GOVERNMENT OF MIZORAM
OFFICE OF THE SUPERINTENDING ENGINEER : P&E : AIZAWL POWER CIRCLE
CENTRAL BLOCK : P&E OFFICE COMPLEX : AIZAWL
Email:apcmizoram@gmail.com Ph. No. 0389 2322248 Fax No. 0389 2325330

NOTICE INVITING TENDER NO.1 OF 2017 - 18

Dated Aizawl the, 6th October, 2017

No.T-11012/02/17-SE(APC)/7 : Superintending Engineer, Aizawl Power Circle, P&E Department, Government of Mizoram on behalf of the Governor of Mizoram, invites sealed tenders from reputed manufacturers or their authorized dealers affixing non-refundable court fee stamp worth Rs. 8.25 (Rupees eight and twenty five paise) only in case of non-tribal tenderers and valid house tax payee certificate in case of tribal tenderers for manufacture, supply, installation, testing and commissioning of 200KW/250kVA Diesel Generating set with AMF Panel, Acoustic Enclosure etc at Mizoram State Assembly House. The tender amount is Rs. 28,97,184.00. Tender bids as per tender specification will be received upto 13:00 hrs on 13th November 2017 and will be opened on the same date at 14:00 hrs.

Details may be had from the office of the undersigned on payment of Rs. 500.00 (Rupees five hundred) only (non-refundable) during office hours on any working day by demand draft/banker's cheque payable at any scheduled bank at Aizawl, Mizoram in favour of Superintending Engineer, Aizawl Power Circle, P&E Department. Tender details are also available at official website www.tender.mizoram.gov.in and www.power.mizoram.gov.in.

Sd/- Vanlalrema
Superintending Engineer, P&ED
Aizawl Power Circle, Aizawl.

Memo No. : T-11012/02/17-SE(APC)/7 Dated Aizawl the, 6th October, 2017

Copy to :

1. The P.S to Hon'ble Minister, P&ED etc. Mizoram for favour of information.
2. The Secretary to the Government of Mizoram, P&E Department for favour of information.
3. The Engineer-in-Chief, Power & Electricity Department, with a request to post this notice in the official website of the department (soft copy of the notice enclosed). This has a reference to his letter No. T-13011/02/13-EC(P)/P/70, Dt. 03.08.2017.
4. The Chief Engineer (System Operation), Power & Electricity Department, for favour of information. This has a reference to his letter No.H-11011/01/15-CE(SO)/P&E/58, Dt. 08.08.2017.

5. The Chief Engineer (Distribution), Power & Electricity Department, for favour of information.
6. The Director, I&PR for information and necessary action. He is requested to publish the NIT (5 copies of simplified form enclosed) in one issue each of one leading regional newspaper and any two leading local newspapers at the earliest with intimation to the undersigned.
7. The Principal Informatics Officer, Department of information and Communication Technology, Government of Mizoram with a request to post this notice in the official website (soft copy of the notice enclosed).
8. The Executive Engineer, P&E Distribution Division, Aizawl for information.
9. Office Notice Board.
10. M/s _____
    _____

Superintending Engineer, P&ED
Aizawl Power Circle, Aizawl.

Tender Inviting Proposals with Terms & Conditions

1. **Tender Documents :**Tender documents shall be sold to the intending Tenderers, who are manufacturers or their authorized dealers only on receipt of Rs.500.00 (Rupees five hundred) only (non-refundable) in the shape of demand draft/Banker's cheque payable at any scheduled bank at Aizawl in favour of the Superintending Engineer, Aizawl Power Circle, Aizawl.

   Tender documents are available at the website www.tender.mizoram.gov.in. and **www.power.mizoram.gov.in**

2. **Scope of work :**The scope of work hereby tendered in brief shall include manufacture, supply, installation, testing and commissioning of 200kW/250kVA Diesel Generating set with AMF Panel, Acoustic Enclosure, L.T Change over Panel etc. in conformity to Technical Specifications as per schedule-I.

3. **Eligibility Criteria :**

i) The bidder should be a regular manufacturer/ Original Equipment Manufacturer (OEM) or authorized representative/dealer. In case non OEM, valid authorisation certificate from OEM should provided.

ii) The OEM should have an experience in manufacturing of the equipment and have an experience of supplying and commissioning directly or through their authorized representative supported with documents showing past experience.

iii) Manufacturer should comply with relevant technical standard/specification.

iv) The bidder should provide maintenance support for the equipment as required by the department.

4. **Guaranteed Technical Particulars :** The GTP (Guaranteed Technical Particulars) of D.G set shall be furnished by the tenderer as per Schedule- II.

5. Deviations from Specifications : Any deviations from Technical Specification shall be separately listed as per pro-forma given at Schedule-IV in absence of which it shall be presumed that the provisions of the specification are complied with by the tenderer.

6. **Examination of the Documents** : The Tenderer shall examine conditions of the Tender and Specifications to satisfy himself about all the Terms & Conditions and circumstances affecting the Tendered Price. He shall quote price(s) according to his own views on these matters and understand the quoted prices are inclusive of all taxes, duties, freight, insurance etc. **The Tenderer shall give his/her signature with seal in each and every page of the Tender Document as an indication of his/her acceptance of the Terms and Conditions of the Tender.**

No overwriting is allowed in the Tender. Dated initial should be given by the Tenderer to all corrections, if any, and the seal stamped on each.

