



U.P. Health Systems Development Project

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Ref. No. 1448 / UPHSDP/PMU/Electrical Work/2008-09

Date: 02.06.2008.

Quotation Notice

To,
M/s

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Sub: Invitation for Quotations for Electrical Accessories such as Panel Board, all other related material Work at PMU, UPHSDP Building, Lucknow.

1. The quotation of following items are hereby invited by the undersigned. Quotation documents can be had from the office of the undersigned between **02.06.2008 to 16.06.2008** during office hours and received up to **3:00 PM on 17.06.2008** and opened on same day at **3:30 PM** in presence of the interested bidders who may like to be present.

| Brief Description of the Works | Specification | Qty. | Completion Period | Bid Security |
|---|---------------------|-------|-------------------|--------------|
| Electrical Accessories such as Panel Board, Cable & all other related material which is required electric to extension of building & impressments of the Electric Load to straighten the electric system of the PMU Building. | As per enclosed BOQ | 1 Job | 60 days | 23000.00 |

2. Government of India has received a credit (3338 IN) from the International Development Association (IDA) in various currencies equivalent the US\$ 110 Million towards the cost of the U.P. Health System Development Project and intends to apply part of the proceeds of this credit to eligible payments under the contract for which this invitation for quotations is issued.
3. **Bid Security:**
 - 3.1 The Bidder shall furnish, as part of his Bid, a Bid security in the amount as shown in table against the particular work. This bid security shall be in favour of The Project Director, UPHSDP and may be in one of the following forms:
 - A bank guarantee issued by a nationalized / Scheduled Bank located in India or a Bank located abroad; or
 - Certified Cheque/Bank draft/Letter of credit, in favour of .the Project Director, UPHSDP payable at Lucknow
 - 3.2 Bank guarantees (and other instruments having fixed validity) issued as surety for the bid shall be valid 90 days from the date of submission.
 - 3.3 Any bid not accompanied by an acceptable Bid Security and not secured shall be rejected by the Employer as non-responsive.
 - 3.4 The Bid Security of the successful bidder will be discharged when the bidder has signed the Agreement and furnished the required Performance Security.
 - 3.5 The Bid Security may be forfeited
 - (a) If the Bidder withdraws the Bid after Bid opening during the period of Bid validity;
 - (b) If the Bidder does not accept the correction of the Bid Price,
 - (c) In the case of a successful Bidder, if the Bidder fails within the specified time limit to
 - (i) Sign the Agreement; or
 - (ii) Furnish the required Performance Security.

4. **Bid Price**
- a) The Contract shall be for the full quantity as described above. Corrections, if any, shall be made by crossing out, rewriting, initialing, and dating.
 - b) All duties, taxes and other levies payable by the contractor under the contract shall be included in the total price.
 - c) The rates quoted by the bidder shall be fixed for the duration of the contract and shall not be subject to adjustment on any account.
5. While submitting your quotation please note that:
- 5.1 Right to accept or reject any quotation will rest with UPHSDP and UPHSDP is not bound to accept the lowest rates without assigning any reasons.
 - 5.2 Sealed quotation should be addressed to the Executive Engineer, UPHSDP, Lucknow.
 - 5.3 Each bidder shall submit only one quotation.
6. **Validity of Quotation:**
Quotation shall remain valid for a period not less than 60 days after the deadline date specified for submission.
7. **Documents Required:**
The following documents should be attached with the quotation:
- (a) Experience certificate for similar nature of work
 - (b) List of present assignments in hand with their address/phone numbers/name of contact person.
 - (c) Registration certificate by Govt. of Uttar Pradesh or its undertaking/Central Govt. or its undertaking/Nationalized banks/ 'A' Class Electrical License.
 - (d) Income tax Return Certificate.
8. **Evaluation of Quotations**
The purchaser will evaluate and compare the quotations determined to be substantially responsive i.e. which
- a) are properly signed; and
 - b) Conform to the terms and conditions and specifications.
9. **Award of Contract**
The purchaser shall award the contract to the bidder whose quotation has been determined to be substantially responsive and who has offered the lowest evaluated quotation price.
- 9.1 Notwithstanding the above, the purchaser reserves the right to accept or reject any or all quotations and to cancel the bidding process and reject all quotations at any time prior to the award of contract.
 - 9.2 The bidder whose bid is accepted will be notified of the award of contract by the purchaser prior to expiration of the quotation validity period. The terms of the accepted offer shall be incorporated in the purchaser order.
10. Payment shall be made immediately after hundred percent completions of the works or as decided by the engineer-in-charge.
11. Defect liability period of 6 months shall be applicable to all of the mentioned works.
12. Bidders are requested to provide their offer latest by **15.00 hours on 17.06.2008.**
13. We look forward to receive your quotations and thank you for your interest in this project.

