ACU/PS/BGS-MCH-1041/CTN- 27 **/2024-25** **Date:** 25/05/2024

TENDER NOTIFICATION

The Adichunchanagiri University invites closed tenders from eligible tenderers or bonafide licensed manufacturer or their authorised local supplier/dealer/distributor in the state of Karnataka for the Procurement of Supply and Installation of 750KVA DG Set for HT yard works at BGS-MCH Hospital as per section I & II.

1	Name of the work	Supply and Installation of 750KVA DG Set for HT yard works at BGS-MCH Hospital, Nagarur.
2	Last date for tender submission	On or Before 11.06.2024 up to 05:00 PM

SECTION -I

Instruction to Tenderers

1. The Tenderer shall send quotes in **2 bid formats (Technical and Financial bids sealed separately inside the main envelope for any or all list of items)** on professional business letterheads. The inner and outer sealed cover must bear the following identification
    1. Tender for .....[name of service | Contract]
    2. Tender Reference No.....[insert number]
    3. Address to "The Registrar, Adichunchanagiri University, B.G. Nagara -571448, Nagamangala (T), Mandya (D)"
    4. The tenderer who prefers to submit the tender through Post can dispatch the same through Registered Post / Speed Post or Courier so as to reach the above address on or before the due date and time specified in the Tender Notice. Tenders received after the due date and time, for what so ever reasons will not be considered and the authority, ACU BG-Nagara will not be liable or responsible for the same.
2. Tender Currency: Prices shall be quoted in Indian Rupees Only
3. AMC/CMC (If any) is subject to the Adichunchanagiri University's norms.
4. Warranty: As per the Standard.
5. Amendment of Tender Documents: At any time prior to the deadline for submission of tenders, the University may, for any reason, whether at its own initiative or otherwise, modify the tender documents by amendment. Adichunchanagiri University reserves all the rights to accept, reject, incorporate changes and re-tender without giving any reasons.
6. Documents Comprising the Tender: Shall attach Brochure, Certification of the product, Bank/account details, PAN, GSTIN, Good Standing Certificate and 02 Years of ITR declaration inside the envelope and company contact details with email ID on the main envelope cover for further correspondence.

7. Tender Prices: Prices indicated on the Price Schedule shall be entered separately I.e. the price of the goods, quoted (ex-works, ex-factory, ex-showroom, ex-warehouse, or off-the-shelf, as applicable), including all duties and sales and other taxes already paid or payable. Any Indian duties, sales and other taxes which will be payable on the goods if this Contract is awarded. Conditional tenders will not be considered.

8. Validity of the Bid: 90 Days from the last date of submission of bid

9. Corrupt or Fraudulent practices: The Adichunchanagiri University requires that the Tenderers, observe the highest standard of ethics during the procurement and execution of such contracts. In pursuance of this policy:

    1. will reject a proposal for award if it determines that the Tenderer recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question;

    2. will declare a firm ineligible, either indefinitely or for a stated period of time, to be awarded a university contract if it at any time determines that the firm has engaged in corrupt or fraudulent practices in competing for, or in executing, a University contract.

10. Process to be confidential: Information relating to the examination, clarification, evaluation, and comparison of Tenders and recommendations for the award of a contract shall not be disclosed to Tenderers or any other persons not officially concerned with such process until the award to the successful Tenderer has been announced. Any effort by a Tenderer to influence the Employer's processing of Tenders or award decisions may result in the rejection of his Tender.

11. Clarification of Tenders: To assist in the examination, evaluation, and comparison of Tenders, the Employer may, at his discretion, ask any Tenderer for clarification of his Tender, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by cable, but no change in the price or substance of the Tender shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the tenders.

12. Delivery: The successful BIDDER should commence the services as per tender document/Work or Purchase Order. For any queries/ assistance, please write to registrar@acu.edu.in or telephone to purchase section +91- 7406907357.