Tenderers should submit the following along with their tenders :

i) Authorized Dealer must submit an Authorized Dealership Certificate issued by Manufacturers.
ii) Valid House Tax Payee Certificate in certificate in case of Tribal Tenderer.
iii) Court fee stamp worth Rs.8.25 in case of Non-Tribal Tenderer.
iv) Documents showing past experience.

7. **Earnest Money** : The tenderers shall have to furnish Earnest Money amounting to Rs. 57,900.00 (Rupees fifty seven thousand nine hundred) only in the form of Bank Draft/Banker's Cheque from a scheduled bank pledged in favour of the Superintending Engineer, Aizawl Power Circle, Aizawl, Mizoram in a separate cover super scribing the Notice Inviting Tender (NIT) Number and Date of opening. Tribal Tenderers are allowed to submit Earnest Money for half the amount. Manufacturers registered with NSIC, DGS&D and also SSI unit under Government of Mizoram is exempted for payment of Earnest Money provided Registration Certificate is enclosed.

8. Price :

i) Price quoted should be firm and FOT Aizawl.
ii) Price should be quoted both in figure and in words using Schedule of Prices given in Schedule-III.
iii) Price should be inclusive of all taxes, duties, insurance, freight, handling charges, etc (Form- C/D will not be applicable/issued).
iv) If there is any discrepancy between the words and figures the price/amount in words should prevail.

9. **Opening the bid***:* Tendering firms are at liberty to be present or authorize a representative to be present at the opening of the tender at the time and date as specified. In the event of any specified date for submission or opening of the tender being declared as holiday, the tender will be received/opened at the appointed time on the next working day.

10. **Validity** : Tender should be kept valid at least for a period of 240(two hundred forty) days from the date of opening the tender.

11. **Terms of Payment :** 100% payment price shall be made after receipt of the equipment in full and good condition and with the satisfaction of the consignee and successful testing/commissioning at site.

12. **Target date of completion :** The work should be completed within 90 (ninety) days from the date of issue of LOA/signing of contract agreement.

13. **Extension of time :** If the work is delayed due to any reasons, the contractor shall without delay giving notice to the Power & Electricity, Department in writing of his claim for extension of time within 30 (thirty) days of scheduled date of completion. Power & Electricity, Department on receipt of such notice may agree to extend the contract completion date as may be reasonable but with liquidated damages. However, in case of force majeure or in any such cases beyond the control of the

contractor and are accepted as such by P&E., Deptt., the completion date may be extended without liquidated damages.

14. Delay in completion: If the contractor shall fail to complete the work within the time in the Work Order/Contract Agreement or extension of time without liquidated damage, P&E., Deptt., shall recover from the contractor as liquidated damages a sum of one half of one percent (0.5%) of the contract value for each month (30 days) of delay from the expiry of scheduled date of completion. The total liquidated damages shall not exceed 10% (ten percent) of the contract price.

15. Taking over :

i) Upon completion of the work and after successful commissioning of the D.G. set P&E Deptt., will issue taking over certificate in which he shall certify the date on which the work is completed. This certificate shall be issued within 60 (sixty) days of commissioning. The taking over shall be withheld if there is any equipment found defective due to faulty design or workmanship or damaged due to defective packing or otherwise not in conformity with the requirements of the contract until such time the defects have been corrected.

ii) The issuance of a Taking over Certificate shall in no way relieve the Contractor of his responsibility for the satisfactory operation of the equipment in terms of the specifications.

16. Preparation and Submission of tender :

i) The tender should be prepared and submitted enclosing all documents in two sealed envelopes superscribing tender notice number and date with date of opening.

ii) Bid shall be submitted in two envelopes

a) Envelope-I :- Techno-commercial bid which shall comprise all tender requirements to be furnished by the tenderer, viz Court fee stamp, valid HTPC, authorized dealer ship certificate, bidder's eligibility and qualifications, earnest money (enclosed in a separate envelop) etc. as stipulated in this tender document.

b) Envelop-2 :- Financial bid which shall comprise Price Schedule as per schedule-III.

iii) All the envelopes should bear the name and address of the Tenderer and marking should be made for the original and duplicate copy.

iv) The sealed envelopes addressed to The Superintending Engineer, Aizawl Power Circle, P&E Office Complex, Central Block, Electric Veng, Aizawl– 796 007, Mizoram are to be deposited in the tender box placed at the office of Superintending Engineer, Aizawl Power Circle, Aizawl.

v) Late/delayed tenders due to any reason whatsoever will not be accepted under any circumstances.

vi) At any time prior to date of submission of tender, Tender Inviting Authority may, for any reason, or decision, modify the terms & conditions of the tender document by a corrigendum displayed on the website

www.tender.mizoram.gov.in. and www.power.mizoram.gov.in. In order to provide reasonable time to take the amendment into account in preparing their bid, Tender Inviting Authority may or may not, at his discretion, extend the date and time for submission of tenders.

17. Reservation :

The undersigned/Owner reserves the right to accept or reject, partly or wholly, or all the tenders without assigning any reason thereof if the situation so warrants. Further, he is not bound to propose the lowest Tenderer for selection. **The Technical Committee of the Department shall scrutinize and evaluate tenders with reference to the documents submitted by the Tenderer.**

18. Testing & Commissioning :

Testing and Commissioning of Diesel Generating set will be conducted by the Successful tenderer at customer's site as indicated in the Technical specification (Schedule-I) in detail.

