offer at our end. Checklist should be sent along with the Technical bid (Part-1).

8.0 ALL CORRESPONDENCE BEARING TENDER / PO NO. TO BE ADDRESSED TO :

Dy. Manager (MM) /MWX
 BLOCK IV ANNEXE
 BHEL, BHOPAL – 462021
 Tel. No.: 0091-755-2505088
 Email : rakesh_kum@bhel.in
 & copy to : d.kumar@bhel.in

9.0 Deleted

10.0 Deleted

11.0 ACCEPTANCE INSPECTION AT SUPPLIER WORKS :

Inspection shall be carried by any one of the BHEL/OIL's approved Third party Inspection agencies viz. Lloyds / BV /DNV /RITES /IRS/ TUBOSGOPE VETCO or by BHEL/OIL representative or both as per requirements of various codes and standard mentioned in the purchase order and approved QA plan.

DG Set shall be tested as per standard test procedure of DG Set manufacturers.

Broad Scope of Third Party Inspection for Rig and Equipment's shall be as under: -

- (i) Upon approval of QA plan by BHEL/OIL, manufacturer shall intimate readiness for inspection to inspecting agency & BHEL giving advance notice of 7 days for deputing their inspectors.

- (ii) Carry out all necessary NDT, Visual, Dimensional, Functional checks/ tests as per approved QA plan including checks for raw material.
- (iii) Review/verification of material test certificate, QC documentations, material traceability records etc.
- (iv) Visual inspection of various assemblies and sub-assemblies as per the specifications given in purchase order.
- (v) Inspection for proper workmanship of various welding jobs and mountings.
- (vi) Witness final testing /performance testing/Load testing of equipment by inspecting agency as per approved QA plan.
- (vii) **Issue of TPI certificate.**

Each Engine must be load tested at Engine manufacturer's work & test certificate have to be provided during TPI inspection and also along with the delivery of DG Set.

Inspection shall be carried out as per approved detailed QA plan based on Annexure- 2. "Acceptance Inspection, Testing & QA plan" furnished with this specification. Based on Annexure-2 . Calibration certificates of testing instruments to be provided by supplier.

All DG Sets shall be subjected to TPI inspection as above before acceptance. In case inspection of assembled DG set or Control panel is waived by BHEL due to any reason, the supplier shall be liable to conduct the inspection as per approved quality plan and submit the duly signed report to BHEL. The material in such cases shall only be dispatched after written acceptance of supplier's inspection report by BHEL/OIL.

All cost, Charges and expenses for the testing and inspection at supplier works including TPI charges shall be borne by supplier. All reasonable facilities for testing and inspections shall be provided by supplier free of charge. Travel and lodging expenses of BHEL / OIL inspector shall be borne by respective agencies. If the DG Set offered by supplier does not meet acceptance criteria, the same shall be rectified by supplier and fresh inspection call shall be given by supplier.

It is to be noted that inspection by BHEL shall not be in any way absolving supplier of its warranty/performance/contractual obligation.

12.0 PACKING:

DG Set shall be supplied mounted on enclosure as per specification. The enclosure shall be suitably packed to avoid transit damage and any water or dust ingress. The exhaust outlet shall be suitably sealed to avoid water/dust ingress during transit & storage. Separate boxes of loose items like battery, spares etc. shall be made for each DG Set. Each box shall have one packing list of items inside the box whereas one copy shall be pasted on the top of the box.

For safety of equipment exhaust system may be transported in dismantled condition, in box. The same shall be assembled at BHEL Hyderabad and OIL Duliajan site by supplier.

The Load test schedule may be revised due to unforeseen circumstances. Supplier shall take adequate precaution to ensure that proper preservation techniques are followed while packing to avoid any damage due to outdoor storing of DG Set after receipt at Oil India site, with 95% humidity conditions.

Batteries for DG set shall be supplied in dry un-charge condition, to avoid deterioration before commissioning. Electrolyte and, charging at site at the time of commissioning, shall be in supplier's scope.

BHEL shall be informed about preservation procedures to be followed at site by supplier, in order to avoid damages during storage.

Each Box/ Packing on its outer surface shall have following marking:

- (a) Supply Order No.
- (b) Name of Supplier
- (c) Case No. (Running No. on each box)
- (d) Dimension of Package & Weight
- (e) Consignee
- (f) Warning as required: for example-TOP/ HANDLE WITH CARE/ DO NOT TURNOVER
- (g) One copy of the packing slip shall be preferably pasted over each box and one copy shall be packed inside the box. Packing slip shall have details of item/s inside each pack.

13.0 LIQUIDATED DAMAGES PENALTY :

Refer BHEL general Terms and conditions BP200102 for penalty in case of delayed supply / execution and same shall be applicable.

14.0 DEFICIENCIES & DEFECTIVE GOODS:

BHEL shall inspect the equipment after receipt of the same at BHEL works. Supplier may depute their representative, at their discretion during Inspection. However, it will be the responsibility of the supplier to inform BHEL in advance if they would like to participate in material inspection and verification process. Should any deficiency or defect noticed in the goods during material receipt inspection same shall be replaced by the Supplier without any extra charge under no charge invoice. Any complaint in regard to the material will be notified to supplier who shall replace same promptly. The rejected/damaged material will have to be accepted back by the supplier who will bear it's to and fro freight also & the supplier will supply the items at site, free of cost and carry out repair/replacement at site without any charge.

15.0 WARRANTY:

- 15.1** Supplier will warranty the products to be free from defects in materials and workmanship and to comply with specification and intended use. The supplier will provide warranty for a period of 30 months from the date of dispatch or 12 months from the date of commissioning at OIL Duliajan site **or 5000 Running hours whichever is earlier**. The warranty applies to all supplier manufactured and supplied components.

Supplier shall furnish full contact details for giving warranty calls, as per format provided in Annexure-5, and shall ensure that their engineer/ representative reaches site fully prepared within 48 hours of warranty call. If required Supplier/ it's authorized representative, will be available for warranty calls at Supplier's account.

Free scheduled maintenance to be provided by OEM of Engine / their authorized service provider at OIL Duliajan Site as per Engine OEM recommended maintenance schedule & procedure during warranty period. **Spares & Consumables required during free scheduled maintenance shall be in the scope of bidder.**

15.2 DESIGN PROBLEM:

After installation and commissioning, if the system is not operating as per specifications during warranty period, the same shall be attended by Supplier free of charge.

If Supplier has a design situation that requires Supplier service representative to perform services, Supplier warranty services rendered shall be at no charge with all travel expenses related to warranty service calls at supplier's account. Recurring problem and repeated failure of component/s shall be considered as design problem.

If modification in the DG Set is envisaged, for proper functioning / integration of sub-assemblies of DG Set, supplier to carry out such modifications free of cost. All services for this purpose shall be rendered by supplier free of charge.

15.3 COMMITMENT:

- a) The supplier will also undertake and confirm that for the equipment to be supplied, provision for supplying spares and services of the equipment 10 years after completion of warranty will be continued.
- b) The manufacturer shall give a commitment that the offered equipment is new and of recent manufactured/make.
- c) In case of equipment going out of production intimation shall be given 1 years in advance for a ONE TIME purchase of the spare parts.
- d) Irrespective of engagement of dealer/external service agency for field service of equipments covered in this contract the prime responsibility of providing warranty services lies with supplier.
- e) Supplier shall intimate full contact details of any subcontractor/s engaged by them during commissioning at Rig site.

16.0 PERFORMANCE BANK GUARANTEE (PBG) :

Supplier will furnish a Performance Bank Guarantee of 7.5% of the PO value with validity up to 3 month beyond warranty, along with invoice for 80% material payment. The Performance Bank Guarantee will cover all the items and terms in the P.O. and shall be issued from a bank acceptable to BHEL Bhopal. Supplier to obtain Bank Guarantee format along with list of acceptable Banks from BHEL Bhopal after PO placement.

17.0 INDEMNIFICATION:

During the performance of PO/ contract (entered into by BHEL & Supplier, consequent to this enquiry), the indemnity obligations of the supplier shall apply in events to any

geographic location where the contract shall be executed/ performed by supplier, or following the Delivery Date, where Equipment is being used by or for the benefit of BHEL.

The contractor shall fully indemnify BHEL against all claims of whatsoever nature arising during the course of work under the contract.

The contractor shall comply with all applicable State and Central Laws, Statutory Rules, Regulations etc. such as Payment of Wages Act, Minimum Wages Act, Workmen Compensation Act, Employer's Liability Act, Industrial Disputes Act, Employers Provident Act, Employees State Insurance Scheme, Contract Labour (Regulation and Abolition) Act 1970, Payment of Bonus & Gratuity Act and other Acts, Rules and Regulations for labour as may be enacted by the Government during the tenure of the Contract and having force or jurisdiction at Site. The Contractor shall also give to the local Governing Body, Police and other relevant Authorities all such notices as may be required by the Law.