Executive Engineer (HQ)
U. P. H. S. D. P.

Copy forward to the following:

- 1. All Concerned.

Executive Engineer (HQ)
U. P. H. S. D. P.

PRICE FORMAT FOR QUOTATION

Annexure - A

BILL OF QUANTITY

Name of Work: Supply Installation & Commissioning of Change Over Panel of DG set & other neccessary work at PMU, UPHSDP, Lucknow.

| S. No. | Description | UPPWD S. O. R. 2007 | Unit | Quantity | Rate | Amount |
|--------|--|---------------------|------|----------|------|--------|
| | Requirement :- Change over panel board to run the 180 KVA and 125 KVA D. G. Set and power corportation supply simultaneously the change over panel board should be degined such as the electrical supply can be provided in three following ways :- A. The cange over panel bioard should be suitable to change over the supply in failure of power corporation supply from D. G. Set B. The change over panel board shuld be degined such as the whole building of PMU total electrical supply can be transferred to 180 KVA D. G. Set C. The change over panel board shuld be degined such as the whole building of PMU total electrical supply can be transferred to 125 KVA D. G. Set. D. The change over panel board shuld be degined such as only one floor can be enegesed on 125 KVA D. G. Set and rest of other floors can be energysed on 180 KVA D. G. Set in case of overload/exsesload on 180 KVA D. G. Set | | | | | |
| 1 | Scope of Work :- Design manufacture supply installation testing and commissioning of Change over panel. Board suitable to operate the one no 180 KVA & 1 no. 125 KVA DG set or both 180 KVA & 125 KVA D. G. Set with 1 no. standby change over made of 14 SWG sheet steel fabricated cubical type floor mounting front operated construction encloser class IP 52 painting by one coat of red oxide primer with two coats of approved synthetic enamel paint complete with top/bottom (as called for) removable gland plated double compression doors to achive dust and vermin proof complete with all inter connection small wiring by copper wires ckt labels etc. the aluminium bus bar shall be of suitable size for 500 volts 3 phase 50Hz TPN electrolyte aluminium as per IS 8623 insulated by heat shrinkable sleeves with surround joints. The technical Specification of Power | | | | | |

| | | | | | |
|---|--|-----|-----|---|--|
| | Panel has been attached at Annexure - B . The instrument chamber shall be separate and shall comprise of the following with the subject to minor variation as per the instruction of engineer in charge: | | | | |
| | INCOMING 630 Amp TPM SFU | | | | |
| | Bus Bar : 800 Amp Aluminium TPN bus bar - 1 set 630 Amp Aluminium bus bar - 1 set | | | | |
| | OUTGOING | | | | |
| | 1 no 400 amp TPN on load change over switch | | | | |
| | 3 no 250 amp TPN on load change over switch | | | | |
| | Following provision should be provided in the Change Over Panel Board | | | | |
| | Arrangement of Mimic system for showing the Diagram of electrical circuit path front of the panel board | | | | |
| | An arrangement of the exhaust fans of suitable capacity in the electrical change over panel board to exhaust the hot air from | NSH | Set | 1 | |
| 2 | Design manufacture supply installation testing and commissioning of distribution Electric panel board of 14 SWG sheet steel fabricated cubical type floor mounting front operated construction enclosure class IP 52 painting by one coat of red oxide primer with two coats of approved synthetic enamel paint complete with top/bottom (as called for) removable gland plated double compression doors to achieve dust and vermin proof complete with all inter connection small wiring by copper wires ckt labels etc. the aluminium bus bar shall be of suitable size for 500 volts 3 phase 50Hz TPN electrolyte aluminium as per IS 8623 insulated by heat shrinkable sleeves with surround joints. The technical Specification of Power Panel has been attached at Annexure - B . The instrument chamber shall be separate and shall comprise of following: | | | | |
| | INCOMING 300 Amp/315 Amp TPN SFU | | | | |
| | Bus Bar 400 Amp Aluminium TPN bus bar - 1 set | | | | |
| | OUTGOING 100 Amp/125 Amp TPN SFU 6 No. | | | | |
| | Following provision should be provided in the Change Over Panel Board | | | | |