13. Penalty Clause: Non-execution of supply order - For the reasons of failure to supply partially or completely within the stipulated time or any event of breach of contract. In case at any following stages

    1. For the delayed supply (3 days of grace period) - 5% deduction
    2. Quantity issues - 5% deduction
    3. Quality issues - 10% deduction

30/5/24

SECTION -II

Detailed BOQ:

Sl.No	DESCRIPTION	Unit	Qty	RATE		AMOUNT	
				Supply	Install	Supply	Install
Part-4	**DG SETS**						
	Supply of the following DG Sets as per Specification						
4.1.1	**415V, 3ph, 1500 RPM, Prime Rated 750kVA DG set With Acoustic Enclosures Suitable for outdoor conditions, conforming to CPCB IV guidelines & attached specification.**	Set	1				
	The DG Sets offered shall be complete with the following accessories:						
a)	Battery with stand, leads, cover and accessories.						
b)	Residential grade silencers with thermal insulation and aluminium cladding..						
c)	Set of hoses.						
d)	Flexible stainless steel bellows for connection to exhaust piping(exhaust pipe size is 18 inches diameter/Manufacturer standards)						
e)	990 Litres day tank fabricated out of 5mm thick sheet steel with secondary containment tank and with fitments & accessories As per the norms & Site Conditions. Flame proof level controller / switch and ball valves, level indicator, inlet, outlet and overflow tapings. The day tanks shall have provision for maintenance access cover.						
f)	**Provision for connection of required number of aluminium armored cable to be provided with scheduled clearances as per CIEG**						
g)	Drip trays under diesel engine &						

	Day tanks.						
h)	Electric driven lube oil priming pump, if required.						
I)	Anti-vibration mounts with accessories.						
j)	2x12V Battery Block with accessories for engine starting, the number and AH capacity shall be selected to meet the engine starting current requirements.						
k)	AVR/Engine Controller						
l)	Coolant, DM water etc., for the first fill as required						
m)	Unloading, Shifting & Positioning of DG sets						
n)	Site testing of DG Sets (Load banks and fuel by DG vendor)						
o)	DG Isolator Panel as per technical specification and SLD. This is provided as per CEIG, Karnataka State requirement						
	DG sets to complete with AMF panel. All necessary accessories shall be provided for successful commissioning of DG sets on ready mode.						
	Design calculations in support exhaust system including the exhaust pipe sizing shall be submitted for approval prior to execution of work.						
Total Carried Over to Summary							
4.2	**FUEL PIPING WITH VALVES AND ACCESSORIES.**						
	Supply of Class 'B' MS Pipe of TATA/JINDAL make including accessories like tees, 'reducers, unions, cutting welding, including two coats of primer zinc chromate and 2 coats of synthetic enamel paint of brown color.						
a	25mm dia Class 'B' MS Pipe with accessories for vent and drain fuel pipe line	Rmt	R.O.				

b	38mm dia Class 'B' MS Pipe with accessories	Rmt	R.O.				
c	50 mm dia Class 'B' MS Pipe with accessories	Rmt	R.O.				
d	65 mm dia Class 'B' MS Pipe with accessories	Rmt	R.O.				
e	80 mm dia Class 'B' MS Pipe with accessories	Rmt	R.O.				
f	100 mm dia Class 'B' MS Pipe with accessories	Rmt	R.O.				
Total Carried Over to Summary							
4.3	**EXHAUST SYSTEM**						
4.3.1	**Exhaust pipe**						
	Design, manufacture, Supply of MS exhaust pipe, suitable for 750KVA exhaust line, as per manufacturer's recommendation up to Y Transformation Piece. The rate shall be inclusive of residential silencer, necessary, bends, flanges, gaskets, condensation removal plug, inspection point, ash door, welding arrangements as specified to suit the site conditions. The tenderer shall submit calculation along with the size offered for the DG set. 1 exhaust manifolds to DG. The foundation will be provided by other Agency.						
a	20" dia with bends as required	Rmt	R.O				
b	18" dia with bends as required	Rmt	R.O				
c	12" dia with bends as required	Rmt	R.O				
d	10" dia with bends as required	Rmt	R.O				
	Note:						
1	The system shall comply with the norms of KSPCB/ other statutory bodies.						
2	5mm thick MS pipes as per IS 3589 shall be supplied. The exhaust system including the silencer must be sized to ensure that back pressure on system with a building height of 50m does not exceed the limit recommended by engine						