The contractor shall ensure that no damage is caused to any person/property of other parties working at site. If any such damage is caused, it is responsibility of the contractor to make good the losses or compensate for the same.

18.0 END USER APPROVAL OF BIDDER / OFFERED MAKES BY BIDDER.

DG sets in this tender are intended for Oil Well drilling application where drilling operations are of continuous in nature and DG sets are suppose to work on continuous basis. Considering criticality of operations, end user M/s OIL Duliajan, has given their approved makes for DG sets, Engine, Alternators and other items and same is provided in the tender document (Part-II Annexure-6). For Bidders whose bids are found to be techno-commercially acceptable but not meeting approved vendor criteria, such Bidder's credentials & offered makes shall be forwarded to M/s OIL Duliajan for their acceptance. Price bids of such bidders will be considered for opening only after acceptance of M/s OIL Duliajan.

BHEL may ask bidders to submit additional documents to establish the credentials, if required by M/s OIL Duliajan for unapproved vendors/makes.

Note : All other terms and conditions as mentioned in BHEL GTC document BP200102 shall be applicable.

PART II

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TECHNICAL DETAILS & SPECIFICATION OF THE EQUIPMENT

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TECHNICAL DETAILS & SPECIFICATION OF 200 KVA DG SET

1.0 GENERAL SITE CONDITIONS & APPLICATION :

- 1.1 Site Location: : Duliajan, Assam
- 1.2 Ambient Temperature
 - 1.2.1 Maximum : + 50⁰ C (See for Alternator in Alternator section)
 - 1.2.2 Minimum : + 02⁰ C
- 1.3 Relative Humidity (%) : 95 % at 35 deg C
- 1.4 Av. Annual Rain Fall : 343 cms
- 1.5 Altitude above mean sea level : 150 Mtrs.
- 1.6 Environmental conditions : Dusty , saline onshore oil exploration Rig area
- 1.7 Earthing : Neutral grounded with Neutral Grounding Resistor.
- 1.8 Type of fuel : High Speed Diesel, as per IS:-1460: 1995 (2000) or BSVI Standard fuel (applicable from 2020).

1.10 **Application: -**

Diesel Generator Set of 200 KVA (160 eKW) **rated load / capacity** shall feed power for Compressor, area lighting & AC load and miscellaneous AC motors. **200KVA (160 eKW) power shall be available at the output of alternator. DG set Engine and Alternator sizing to be done accordingly to cater for internal losses and engine HP consumption for radiator etc.**

The DG Set shall be manual start type used as standby Generator, without paralleling facility. DG Enclosure (Kiosk) shall be placed in dusty, saline and humid open atmosphere on ground, of Oil Rig. Flooding of water up to 1 foot is a common phenomenon at oil rig site.

- 1.11 Starting Time: The starting time required from initiating start signal up to operating speed & voltage is attained and the engine and generator are ready to take the load, shall not be more than 40 second-
- 1.12 The make of the all components shall be as per the approved Vendor List furnished in Annexure-6.

2.0 APPLICABLE STANDARDS:

- 2.1 The equipment shall conform to the Indian Electricity Rules 1956 as amended time to time, other Regulation and the stipulation of Inspectorate of Factories and other applicable statutory bodies of the state in which the equipment are supplied, as regards to Safety, earthing and other essential Provisions specified there in, for installation and operation of equipment and plant. Nothing in this specification shall be construed to relieve the vendor of this responsibility.
- 2.2 The equipment & accessories covered by this Specification shall be designed, manufactured and tested in accordance with the latest relevant standards and codes of practice published by the Bureau of Indian Standards and International standards (British Standards/ IEC & ISO) as per 1.0 to 5.0 furnished below:

2.2.1 For Engine: -

IS:10000 / BS: 5514 or : Engine General equivalent

BS ISO 3046: 2002 : Reciprocating internal combustion engine- Performance- Part 1 : Declaration of power, fuel and lubricating oil consumptions, and test method- Additional requirements for engines for general use

Part 3 (2006) : Test measurements

Part 4 (2009) : Speed governing

Part 5 (2001) : Torsional vibrations

BS 5514-6: 1992, ISO : Reciprocating internal combustion engines – performance – Part 6 : Specification for over speed protection
3046-6: 1990

IS14817-1 2000 / : Mechanical vibrations
ISO 10816-1 1995

IS:1460 : 2017 : Automotive Diesel fuel

IS : 496 : 1982 : Automotive Internal Combustion Engine lubricating Oil

IS 13656-2019 : Internal Combustion Engine Crankcase Oils for automotive application

ISO 8528-5 Transient response requirements and accept 100 percent rated load in one step.

2.2.2 For Alternator: -

IS-1271, 2012 ` Thermal evaluation and classification of electrical
(Re-affirmed 2017) insulation.

IS:3043, 2018 : Code of practice for earthing.

IS-4722, 2001	: Rotating Electrical machines – Specification
IS-4728, 1975 (Re-affirmed 2007)	: Terminal marking & direction of rotation of rotating electrical machinery.
IS-4889, 1968 (Re-affirmed 2007)	: Method of determination of efficiency of rotating electrical machines.
IS-7816, 1975 (Re-affirmed 2007)	: Guide for testing insulation resistance of rotating machines.
IS-12075, 2008	: Mechanical Vibration of rotating electrical machines with shaft height 56 mm and higher. Measurement, evaluation and limits of vibration.
IEC 60034-14, 2018	: Mechanical vibration of certain machine with shaft height 56 mm & higher measurement, evaluation and limit
IS-12802, 1989 (Re-affirmed 2004)	: Temperature rise measurement of rotating electrical machines.
IS-13364, Part – 2, 1992 (Re-affirmed 2008)	: AC Generators driven by reciprocating internal combustion engines. Part – 2 : rated above 20 KVA & up to 1250 KVA.
IEC-60034	: Rotating Electrical Machines.
IS-4691, 1985 (Re-affirmed 2004)	: Degree of protection by enclosure for rotating electrical machinery.

2.2.3 For Control Panel :-

IS/IEC 60947	: Specification for Low voltage Switchgear & Control Gears.
IS-2705, 1992, (Re-affirmed 1997)	: Current Transformers
IS-3156, 1992 (Re-affirmed 2007)	: Voltage Transformers
IS-1248	: Direct acting indicating analogue electrical measuring instrument & their accessories.
IS-5578, 1984 (Re-affirmed 2006)	: Guide for marking of Insulated Conductors.
IS-8923, 1978 (Re-affirmed 2005)	: Warning Symbol for dangerous voltages.
IS-2551, 1982 (Re-affirmed 2005)	: Danger Notice Plates.

IS-5, 2007 : Color for ready mixed paints & enamels

2.2.4 General :-

IS-694, 2010 : PVC Insulated cables for working voltage up to and
(Re-affirmed 2015) including 450/750 Volts.

IS-7372, 1995 : Lead Acid storage batteries for Motor vehicles.
(Re-affirmed 2007)

Note : Standards not listed above but are applicable also to be followed.

3.0 STATUTORY NORMS :

- 3.1 Acoustic enclosure shall be provided with DG Set in order to meet the latest CPCB norms as integral part of DG Set. Supplier should have valid type test certificate of acoustic enclosure, issued by competent authority. If however supplier needs is required to develop new enclosure to meet the specification the same shall be mentioned in it's offer. In such case BHEL may join to witness type test of the enclosure by certifying agency and acceptance test of DG Set shall be witnessed only after getting clearance regarding CPCB norms from certifying agency.
- 3.2 Any stack height increase/ modification of exhaust assembly required to be done at site to meet statutory norms of enforcement agencies shall be responsibility of supplier and shall be done free of cost.
- 3.3 The DG set should meet requirement of conformance labeling for CPCB norms
- 3.4 Acoustic Enclosure should be specially designed with high quality acoustic insulation material to meet stringent MoEF/ CPCB norms that the noise pressure level of the generating set should not exceed 75 dB(A) measured at a distance of 01(one) meter from the enclosure surface.
- 3.5 Generating sets should meet latest Indian Noise Pollution & Emission norms as follows & provide all the documents / certificates required to be obtained from MoEF / CPCB, India for operation of the supplied Generating set at OIL's site at the time of inspection:
 - (i) CPCB II (Central Pollution Control Board) norms as per G.S.R 771(E) dated 11.12.2013 and its further amendments.
 - (ii) CPCB / MoEF (Ministry of Environment & Forest) norms as per G.S.R 371(E) dated 17.05.2002 and its further amendments.
- 3.6 Type Approval & Conformity of Production Certificate to be produced for the offered Generating set along with the supply.