| | | | | | | |
|----------|---|----------------------------|------|-----|--|--|
| | Arrangement of Mimic system for showing the Diagram of electrical circuit path front of the panel board | | | | | |
| | An arrangement of the exhaust fans of suitable capacity in the electrical change over panel board to exhaust the hot air from | NSH | Set | 3 | | |
| 3 | Supply & laying of aluminium conductor PVC Insulated armored served sheathed cable 1100 volts grade at a depth of 750 mm below ground level over a cushion of 75 mm thick sand all round and protected with burnt bricks. On surface the cable run shall be fixed on M. S. clamps etc. of suitable size as directed by the engineer incharge. | | | | | |
| a | 6 sq mm x 2 core | P W D S O R NO. 501 (A) | Mtr | 200 | | |
| b | 10 sq mm x 2 core | P W D S O R NO. 501 (B) | Mtr | 100 | | |
| c | 25 sq mm x 3.5 core | P W D S O R NO. 501 (J) | Mtr | 150 | | |
| d | 50 sq mm x 3.5 core | P W D S O R NO. 501 (L) | Mtr | 150 | | |
| e | 95 sq mm x 3.5 core | P W D S O R NO. 501 (N) | Mtr | 30 | | |
| f | 240 sq mm x 3.5 core | P W D S O R NO. 501 (R) | Mtr | 30 | | |
| g | 400 sq mm x 3.5 core | P W D S O R NO. 501 (T) | Mtr | 60 | | |
| 4 | Supply and fixing of factory wired totally inclosed integral street light fitting having top opening single piece, powder coated dia cost aluminium housing, glass pot optics reflector, side entry with full frame glass accessories suitable for and with 250 w HPSV - T lamp conforming to IP 66 complete in all respect on wall Cat AA | 445.1 | Each | 5 | | |
| 5 | Supply and fixing of factory wired recess mounting mirror optic fitting for 2 x 36 w CFL with electronic ballast and bright anodized aluminium reflector and P5 paralite louvers with 2 no 36 w CFL complete in all respect Cat AA. | 425.1 | Each | 25 | | |
| 6 | Supply and fixing of fire extinguisher dry chemical type 5 KG capacity ISI marks complete with initial charge and wall bracket, along with supply of all material and lever for proper completion of work. | 1131 | Each | 10 | | |
| 7 | Supply and fixing of fire bucket, round bottom made of GI sheet 9-11 litres capacity duly painted as per fire briged disigne, supported on hanging brackets initially filled with fine river sand, | 1133 | Each | 10 | | |

| | | | | | | |
|--|---|------|------|---|--|--|
| | water as per direction of engineer incharge. | | | | | |
| 8 | Supply and laying of 1800 mm x 900 mm x 12 mm thick chequered rubber matting of tested quality | 1136 | Each | 6 | | |
| 9 | Supply and fixing of shock treatment chart (prescribed under I. E. rules) duly framed with glass and supported from back with hard board or shoft with supply of all material labour T&P for proper completion of work. | 1134 | Each | 5 | | |
| 10 | Supply and fixing of GI streat light bracket made of 40 mm dia GI pipe 1.5 Meter long complete with 2 no. MS clamps made of 35 mm x 5 mm flate iron angle, required nut and bolts and 2.5 sq mm flat twin aluminium cable for the connection complete with all material labor for T&P for proper completion of the work | NSH | Each | 5 | | |
| 11 | Supply and fixing of MS pole box with water tite cover made 16 SWG MS Sheet and 2 no 15 Amp I C cutout of approved make with 5 Amp fuse for connection including masonary work complete in all respect. | NSH | Each | 5 | | |
| | Total | | | | | |
| (Rsonly) | | | | | | |
| Note: | 1. The quantity may be vary as per site conditions. Contractors are requested to visit the site before quoting the rate. | | | | | |
| (Sign & Seal of Contractor) | | | | | | |