19. PERFORMANCE BANK GUARANTEE:

i) Firm whose offer is accepted will have to furnish Performance Bank Guarantee(s) from scheduled bank to paying authority in the prescribed form at schedule-V before releasing payment of an amount equal to 5% of the value of contract amount in favour of the Superintending Engineer, Aizawl Power Circle, Aizawl, Mizoram.

ii) The performance Bank Guarantee submitted should be valid for 12 (twelve) months from the date of commissioning by the consignee of equipment and may be extended if required.

iii) No interest will be payable on Performance Bank Guarantee.

20. Guarantee :

The Successful Tenderer shall guarantee for satisfactory performance of the equipment for a minimum period of 12 (twelve) months from the date of commissioning of Diesel Generating set. In the event of any defect in the equipment within the guarantee period, the Successful Tenderer shall guarantee to repair/replace to the satisfaction of the P&E Deptt., free of cost.

21. Jurisdiction :

No legal proceedings shall be taken to enforce any claim and no suit rising out of any conflict shall be instituted except in a court of competent jurisdiction located within MIZORAM.

22. Address : All correspondences with regard to the above may be made to the following address :

The Superintending Engineer
Aizawl Power Circle
P & E Office Complex : Electric Veng
Central Block
Aizawl : Mizoram, Pin -796007.
Phone No – 0389 2322248

TECHNICAL SPECIFICATION OF 200kW/250kVA DIESEL GENERATING SET

3.4.4. **STANDARD**

3.4.4.1. The equipment covered by this specification shall, unless otherwise stated be designed, manufactured and tested in accordance with the latest revisions of relevant Indian Standards/IEC/BS and shall conform to Certification and compliance for meeting noise level & emission parameters and other requirements in accordance with latest Notifications of MoEF and also the regulations of local statutory authorities.

3.4.4.2. In case of any conflict between the Standards and this specification, this specification shall govern.

(i) IS 10002: Specification for performance requirements for constant speed compression Ignition (diesel engine) for general purposes

(ii) IS 10000: Method of tests for internal combustion engines

(iii) IS 4722: Rotating electrical machines-specification

(iv) IS 12063; Degree of protection provided by enclosures

(v) IS 12065: Permissible limit of noise levels for rotating electrical machines

3.4.5. **GENERAL REQUIREMENTS**

3.4.5.1. Diesel Generating (D.G) set of stationery type and have a net electrical output of 200kW/250KVA, capacity at specified site condition of 50˚ C ambient temperature and 100% relative humidity. The D.G. set shall be mounted on a common base frame as per the recommendations of engine manufacturer. The base frame shall be mounted with anti-vibration mounts / friction pads.

3.4.5.2. The D.G set shall comprise of the following systems to make it complete in all respects.

(i) Diesel Engine complete with all accessories.

(ii) An alternator directly coupled to the engine through coupling, complete with all accessories.

(iii) Automatic voltage regulator.

(iv) Complete starting arrangement, including batteries & charger.

(v) Lub oil system

(vi) Engine Cooling System

(vii) Exhaust Silencer System

(viii) Engine air filtering system.

(ix) Day tank of 400 Litre minimum capacity.

(x) AMF panel for control, metering and alarm & LT changeover Panel.

(xi) Base frame, foundation bolts etc.

(xii) All lubricants, consumable, touch up paints etc. for first filing, testing & commissioning at site. The contractor will also provide the fuel oil for first commissioning.

(xiii) Enclosure for silent type D.G. Set

3.4.6. **TECHNICAL REQUIREMENTS OF DIESEL ENGINE**

3.4.6.1. The diesel engine should be vertical cylinder type having 6 cylinders totally enclosed, compression ignition, water cooled (radiator cooled), turbo charged cooled suitable for power generation application having minimum of 306 BHP capacity to drive 250KVA alternator at 1500 rpm confirming to IS 10002, complete with all interconnecting piping and the following standard accessories.

a) Suitable fly wheel.
b) Flexible coupling
c) Air cleaner
d) Radiator – heavy duty type
e) Cooling fan
f) Water circulating pump
g) Corrosion resistor
h) PT fuel pump
i) Electronic governing control (EGC)
j) Fuel filter
k) Fuel shut down solenoid (24Vdc, stop solenoid)
l) Lubricating oil filter
m) Oil cooler
n) By pass filter
o) Silencer (Residential type)
p) Starter
q) Engine instrument panel with following:
   - L u b r i c a t i n g oil temperature
   - Lubricating oil pressure gauge
   - Water temperature gauge
   - Hour meter and speedometer

3.4.6.2. The engine should also have following:

- Safety control trip for low lube oil pressure
- Safety control trip for high lube oil temp.
- Safety control trip for high water temp.
- Safety control trip for engine over speed

3.4.6.3. The diesel engine shall be vertical cylinder, single acting, mechanical fuel injection type and furnished with all the required equipment as per standard practice. The engine should develop rated horse power to drive 250KVA alternator. The required auxiliaries, guarantee of fuel consumption for rated output, provision for parallel operation, governor performance and torsional vibration shall be in accordance with IS: 1002. The engine shall be provided with an exhaust gas

Turbo-charger and a charged air cooler, integral air intake filter and silencer. The engine should have throttle controlled and the engine water cooling should have radiator. For charged air cooler, the cooling water inlet flow shall be thermostatically controlled.

3.4.6.4. The engine with all accessories shall be enclosed in an enclosure to make it work silently (within permissible noise level) without any degradation in its performance.