4.0 SCOPE OF SUPPLY

Sl. No.	Item Description
01	200KVA DG set complete in Acoustic Enclosure with Engine, Radiator, Alternator, AVR, Acoustic Enclosure, DG Control Panel, Fuel Tank, Battery, Battery Charger, Earthing electrodes, Plug Socket & other accessories as per technical details in the Part II of specification OR12695 Rev03.
02	Special Tools for DG set as per clause 6.0, Part II, of Spec OR12695 Rev03

03	Spare parts for Diesel Generating sets as per clause 7.0, Part II, of Spec OR12695 Rev03
04	Engine fault Diagnostic Tool for as per clause 8.0, Part II, of Spec OR12695 Rev03
05	Commissioning of 200 KVA DG set at BHEL Hyderabad as per clause 9.0, Part II, of Spec OR12695 Rev03
06	Commissioning of 200 KVA DG set at M/s OIL Duliajan Site Assam as per clause 10, Part II, of Spec OR12695 Rev03
07	Training of OIL staff at M/s OIL Duliajan Site Assam as per clause 10, Part II, of Spec OR12695 Rev03

5.0 TECHNICAL SPECIFICATION OF DG SET SUB-ASSEMBLIES:

200 KVA (160 eKW), 415 VAC, 50 Hz, 3 Phase Diesel Generator Set shall consist of a Radiator, diesel engine and Alternator, which are coupled and mounted on a common base frame. That base frame shall further be mounted on an oilfield skid made from 2/3 runner I-beam with lifting pipes at both the ends for bottom lifting arrangement as per attached GA drawing of DG set. The whole arrangement shall be in a Kiosk with acoustic enclosure. Electrical scheme for distribution and NGR is furnished as Annexure-3. Scope of supplier includes complete inter connecting piping, instrumentation, electrical connection and fabrication required to meet requirement of specification, for the successful and integrated operation of the DG set and to deliver required performance.

DG set should be designed to meet ISO 8528-5 transient response requirements. DG set should be suitable to accept minimum 50 percent of rated load/capacity in first step considering G3 governing / performance class as per ISO8528-5.

Each Generating set should comprise of an Engine coupled with Alternator that shall be in unitized condition and enclosed in a single, weather proof, skid mounted Acoustic Enclosure. Engine and Alternator should be:

- Compatible to power and torque trend (varying loading pattern), responsive to instantaneous load and torque changes including no load.
- Easily serviceable in-site.
- of up-to-date technology.
- Shall be able to withstand the shock and vibration associated with the frequent movement of rigs from place to place and also to withstand severe environmental conditions including heat and humidity. The Alternator rotor shall be dynamically balanced and engineered to withstand 125% load over normal load.
- Shall be manufactured to International Standards and shall meet or exceed BIS, NEMA, IEEE, ANSI, IEC, ISO etc. requirements.

Diesel Generator Set shall be complete in ready to use condition and broadly consisting of, but not limited to the following:

- Diesel Engine and Radiator
- 200 KVA Alternator & AVR
- DG Control panel with NGR & NGR health monitor
- Kiosk with acoustic enclosure mounted on Oil Field type skid of I-Beams
- Fuel Tank
- Battery & Battery Charger
- Coupling
- Anti-vibration Mounting
- Termination box for external connection

- J. Earthing
- K. Illumination
- L. Interlock for NGR related CB tripping
- M. Working platform around DG set

The technical requirements of various sub-assemblies are as follows:

5.1 ENGINE :

Rating of engine should be suitable to meet the DG set rating as specified in this specifications.

The Engine should conform to specifications IS: 10000 / BS: 5514 or equivalent. Each Generating set should be complete with compatible AC generator [refer details of Alternator under heading Generator in Electrical section] is for 50 cycle's operation at the site conditions given below:

The engine should be equipped with following major accessories :-

- a) Air handling system having dry type Air Cleaner with restriction indicator.
- b) Exhaust system with exhaust manifold, SS exhaust flexible connection, Spark arrestor cum Silencer.
- c) Cooling system with Radiator, Fan, water pump etc designed & tested for 50°C ambient temperature, high radiator coolant temperature engine trip & low coolant level engine alarm with trip. The radiator should be having capacity of at least 20% in excess of total heat rejection of the engine.
- d) **Instrument / Control panel as per Engine OEM standard should have Oil & Fuel pressure gauge/display, Oil, Water & Exhaust temperature gauge/display, Electronic Tachometer with R/Hrs meter/display etc. There should have sufficient space for maintenance and repair of the Instrument / Control Panel.**
- e) Safety Shut Off system should be equipped-with Alarm for Low lube oil pressure, High coolant temperature, Engine over speed etc.
- f) The critical wiring should be in a separate rodent proof conduit with proper marking from other wiring. All the wirings must have proper ferrules / labels / numbers for identification of the wires.
- g) Engine Aspiration with Turbocharger, Air to Air after cooler etc.
- h) Lube system with full flow Spin on lube oil filter, adequate capacity in line lube oil centrifuge, lube oil pump, sump, oil cooler, breather, lube oil drain pump etc.
- i) Fuel system with dual fuel filter having Pre filter, reusable type water separator including drain valve & water in fuel (WIF) sensor and main filter. Integral fuel tank of standard design capacity provided with drain plug, air vent, inlet filling port [outside the enclosure] with locking facility & outlet connection, level indicator, provision for cleaning etc.
- j) Starting System with Electrical starter motor, battery charging alternator, 2 nos heavy duty battery, heavy duty battery terminals.
- k) Engine Harness wirings must be of OEM supplied.
- l) The specifications of Fuel: High Speed Diesel conforming to IS:-1460: 1995 (2000) or BSVI Standard fuel (applicable from 2020).
- m) Engine control panel should be of LCD screen type having all display menus including faults and monitoring of critical parameters of engines including but not limited to following :
 - High Water Temperature Trip
 - Lube Oil Pressure Low
 - Overload

- Over Speed trip
- Fuel level low
- Engine speed
- Battery Voltage
- etc

SPECIAL NOTES :

- n) All the engine accessories & fittings viz. Radiator, Coolers, Silencer cum Spark Arrestor, Engine Harness Wirings & accessories etc., must be of OEM supplied. Documentary evidence from OEM regarding supply of the above mentioned items should be submitted to OIL at the time of Pre-dispatch inspection.
- o) Engine Harness wirings must be of OEM supplied. The critical wiring should be in separate rodent proof conduit with proper marking from other wiring
- p) Detailed dimensional / GA drawings of the DG Set including footprint should be submitted during PDI
- q) Each Engine must be load tested at Engine manufacturer's work & test certificate have to be provided during TPI inspection and also along with the delivery of DG Set.

5.1.1. ENGINE COUPLING:

Engine and alternator shall be coupled through suitable rigid/flexible coupling on a common skid. Coupling shall be capable of withstanding the maximum generator sudden short circuit torque and inherent vibrations present in DG Set.

5.1.2 ANTIVIBRATION MOUNTING:

Anti-vibration mounting pads shall be provided below Engine / common base rail. Anti-vibration pads for alternator is optional based on supplier's design requirements. Vibration limits shall be as per ISO-2372/IS-11727/IEC 34.1 or relevant standards

5.2 ALTERNATOR & AUTOMATIC VOLTAGE REGULATOR (AVR) :

Brushless type alternator of 200 KVA rating, when coupled to diesel engine shall develop 200 KVA (160 Ekw) at 3 phase, 415 Volt, 0.8 power factor, when running at rated rpm under normal temperature and pressure conditions. The brushless alternator shall be composed of 3 phase AC exciter with rotating diodes, surge suppressor, static voltage regulator with voltage adjuster potentiometer, main field windings and stator windings. PIV of exciter rotating diodes must be minimum 6 times the maximum exciter armature operating voltage or 1200 V whichever is higher. All windings should be made from electrolytic grade copper of high purity. Each alternator shall be supplied with suitable Automatic Voltage Regulator (AVR).

5.2.1 DETAILED SPECIFICATIONS OF THE ALTERNATOR

NOTE - NEUTRAL CONDUCTOR IS NOT TO BE USED - There will be no single phase load supplied directly from the Alternator. All single phase loads, and loads requiring neutral will be supplied from a separate isolation transformer (Isolation Transformer is not part of scope of supply).