SPECIAL CONDITIONS

1. Variation in quantities

- a) The Bill of Quantities shall contain items for the construction, installation, testing, and commissioning work to be done by the Contractor.
- b) The Bill of quantities is used to calculate the Contract Price. The Contractor is paid for the quantity of the work done at the rate in the Bill of Quantities for each item.
- c) If the final quantity of the work done differs from the quantity in the Bill of Quantities for the particular item by more than 25 percent provided the change exceeds 1% of initial Contract Price, the Engineer shall adjust the rate to allow for the change.
- d) The Engineer shall not adjust rates from changes in quantities if thereby the Initial Contract Price is exceeded by more than 15 percent, except with the Prior approval of the Employer.
- e) If requested by the Engineer, the Contractor shall provide the Engineer with a detailed cost breakdown of any rate in the Bill of Quantities.

2. Payments for Variations

- a) The Contractor shall provide the Engineer with a quotation (with breakdown of unit rates) for carrying out the variation when requested to do so by the Engineer. The Engineer shall assess the quotation, which shall be given within seven days of the request or within any longer period stated by the Engineer and before the Variation is ordered.
- b) If the work in the Variation corresponds with an item description in the Bill of Quantities and if, in the opinion of the Engineer, the quantity of work above the limit stated in Sub Clause "c" as above or the timing of its execution do not cause the cost per unit of quantity to change, the rate in the Bill of Quantities shall be used to calculate the value of the Variation. If the cost per unit of quantity changes, or if the nature or timing of the work in the Variation does not correspond with items in the Bill of Quantities, the quotation by the Contractor shall be in the form of new rates for the relevant items of work.
- c) If the Contractor's quotation is unreasonable, the Engineer may order the Variation and make a change to the Contract Price which shall be based on Engineer's own forecast of the effects of the variation on the Contractor's costs.
- d) If the Engineer decides that the urgency of varying the work would prevent a quotation being given and considered without delaying the work, no quotation shall be given and the Variation shall be treated as a Compensation Event.
- e) The Contractor shall not be entitled to additional payment for costs, which could have been avoided by giving early warning.

3. Extension of the Intended Completion Date

- a) The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation is issued which makes it impossible for Completion to be achieved by the Intended Completion Date without the Contractor taking steps to accelerate the remaining work and which would cause the Contractor to incur additional cost.
- b) The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days of the Contractor asking the Engineer for a decision upon the effect of a Compensation Event or Variation and submitting full supporting information. If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

4. Termination of contract:

The agreement can be terminated on giving one month prior notice.