	manufacturer. Design calculation in support shall be submitted with the offer.						
3	Pipe shall be thoroughly cleaned of rust and painted with heat resistant paint after fabrication and erection.						
4	Exhaust piping and Residential silencer shall be thermally insulated with 50mm thick mineral wool and shall be cladded with 24 G aluminium sheet.						
5	Silencers and Horizontal runs shall be supported on spring supports fixed to supports on floor/ceiling. Vertical runs to have expansion bellows where length exceeds 25m. The supporting system for the vertical portion of the exhaust pipe shall be designed to permit expansion/contraction during operation.						
6	Flexible expansion joint of multiple corrugated stainless steel shall be provided between engine exhaust manifold and exhaust piping.						
7	The exhaust pipes should be earthed.						
8	Weather cowl to be provided at the top.						
9	Smoke Test shall be conducted on the exhaust piping						
10	Dia of indicated below for reference only, the actual requirement pipe to be used shall be indicated in the tender. If more than one size is proposed to be used, estimated quantities with rates of for each size shall be furnished.						
Total Carried Over to Summary							
4.4	**SUPPORTING MS ITEMS**						

	MS supporting steel work with MS ISMC, ISA Steel sections / channels, angles, flats brackets, frames, anchor fasteners, welding works with minor civil works etc. complete as required and as per standards for supporting the exhaust pipes, silencers, switchgear supports etc. ,the pipe shall be painted with2 coat of red oxide primer and 2 coat of Black synthetic enamel paints.	Kgs	500				
Total Carried Over to Summary						0.00	0.00
4.5	**CONTROL CABLES**						
	1.1KV grade Cu.conductor, PVC insulated, GI strip armoured & PVC sheathed cable including the termination. The cables shall be laid on preformed trench / trays / in pipes / underground / clamped to wall/ceiling. Rate to exclude cost of trays, pipes & supporting items but include necessary termination & cable clamps.						
a	3 core 2.5 Sqmm shielded copper cable from DG sets to synch panel for speed control and voltage control	Rmt	R.O				
c	2C x 2.5Sqmm Cu.conductor, PVC insulated, and GI armoured PVC sheathed.	Rmt	R.O				
e	2 Core 4 Sq mm armored copper cable from DG sets Batteries to synch panel for battery charging.	Rmt	R.O				
g	3 core 4 Sqmm armored copper cable from Synch panel to LT panels for EB sensing	Rmt	R.O				
i	4 core 4 Sqmm armored copper cable from DG sets to DG auxiliary panel in panel room	Rmt	R.O				
k	6C x 1.5 Sqmm Cu.conductor, PVC insulated, GI armoured PVC sheathed.	Rmt	R.O				

m	6C x 2.5 Sqmm Cu.conductor, PVC insulated, and GI armoured PVC sheathed.	Rmt	R.O				
o	16 Core 2.5 Sq mm armored copper control cable from DG sets to synch panel for DG controls	Rmt	R.O				
q	24C x 1.5 Sqmm Cu.conductor, PVC insulated, GI armoured PVC sheathed.	Rmt	R.O				
s	24C x 1.5Sqmm Cu.conductor, PVC insulated, GI armoured Shielded cable	Rmt	R.O				
	Note: Control cable schedule is indicative only, Any other item not specifically mentioned but required for operation of the system shall be brought out / appended to the list by the bidder. no extras will be permitted on this account during execution of project. The control cable lengths will be as per site conditions.						
	Special Notes:						
1	Diesel pumping from tank to dg set to be included in the scope. Diesel pipes with necessary safety valves to be in supplier scope (if necessary).						
2	Safety barriers for diesel tanks to be proposed by vendor, BGS to execute.						
	NOTE :						
	DELETE WHAT IS INAPPLICABLE & ADD WITH LATEST INDUSTRIAL STANDARDS						
Total Carried Over to Summary							

SECTION –III
TECHNICAL SPECIFICATIONS FOR 750kVALT DG SETS AND ACCESSORIES

Scope: This Document Covers the requirements of Design, Construction & specification of 1 No. 415 Volts, 3 phase, 750KVA, 1500 RPM, Air Cooled, AMF DG sets with associated accessories.