- a) Rated Output : 200 kVA continuous rating at 0.8 PF at specified ambient
- b) Rated Voltage : 415 Volts, AC

- c) Phase : 3, (4 wire), neutral point has to be brought out to generator terminal box, but not connected to any power circuit. The Neutral conductor shall be grounded at generator terminal through a Neutral Grounding Resistor (NGR) - see NGR details below.
- d) Type : Brushless
- e) Frequency rated / cycle: 50 Hz
- f) Rated power factor: 0.8 lagging
- g) No. of Poles: **as per design (Bidder to inform with offer)**
- h) Class of insulation: Class F/H
- i) RPM : as per design
- j) Phase sequence: UVW
- k) Conforming to : IS: 4722, 13364 or equivalent, with latest amendments.
- l) Rating : Continuous suitable for Motor loads.
- m) Connection : Y (Star)
- n) Ambient: average Temperature 40 °C, RH 98 %.
- o) Alternator Enclosure Protection: IP 23 (minimum)
- p) Alternator Terminal Box Protection: IP 23 (minimum)
- q) Amplitude of vibration: Should be as per IS-12075
- r) Excitation system: Brushless, self-excited and self-regulated with solid state AVR. The AVR may also be mounted in separate control panel. The excitation system should be able to handle motor as well as non-linear loads, and be suitable for running the alternator on Both solo and parallel running modes.
- s) Mounting : Foot mounted.
- t) Permissible voltage variation: +/-2% max at rated speed, load and power factor
- u) Permissible frequency variation : +/-2% at rated load and power factor
- v) Frame size : **Bidder to inform with offer**
- w) Motor starting ability: 200 % of FLC for 10 sec with max. voltage dip of 30% (Indicative)
- x) Unbalanced current carrying capacity: 25% of FLC continuously, with none of the phase currents exceeding the rated current
- y) **In case of short-circuit of all phases during operation at rated voltages, short circuit current shall not exceed 15 times the peak value or 21 times the rms value of the rated current as per IS4722.**
- z) No. of alternator bearings: **Single / double bearing (Bidder to inform with offer).**
- aa) Voltage swing (Transient response): Maximum 10% with 0.2 to 0.7 sec (recovery time), when rated load is suddenly switched on.
- bb) Automatic voltage regulation: $\pm 0.5\%$ to $\pm 1.0\%$ from no load to full load
- cc) The alternator should be capable of sustaining a 10 % over load for one hour in any 12 hours operation.
- dd) The alternator shall be designed to withstand a speed of 1.2 times the rated speed.
- ee) The alternator should be capable of continuous operation over a range of 110 % of rated voltage.
- ff) Total harmonic distortion factor should be less than 4% between phases at no load.
- gg) Bidder shall mention efficiency of the alternator at 25 %, 50%, 80% load at 0.8 pf.

5.2.2 ALTERNATOR TECHNICAL DETAILS

- a) Alternator stator winding terminals are to be connected to 4 nos. of suitably rated terminals supported on sheet molding compound (SMC) or other similar / better insulating supports inside the alternator terminal box.
- b) The alternator terminal box should be suitable and should have sufficient space for terminating one suitably sized, 4 core, 1100V grade PVC insulated, armored, multi-strand copper cable. Suitable size of cable gland should be fitted in the terminal box. Cable gland and entry hole shall also be provided in the TB for AVR cables if AVR is mounted in the control panel.

- c) Neutral point of each alternator shall be connected to the NGR (see NGR Specs, NGR is in DG set supplier scope), and thereafter to 2 (two) nos. heavy duty PVC insulated, PVC sheathed, flexible, single core, copper **cables of adequate size (25 sq mm) and of sufficient length (minimum 10.0 m)** for earth connection (to separate earth electrodes near the alternator-engine skid). The free ends of cables are to be terminated with heavy duty, tinned copper tubular lugs.
- d) Two numbers of earth studs are to be provided on both sides of the alternator for body earthing.
- e) Lifting hook are to be provided for lifting the alternator.
- f) Automatic voltage regulator if mounted in the DG control panel should be with rubber bushes under AVR mounting holes to reduce vibration. AVR should have under speed, over excitation protection features with LED display.
- g) Alternator windings and AVR should be suitable for tropical, humid atmosphere as per ambient conditions mentioned above in the technical specifications. AVR should be suitable for motor load duty as well as non-linear loads.
- h) Alternator frame should be made of heavy metal (MS or Cast steel). Alternator body of light construction material would not be accepted.

5.3 DG CONTROL PANEL WITH NGR & NGRM

5.3.1 DG CONTROL PANEL

One Control panel with each DG set skid for the alternator and NGR system with provision of outgoing socket. The panel should be part of the enclosure with a partition between engine-generator set for acoustic purpose. Panel area to be provided with doors to protect the panels and its equipment from rain, dirt, dust etc. The panel shall consist of quick connect sockets for taking out the DG set power. Sufficient space to be provided for maintenance and operations of the Control panel and DG set. In case access for components is required from the back, bolted/ hinged door shall be provided at back side.

5.3.1.1 CONSTRUCTION DETAILS FOR DG CONTROL PANEL

- a) Sheet steel clad, self-supporting, floor mounted, cubicle type, dust and vermin proof control panel made of 2mm thick CRCA steel sheet and built upon rigid framework, having front and rear hinged doors with danger plate fitted on both sides, lifting lugs on top, ventilation louvers on both sides, bottom detachable gland plates, double earthing studs on two sides, complete with suitably sized zinc passivated hardware with heavy plain and spring washers. The panel should be designed and manufactured as per IS: 8623. Suitable wire mesh should be provided on the inner side of the louvers to prevent entry of insects/vermin.
- b) The panel shall be painted with 2 coats of synthetic enamel paint above Zinc rich primer or powder coated with seven tank processes as per following colour scheme. Minimum DFT for the paint thickness shall be 60 microns.

Exterior	:	Light Grey
Interior	:	Light Grey
Base Frame	:	Black

- c) Control Panel shall be mounted approximately 200-300 mm above the base on suitable frame to ensure easy entry and exit of Incoming and out going cables.
- d) Neoprene rubber gasket shall be provided on doors to make panels dust and vermin proof
- e) Earthing shall be through earth bolt or earthbar.
- f) Suitable cable glands and lugs shall be provided for incoming & outgoing cables for all panels.
- g) Nameplate shall be 3 Ply lamicoid / Al anodized having white letters engraved on black background. All components shall be identified using suitable identification label. All terminal of TB's must be identified with suitable TB markers.
- f) The panel shall have a approx height of 1.5m and other dimensions should be such that it must accommodate all the equipments for the generator like AVR, sockets & MCCBs for the sockets, NGR & monitoring device, meters etc. Ease of maintenance should be taken care during design of the panel and its housing.
- h) Suitable arrangement should be made inside the panel for the terminations of the power cables from the alternator. Socket with suitable rating MCCB with RCD or other convenient arrangement with MCCB & RCD should be provided for connecting the power cable (indicative size 4 core 150 sq mm, PVC copper cable).
- i) Control wiring shall be done with FRLS wire as per IS-694, flexible stranded copper wire and size of control wires shall be as follows: -

CT & VT Circuits	:	2.5 sqmm (Grey / Black)
Control Circuits	:	1.5 sqmm (Grey / Black)
Control Ground Circuits	:	2.5 sqmm (Green)
- j) All components should have easy access –preferably from front for monitoring/repair & maintenance. The potential transformers shall be mounted inside the panel and shall be accessible from the front.
- k) As the Rigs are frequently transported from one location to other the control panel must be suitably anchored through sturdy support from top. This will be in addition to base frame mounting at bottom. The panel should be able to withstand the stress and vibration during transportation. Viewing glass should be provided to read various meters and NGR monitor without opening the panel door.

5.3.1.2 MAIN COMPONENTS OF DG CONTROL PANEL

- a) The control panel shall have one set of TP & N electrolytic grade, high conductivity, tinned copper bus-bars, made from electrolytic grade copper of 99% purity, suitably **designed** and supported at required intervals to withstand short circuit fault levels up to 50 kA for 3 seconds **(ref standard IS8623)**. Bus-bar support shall be non-hygroscopic SMC / FRP and the bus-bar shall be insulated with heat shrinkable PVC sleeves. Incoming and outgoing power cable shall terminate on tinned copper links. Here, neutral bus shall not be used, however it should be provided with the panel.