POWER PANELS

1. CONSTRUCTION

- a) All electric panels will be fabricated from 14 SWG / 16 SWG (as mentioned in BoQ) MS sheets properly supported with angles and base channels having IP 52 protection.
- b) The cubical will be single front or double front.
- c) The cubical will be floor-mounted type unless specified.
- d) The doors will be provided with internal hinges and panel locks of superior quality. The hinges will be union joint type to facilitate easy removal of the doors when necessary.
- e) The doors will be provided in a similar fashion as generally provided for the outdoor cabinet, where water cannot enter in the cabinet from the door.
- f) The door will be dust and vermin proof, provided with strengthening arrangement to avoid wobbling and distortion.
- g) Wherever the doors are opened on the horizontal hinges, an arrangement will be provided to latch the doors in the open condition for the inspection of the wiring.
- h) Generally push buttons, indication lamps and control components will be provided on hinged door, hinged at the top, with suitable latching arrangement to hold the door in open position. These components i.e. push buttons, lamps etc. will be at suitable height.
- i) The cabinet will be of welded construction and not of jointing construction.
- j) In case of the main switchboard, the cabinet will be compartmentalized having the horizontal bus bars at the backside, centrally located and circuit breakers will be arranged at the bottom portion of the pillars and the switch-fuse units in double front with the top entry in the top portion of the pillar.
- k) The minimum section of channel 75 mm x 75 mm x 9 mm will be provided at the bottom of each cabinet. This is required to make the cabinet stable and space for cable bends. The foundation holes with grouting bolts will be provided in the channel frame.
- l) Sectionalized cable entry plants of 14/16 SWG MS sheets at the bottom complete with cable glands and cable lugs for both the end terminations of each cable should also be supplied in sizes as specified in the panel details.
- m) The circuit components will be mounted on sectionalized 14 SWG MS sheet with suitable threading in the sheets to facilitate easy maintenance, future addition etc.

2. DIMENSIONS

The height of all the panels will not be more than 1850 mm and the depth of panel will not be more than 400 mm for single front and 800 mm for double front except for the circuit breaker panel. The width of the door shall be restricted to 600 mm.

3. BUS BAR CONNECTIONS

The bus bars and interconnections shall be of electrolytic aluminium as per IS 8623 and of rectangular cross sections suitable for full load current for phase bus bars and half rated current for neutral bus bars of suitable lengths and interconnections shall be insulated with insulation tapes and color coded. The bus bars shall be insulated by heat shrinkable sleeves with shrouded joints. The bus bars shall be supported on unbreakable non-hygroscopic insulated supports at regular intervals to withstand the forces arising from short circuit in the system. All bus bars shall be provided in a separate chamber and properly ventilated. All bus bars connections shall be done by clamping. No holes shall be drilled in the bus bars for mounting clamps.

All connections between bus bars and switches and between switches and cable alley terminal shall be through solid strips of proper size to carry full rated current and insulated with insulating tapes.

The sizes of Bus Bars shall be as per following table –

ALUMINIUM / COPPER BUS BAR SECTIONS

| Current ratings in Amps up to. | Recommended rectangular cross section | | | |
|-----------------------------------|---------------------------------------|------------|-------------------------|------------|
| | Aluminium | | Copper | |
| | No. of strips/ phase | Size in mm | No. of strips/ phase | Size in mm |
| 100 | 1 | 25 x 5 | 1 | 20 x 3 |
| 200 | 1 | 40 x 5 | 1 | 25 x 5 |
| 300 | 1 | 50 x 6 | 1 | 40 x 5 |
| 400 | 1 | 65 x 6 | 1 | 50 x 5 |
| 500 | 1 | 80 x 6 | 1 | 60 x 6 |
| 600 | 1 | 100 x 6 | - | - |
| 800 | 1 | 100 x 10 | - | - |
| 1000 | 1 | 125 x 10 | - | - |
| 1200 | 2 | 100 x 10 | - | - |
| 1600 | 2 | 125 x 10 | - | - |
| 2000 | 3 | 100 x 10 | - | - |
| 2500 | 3 | 125 x 10 | - | - |

NOTE: -

- i. In larger bus bars of sizes above 1000 amps. The sections can be accepted in other rectangular cross-sections and numbers also, provided the total cross-sectional area offered is not less than the total cross-sectional area shown in the above table against the respective bus bar rating.
- ii. With aluminium bus bars, only aluminum wire/solid bar connections shall be made for incoming/outgoing mountings on the switchboards.
- iii. With copper bus bars, only copper wire/solid bar connections shall be made for incoming/outgoing mountings on the switchboards.

4. CABLE COMPARTMENTS

Cable compartments of adequate size shall be provided in the distribution panel/boards for easy termination of all incoming and outgoing cables entering from bottom. Adequate supports shall be provided in cable compartments to support cables. All incoming and out going switches, terminal shall be brought out to terminal blocks in cable compartments.