3.4.6.5. The fuel used shall be High Speed Diesel oil (HSD) as per IS:1460.

3.4.6.6. **Fuel system**

Fuel (Diesel) system to the engine shall be supplied from a fuel tank. The supplier should provide a fuel tank of minimum 400 litre capacity, on a suitably fabricated steel platform. The supplier should provide mechanical fuel level indicator with 'Low' and 'High' markings. Also fuel level indication should be provided in the AMF panel with alarm for Fuel level 'Low' (if fuel level falls below 100ltrs.).The tank shall be painted with oil resistant paint and shall be erected in accordance with Indian explosive act of 1932. The tank shall be complete with fuel inlet and outlet, air vent, drain plug, opening with cover for direct filling from the top of the tank. Fuel tank shall be kept outside of enclosure. The fuel piping shall be carried out to connect the D.G set kept inside.

3.4.6.7. **Lube oil system**

The automatic pressure lubrication shall be provided by an engine driven pump. This system should be complete with an oil cooler and 2 Nos. of 100% capacity mesh filters. The oil cooler should be water cooled and equipped with necessary bypass arrangement, to bypass cooler during starting until oil temperature reaches the minimum (or the threshold) temperature.

3.4.6.8. **Air intake and Exhaust system**

Air intake system should have requisite air filters and complete interconnecting piping, supports etc. Engine exhaust system shall consist of exhaust gas driven turbo charger with lagged piping, interconnecting cylinder head out lets with the turbo charger inlet. Exhaust gas from the turbo charger shall be let out through exhaust gas silencer. The exhaust gas silencer, necessary pipes etc., shall be provided by the contractor. Exhaust piping shall be suitably clad with aluminium sheets, mineral wool etc. The silencer should be of residential type. Flexible connection (expansion joints) shall be provided in the exhaust piping to avoid transmission of vibration from engine to the structure (acoustic and weather proof enclosure etc.). Also the exhaust line with suitable bends, collars, flanges, angle supports and other accessories should be provided. Necessary arrangements should be provided to avoid entry of rain water, falling dust etc. at the top of the exhaust pipe. The exhaust piping system should be designed and laid up to a height of 5 Meters above the acoustic enclosure or as directed by the Engineer i/c of the P&E., Deptt., authorities to suit the site and environmental condition as per the controller pollution board, standards.

3.4.6.9. **Engine starting system**: Automatic electric starting by DC starter motor shall be provided. The starting system shall consist of DC motor energized by 24 V batteries. The battery charger and necessary instrument and accessories to indicate the condition of the batteries shall be provided.

3.4.6.10. **Engine governing system**

The engine shall be fitted with electronic governor suitable for class A-1 as per IS 10000. An over speed trip mechanism shall be provided to automatically shut off the fuel supply in case of set speed reading about 110% of rated speed.

3.4.7. **TECHNICAL REQUIREMENTS FOR ALTERNATOR**

3.4.7.1. The alternator shall comply with latest edition of IS 4722. The Alternator shall be drip proof, screen protected as per IP-23 degree of protection.

3.4.7.2. The Alternator shall have self-excited, brushless, synchronous, self-regulating system and shall be continuously rated to give an output of 250 KVA at rated pf. of 0.8 pf at 415V, 50Hz, 1500rpm,3 phase, 4wire system.

3.4.7.3. The alternator should be provided with automatic voltage regulator with voltage regulation of ± 0.5% and is designed, tested for confirming to IS 4772/1992.

3.4.7.4. The insulating material of the alternator shall be non-hygroscopic and fully tropicalized. The Alternator shall be suitable for operation with its neutral solidly grounded. The neutral shall be formed at the terminal box. It shall have winding of class H but limited to Class-F for temperature rise as per IS: 4722.

3.4.7.5. The rotor shall be dynamically balanced to minimize vibration.

3.4.7.6. The alternator shall be fitted with shaft mounted centrifugal fan.

3.4.7.7. The alternator with all accessories shall be enclosed in a enclosure to make it work Silently (within permissible noise level)

3.4.8. **COUPLING**

3.4.8.1. The engine and alternator shall be directly coupled by means of self-aligning flexible flange coupling to avoid misalignment.

3.4.8.2. The coupling shall be provided with a protecting guard to avoid accidental contract.

3.4.9. **MOUNTING OF DG SET**

3.4.9.1. The engine and alternator shall be mounted on a common heavy duty, rigid fabricated steel base frame constructed from ISMC of suitable sections.

3.4.9.2. Adequate number of anti-vibration mounting pads shall be fixed on the common base frame on which the engine and the alternator shall be mounted to isolate the vibration from passing on to the common base frame or the foundation of the D.G. Set.

3.4.10. **BATTERIES AND BATTERY CHARGER**

3.4.10.1. Two nos. 12V batteries complete with all leads, terminals and stand shall be provided. Each battery shall have sufficient capacity to give 10 nos. successive starting impulse to the diesel engine.

3.4.10.2. The battery charger shall be complete with transformer, suitable rating (415 V, 3 Ph., 50 Hz. /230V,1Ph., 50 Hz) rectifier circuit, charge rate selector switch for “trickle”/’boost’ charge, D.C. ammeter & voltmeter, annunciation panel for battery charge indication / loading failures.

3.4.10.3. The charger shall float and Boost Charge the battery as per recommendation of manufacturer of battery. The charger shall be able to charge a fully discharged battery to a state of full charge in 8 Hrs. with 25% spare capacity.

3.4.10.4. Manual control for coarse and fine voltage variation shall be provided. Float charger shall have built-in load limiting features.