- b) One of MCCBs with RCDs, 500A, (or nearest available rating) 50KA breaking capacity, adjustable overload and short circuit, for incoming power supply to the busbar. Similar rating another MCCB with RCD / ELR with CBCT should be used for the outgoing feeder. MCCBs should be suitable for operation without opening the panel. Total no of MCCBs with RCD / ELR with CBCT are two numbers with each panel. Earth leakage tripping should be set at 100 milliamps.
- c) Neutral Grounding Resistor and Monitor (NGR Monitor) should be part of the control panel.
- d) One Multi Function Meter, electronic type suitable for balanced and unbalanced loads, with CT etc for displaying generator parameters like, KW, KVAR, PF, KWH, Hz etc.
- e) One moving iron Voltmeter, with 3 phase voltmeter selector switch, 1.0% accuracy, 96 sq.mm, 0-600VAC to read the DG set voltage while running.
- f) One M.I. Ammeter, with 3 phase ammeter selector switch, 1.0% accuracy, 96 sq.mm, 0-1000A, measuring the current in each phase.
- g) One Starting Battery Voltmeter
- h) Suitable CTs should be provided for meters wherever required.
- i) Hour meter to indicate engine running hours.
- j) Indication lamps and any other items or equipment to complete the panel in all respect. Following minimum indications to be provided :
 - Generator ON (set running)
 - 3 Phase R,Y,B indications
 - Load on Generator
 - Battery Charger ON/OFF
 - External Supply ON
- k) Following fault conditions to be displayed on annunciator or any other digital protection relay on DG Control panel :
 - Over Voltage
 - Over Current
 - Overload
 - Under Voltage
 - NGR/ELR Trip
 - Emergency Stop
 - Alternator Bearing / Winding Temperature High
 - Engine fault
 - Spare Window
- l) Following Protection & Safety to be incorporated in DG set Controls :
 - Short Circuit
 - Over Current
 - Overload
 - Under Speed

- Over Voltage
- Loss of exciter field
- Under voltage
- Fuel level low
- Bearing & Winding over temperature

Under above conditions DG Set must be protected by tripping of Incomer MCCB or suitably. Supplier has option of combining more than one protection and display features in single numerical relay in order to save space and wiring. In such case supplier shall furnish full details of numerical relay during drawing approval.

- m) Audio alarm hooter to be provided in case of fault in DG set.
- n) Suitable Space heater, Thermostat switch to be provided.

5.3.1.3 NGR AND NGR MONITOR DETAILS

The NGR system shall comprise of one Neutral Grounding resistance and a NGR monitor. The NGR system with NGR monitor shall be part control panel.

NEUTRAL GROUNDING RESISTOR (NGR) :

The NGR shall be able to restrict earth fault currents to 750 milli-amperes, (to meet the requirement as per Regulation 100 of CEA (Measures relating to Safety and Electric Supply), 2010).

- i) **NGR Type – Tubular, Silicon Coated, Wire-wound, Natural air cooled resistors as per IS8909. Three Nos of 1 Kilo ohm 225W resistances to be connected in parallel.**
- ii) Mounting - The NGR shall be part of DG Control panel. Adequate provisions for safety to be undertaken so as to prevent accidental contact of operational personnel with live parts.
- iii) Connection - One end of the NGR is to be connected to the neutral conductor of the main bus in DG panel. The other end is to have provision to connect to two earth electrodes via cables. This earthing shall be done by insulated, single core copper cables, of adequate size (not less than 25 sqmm).

NGR MONITOR :

The NGR shall have a NGR health monitoring system, which shall alert the rig crew under the following conditions :

- i) If there is an earth fault, and any of the phases are grounded.
- ii) If there is a breakage of the neutral path.
- iii) If the Neutral Grounding Resistors (NGR) are open-circuited or short-circuited.

Suitable interlocking shall be provided to ensure that Incomer MCCB trips in case of earth leakage exceeds 750 mA as per NGR Provision:

The design of the system is to be such that the system neutral is at all times, grounded through the NGR. This should be automatic, without any manual intervention.

Appropriate Instrument transformers (CT/PT) shall be used wherever necessary by design.

Bidder shall have to provide details of proposed NGR system, in a schematic diagram with bid. The design shall be approved by M/s OIL/BHEL before manufacture.

Refer BHEL Schematic drawing for proposed NGR scheme as given in Annexure-3.

5.4 CONSTRUCTION OF ACOUSTIC ENCLOSURE

Refer BHEL OGA : 17211013383 (Supplier to submit their OGA with offer)

5.4.1 MASTER SKID AND BASE FRAME FOR DG SET :

Complete enclosure to be fabricated or mounted on a Master skid as detailed below. The DG set to be mounted on a base frame welded over the master skid.

- a) Base frame of the Engine & Alternator must be rugged & fabricated out of adequate size ISMC & not from sheet metal.
- b) Master Skid : Complete DG set must be placed on a 3 (three) runner oilfield type skid fabricated out of ISMB 250 & reinforced with min 3 (three) numbers cross member.
- c) Approx 500 mm wide working platform with 10mm chequered plate welded on it should be provided in all 4 (four) sides of the DG set skid.
- d) The ends of the skid should be projected out by 300mm and curved upwards. Minimum 125mm (5") NB X 8 mm thick pipe with provision for lifting should reinforce the end of skid for tail boarding.
- e) Limiting dimension of along with DG is approximately 7M(L) X 2.5M(W) X 2.5M (H).
- f) Limiting weight of each DG set is approximately 20 Ton.
- g) Master skid to be finished with Black Coal tar epoxy paint with DFT of minimum 200 microns.

5.4.2 ACOUSTIC ENCLOSURE :

The acoustic enclosure should be made of CRCA steel sheet, painted with inorganic zinc primer followed by polyurethane paint colour shade shall be standard colour scheme of manufacturer with paint thickness (DFT) of 100 Microns minimum. The features of acoustic enclosure are as follows :

- a) It should be specially designed with high quality acoustic insulation material to meet stringent MoEF / CPCB norms that the noise pressure level of the generating set should not exceed 75 dB(A) measured at a distance of 01 (one) meter from the enclosure surface.
- b) The acoustic enclosure shall be designed for minimum 25 db(A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side and shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB(A) to meet MoEF / CPCB norms.
- c) Bidder must confirm in their offer that the offered Generating sets meet latest Indian Noise Pollution & Emission norms as follows & provide all the documents / certificates required to be obtained from MoEF / CPCB, India for operation of the supplied Generating set at OIL's site at the time of inspection:
 - i) CPCB II (Central Pollution Control Board) norms as per G.S.R 771(E) dated 11.12.2013 and its further amendments.

- ii) CPCB / MoEF (Ministry of Environment & Forest) norms as per G.S.R 371(E) dated 17.05.2002 and its further amendments.

NOTE : Acoustic enclosure must be certified by any one of the authorized agencies for MoEF / CPCB Certification.

- d) Bidder must provide valid Type Approval & Conformity of Production Certificate for the offered Generating set along with the offer for scrutiny.
- e) The acoustic enclosure shall have a base plate of 6 mm thick checkered plate and the side wall & top roof shall have a minimum of 3 mm thick steel sheet suitably formed to have adequate strength. The side wall shall be supported at the corners with suitable steel sections and reinforced with suitable steel sections all along the periphery. Hinged doors with gasket, along the length shall be provided at both sides and all columns except for the purpose of providing louvers etc. were door can not be provided.
- f) The top roof of the enclosure shall be made slopping type with sufficient strength. The roof shall be removable bolted type, in order to facilitate maintenance. Inside the enclosure, sufficient walking space 500mm on both sides (after mounting the DG set) shall be available.
- g) The doors of acoustic enclosure must have SS hinges (not Al/Cl hinge) with inbuilt as well as external locking arrangement. Locks shall be sturdy type. Gaskets for doors and other portions shall be of Synthetic long lasting rubber compound suitable for outdoor applications.
- h) For temperature above 25 degree C (Degree centigrade , after running the genset for half an hour at the rated load), the difference between the air temperatures inside the enclosure at 50 mm from combustion air intake, away from the hot spot, and outside the enclosure, should not be more than 6 deg C.
- i) Lines for draining of lube oil, fuel, radiator water and breather outlet shall be provided up to end of master skid. No water accumulation should happen in engine, radiator, alternator and control panel area.
- j) Glass window shall be provided in one of the enclosure door to watch the engine instrument panel.
- k) Control panel front (Instrument side shall be visible from outside. Suitable glass windows shall be provided to monitor indication and meters. In such case and hinges in the canopy shall be provided such that after opening hinged doors of canopy the control panel cubicle doors opens at minimum 90 degree and components are completely accessible.
- l) Diesel Engine, radiator and alternator must be in acoustic area where as control panel and diesel tank can be in non-acoustic area with a partition wall in the enclosure.
- m) To ensure safety, easy accessibility, operational convince, ease of maintenance, supplier shall comply with relevant design standards and norms for the enclosure, however following is suggested :
- Minimum distance between diesel tank and DG control panel shall be 1.5 mtr. Bidder shall ensure that spilled over diesel near diesel tank shall not come in contact with control panel or cables.
 - Diesel tank shall be placed minimum 2 mtr away from the starting battery.

- Minimum distance between diesel lines and cable anywhere shall be 1 meter.
- Cable and diesel line shall not be laid above the chequered plate. Suitable groove to be cut in the cross I beam of the skid below chequered plate. Diesel lines and cable lying in this groove shall be covered with cover plate piece having handle for lifting for maintenance/accessibility of diesel lines/cables or alternatively suitable protection arrangement as standard of manufacturer will be also acceptable.
- Out going cable shall also be either run through cable trench as mentioned above or through suitably covered cable tray. Cable tray to be provided up to end of skid.
- A working space of minimum 700 mm shall be available at front of control panel for a operator to work. If control panel components are required to accessed from side and / or Back sufficient gap not less than 700 mm shall be available for a person to stand and do the job.