SCOPE OF WORK:

General Scope of Work shall include the supply, installation, testing and commissioning of the following:

a) Transport, handling, supply, installation of Diesel generators complete with all accessories for starting, regulation and control.
b) Supply and installation of electrical panel boards, including their connections to generators and ancillaries.
c) Supply and installation of equipment necessary for engine cooling.
d) Supply and installation of equipment necessary for fuel storing and distribution (storage tank, day tank, piping, pumps, valves, level indicators etc.)
e) Supply and installation of flexible connections and Residential type silencer of exhaust system, including thermal lagging.
f) Supply and installation of batteries and battery charging equipment, including their connections as necessary.
g) Supply and installation of anti-vibration mountings etc.
h) Preparing all related shop drawings for approval.
i) Obtaining approval of the installation of Diesel Generator by the Electrical Inspectorate and Pollution Control Board.

AMBIENT CONDITIONS:

i) Ambient Temperature - 45 deg. C.
ii) Altitude above MSL - 1000 m.
iii) Relative Humidity - 90%

Cleaning, upon completion of the entire installation, all premises, equipment and ancillary shall be thoroughly cleaned and delivered free from rubble, etc.

ENGINE :

1. **TYPE :**
The Engine for One (1) 750 kVA D.G Set shall be CUMMINS or KIRLOSKAR Diesel Engines, 6 cylinder, radiator water cooled, Turbo-charged suitable for generating set application developing required kVA at 1500 RPM under normal temperature and pressure.

2. **SPEED :**
Shall be 1500 revolutions per minute. Speed governor/over speed protection shall be provided.
At due running conditions, speed shall be stabilized at plus or minus 2% nominal speed, regardless of load. At transient condition, engine speed shall vary not more than 10% plus or minus.

3. **TIME FOR RUN-UP TO SPEED:**
From the initial operation of the starting device, the engine shall start, run up to normal speed and be capable of accepting 80% of full load within a maximum time of 10 seconds, and full load within a further 5 seconds.

4. **COOLING:**

The Engine cooling system shall be by water cooled radiators mounted directly on the engine. The water tubes of the radiator shall be of high conductivity copper. tubes.

5. **ENGINE STARTING :**

Engine starting shall be by electric starting motor viz. Local or Remote control and complete with Manual/Automatic starting arrangement. The starter motor shall be of adequate power for its duty and be of inertia or pre-engaged type. The pinion shall positively disengage when the engine starts up or when the motor is de-energized.

6. **ENGINE SAFEGUARDS :**

Safeguards shall be provided and arranged when necessary to stop the engine automatically by energizing a solenoid coupled to the stop lever on the fuel injection pump rack. The operation of the safeguard shall at the same time give individual warning of the failure by illuminating an appropriate local visual indicator and remote alarm to generator panel.

The contactors, relays and other devices necessary for signal and control transmission to the Generator

Panel shall be provided.

The safeguards shall operate when any of the following conditions occur, irrespective of whether the set is on automatic or manual control.

- Fail to start
- Over speed
- Alternator failure
- High cooling water temperature
- Low lubricating oil pressure
- Low fuel oil level

A key operated switch shall be fitted on the control panel and so connected as to override the engine safeguards and, in an emergency, allow the engine to be restarted under manual control, but with the alarms remaining operative. Key to be tripped when safeguards are overridden. The alarm will be annunciated if any one of the above safe guards operates.

7. **OIL DIPSTICK :**

A lubricating oil level dipstick suitably graduated shall be provided and located in an accessible position.

8. **STARTER BATTERY :**

The starter battery shall be 24 volts heavy duty high performance quality lead-acid type of adequate size for trickle charging and rapid recharging after use and shall be supplied complete with corrosion resisting outer container or box of an approved type standing direct on the set.

The type, voltage and ampere-hours capacity of the battery shall be suitable for the required duty. The battery shall be supplied in a fully charged state ready for use.

9. **ENGINE INSTRUMENTS :**

The following dial type instruments shall be provided:

- Engine shaft speed tachometer
- Service hours counter

- Lubricating oil pressure gauge
- Lubricating oil temperature gauge
- Cooling water temperature gauge.