3.4.10.5. Ripple shall not be more than 1% (r.m.s) to get smooth DC voltage shall be provided.

3.4.11. **AMF Control Panel**

3.4.11.1 The automatic mains failure (AMF) panel should be made out of well painted 16SWG sheet steel enclosure with necessary components like mains contractor, control relays, timers, bus-bars, protective relays, metering, battery charger, indication annunciation system etc should be provided.

3.4.11.2 The panel shall be floor mounting, cubical type, indoor, dust and worm in proof, totally enclosed, made out of 16SWG sheet steel, having hinged door with removable type bottom gland plates. Bottom frame for concrete floor mounting.

3.4.11.3 Bus-bar should be of 600A capacity tinned copper for all the phases and Neutral with color coded heat shrinkable sleeves, sufficient capacity of earth bus should be provided on either side of the panel.

3.4.11.4 The AMF should be operated in Test/Manual /Auto mode and 3 attempt starting facility with necessary control relays.

3.4.11.5 Requirements in AMF panel

(i) Four pole Air break contactor for Mains and for Alternator of 630A capacity

(ii) Three over current relay for generator protection (CDV61/62)

(iii) Instantaneous earth fault Relay through Neutral CT (1A-4A)

(iv) Field failure relay YCGF-11A

(v) HRC fuses for short circuit protection on both mains and for alternator. Mode

(vi) Selector switch (Auto / Manual / test / off)

(vii) Voltmeter with selector switch 0-500V A.C. Analog type

(viii) Ammeter with selector switch 0-400A, A.C. Analog type

(ix) Line voltage monitor (3-phase) with adjustment for presetting the voltage

(x) Current transformers 400/5A 5P10 for protection and class 1 for measurement

Note : The line voltage monitor (LVM) should monitor the voltage condition of the mains supply and bring the DG set in to operation if the line voltage falls below $\pm$10% from the rated voltage of 415V.

(xi) kWH meter (energy meter) 3-phase, 4-wire unbalanced type

(xii) Power factor and frequency meter

(xii) Frequency monitor

Apart from the above the panel should have necessary DC/AC aux. relays, control fuses, MCBs, pushbuttons for start, stop, accept, reset, test, emergency, indication lamps for healthy, trip, faulty indication, fuel level low, 24Vdc alarm with all indication for various faults. Use minimum of 2.5sq.mm copper wire for control circuit.

3.4.12. **ACOUSTIC AND WEATHER PROOF ENCLOSURE**

3.4.12.1. Design, fabricate, supply and installation of outdoor type acoustic and weather

proof enclosure for the healthy operation of D.G. set at site is also in the scope of this Bid. The enclosure should have sufficient working clearance around the D-G set inside the enclosure.

3.4.12.2. Diesel engine, alternator, AMF panel, Batteries and Charger shall be installed in the enclosure In addition to the weather proofing, acoustic enclosure shall also be designed such that the noise level shall meet the requirement of MOEF. The DG set should also conform to Environment (Protection) Rules, 1986 as amended. An exhaust fan with louvers shall be installed in the enclosure for temperature control inside the enclosure. The enclosure shall allow sufficient ventilation to the enclosed D.G. Set so that the body temperature is limit to 50°C. The air flow of the exhaust fan shall be from inside to the outside the shelter. The exhaust fan shall be powered from the DG set supply output so that it starts with the starting of the DG set and stops with the stopping of the DG set. The enclosure shall have suitable viewing glass to view the local parameters on the engine.

3.4.12.3. The enclosure shall be fabricated from at least 14 Gauge CRCA sheet steel and of Modular construction for easy assembling and dismantling. The sheet metal components shall be pre- treated by Seven Tank Process and Powder coated (PURO Polyester based) both-inside and outside – for long life. The hard-ware and accessories shall be high tensile grade. Enclosure shall be given a lasting anti-rust treatment and finished with pleasant environment friendly paint. All the hardwares and fixtures shall be rust proof and able to withstand the weather conditions.

3.4.12.4. Doors shall be large sized for easy access and provided with long lasting gasket to make the enclosure sound proof. All the door handles shall be lockable type.

3.4.12.5. The enclosure shall be provided with anti-vibration pads (suitable for the loads and vibration they are required to carry) with minimum vibration transmitted to the surface the set is resting on.

3.4.12.6. High quality rock wool of required density and thickness shall be used with fire retardant thermo – setting resin to make the enclosure sound proof.

3.4.12.7. Fresh air intake for the engine shall be available abundantly without making the Engine to gasp for air intake. A chicken mess shall be provided for air inlet at suitable location in enclosure.

3.4.12.8. The enclosure shall be designed and the layout of the equipment inside it shall be such that there is easy access to all the serviceable parts.

3.4.12.9. Engine and Alternator used inside the enclosure shall carry their manufacturer's Warranty for their respective Models and this shall not degrade their performance.

3.4.12.10. Exhaust from the engine shall be let off through Silencer arrangement to keep the noise level within desired limits. Interconnection between silencer and engine should be through stainless steel flexible hose/ pipe.

3.4.12.11. All the Controls for Operation of the D.G. Set shall be easily accessible. There should be provision for emergency shut down from outside the enclosure.

3.4.12.12. Arrangement shall be made for housing the battery set in a tray inside the enclosure.

3.4.12.13. Points shall be available at two side of the enclosure with the help of flexible

copper wires from alternator neutral, and electrical panel body respectively. The earthing point shall be isolated through insulator mounted on enclosure.