5.4.3 FUEL TANK FOR DG SET :

- a) Fuel tank with standard capacity (recommended capacity is minimum 500 liters) with mounting brackets, level indicator, fuel inlet (outside the enclosure) and outlet, air vent, drain plug, breather, wire mesh filter, inlet arrangement for direct filling, flexible fuel piping shall be provided. Unloading shall also be possible through gravity.
- b) Fuel tank to be provided inside the enclosure on the skid and shall be properly sealed against any leakage.

5.4.4 BATTERY & BATTERY CHARGER

- a) Battery with 200 KVA DG Set shall be sufficient to give minimum three crank-starts to engine. Supplier shall mention V & AH rating of battery offered.
- b) Batteries shall be supplied dry–uncharged condition. Supplier at site shall do first electrolyte filling and charging.
- c) The battery shall be lead acid type or better, conform to the requirements of IS: 7372.
- d) Acid resistant molded battery trays, below the battery shall be provided in order to protect sheet metal and other components from acid leakage /spillover while filling. A suitable battery charger using transformer and semiconductor rectifier shall be provided to recharge the battery. This can be housed in control panel area. There should be provision in DG Control panel for changeover arrangement so that the charger can be fed power from either external source or DG Set itself.
- e) Battery Charger shall have and suitable drooping characteristics by means of choke/ electronics and / or suitable input transformer impedance to automatically reduce the charging current as the battery gradually charges up. Provision for over-charging cut-off shall be provided.
- f) The Battery charger shall be provided with Voltmeter 0–50V. The Battery Charger shall have different charging rate selected by a Selector Switch for OFF/ TRICKLE /BOOST or automatically through electronically controlled charger.
- g) If the supplier's scheme requires that, the battery and battery charger shall also feed the control supply to the control panel and other circuit it should be rated accordingly. The minimum voltage at the end of load cycle shall not be less than 1.75 volts per cell.
- h) Battery shall be located at a safe area away from hot spots and diesel tank.

5.4.5 ENCLOSURE INTERNAL ILLUMINATION:

Enclosure shall be provided with suitable illumination devices preferably LED type, with sufficient lumen output to facilitate monitoring and maintenance inside the kiosk. Illumination device and mounting arrangement shall be immune to vibrations in the DG Set. Illumination device shall be rated at 240 VAC.

6.0 SPECIAL TOOLS FOR DG SET:

The following OEM supplied tools should be supplied along with the consignment for carrying out engine major overhauling jobs. These tools must be supplied in proper tool box.

Sl. No.	Description	Qty	Unit
1	Liner Puller	01	set
2	Piston Insert tool	01	set
3	Piston ring expander	01	set
4	Injector puller	01	set
5	Timing adjustment tool	01	set
6	Bearing puller for fan shaft	01	set
7	Alternator Alignment Tool kit with Instruction Manual	01	set

Above list of tools is specified considering special tools required for maintenance of DG sets, however in case any tool(s), if not applicable for the offered DG set, same to be clearly specified in technical bid. Also in case any other special tool required for maintenance of DG sets and not covered above to be included in the list of offered tools.

In case at a later stage, if it is found that the tool which is in the above list and is not supplied by bidder (stating in the bid that same is not applicable to their offered DG set) but is required for the maintenance of DG sets, bidder shall be bound to supply that tool free of cost including all taxes & freight.

7.0 SPARE PARTS FOR DG SETS :

The following OEM spares should be supplied along with the consignment for carrying out engine major overhauling jobs. These spares must be supplied suitably in original packing of OEM.

Sl. No.	Description	Qty	Unit
1	AVR Suitable for Alternator	06	Nos
2	Primary Fuel Filter.	20	Nos
3	Secondary Fuel Filter.	20	Nos
4	Lube Oil Filter.	20	Nos
5	Air Filter.	08	Nos
6	Electric Starter.	02	Nos

7	Charging Alternator.	02	Nos
8	Fuel Injector	12	Nos
10	Radiator & Alternator Power Transmission Belt Set.	01	Set
11	Coolant (ltr.).	200	Ltr
12	Air Compressor Repair Kit.	02	Nos
13	Turbocharger Repair Kit.	02	Nos
14	Water-Oil Separator.	04	Nos
15	MCCB-1, 4P, 500A (as used in DG panel), 50KA	01	No
16	MCCB-2, 3P, 500A (as used in DG panel), 50KA	01	No
17	NGR Monitor	02	Nos
18	NGR Resistor set (Each set contains 3 resistors of 1K and 225W)	03	Sets
19	ELR with CBCT (as used in DG panel)	01	set

Above list of spares is specified considering mandatory spares required for maintenance of DG sets, however in case any spare(s), if not applicable for the offered DG set, same to be clearly specified in technical bid. In case at a later stage, if it is found that the spare which is in the above list and is not supplied by bidder (stating in the bid that same is not applicable to their offered DG set) but is required for the DG sets, bidder shall be bound to supply the free of cost including all taxes & freight.

8.0 ENGINE FAULT AND DIAGNOSTIC TOOL:

Laptop / hand held fault diagnostic system along with licensed software for Engine fault diagnostics to be supplied for engine fault diagnosis. Brief Specification for diagnostic tool are as under :

Parameter	Specification
Screen Size	Maximum 14.6 inch
Processor	Intel Core i5 processor or equivalent
RAM	4 GB or suitable for Engine application software
ROM	1 TB In Built Hard Disk Drive with 256 GB capacity SSD
OS	Operating System – Windows 10 Home 64-bit with lifetime validity
Software	Pre-installed MS Office Home, and Antivirus for minimum one year License, Licensed software for engine diagnostic.
Recommended Make	HP/Lenovo/Dell/Sony/ACER/Wipro/Toshiba
Accessories	Power Cable, Adapter, Carrying case

9.0 LOAD TEST & COMMISSIONING AT RIG-UP YARD BHEL HYDERABAD

After receipt of DG Set at BHEL, load testing shall be conducted by supplier's service personnel. After load test of DG set and other rig commissioning activities at BHEL works, the DG set shall be transported to respective rig site of M/s OIL Duliajan. The commissioning at Rig site shall be conducted by BHEL & M/s OIL and the supplier to depute their / OEM's engineer at Rig site for commissioning supervision.

Supplier shall submit start-up & testing report format with details of checks to be performed at BHEL Rig-up yard prior to testing, and preparedness required for load testing of DG Set at BHEL Rig-up yard. The same shall be complied to the extent possible by BHEL. BHEL will intimate the commissioning & load testing schedule seven days in advance, on which supplier's engineer is required at Rig-up yard. Supplier shall depute experienced and qualified engineers, fully equipped with necessary drawings, instrumentation, all tools and tackles as required, for commissioning & testing activities.

START UP & LOAD TESTING ACTIVITIES AT BHEL HYDERABAD:

Start-up & Load testing activities to be carried out by the supplier, shall include, but not limited to the following activities :

- a) Preparation and charging of dry uncharged DG starting battery. Battery Electrolyte in scope of supplier. (Unskilled labor shall be provided by BHEL).
- b) Checking of internal & external electrical interconnection.
- c) Erection of earthing pit and termination of earth strip to it. (BHEL shall provide manpower, for this activity), Supervision shall be done by supplier's engineer.
- d) Prepare the engine, radiator and other accessories for commissioning.
- e) Pre-commissioning checks, fine tuning of entire system and start-up of DG Set as per standard procedure of supplier.
- e) Other performance check activities as per supplier's standards.
- f) First fill of engine lube Oil, coolant shall be in supplier scope.
- g) Any part failing or needing replacement during commissioning will be in the scope of supplier and shall be replaced free of cost by supplier. The supplier / designated service provider at site will keep sufficient stock of spares like filters, belts etc. and consumable items for this purpose.

BHEL shall provide limited support as under:

Providing logistics support such as crane, welding set, compressor etc. for installation of DG set accessories & load test. Cable laying for Incoming and outgoing feeders. (Any Internal cables of DG Set shall be in the scope of supplier). Arranging load and diesel fuel for testing & operation shall be in BHEL scope.