10. EXHAUST SYSTEMS :

The exhaust gas expulsion system shall be in accordance with the indications shown in the drawings. The exhaust piping shall be fitted with Residential type silencer in order to limit the sound level. Expansion joints shall take care of thermal deformations. The pressure drop in exhaust piping including silencer, bends expansion joints etc., shall be compatible with exhaust gas leaving the engine. The turbo charger shall be added to the system. The exhaust piping shall be duly lagged throughout the length from engine outlet up to the outlet point inside the room with high temperature resisting thermal wool, wound with chicken mesh and on top lagged with aluminum sheet wrapping. The exhaust piping shall be independent for each engine and shall be as straight as possible. The bending radius of bends shall be not less than 3-internal diameter of chosen piping. A drain plug shall be fitted at the lowest point of piping for condensate extraction. The exhaust pipe shall be raised at least 4m, above the highest point on the roof and should meet the regulations from pollution board. Suitable supports shall be made for proper installation of exhaust pipes.

11. DRAIN PLUGS AND COCKS :

Drain plugs and cocks, as appropriate, shall be fitted adequately to drain the engine of lubricating oil, water and fuel. They shall be so designed and constructed as to be free from leas and so positioned as to be readily accessible and allow draining to be undertaken without need for special receptacles.

12. FUEL & LUBRICATING OIL FILTERS :

Suitable and efficient oil filters of an approved type and construction, having replaceable filter elements shall be provided in the fuel oil and engine lubrication system. The oil filters shall be readily accessible and allow the elements to be changed without difficulty. The fuel oil filter shall be located as close as possible to the fuel pump manifold.

13. CONTROL WIRING ON ENGINE/ALTERNATOR UNIT/CONTROL PANEL :

The electrical wiring on the engine/alternator unit shall be carried out with cable having stranded copper of conductor minimum cross section of 2.5 Sq.mm. for single core cables and 1.5 Sq.mm. for multicore copper cables. All wiring shall be adequately supported and protected from accidental damage and properly installed and terminated in suitable terminal boxes with flexible connections, all in accordance with the manufacturer's recommendations. The Conductor will be of copper only.

14. COUPLING TO ALTERNATOR :

The engine shall be coupled to the alternator in an approved manner in a monoblock arrangement. Matching faces of the alternator and shield and the engine flywheel housing shall be fully machined with spigots concentric to their shaft to give automatic alignment.

15. ALTERNATOR :

a) Type :

The alternator shall be continuously rated three phase, four wire, star connected, alternating current machine, rotating field, self-excited brushless type, direct coupled to the diesel engine

prime mover, the whole unit shall be designed and constructed to operate as one unit. The alternator shall be complete with all necessary controls and instruments and shall comply in all respects with IS code. The winding and all connecting leads shall be insulated with class 'B' insulation. The temperature rise after carrying continuously the rated load at the specified P.F. at an ambient of 40 deg C shall not be more than 80 deg C by resistance. The machine shall be naturally ventilated

The terminal box shall be suitable for terminating armoured aluminum cables of adequate size. The alternator shall be complete with all necessary control and instruments and shall comply in all respects with IS 4722/BS 4999. Degree of protection shall conform to IP 21.

The alternator shall be capable of withstanding, without injury, a 10-Sec, three phase short circuit at its terminals, when operating at rated kVA and power factor at 5% over voltage, with fixed excitation.

b) Main characteristics :

-Three phase current, with neutral

-Voltage : 415V between phases +/-2.5%

-Frequency : 50 Hz+/-3%

-Nominal power : 750 kVA

-Power factor : between 0.8 and 1.0

-Overload : 10% for one hr with normal excitation in every 12hours of continuous running at rated load

-Max momentary : 50% for one-min with normal rated load excitation.

-Neutral : earthed

-Harmonics-less than : 3%

-Load unbalance : 20% between phases

c) Voltage regulation :

Alternator shall have a reliable 3 phase voltage sensing compound excitation system having:

- Capability to build up the voltage from residual magnetism.
- Protection against low speed operation
- Volts/hertz responsive feature
- Compound 'back-up' auto-regulation system in case of regulator failure
- Facility to limit over voltage in case of regulator failure to the compounding level
- Smooth auto/manual changeover without the danger of sudden change in excitation level during change over.

