

Technical Specifications for Rectifiers

1- Introduction :

This specifications define technical requirements of System (Rectifier) that shall be used for telecommunication equipments in Yemen Mobile Company. The telecom equipments shall supply from the Rectifiers and the batteries .

The power supply system shall be modular power supply system that use for telecommunications load is -48 VDC as a nominal voltage . The system shall be capable to provide a high quality (smooth) DC power supply and has acapability for manually and automatically batteries charging . And , it shall permit connecting two sets of batteries where at least one set of batteries is always connecting to the load.

2- Sites conditions :

- The altitudes varying from sea level up to 2500 meters .
- The ambient temperature up to 60 degrees C .
- The relative humidity up to 98% .

De-rating tables and curves for electric power Rectifier System shall be supplied by the tenderer under different ambient temperature and, humidity .

3- Input power :

The rectifier works normally on 400V AC $\pm 15\%$, 3 phase , 4 wire , 50 HZ $\pm 10\%$.

4- system capacity & Quality:

- The nominal output current of the system shall not be less than 200A shared by multi- rectifier modules.
- The rectifier system shall be delivered with Available rectifiers modules capacity 150A(delivered configuration) , that means the other 50s A will be as spare capacity.
- The system shall be provided pre- cable and wired(plug connections) for each module with ease access for plugging and unplugging at any time .



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- The efficiency of the rectifier system should not be less than 90% with 0.95 PF while delivering the rated current.
- Natural air cooling shall be employed at specified ambient conditions.

5- The main equipments :

5.1- Main Cabinet :

- General purpose type, suitable for relevant ambient conditions, flush or surface mounted (the tenderer should provide approved manufacturer's standards and sizes).
- Box, trim and doors shall be electro-galvanized according to the standards.

5.2- The control and monitor unit :

It is the main unit which control the operation of the rectifier system with monitoring parameters values and display the statues of operation parameters values and all alarms existed with all alarms in the history .on display screen . also, this unit functions shall handle the following :

- output balancing of the installed modules : voltages and currents with no more than 5% output differences between working modules.
- Output voltage , current monitoring and controlling .
- Battery charging voltage ¤t metering and controlling.
- Battery discharging voltage ¤t metering and controlling.
- All input & output parameters conditions shall be monitored and any relevant alarms shall be displayed .
- Manual adjustable for input and output parameters .
- Protect loads and batteries by disconnecting and reconnecting the load and batteries, according to the adjusted parameters.
- Auto restart adjustable delay between working modules.
- Basic display and metering parameters :
 - AC & DC Input voltages .
 - DC Output voltage and current .
 - Battery charging & discharging voltage and current .
 - Load current & voltage .
 - Capacity of batteries .



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- Rectifier alarms
 - Rectifier fail
- Input alarms :
 1. AC failure .
- Output Alarms :
 - Battery low voltage alarm (default 45V DC).
 - Battery low voltage cutoff (default 43V DC).
 - Battery high voltage alarm (default 56.6V DC).
 - Battery high voltage cutoff (default 58V DC)
- Battery Charging Function :
 1. the system must have different moods for charging (boost, equalization, float) according to adjusted battery values and standards which adapt with our batteries specifications (2V per cell & 48 V per group with different capacities 400Ah -1500 Ah) .
- Other function the tenderer should specify .

5.3- Modules :

each module produces D.C voltage and current which sharing with the other installed modules through the control unit and must have the main following features :

- Input power : single phase , 220 V $\pm 30\%$, 3 wire , 50 $\pm 10\%$.
- Nominal output voltage (-48 V DC)
- Adjustable output voltage (44 VDC – 60 VDC) .
- led indicators to indicate the normal and up normal operation of the module .
- Ripple noise must be $< 0.5\text{mv}$ weighted to 800Hz, 5mv above 3 KHz according to CCIT.
- Modules shall be started automatically , when power is restored after failure .
- Each module shall have overload protection features to limit the output Current beyond its rated value.
- Each module should be protected from under and over voltage .
- any more feature the tenderer should specify.
- Each module shall be tested separately and then in the system adequate facilities shall be provided in the termination for carrying out such tests.



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- All modules shall be easy installed , removed and safety locked(with out screws) to be stable and secure during operation..

5.4- Fuses / circuit breakers and protection devices:

- 4 pole MCB(suitable rated) with thermal protection for AC input voltage .
- Single MCB (suitable rated) for AC input voltage to each module .
- Two fuses (200 ADC) for battery groups .
- Five circuit breakers for the un priority loads (2x100A+ 2x60A+ 1X40).
- Two circuit breakers for the priority loads (1x40A + 1x20A).

5.5- LVD contactors :

There are two LVD contactors :

- LLVD contactor to disconnect the load when the DC voltage decreased to minimum allowable adjusted value (default = -43.2 VDC) via controller unit .
- BLVD contactor to disconnect the batteries when the DC voltage decreased to minimum allowable adjusted value (default = -42 VDC) via controller unit .

5.6- Surge protection devices :

There are two types of surge protection device :

- For AC input three phase surge protection device , level 2 at least .
- For DC output .

5.7- Alarms Card unit :

There are at least 8 alarms shall be extendable with free contact(open/close contacts) and easy to transmit the alarms .

6- Information shall be supplied with offer :

The tenderer should furnish complete details with reference to the following:

- physical dimensions and weight (packed an unpacked).
- Technical description of system devices shall be offered .
- List of spare parts for at least 5 years of operation .
- Block diagrams and electrical diagrams for the system .



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- Electronic / electric diagrams .
- Functional list of all system components .
- Make & Model No. of Offered Product / items to be specified by bidders along with technical parameter .
- technical compliance point-by-point shall be provided, detailed price lists shall be provided by the suppliers for all equipment, spare parts, installation, etc
- The supplier shall provide the schedule program of training with the offer .

7- Materials for Complete system :

- The tenderer should quote for all material, spares, consumables and test instruments for the installation of the system. The maintenance spares are required for three years service .
- The tenderer shall supply installation, Testing, operation and maintenance documents for each unit. also provide technical specification, test data, circuit and schematic diagrams, and a catalogue for spare parts. And The following documents shall be provided :
 - Electronic diagrams of electronic cards.
 - Technical specification and data of rectifier system performance .
 - List of electronic components .
- The wiring within the rectifier shall be labeled with cable markers .
- All installation material specifications like Power & Earth cables , nuts & bolts, cable glands, PVC ducts etc, required for complete installation, commissioning & operation of the DC Power supply shall be supplied by the tenderer .
- The tenderer have to clearly indicates the manufacturer , country of manufacturing and the country of origin.

8- Warranty :

- The supplier must grantee that the equipments supplied are free all manufacturing and design defects. If any failure is noticed within (18) months from the data of receipt due to manufacturing / design defects, failed item shall be repaired / replaced by supplier at the supplier's cost to the satisfaction of the purchaser .



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- The bidders must deliver spare parts for at least 10 years , when required .

9- Packing & Transportation :

The equipment shall be packed suitable to withstand journeys over sea and road transportation without any damage. If any damage occurs due to miss packing or transportation, the damage item must be replaced / repaired by the supplier free of charge.

10- Factory test :

- make the test factory by testing company for the system in the original country ,that shall be done by attending two engineers from Yemen Mobile Company and it shall be on tenderer cost.and it shall be done for a week at least.

11- Training :

- The supplier shall provide training for Four engineers in the country of manufacturing .
- the period time of training not less than three weeks of working days.
- The supplier shall provide travel ticket, accommodation and transportation for each engineer.
- The supplier shall provide the schedule program of training with the offer.