10.0 FINAL COMMISSIONING & TRAINING AT M/S OIL DULIAJAN SITE

- a) The commissioning at Rig site shall be conducted by BHEL & M/s OIL and the supplier to depute their/ OEM's engineer at Rig site for commissioning supervision for 7 days, All the equipment covered in this specification are to be Finally tested and commissioned by supplier representative. Any problem arising during commissioning shall be attended under warranty by the supplier.
- b) The date of commissioning of DG Set will be the date of spudding of the rig or starting of workover operation at rig site. For record purpose the date as recorded between BHEL & M/s OIL shall be considered as date of commissioning of DG Set for the particular rig.
- c) During the commissioning period, supplier shall provide on the job training to M/s OIL staff (6 personnel) and training material (included hard copies and soft copies of training material) shall be also arranged by supplier at M/s OIL site.
- d) The training shall cover the operation, maintenance, trouble shooting, and repair / rectification of the 200 KVA DG set including engine, alternator, control panel, governor, AVR and battery. Training shall cover hands on experience on startup checks like lube oil, coolant, alignment and governor/ controls checks that must be performed and recorded prior to starting of engine. Day to day maintenance like filter & Lube Oil replacement and essential troubleshooting shall also be covered. These aspects should also be covered in training material handed over to participants during training. Training shall be imparted to minimum 4 OIL Staff for a period of minimum 5 (five) days.
- e) The engines shall be commissioned at site by the OEM's authorized dealer in India for which all the necessary measures to be taken to commission the same. OEM recommended servicing shall be carried out during the Warranty period.
- f) Any top-up requirement for Lube oil and Coolant at M/s OIL site shall be in supplier scope.

GENERAL NOTES FOR COMMISSIONING ACTIVITIES

- g) After successful load testing of 200 KVA DG Set as above, supplier will produce duly filled up load test report with modified drawings if any. BHEL and OIL (optional) will sign the commissioning report. Copy of the final load test report duly counter signed by BHEL will be submitted to BHEL Bhopal, for release of balance payment for material.
- h) Startup & load test shall be quoted by the bidder for BHEL Hyderabad and at M/s OIL Duliajan site, on lump sum firm basis in price bid.

11.0 PHILOSOPHY OF ELECTRICAL SCHEME:

In order to meet the intended applications use, the electrical scheme of the DG Set shall meet the following requirements :

- a) 4 poles MCCB shall be used to make the DG output power available and neutral of DG shall be grounded thru NGR & NGR Monitoring system. The UV coil of this MCCB shall be used to ensure that MCCB can be made ON only when Voltage O/P of DG Set is available at incomer of MCCB.
- b) There is provision for alternate 10A, 230VAC power supply (when DG is not working). This will be fed temporarily through external supply when DG is not working to meet following :
 - Illuminate DG enclosure for maintenance.

- Battery Charging
- Any other use.

External Supply shall be protected by MCB/fuses in DG Control panel. Supplier shall provide necessary changeover arrangement (Manual switch/ Auto changeover) or electrical interlocking and protection through fuse / MCB, external supply source can be used only when DG Set is not generating. During normal DG set running condition these loads shall be fed from DG supply itself.

11.1 PROTECTION INTERLOCKING :

Following inbuilt protection shall be supplied as integral part of DG set:

- i) Short Circuit
- ii) Over Current
- iii) Under Speed
- iv) Over Voltage
- v) Loss of field excitation
- vi) Under voltage
- vii) Bearing & Winding over temperature
- viii) Low lube oil pressure
- ix) High water temperature
- x) Engine over speed
- xi) Fuel level low

It is desirable that for faults A to F only load is thrown off i.e. MCCB to trip, whereas for fault conditions G to K engine shall stop along with MCCB tripping

12.0 INFORMATION REGARDING ENGINE CONSUMABLES (LUBE OIL & COOLANT) & PRESEVATION PROCESS:

a) LUBE OIL:

In their offer, bidder shall furnish information regarding lube oil replacement periodicity and quantity required per fill. This shall include grade, and preferably trade name & make of lube Oil recommended/ approved by OEM of the engine and equivalent commercially available Lube Oil in India, from reputed companies such as M/s IOC, HPCL, BPCL etc. Bidder shall also furnish required details of Lube Oil to be used in offered engine, for reference and regular local procurement of lube oil in long term.

b) COOLANT:

Bidder shall furnish following information regarding engine coolant:

- Quantity of coolant required for each fill, including radiator tank capacity, radiator tube capacity etc.
- Grade of coolant and specification of recommended specific coolant
- Source/ manufacturer of coolant including Indian supplier if any.
- Shelf life & operational life of coolant
- OEM's recommendation for transportation of Power Pack with coolant filled in from BHEL to site. Bidder shall clearly specify with reasons, whether the coolant is to be drained or should remain filled in radiator during transportation from BHEL to site and special transport requirement, especially from hazard point of view.

c) **PRESERVATION PROCESS:**

Bidder to provide preservation process instructions for DG set and its consumables.

13.0 GENERAL:

Though a broad outline on the requirement of DG set has been made, yet the scope should include anything not mentioned but required for completeness of the system suitable for dismantling, transportation and installation very often in rough and harsh environmental conditions.

14.0 NAME PLATE:

Name Plate bearing following information (engraved/ embossed) should be provided on the body of the main unit of the system.

Manufacturer's Name

Sl. No.

Model Number

Size

Year of Manufacture

Weight of equipment/component

Alternator detail

Any other information

Standards it complies

Details of Rev03 :

1. Part-I, Clause 15.1 (warranty) and 15.2 (Design Problem)
2. Part-I, Clause 7.0 (Checklist)
3. Part-II, Clause 1.10 (application)
4. Part-II, Clause 5.0 (Technical specifications of DG set & sub assemblies)
5. Part-II, Clause 5.1 (Engine)
6. Part-II, Clause 5.1d (Engine Gauges)
7. Part-II, Clause 5.2.1y (Short circuit current)
8. Part-II, Clause 5.3.1.2a (DG Control panel fault rating)
9. Part-II, Clause 5.3.1.3 (NGR Resistors)

LIST OF ANNEXURE

Annexure – 1	RIG DISPOSITION
Annexure – 2	ACCEPTANCE INSPECTION, TESTING & QA PLAN
Annexure – 3	SINGLE LINE DIAGRAM OF DG SET & NGR SCHEME
Annexure – 4	TECHNICAL INFORMATION TO BE FURNISHED BY THE VENDOR ALONG WITH BID
Annexure – 5	CONTACT DETAILS FOR GIVING WARRANTY/ SERVICE CALL FOR DG SET
Annexure – 6	APPROVED VENDOR LIST
Annexure – 7	CHECKLIST FOR TENDER SPECIFICATIONS

ANNEXURE 01**RIG DISPOSITION**

SL. NO.	RIG No.	RATING OF DG SET	PLANNED RIG LOCATION	CUSTOMER
1.	Rig-01	200 KVA	OIL India Assam	M/s OIL
2.	Rig-02	200 KVA	OIL India Assam	M/s OIL

Annexure-2

ACCEPTANCE INSPECTION, TESTING & QA PLAN

1.0 All Inspection & testing shall be carried out as detailed below: -

i) Visual Inspection of: -

- a- Diesel Engine
- b- Alternator
- c- Control Panel
- d- Paint quality
- e- Clearance

i) Tests of Engine & Alternator combined set (Performance Test): -

- a- Alternator Insulation Resistance Test
- b- Load Test of DG Set for 1 hr at 100% and 1 hrs at 110%
- c- Vibration measurement
- d- Noise Measurement
- e- Meters and gauges

ii) Test for Control Panel: -

- a-Wiring Continuity check
- b-Functional Check
- c-Insulation Resistance Test
- d-High Voltage Test
- e-NGR operation test

iii) Inspection for Acoustic Enclosure:

- a-Acoustic Enclosure Paint finish
- b-External Finish & Aesthetic
- c-Skid Member & DP Test of lifting pipe
- d- Sheet thickness etc.
- e- Sound level witness test certificate.
- f- Protection from outside water ingress in control panel and engine room areas.

All OEM test reports of major components (Engine, Alternators etc) to be provided during Inspection.

Type approval report copy of Acoustic Enclosure shall also be provided during Inspection.