The output voltage of the alternator shall be automatically maintained within 2 1/2% of the normal voltage, of any one phase, from no load to full load at any power factor between unity and 0.8 lagging, for cold to hot variations, 3% speed variation using a solid state automatic voltage regulator. Provision shall be made for adjusting the alternator voltage within plus or minus 5%. In addition to the Automatic operation shall also be provided. The regulator shall be of reputed make manufactured to meet all the special requirement of such generators. The regulator of the solid state type with Auto/Manual selection & duplicate channel selection will be housed in control panel.

d) Voltage Wave Form: The voltage wave form of the alternator output shall be a sine wave shape within the limits of 3%.

16. EARTHING :

The earthing of all equipment's supplied and allied parts such as panels, piping, fuel tank etc., shall be complied in accordance with the relevant IS Code and to meet the requirement of Inspectorate. The Alternator Neutral and the body shall be earthed by providing two independent earthing stations for Neutral & body Grounding

17. AMF PANEL & STANDARD CONTROL PANEL:

a) **A standard control panel with inbuilt AMF Logic** shall be provided for generator sets and shall comprise a totally enclosed floor standing cabinet of ample size to accommodate the required relays, Battery charger & feedback to LT Kiosk & Sensing input from LVM located in LT Kiosk. And other equipment to form a complete control unit for all the emergency generators. However the Power Change over shall be in LT Kiosk (not in DG suppliers scope)

The cabinet panels shall be of heavy gauge sheet metal, having a zinc or other suitable corrosion resisting coating, and be mounted on a rigid metal framework with the panel edges rounded to give a smooth finish.

Front access doors with concealed hinges shall be fitted with locking handles. Duplicate keys shall be supplied.

Removable gland plates of adequate thickness shall be provided in the base for cables and pipes entering the cabinet and shall be drilled as required.

The completed cabinet shall be painted overall with two priming and two finishing coats of best quality stove enamel paint. Shade No.693 to IS 5

The internal surfaces shall be matt white.

All covers, both internal and external, which are removable to allow access to components shall be inscribed "Danger".

b) **Panel Equipment :**

For D.G Set the main Incomer from generator supply shall be provided with One No. of adequate rating three pole ACBs and neutral isolator complete with operating relays, time delay relays, IDMT relay, alternator over load protections.

The Contactors shall comply with relevant I.S. Code and shall be capable of satisfying the making and breaking test with an inductive load having a power factor of 0.8 lagging.

c) **Controls :**

With a switch in the "off" position, it shall not be possible to start the engine in any way whatsoever.

d) **Main Circuit Breaker :**

This shall connect the output terminals of the machine to the emergency network. The circuit breaker shall be designed to close when the full voltage has been attained on start up, and to trip when the alternator voltage drops to 75% of its normal value.

The Controls for the contactor shall be operated by the alternator output voltage.

e) **Auxiliary Contactor for Battery Charger :**

A suitable auxiliary contactor shall be provided for connecting the battery charger to the

mains supply. The contactor shall be provided with an isolating switch and shall be so arranged as to disconnect the battery charger during engine starting.

f) Protection : The protection of the alternator shall be by means of :

a) Over Current (Voltage controlled) relay type CDV 62 `A' (Required for AMF panel) English Electric Make.

b) Over Voltage relay, English Electric Make.

The protection equipment shall be connected so that a failure lights a clearly marked indicator and initiates the alarm on the control panel.

g) **Instruments :**

In addition to the equipment earlier specified, the control panel shall be provided with the following instruments, selector switches and all necessary instruments fuses, current transformers etc., for each set:

- Meter kWh
- Frequency Meter (45-50-55 Hz_ scale, reed type.
- Ammeter with selector switch
- Voltmeter with phase selector switch
- One P.F. Meter.
- KW meter.

h) **Annunciation/Panel Indicator Lamps :**

Colored indicators shall be provided for the following:

White lamp: Supply available

-Green lamps: Battery charger on.

-Red lamps: Fail to start, over speed, high cooling water temperature, low lubricating oil pressure, low Cooling water level, alternator failure, and low fuel oil level.