3.4.12.14. Adequate and suitable lighting arrangement inside the acoustic enclosure shall be made. Separate DP MCBS with control box to be provided for Lighting and blower fans.

3.4.13. **LT CHANGE OVER PANEL**

3.4.13.1. Design, fabrication & supply of Indoor L.T. 415V distribution switchgear Panel made out of 16 SWG CRCA sheet steel enclosure with powder coated matt grey finish. The panel shall have proper supporting and mounting structure of suitable size 'u' channel, provision for grouting and provide sufficient clearance between live and non live parts as per standards. The panel should have 14 SWG gland plate. Cable alley and bus-bar chambers should be provided. The panel must have two MCCBs of 630A, one for D.G Set and the rest for Station Service Transformer. The terminals of the MCCBs must have adequate size & mechanical strength to receive the terminals lugs on cables of requisite sizes. The two MCCBs must be so mechanically interlocked that one MCCB may be switched on at any instant of time and not both.

3.4.13.2 Metering & Indication

- 0-500V digital voltmeter of size 96 mm square with selector switch.
- CT operated 400/5A digital Ammeter 3½ digit of 96 mm square with selector switch.
- 1 set of Measuring CT 400/5A, class-1 for all the three phases
- 3 Nos. of 22.5 mm dia 230V Cluster LED type Phase indicating lamps for R,Y,B.
- Separate control Fuses 2/4A, for Voltmeter, indication circuits.

Use 2.5 sq mm. Copper multi strand wire for measuring and control circuit.

3.4.13.3 600A capacity PVC sleeves (with colour code) Aluminium bus-bar for all the 3-phases and 300A capacity for Neutral. The bus-bar should be well supported by 1.1kV grade resin compound mould / porcelain material. Proper clearance should be maintained between Line to Line and Line to earth as per standards. Suitable capacity of bus-bar jumpers / cables should be used from bus-bar to feeders. Suitable capacity of earth bus should be run throughout the length of the panel.

3.4.14. **Documents**

3.4.14.1. Following drawings and data sheet shall be submitted for approval:

(i) Data sheet for Engine, Alternator, Battery, AMF panel, LT Change Over Panel and enclosure

(ii) GA drawing of DG set.

(iii) Layout of DG set in the enclosure along with sections

(iv) GA and schematic of AMF & LT Panels

(v) Arrangement of inclined roof and pedestal.

(vi) T.B. wiring diagram

3.4.14.2. The D G Set shall be supplied with

(i) D G Set test certificate

(ii) Engine Operation & maintenance Manual.

(iii) Engine Parts Catalogue.

(iv) Alternator Operation, maintenance & Spare parts Manual.

(v) Alternator test certificate.

3.4.15. **TESTS**

The Diesel Generating set shall be tested for routine and acceptance tests as per the relevant IS/IEC standards.

3.4.16. **COMMISSIONING CHECKS**

3.4.16.1. **Load Test**

In addition to the checks and tests recommended by the manufacturer, the Contractor shall perform the following commissioning tests to be carried out at site. The engine shall be given test run for a period of at least 6 hours. The set shall be subjected to the maximum achievable load as decided by Engineer i/c of P&E Deptt., without exceeding the specified DG Set rating. It is the responsibility of contractor to arrange the necessary load, fuel, lube oil, tools and test equipment required to carry out the tests at the site without any additional cost.

During the load test, half hourly records of the following shall be taken :

a) Ambient temperature.

b) Exhaust temperature if exhaust thermometer is fitted.

c) Cooling water temperature at a convenient point adjacent to the water output from the engine jacket.

d) Lubricating oil temperature where oil cooler fitted.

e) Lubricating oil pressure.

f) Colour of exhaust gas

g) Speed

h) Voltage, wattage and current output.

i) Oil tank level

The necessary load to carry out the test shall be provided by the purchaser.

3.4.16.2. **Insulation Resistance Test for Alternator**

Insulation resistance in mega-ohms between the coils and the frame of the alternator when tested with a 500V Insulation resistance tester shall not be less than IR=2x(rated voltage in KV)+1

3.4.16.3. **Check of Fuel Consumption**

A check of the fuel consumption shall be made during the load run test. This test shall be conducted for the purpose of proper tuning of the engine.

3.4.16.4. **Insulation Resistance of Wiring**

Insulation resistance of control panel wiring shall be checked by 500V Insulation resistance tester. The IR shall not be less than one mega ohm.

3.4.16.5. **Functional Tests**

a) Functional tests on control panel.

b) Functional test on starting provision on the engine. (Auto/Manual/Test mode)

c) Functional tests on all Field devices.

d) Functional tests on AVR and speed governor.

3.4.16.6. **Measurement of Vibration**

The vibration shall be measured at load as close to maximum achievable load and shall not exceed 250microns.

3.4.16.7. **Noise Level check**

As per relevant standard. The tests shall be carried out with the DG set operating at rated speed and at maximum achievable load. Necessary correction for test environment condition & background noise will be applied as per IS:12065.

3.4.17. **ERECTION, TESTING AND COMMISSIONING INCLUDING NECESSARY CIVIL WORKS**

3.4.17.1. The DG Set shall be installed, tested and commissioned by the contractor after construction of the necessary foundation at the designated location.