Annexure-3

- | | |
|------------------------|--|
| 1. SINGLE LINE /SCHEME | BHEL Drg No. 37211012452 Rev00 |
| 2. NGR & NGR MONITOR | BHEL Drg No. 37211012453 Rev00 |
| 3. OGA OF DG SET | BHEL Drg No. 17211013383 Rev01 (Rev01 with Ladder) |

Annexure-4

TECHNICAL INFORMATION TO BE FURNISHED BY THE VENDOR ALONG WITH BID

Checklist for 200 KVA, 415V, 1500 RPM, DG set: -

SL. NO.	DESCRIPTION	TO BE CONFIRMED BY SUPPLIER
	Diesel Engine: - Manufacturer Model Type Rating at 500 Net Power	
	Alternator (Brushless): - Type / Rating / KVA RPM Voltage Class of Insulation 'F' minimum Transient reactance Max fault current Efficiency Temperature rise limit DG Set electrical net output at alternator terminals with radiator cooling. Harmonic percentage with list of harmonics	
	Battery: Rating V,AH Suitable for no. of cranks Make and Model	
1.	Type of AVR	
2.	Type and Class of Governor	
3.	Engine rated over load capacity 10% overload for 1 hour in every 12 hours	
7.	Whether supplier has considered lube oil (first fill) and coolant (first fill) in their offer	
8.	Method of Starting: - • Electrical Start	
9.	Time required for starting from cold to till achieving rated speed and voltage (Sec.)	
11.	Complete list of installed accessories (If required include annexure)	

SL. NO.	DESCRIPTION	TO BE CONFIRMED BY SUPPLIER
12	Information regarding Lube Oil: • Capacity of Sump • Quantity per fill of Lube Oil • Recommended Lube Oil • Grade/ Brand Name/s/ Make/s • Replacement period in months • Replacement Period in Running Hour operation • OEM recommended replacement practice • OEM recommendation for transportation • Any hazard from transportation point of view	
13	Information regarding Coolant: • Capacity of Radiator & Coolant sump • Quantity per fill of Coolant • Recommended Coolant • Grade/ Brand Name/s/ Make/s • Replacement required or only top up required • Replacement (if recommended) period in months • Replacement (If recommended) Period in Running Hour operation • Other OEM recommendation • OEM recommendation for transportation • Any hazard from transportation point of view	

Annexure-5**CONTACT DETAILS FOR GIVING WARRANTY/SERVICE CALL FOR 200 KVA DG Set**

Name of Agency	
Contact Person/s	
Postal address	
Phone No	
Fax No	
Mobile	
Email ID	

Supplier shall also furnish details of authorized service provider if any for different sub-assemblies, i.e. engine, alternator, battery etc.

Annexure-6**APPROVED VENDOR LIST**

EQUIPMENT / COMPONENTS	VENDORS NAME
DG set with Acoustic Enclosure	FG Wilson India, GMMCO Ltd India, TIPL (Gainwell Commosales India), Caterpillar India, Jakson Ltd India, Powerica Ltd, Sudhir Power Ltd, Cummins India
Diesel Engine	Caterpillar, Cummins
Alternator	Caterpillar, STAMFORD, Kirloskar, Crompton Greaves, AVK-SEGC
MCCB/Change Over Switches/Relays/RCCB/ELCB/MCB/ Relays/Contactors	Siemens/ ABB/ Schenider/ L&T/ GE/ C&S/Legrand
Fuse Switch Unit / Fuse Holders / HRC Fuse links	Siemens/ L&T /Bussmann/ Mersen/ CG/BCH/ABB/Alstom/ Schenider
Control Transformer	CG/BB/Siemens/GPD/Quantam/Arya/Silkans/ AEI
CT	AEI/Kappa or equivalent
PT	Kappa/ AEI/ Pragati / Silkaans/ Prayog/GPD
NGR resistors	Kiyosh / PEC / Equivalent
NGR monitor	I-Gard / Bender / Startco
Control/Selector switches	Siemens / Kaycee / L&T / Salzar /Alstom /ABB /Siemens /GE
Meters (MI)	AE / Rishabh / equivalent
Protection Relays	Woodward / Alstom / Easun Reyrole / ABB/ Siemens/ L&T / Schneider / Equivalent
Window Annunciation	PROCON / IIC / Minilec
Indicating lamps & Push buttons	Siemens / BCH/ L&T / GE / Schneider/ ABB / Binay / Equivalent
Digital Multifunction meter	Enercon/ ABB/ SEMS/ L&T/ Conzerv/ Schneider / Siemens / EL Measure / Rishabh / Euqivalent
Cable gland	Baliga/ GMI/ Dowells/ Glen Mach/ Electromag/ CCI/ Comet/ Bracko / Equivalent
Battery	As per engine OEM recomondation
Plug/Socket	BCH / Amphenol / Appletone / Eaton / Equivalent
ELR & CBCT	Siemens / ABB / Schneider / Prok-DV / Equivalent
Lighting	Phillips/ Bajaj/ GEC/ Crompton/ HPL
Control Cables for Wiring (FRLS)	Finolex / Havells / Unicab / Equivalent

All other items shall be of reputed make meeting Indian / International standards

ANNEXURE – 7
CHECKLIST FOR TENDER SPECIFICATIONS

Bidder to submit this document completely filled up for evaluation of its offer

Sl. No.	Clause	Yes / No	Bidder Comments
PART-I			
1	Has the bidder noted Introduction as per Clause - 1.1 – 1.5 ?		
2	Has the bidder noted and confirmed delivery schedule and consignee as per clause- 2.0 ?		
3	Has the offer been submitted in two bid format as per clause 3.0 ?		
4	Has the bidder noted and confirmed the clause-4.0 regarding terms of payment ?		
5	Has the bidder submitted Drawings & documents along with offer as per clause 5.1 ?		
6	Has bidder noted and agree to submits drawings and documents after placement of PO as per clause 5.2 ?		
7	Has bidder noted and agree to submits drawings and documents along with supply as per clause 5.3 ?		
8	Has bidder noted the address for send documents after dispatch as per clause 6.0 ?		
9	Has the bidder submitted completely filled up matrix of bid evaluation criteria as per clause 7.0 ?		
10	Has the bidder noted address for correspondence as per clause 8.0 ?		
11	Has bidder noted and confirmed clause 11.0 regarding providing QA plan and acceptance inspection at supplier's works ?		
12	Has the bidder noted and comply with clause 12.0 regarding packing ?		
13	Has the bidder noted and confirmed clause 13.0 regarding LD ?		
14	Has the bidder noted and confirmed clause 14.0 regarding making good any deficiencies & defective goods noted during inspection ?		
15	Has bidder noted & confirmed clause 15.1 regarding warranty ?		
16	Has bidder noted & confirmed clause 15.2 regarding design problem ?		
17	Has bidder noted & confirmed commitments as per clause 15.3 ?		
18	Has the bidder noted and confirmed to provide performance bank guarantee as per clause 16.0 ?		
19	Has bidder noted & confirmed clause 17.0 regarding indemnity ?		
20	Has bidder noted the clause 18.0 for approved vendors / makes ?		
21	Has bidder noted and confirmed other applicable clauses of BHEL tender General Terms and conditions BP 200102 ? Bidder to submit signed copy of BP200102 for compliance.		
22	Has bidder provided clause-wise comments to tender specifications part – I & II in their offer?		
PART II			
Sl. No.	Clause	Yes / No	Comments
1	Has the bidder noted and confirmed that offered equipment confirms to clause 1.0 (General site condition & application) ?		
2	Has the bidder noted and confirmed clause 2.1 ? regarding complying rules and regulations		
3	Has the bidder noted and confirmed clause 2.2 regarding applicable codes ?		
4	Has the Bidder noted & confirmed clause 3.0 regarding statutory		

	norms for DG sets ?		
5	Has the bidder noted and confirmed clause 3.2 regarding stack height ?		
6	Has the bidder noted and confirmed clause 3.4 – 3.5 regarding meeting CPCB norms & MoEF requirements ?		
7	Has the bidder has submitted certificates as per clause 3.6 ?		
8	Has the bidder noted and confirmed scope of supply as per clause 4 ?		
9	Has the bidder noted and confirmed technical specification as per clause 5.0 ?		
10	Has the bidder noted and confirmed to provide the NGR & NGR Monitoring system as per clause 5.3.1.3 ?		
11	Has the bidder noted and confirmed the requirement of Special tools for engine as per clause 6.0 ?		
12	Has the bidder noted and confirmed the requirement of Spare parts as per clause 7.0 ?		
13	Has the bidder noted and confirmed the requirement of Engine Fault Diagnostic tool as per clause 8.0 ?		
14	Has the bidder noted and confirmed the requirement of Load testing & commissioning at BHEL Hyderabad as per clause 9.0 ?		
15	Has the bidder noted and confirmed the requirement of Load testing & commissioning at M/s OIL Rig Site as per clause 10.0 ?		
16	Has the bidder noted and confirmed the requirement of Training as per clause 10.0 ?		
17	Has the bidder noted Philosophy of Electrical Scheme as per clause 11.0 ?		
18	Has the bidder furnished information regarding consumable & preservation as per clause 12.0 ?		
19	Has the bidder noted and confirmed general condition as per clause 13.0		
20	Has the bidder noted and confirmed to provide name plate as per clause 14.0		
21	Has the bidder noted and submitted the filled up Annexure-4 for the data of DG set with the offer ?		
22	Has the bidder noted and submitted the filled up Annexure-5 for Contact details of service provider ?		
23	Has the bidder noted and confirms the list of vendors for major items / components of DG set as per Annexure – 6 ?		

----- End of Document OR12695-----