-Blue lamps: Emergency supply required. Engine safeguard overridden. Engine switched off

Illumination shall be by lamps served from the mains of generator.

i) **Audible Alarms :**

An audible alarm of a distinctive type shall be provided and installed in the control panel and shall operate on the occurrence of one or more of the following:

- Engine not starting or not continuing to run (from any cause) when called upon
- Operation of the alternator overload protection or failure of one or more phases of the alternator supply.
- Engine safeguards overridden.

An alarm muting switch shall be provided and connected so that its operation silences the local alarm only.

j) **Push Buttons :**

Suitable robust protected type spring return push buttons shall be provided in a convenient position on the front of the control panel for the following duties:

- Start engine (for testing, servicing etc., with control selector switch in "Manual" position)
- Stop engine
- Manual control

- Stop audible alarm
- Visual alarm keep-on
- Lamp testing
- Main circuit breaker /contactor switch-on/switch-off.

k) Mains operated Battery Charging Equipment :

The battery charger shall be of the static type employing semiconductor devices, the whole being enclosed in an adequately ventilated enamelled corrosion resistant sheet steel case of an approved type.

The charger shall be incorporated within the Generator control panel with its associated instruments and controls mounted on the control panel. The instruments and controls shall match those of the main panel.

The charger shall have an illuminated indicator on the panel front to show when the charger is switched on. The charger shall be of adequate size and shall at all times monitor the battery conditions and automatically control the charging rate to suit the state of the battery, maintaining it in a properly charged condition when not in use. Following a period of use, the charger shall automatically re-charge the battery in the shortest practicable time consistent with battery welfare, and the size and output of the charger shall match battery size and shall at all times monitor the battery conditions and automatically control the charging rate to maintain the state of the battery, maintaining it in a properly charged condition when not in use.

l) Equipment and Instrument Fuses :

All equipment and instruments incorporated in the control panel shall be protected by suitably rated H.R.C. cartridge fuses. Three replacement fuses shall be provided as spares for each size of fuse used and these shall be mounted in proper holders located in convenient positions within the panel enclosure.

m) Labelling :

The function, duty and operation of each meter, instrument, indicator, switch, push button or other device for external control shall be clearly and neatly defined by labels having black lettering on a white background, properly and securely fixed by screws on or close to the item to which the label relates. Any instructions necessary for the proper and safe working of the plant shall be similarly dealt with and the instructions put in a position close to where the operation is carried out.

n) Panel Diagram :

An internal panel arrangement and key diagram shall be fixed to the inside of the control panel door.

18. BALANCING :

The rotating system of the engine, alternator and ancillaries shall, as a unit, be statically balanced during manufacture to reduce out of balance forces to a practical minimum.

19. ANTI-VIBRATION MOUNTING :

Multiple neoprene bonded anti-vibration pads and springs shall be mounted between the primary and main frame.

They shall be so designed and installed that no appreciable engine vibration shall be transmitted to the floor or to any bases or pads to prevent movement across the surface of the floor when the engine is running.

20. GUARDING OF MOVING PARTS :

All exposed moving parts of the engine, alternator and ancillaries shall be fully guarded so as to prevent accidental contact by personnel. The guards shall be securely fixed and so constructed as to be readily removable to facilitate inspection or maintenance.

21. DRIP TRAYS :

Galvanized trays shall be provided under every part of the set where drips of fluid are likely to occur. The trays shall be integral parts of the items they serve and provided with readily accessible drain cocks, or shall be constructed of heavy gauge galvanised steel, with rounded corners and smooth reinforced edges and be easily removable for emptying and cleaning.

22. TOOLS :

A complete set of tools shall be provided, including grease and oil guns, necessary for the normal maintenance of the set and its controls. The tools shall be of the best quality, the spanners being of chrome-vanadium steel, and shall be contained in a suitable robust steel tool box fitted to the base frame of one set, with lid fitted with a lock and two keys.

23. FINISH :

Sheet steel and zinc coated. All fabricated constructions are sand blasted and both sprayed with combined etching and priming undercoat.