5. CIRCUIT COMPARTMENTS

Each circuit breaker and switch fuse units shall be housed in separate compartments and shall be enclosed on all sides. Sheet steel hinged lockable doors shall be duly interlocked with the breaker/switch fuse unit in ON and OFF position. Safety interlocks shall be provided for air circuit breaker is in ON position. The door shall not form an integral part of the draw out portion of the ACB. All instruction and indicating lamps shall not be mounted on the ACB compartment door. Sheet steel barriers shall be provided between the tiers in a vertical section.

6. INSTRUMENTS ACCOMMODATION

Separate and adequate compartments shall be provided for accommodating instruments, indicating lamps, control contactors and control fuses etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of circuit breaker, bus bars and connections.

7. TERMINALS

The outgoing terminals of the breaker and neutral link shall be brought out to a terminal block suitably located at rear side of the panel. Separate cable compartments shall be provided for incoming and outgoing cables.

8. WIRE WAYS

A horizontal wire way with screwed covers shall be provided at the top to take interconnecting control wiring between different vertical sections.

9. CABLE TERMINATION

Every cable, either for control or power duty will be provided with crimping of soldering type of lugs of suitable size.

10. CABLE GLANDS AND LUGS

The cable glands will be of double compression brass cone grip type. These glands will be provided for all outgoing connections at both the ends for power as well as control circuit provided in the panel and also for the incoming cable or cables. Crimping type or solder type lugs should be supplied along with each panel for termination of outgoing cable at both the ends with each outgoing feeder.

11. DISTRIBUTION

All meters and indicating instruments shall be in accordance with relevant Indian Standards. The meters shall be flush mounted and draw out type. Indicating lamps shall be neon type and of low burden.

12. EARTHING

2 nos. G.I. earth bars of suitable size as mentioned in drawings shall be provided for the distribution panel for the full length of the panel and connected to the frame work. Provisions shall be made for connection from this earth bar to the main earthing bar on both sides of distributions panel.

13. PAINTING

All sheet steel shall undergo a process of degreasing pickling in acid, cold rinsing, phosphating, passivating and then sprayed with a high corrosive treatment shall be by application of two coats of synthetic enamel paint of approved colours and stoved.

14. LABELS

Engraved labels shall be provided on all incoming and outgoing feeder switches. Circuit diagram showing the arrangement of the circuit inside the distribution board shall be pasted on inside of the panel door and covered with transparent laminated plastic sheet. All the distribution boards shall be subject to tests specified in relevant Indian Standards and test certificates shall be furnished.

15. METERS

All the meters shall be housed in a separate compartment and accessible from front only. Lockable doors shall be provided for the metering compartments. The distribution boards shall be provided with indicating panel comprising of 1 No. (0-500 V) 96 mm x 96 mm square type voltmeter with 3 way "OFF" selector switch of appropriate range and scale and one no. 96 x 96 mm square type ammeter with selector switch.

16. CURRENT TRANSFORMER

Current transformers (resin cast) shall be provided for main distribution boards carrying current in excess of 60 amps wherever shown in drawing. All phases shall be provided with current transformers of accuracy Class I and 15 VA burden to operate associated metering. Current transformers shall be in accordance with IS 2705 - 1964. Separate C.T.'s shall be used for protective devices.

17. MOULDED CASE CIRCUIT BREAKER (MCCB's)

The Moulded Case Circuit Breaker shall be magneto-thermal type for 100 Amp frame rating and current limiting type with Static trip release for above 100 Amp frame rating for accurate overload and short circuit protection. MCCB's of over 200 Amp rating shall be provided with field adjustable setting plug for accurate adjustment of continuous current. 100 and 200 Amp MCCB shall be provided with factory adjusted settings as required.

Electromagnetic Under voltage release shall be provided on MCCB's (as mentioned in BoQ) of desired setting with time delay of 1 +/- 0.25 second to avoid nuisance tripping due to momentary voltage variation.

Earth fault Module shall be provided on MCCB's (as mentioned in BoQ) on the load side.