3.4.17.2. **All fittings, unit assemblies, accessories, hardware foundation bolts, terminal lugs for electrical connections, cable glands and miscellaneous materials or accessories of items of work which are useful and necessary for efficient assembly and working of the equipment shall be deemed to be included in the tender within the overall cost quoted. The equipment shall be complete in all details whether such details have been mentioned or not.**

3.4.17.3. Foundation shall be constructed to provide a suitable reinforced cement concrete. Pedestal for both the D.G set and fuel tank with concrete proportion of 1:2:4 and reinforcing steel rods of 12mm dia. RCC bed should rise at least 0.3m above the ground level. All materials required for the related civil works are under the scope of the contractor. However, drawings for the foundation

work shall be approved by the Engineer i/c of P&E Deptt., before taking up the work for execution.

3.4.17.4. 2 Nos. of earth electrodes for body earth and 2 Nos. earth electrode for neutral earth shall be provided as per IS-3043 with GI pipe ('B' Class) earth electrode. Interconnection of earth electrode, earthing of fuel oil tank, base frame etc. shall also be carried out as per relevant standards.

3.4.17.5. The LT panel shall be installed by the contractor at suitable location as directed by Engineer i/c of P&E Deptt.,.

3.4.17.6. The contractor shall lay and execute termination of the necessary power and control cables from the D.G set to the LT panel. Necessary power and control cables will be provided by P&E., Deptt.,.

3.4.17.7. In addition to the checks and test recommended by the manufacturer, the Contractor shall carry out the commissioning tests as indicated in Clause No.3.4.16

3.4.17.8. The contractor must request P&E Deptt., in writing at least 15(fifteen) days in advance for any shut down, if required, in respect of the termination works.

Schedule – II

Guaranteed and Other Technical Particulars

Sl. No.	Description	Particular
1.0	Tenderer's Name & Address	
2.0	Manufacturer and address & Type / Model	
2.1	Diesel Engine	
2.2	Alternator	
2.3	Exciter	
2.4	Battery & Charger	
2.5	AMF Panel	
2.6	Fuel Oil Pump	
3.0	**Diesel Engine**	
3.1	Standards Applicable	
3.2	Capacity (BHP/HP)	
3.3	RPM	
3.4	No. & arrangement of Cylinders	
3.5	No. of strokes	
3.6	Type of Starter	
3.7	Method & of starting	
3.8	Time required for starting (Sec)	
3.9	Type of cooling	
3.1	Capacity of fuel tank (Ltr)	
3.11	Specification of fuel oil.	
3.12	Guaranteed Fuel Consumption (Ltr/hr)	
3.13	(a) At full load	
3.14	(b) At ¾ load	
3.15	(c) At ½ load	
3.16	(d) At ¼ load	
3.17	Compression ratio	
3.18	Displacement (Ltr)	
3.19	Lub oil specification	
3.20	Lub oil sump capacity (Ltr)	
3.21	Lub oil consumption (ltr/hr)	
3.22	Lub oil change period (hr)	

3.23	Coolant capacity (Ltr)	
3.24	Type of Governor	
3.25	Sensitivity of Governor	
3.26	Guaranteed limits of Governing	
	(a) Permanent variation	
	(b) Full Load thrown off	
	(c) Full load put on	
3.27	Total speed variation	
3.28	Mechanical efficiency	
3.29	Thermal efficiency	
3.3	Method of aspiration	
3.31	Emission compliance	
3.32	Type of acoustic enclosure	
3.33	Whether Instrument Panel have the following gauges to monitor	
	(i) Lubricating oil temperature gauge	
	i. Lubricating oil pressure gauge	
	(iii) Cooling Water temperature gauge	
	(iv) Hour meter and RPM meter.	
4.0	**Alternator**	
4.1	Standard applicable	
4.2	Capacity Rating (KW/kVA)	
4.3	Rated Power Factor	
4.4	Rated Terminal Voltage (Volt)	
4.5	Nos. of Phases	
4.6	Rated Frequency (Hz)	
4.7	Rated Stator Current (Amp)	
4.8	Rated Speed (RPM)	
4.9	Excitation current and voltage	
4.10	Efficiencies at 0.8 power factor at	
	(a) 100% load	
	(b) 75% load	
	(c) 50% load	
	(d) 25% load	
4.11	Inherent regulation (%)	

4.12	Impedance	
	(a) Xa dir axis synchronous	
	(b) X'd dir axis transient.	
	(c) Xn dir axis sub transient	
	(d) Xq quad axis reactance	
	(e) Xnq quad axis sub transient	
4.13	Type of exciter used	
4.14	Capacity & Rating of exciter	
4.15	Class of insulation	
4.16	Permissible Temp. Rise (˚C) of:	
	(a) Armature winding	
	(b) Field winding	
	(c) Bearing	
4.17	Short circuit ratio	
4.18	Rotor air gap (mm)	
4.19	Overload capacity	
4.20	Insulation level test voltage	
4.21	Automatic voltage regulator type and technical specifications	
5.0	**Engine Alternator Set**	
5.1	Starting time (Sec)	
5.2	Interval between staring impulse (Sec)	
5.3	No. of starting impulse	
5.4	Time for picking up the load (Sec)	
5.5	Voltage variation	
5.6	Frequency variation	
5.7	Duration of continuous full load operation (hr)	
5.8	Noise level (±ab)	
5.9	Type of coupling/bearing details	
5.10	Dry weight with canopy (aaprox)	
5.11	Overall dimensions LXWXH (MM)	
5.12	Height including Silencer - LXWXH (MM)	
6.0	**Battery**	
6.1	Applicable standard	
6.2	No. of Cells	