Final Finish:

Spray painted twice by a pre-heated hot spray paint process. The

List of preferred makes of equipment enclosed bill be binding.

24. Plug in relays of any make are not acceptable in DG schemes, It shall be a contactor logic only. Contractor with MMOO contactors

All timer relays shall be of pneumatic type only wherever range is not beyond 180 Sec. For timer relays in excess of 180 Sec, electronic automation electronic relay would be acceptable.

25. COMMISSIONING :

The Contractor shall include for fully commissioning the sets and their control equipment and for the purpose of the required tests, shall provide all necessary labour, instruments, tools, fuel and lubricating oil and all consumable.

The following tests and checks shall be carried out by the contractor in the presence of the Owner's Engineer or his representative, in the presence of the consultant.

a) Check that the main frame is level in all directions, engine and alternator shafts are in proper alignment and the vibration absorbing devices are properly installed and located.

b) Check water and sump oil levels.

c) Check the battery electrolyte levels and the specific gravity.

d) Examine the containers in which the fuel and lubricating oils were delivered and check that the types and grades of oils are as recommended for the unit.

e) Ensure that sufficient fuel oil is in the fuel tank for the test run.

f) Check that all Heat Exchange and engine block water drain points are free from sludge and other blockages.

g) Check engine bolts, main drive coupling, valve clearance, fuel pump settings, governor settings, pipe line connections, water hose, exhaust couplings, flexible pipework etc.

h) Check all outgoing connections on the alternator & at the control panel. All lugs for principal connections shall have clean and bright contact surfaces. A suitable material shall be used where necessary.

i) Check access panels and doors for proper opening & for the functioning of any interlocks fitted.

j) With the set isolated from the mains supply and the selector switch in the "Manual" position, start the engine by means of the "Start" push button and allow it to run up to normal speed.

k) Check instruments and gauges for normal operation and response and that alternator voltage is being maintained within the prescribed limits, making due allowance for non- load conditions. Compare the reading of the frequency meter with that of the engine tachometer, where both are fitted.

l) Stop engine by turning selector switch to "off" position and verify that the alternator contactor opens at 75% of normal voltage. Re-check water and oil levels.

m) Run the set at various loads for periods totalling at least two hours. Check the voltage and current phase in turn and that the voltage and frequency are being maintained within the required limits, with large alterations of load.

1) The rate of charge on the trickle charger. Check against manufacturers recommended figures and adjust charging rates if necessary.

n) After completion of the above checks, the set shall be run at full load for period of 2 hours, during which all temperatures, pressures, consumption, etc., shall be recorded. Check that these readings are compatible with those taken during the works tests.

o) Check that the various engine safeguards operate satisfactorily.

p) Check the vibration absorbing devices for proper operation and that the performance of all flexible connections, both mechanical and electrical, is satisfactory.

q) When all tests are satisfactory and agreed with the Engineer, the lubricating oil and water levels shall be finally checked, the fuel oil tank replenished and the set left in normal operating order.

26. MAINTENANCE :

During the maintenance period which is one year after commissioning, the Generator Contractor shall at his own expense:

a) Make good any defects in the unit and replace any parts that fail or show signs of weakness or undue wear in consequence of faulty design, workmanship or materials.

b) Visit the site and with all diligence attend to any such defect that arises within 48 hours of receiving notification of the defect.

c) Carry out regular examination and servicing of the unit every three months, the service and examination to include all necessary adjustments, greasing, oiling, cleaning, changing of lubricating oils (where necessary) to keep the unit in sound & efficient working order. All consumables shall be paid extra.

d) Instruct engineering personnel in the proper operation, care and maintenance of the sets and their equipment's.

FUEL STORAGE TANKS

DAY TANK :

- The Day tank shall be fabricated out of 6mm thick sheet steel. This shall be indoor type with a capacity of 990 Liters to hold HSD oil required for the running of Diesel engines. The tank shall be provided either on steel frame/or pedestal at an elevated level to provide gravity flow of HSD fuel to the engine. The tank shall be provided with vent pipe, overflow pipe, drain pipe, fuel level indicator with valves, manholes for inspection etc., with all pipes connected through flanged joints. Fabrication drawings shall be submitted for approval.

30/5/24

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