Breaking capacities of MCCB's shall be as follows:

| | |
|---------------------|---------|
| 100 Amp | : 25 KA |
| 160/200/250 Amp | : 35 KA |
| 300/400/630/800 Amp | : 50 KA |

18. SWITCH FUSE UNITS

The switch fuse units shall 3 or 4 pole double break type suitable for load duty quick make and break action. Separate neutral link shall be provided in the switch. All switch fuse units shall be provided with hinged doors duly interlocked with operating mechanism, so as to prevent opening of the door when the switch is in "ON" position and also to prevent closing of the switch when the door is not properly secured. All contacts shall be silver plated and all live parts shall be shrouded. High rupturing capacity (HRC) fuse links shall be provided with switch fuse units and shall be in accordance with IS: 9224 and having rupturing capacity of not less than 80 / 100 KA at 415 volts. HRC fuse links shall be provided with visible indicators to show that they have operated.

19. FUSES

Fuses shall be high rupturing capacity (HRC) fuse links and shall be in accordance with IS: 9224 and having breaking capacity of 80 KA / 100 KA.

20. FEEDER UNITS

- i. The feeder units shall be of compartmental design comprising of cubicles assembled together and shall incorporate moulded case circuit breakers or Switch Fuse units as per bill of quantities and drawings.
- ii. Individual MCCB's / SFU's (with ammeter, selector switch, CTs, small wiring, where provided) should be easily removable from the front of the switchboard for servicing and maintenance.
- iii. Bus bars connections should have sufficient mechanical strength to withstand the effects of short circuit until it can be cleared by appropriate protecting device. All bus bars should be clearly marked with appropriate colour code to enable immediate identification of the phase and neutral. Contactors shall be provided for neutrals for three pole MCCB's.
- iv. The vertical bus bars should have a number of laminations to give appropriate current rating and can be graded to suit the current rating required at each point by omitting laminations at the point of current decrease. All bus bars connections should be clamped and no pre-drilling should be necessary.
- v. Arrangement should be provided to receive paper insulated or PVC insulated cables, either from the topside or from the bottom. End plates should be mounted inside the bus bars for cables from above or below.
- vi. Wherever specified, the feeder unit should have on its door, an ammeter and selector switch. The current transformers to feed this ammeter should be clamped to the rear of the units and the whole units complete with CTs, shall be removed intact from the board if required without disconnecting the small wiring.
- vii. All sheet-steel parts used in the construction of the cubicle board should have undergone rigorous rust proofing process which must comprise of alkaline degreasing, de-scaling in dilute sulphuric acid and a recognized phosphating process. The steelwork shall then receive two coats of filler primer before final painting.
- viii. The equipment, when assembled shall form a neat and compact unit and shall be complete with supporting frame work, mounting channels, foundation bolt etc. and shall be designed so as to ensure complete interchangeability of components.

21. CHANGE-OVER SWITCHES

These shall be on load type 4 pole, capable of making, carrying and breaking currents under normal circuit condition which may include operating over load conditions and also carrying for a specified time, currents under specified abnormal circuit conditions such as those of short circuit for safe and foolproof transfer of power from normal supply to auxiliary/emergency supply and vice versa.

These shall be double break type with silver plated copper contacts, 100 KA (r.m.s.) rated short circuit current, 1000 Volts rated insulation voltage.

These shall be fixed on panel similar to feeder units.

22. INSTALLATION OF L.T. DISTRIBUTION BOARDS

INSPECTION

- I. The distribution switch boards will be supplied in sections, duly packed for transport facility. All these sections shall unpacked and items shall be checked as per inspection manual of the Supplier.
- II. Meters, relays etc. shall be checked for any damage in transit.
- III. All mechanical fasteners shall be checked and tightened before installation.

INSTALLATION

- i. Distribution switch boards shall be assembled and aligned together and installed as per installation manual of the switch board supplier, and the installation shall conform to IS 3073 129635
- ii. Switchboards shall be erected and leveled on the foundation as per the Supplier's drawing.
- iii. Bus bar connections shall be checked and tightened after installation of the switchboard.
- iv. Meters and relays shall be fixed in position and connected as per the Supplier's drawing.
- v. Phase sequence for each in comer shall be tested and connections adjusted accordingly.