6.3	Capacity (C10) (Ah)	
6.4	Average life in years	
7.0	**Battery Charger**	
7.1	Ampere Rating	
8.0	**AMF Panel**	
8.1	Overall dimension (LXBXH)	
8.2	Finish	
8.3	Sheet Metal thickness	
8.4	Make and Capacity of Type of ACB & Contactors	
8.5	Type & Make of over current relay	
8.6	Type & Make of Earth fault relay	
8.7	Range of voltmeter (Volt)	
8.8	Range of Ammeter (Amp)	
8.9	Range of KW meter (kW)	
8.10	Range of P.F. meter	
8.11	List of annunciations	
8.12	Terminal Box Bus bar capacity (Amp)	
8.13	Other facilities incorporated	
9.0	**L.T. Change over panel**	
9.1	Make	
9.2	Thickness of sheet steel (SWG/mm)	
9.3	Rating and make of MCCB (Amp)	
9.4	Overall dimensions of panel	
9.5	Finish	

SCHEDULE OF PRICES (to be filled in by the Tenderer)

(Amount in Rupees)

Sl. No.	Description	Unit	Qnty.	Total Price inclusive of all taxes & duties
1	Manufacturer, Supply, Installation, Testing and Commissiong of 200kW/250kVA Diesel Generating set with AMF Panel, Acoustic Enclosure and L.T Change over Panel etc. at Mizoram State Assembly House, Aizawl	No	1	
			Total	

(Rupees _____) only

Place :

Signature & Name of tenderer
(with seal)

Date :

Schedule-IV

SCHEDULE OF DEVIATION BY THE TENDERER

Technical specification

Sl. No.	Specification Clause No.	Details of deviation	Justification for deviation

CERTIFICATE : The tenderer hereby certifies that the above mentioned are the only deviation from the purchaser specification.

(Signature of the Tenderer)

Name (in block letters)

Stamp

Scheduled-V

PROFORMA OF BANK GUARANTEE FOR CONTRACT PERFORMANCE
(To be stamped in accordance with Stamp Act)

Ref..... **Bank Guarantee No.....**

Date.....

To
……
……
……

Dear Sirs,

In consideration of Power & Electricity Department, Govt. of Mizoram., (herein after referred to as the "Owner" which expression shall unless repugnant to the context or meaning thereof include its successors, administrators and assigns) having awarded to M/s.....with registered/Head office at.....(hereinafter referred to as "Contractor" which expression shall unless repugnant to the context or meaning thereof include its successors, administrators, executors and assigns), a Contract issued by Purchaser/ Employer's Letter of Award No.....dated..... for……(scope of work) and the same having been acknowledged by the Contractor, resulting in a Contract bearing No.....dated …… Contractor having agreed to provide a Contract Performance Guarantee for the faithful performance of the entire Contract equivalent to Rs..... being (5%) (Five Percent) of the said value of the Contract to the Purchaser/ Employer.

We..... (Name & Address) having its Head Office at.....(hereinafter referred to as the "Bank", which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, executors and assigns) do hereby guarantee and undertake to pay the Purchaser/ Employer, on demand any or all monies payable by the Contractor to the extent of Rs.....as aforesaid at any time up to..... day/month/year) without any demur, reservation, contest, recourse or protest and/or without any reference to this Contractor.

Any such demand made by the Purchaser/ Employer on the bank shall be conclusive and binding notwithstanding any difference between the Purchaser/ Employer and the Contractor or any

dispute pending before any Court, Tribunal, Arbitrator or any other authority. The Bank undertakes not to revoke this guarantee during its currency without previous consent of the Purchaser/ Employer and further agrees that the guarantee herein contained shall continue to be enforceable till the Purchaser/ Employer discharges this guarantee.

The Purchaser/ Employer shall have the fullest liberty without affecting in any way the liability of the Bank under the guarantee from time to time to extend the time for performance or the Contract by the Contractor. The Purchaser/ Employer shall have the fullest liberty, without affecting this guarantee, to postpone from time to time the exercise of any powers vested in them or of any right which they might have against the Contractor and to exercise the same at any time in any manner and either to enforce or to for bear to enforce any covenants, contained or implied in the Contract between the Purchaser/ Employer and the Contractor or any other course or remedy or security available to the Purchaser/ Employer. The Bank shall not be relieved of its obligations under these presents by any exercise by the Purchaser/ Employer of its liberty with reference to the matters aforesaid or any of them or by reason of any other act of omission or commission on the part of the Purchaser/ Employer or any other indulgences shown by the Purchaser/ Employer or by any other matter or thing whatsoever which under law would, but for this provision have the effect of relieving the Bank.

The Bank also agrees that the Purchaser/ Employer at its option shall be entitled to enforce this guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and not withstanding any security or other guarantee the Purchaser/ Employer may have in relation to the Contractor's liabilities.

Notwithstanding anything contained herein above our liability under this guarantee is restricted to Rs.....and it shall remain in force up to and including .....**(day/month/year)

and shall be extended from time to time for such period as may be desired M/s.....on whose behalf this guarantee has been given. Unless a demand or claim is lodged on us within and including ……..*(day/month/year) we shall be discharged from all liabilities thereafter.

Dated this.....day of.....20.....at.....

WITNESS

....

(Signature) (Signature)

.....	.....
(Name)	(Name)
.....	.....
(Official Address)	(Designation with Bank Stamp)

Attorney as per Power

Of Attorney No.....

Date.....

Notes:

1. The sum shall be 5% (five percent) of the contract price for Contract Performance Guarantee.

Note: The stamp paper of appropriate value shall be purchased in the name of issuing Bank.