TESTING

Prior to commissioning of MV distribution switchboards following tests shall be carried out.

- i. A mechanical endurance test shall be carried out by closing and opening of the circuit breaker.
- ii. Insulation resistance test shall be carried out between phases and phase and earth.
- iii. All the internal connections of the switchboards shall be checked as per the Supplier's drawings.
- iv. All the interlocks, control and tripping mechanism of the circuit breaker, shall be checked for proper operation.
- v. Phase sequence for each in comer shall be tested and connections adjusted accordingly.

LIST OF INDICATIVE MANUFACTURERS FOR ELECTRICAL WORKS

| S.NO. | DESCRIPTION | MANUFACTURER'S NAME |
|--------------|--|---|
| 1 | M.C.B. (10 KA) & RCCB (30 MA) | MDS / HAGER / MERLIN GERIN/L&T |
| 2 | DISTRIBUTION BOARDS | MDS / HAGER / MERLIN GERIN/L&T |
| 3 | SWITCH FUSE UNITS WITH HRC FUSES | GE / L&T |
| 4 | MOULDED CASE CIRCUIT BREAKER (MCCB) | L&T / SIEMENS |
| 5 | AIR CIRCUIT BREAKERS | GE / L&T |
| 6 | STARTERS / CONTACTORS / SELECTOR SWITCH INDICATING LAMPS | L & T / SIEMENS / GE |
| 7 | CURRENT TRANSFORMER / METERS | AUTOMATIC ELECTRIC / SIEMENS |
| 8 | CHANGE OVER SWITCHES | L&T / HAVELLS/C&S |
| 9 | CABLE GLANDS AND SOCKETS | SIEMENS |
| 10 | PVC INSULATED AL /COPPER CONDUCTOR WIRES | FINOLEX / NATIONAL /PLAZA |
| 11 | TELEPHONE WIRES AND CABLES | SKYLINE/DELTON/PARAMOUNT/ EL-KEY TELELINK |
| 12 | TELEVISION COAXIAL CABLE | DELTON/FINOLEX |
| 13 | PVC INSULATED ALUMINUM CONDUCTOR ARMOURED CABLES | GLOSTER / GRANDLAY / CCI SPECIAL CABLES |
| 14 | SWITCHS AND SOCKETS OUTLETS (PIANO | ANCHOR/MK/KLICK |

| | | |
|----|------------------------------------|--|
| | TYPE) | |
| 15 | INDUSTRIAL OUTLET | MDS / MERLIN GERIN / HAGAR |
| 16 | MS CONDUITS AND ACCESSORIES | B.E.C. / AKG/M.KAY |
| 17 | PVC CONDUITS AND ACCESSORIES | AKG / BEC / SUPREM |
| 18 | FLUORESCENT TUBE FITTING | BAJAJ / CROMPTON/PHILLIPS |
| 19 | INCANDESCENT LIGHT FITTINGS | DECON / MR. LIGHT |
| 20 | HPMV / HPSV / HALOGEN LAMP FITTING | PHILIPS / CROMPTON |
| 21 | CEILING FANS | BAJAJ / CROMPTON |
| 21 | EXHAUST FANS | GE / CROMPTON |
| 22 | DIESEL ENGINE / ALTERNATOR | KIRLOSKER-CUMMINS/ CONTROL & SWITCHGEAR/JAKSON |
| 23 | BATTERY | EXIDE/AMARON/SF |
| 24 | INVERTORS | SUKAM/LOGICSTAT |
| 25 | STABILISERS | STABLINE/SERVOKON |

NOTE

- 1 The list of makes furnished here does not exempt the contractor from ensuring that all equipment's and Materials are supplied strictly acc to the technical specifications/drawings/bill of quantities.
2. All materials mentioned above should be of first quality and ISI marked where applicable and desired.
- 3 The above list is indicative one and that substitute is permitted provided that the desired performance/function is ensured and approval of sample of material is taken by competent authority.